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## An introduction to the soils of the Merredin advisory district

T C. Stoneman

National Soil Conservation Program (Australia)

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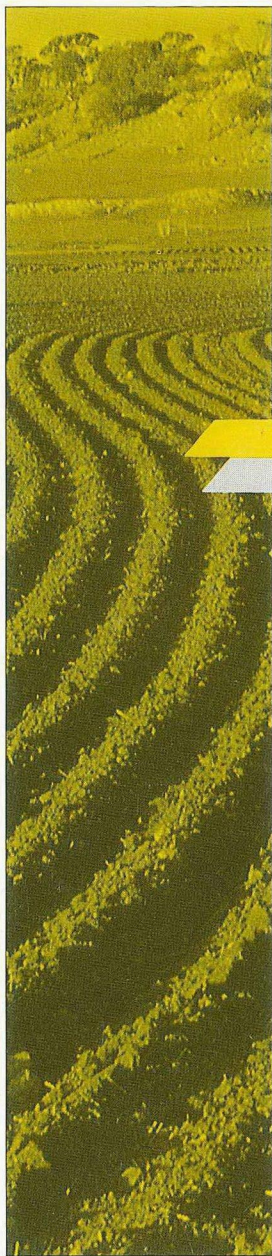
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**January 1992**



AN INTRODUCTION TO THE

# SOILS

OF THE

## MERREDIN

A D V I S O R Y   D I S T R I C T

- descriptions, illustrations and notes on nine common soils

COMPILED BY T.C. STONEMAN



National  
Soil  
Conservation  
Program



WESTERN AUSTRALIAN DEPARTMENT OF AGRICULTURE

## Descriptions, illustrations and notes on nine common soils

This publication is one of a series dealing with soils commonly occurring, or of particular significance, in the wheatbelt advisory districts of the Department of Agriculture. The districts regarded as "wheatbelt" are Geraldton, Three Springs, Moora, Northam, Merredin, Narrogin, Katanning, Lake Grace, Jerramungup, Albany and Esperance (see map below). Most of the publications are in this format, but the Northam Bulletin will be rather more comprehensive in its coverage of the soils, landscapes and agriculture of the district.

The information presented in this Bulletin draws heavily on an internal Department of Agriculture publication - "Land management manual - Merredin advisory district" compiled by F. Frost and M. Howell.

The publications have the objective of encouraging and aiding recognition by advisory staff and farmers of different wheatbelt soils and the development of a greater appreciation of the influence that soil characteristics have on land capability.

Particular points to note with respect to the terminology and descriptions used in this publication follow.

**Australian Great Soil Groups** - The names used follow the identifications discussed by Stace *et al.* (1968) in "A handbook of Australian soils".

**Northcote soil classification** - as described in Northcote, K.H. (1979) "A factual key for the recognition of Australian soils".

**Soil profile sketches** - these line drawings interpret the profiles presented in the matching colour photographs.

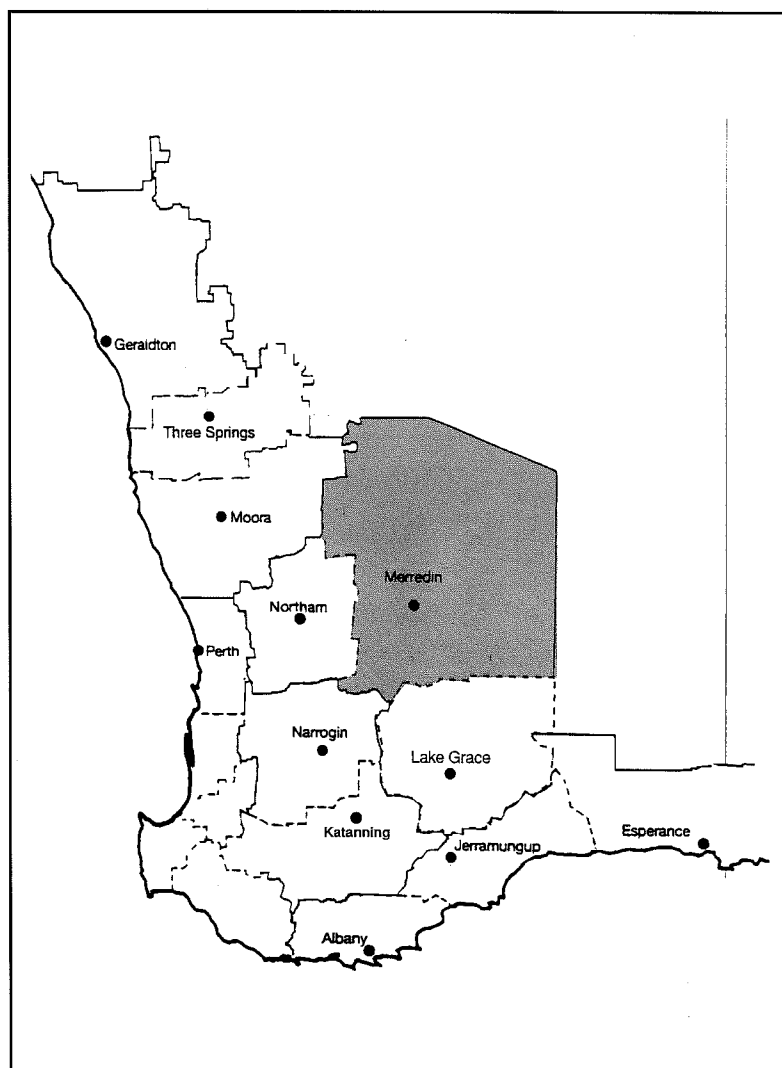
**Colour photographs** - many of the colour photographs show a darker coloured vertical band of soil on either side of the depth tape. The strip has been moistened and is intended to indicate moist and dry soil colours.

**Soil colours** - the common names used in soil descriptions are standard names derived from Munsell soil colour codes.

**pH values** - all pH values recorded in the text are in 1:5 soil water. Values in 0.01 M CaCl<sub>2</sub> are also given in the descriptions of the soil profiles.

**Soil maps** - the maps indicating where each soil most commonly occurs are derived from interpretations of Sheet 5 of the "Atlas of Australian soils" (Northcote *et al.* 1967).

Particular acknowledgement is made for funds provided by the National Soil Conservation Program to assist the Department of Agriculture undertake this project.



\* T.C. Stoneman - formerly Principal Officer, Soil Conservation Branch, Department of Agriculture. Present address, 112 Rosedale Street, Floreat 6014.

The Merredin office of the Department of Agriculture services an advisory district embracing the shires of Bruce Rock, Kellerberrin, Merredin, Mukinbudin, Narembeen, Nungarin, Trayning, Westonia and those parts of the shires of Koorda, Mt Marshall and Yilgarn within the agricultural area. The district has an area of about 3.42 million hectares and has about 1,150 farms.

Geologically, the district is dominated by granitic gneisses and migmatite, with very limited areas of metamorphosed sedimentary and mafic rocks mainly occurring on the eastern fringes of the advisory district. All the rocks are Precambrian in age (i.e. older than about 2500 million years).

The district has a mature landscape with little relief between the valley floors and the divides between major drainage lines. External drainage of the district is provided by a system of very low gradient salt lake channels which arise mainly in vacant Crown Land to the east and drain eventually (and flow only occasionally) via the Yenyenning Lakes near Brookton into the Avon-Swan River system.

A wide variety of soils are present in the district, with distribution broadly related to position in the landscape and underlying geology. Apart from a few soil groups developed on weathering granite or mafic rocks, all the other soils have formed from the weathering products of ancient deep lateritic soil profiles. The various landforms and associated soils now present have formed after dissection of the lateritic surface, and subsequent deposition of the weathered and eroded materials. The degree of dissection is the main factor which has influenced the nature and distribution of soils within the district. The gently undulating plateau areas have mainly lateritic podzolic soils, yellow earthy sands and siliceous sands often containing lateritic gravels (soils 1, 2 and 3).

On the slopes of the main valleys, shallow soils are developed in transported weathered material overlying white pallid zone clays ("pipeclay"). The soils are quite variable but are usually duplex with alkaline clay subsoils (soils 4 and 5). The broad valley floors have generally deep fine textured soils (soils 6, 7 and 9) while soils derived from wind blown material are often found in the vicinity of salt lakes (soil 8). The soils described in this publication are representative of those occurring in the central areas of the Merredin advisory district.

## References to soils of the Merredin advisory district

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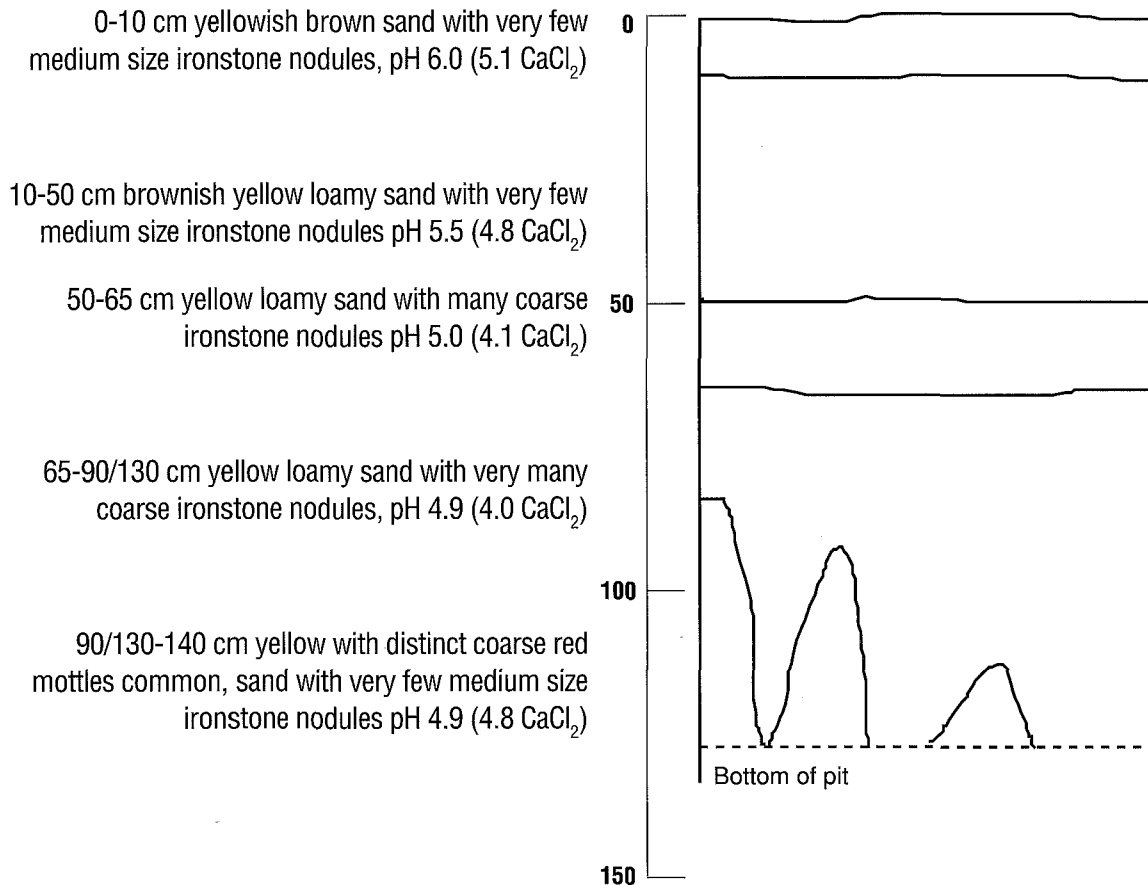
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- Teakle, L.J.H. (1938). A regional classification of the soils of Western Australia. *Journal of the Royal Society of Western Australia* 24: 123-95.

|   |                       |   |
|---|-----------------------|---|
| <b>Classification</b><br>Australian Great Soil Group:<br>Lateritic Podzolic | Northcote: KS-Uc 4.21 | Local name: Gravelly sand. Other names: Ulva gravelly sand (Bettenay and Hingston 1961).<br>Relevant MIDAS soil class: S3 |
|---|-----------------------|---|

## Soil profile description

(See Figure 1, colour photograph inside back cover)



## Distinguishing features

- The soil profile is a half metre depth of yellow brown loamy sand over ironstone gravel with yellow loamy sand between the gravel nodules.
- The soil reaction is slightly acidic at the surface becoming strongly acidic with depth.
- The soil occurs high in the landscape on gently undulating uplands. It commonly occurs in association with Soil 2 (earthy sand), Soil 3 (acid siliceous sand) and shallow cemented ironstone.
- The native vegetation is mallee shrubland, *Eucalyptus redunca* (white gum mallee), *E. leptopoda* (Tammin mallee or whipstick mallee) with large shrubs of *Hakea coriacea*, *E. rigidula* (still leafed mallee), *Allocasuarina huegeliana*, *A. acutivalus* (black tamma), *Melaleuca uncinata* and *Grevillea* spp. The small shrub, *Gastrolobium floribundum* (Wodjil poison), is often present.
- Map 1 provides an indication of the area within which this soil most commonly occurs in the Merredin advisory district.

## Agricultural use and management

### Soil characteristics

#### Favourable attributes

Water entry and drainage - good.

Soil workability - good.

#### Limitations

Soil water storage - limited by relatively light soil textures and large amounts of ironstone gravel.

Nutrient status - low, especially for phosphorus which becomes unavailable due to adsorption onto the ironstone gravels.

### Agronomic considerations

Crops - given appropriate fertilizer and rotation practices, wheat is the most suitable crop. Other cereals (oats, triticale) can be grown but are not as profitable. Lupins do not usually do well, except where depth of sand over gravel exceeds 40 cm.

Pasture - the slightly acidic soil conditions in the surface soil horizon make subterranean clover the most appropriate pasture legume.

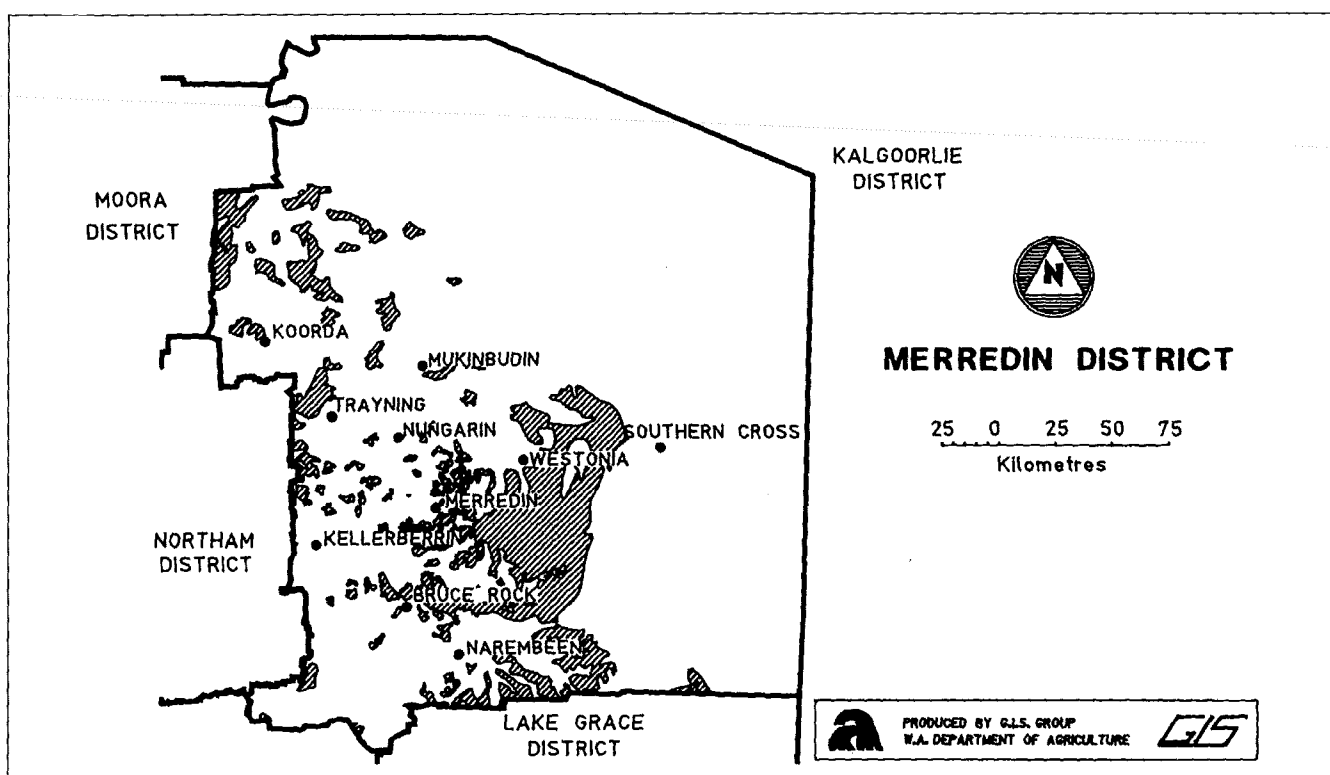
### Soil conservation

The surface soil is prone to wind erosion and water erosion occurs where there is run-on from upslope. Necessary soil conservation practices are the maintenance of stable vegetative cover at all times, construction of contour earthworks to intercept run-on water from rocks and breakaways upslope, and the use of contour guide lines for contour cultivation.

### Water conservation

The soil is unsatisfactory for natural water catchment and usually is unsuitable for improved catchments because of the excessive depth to clay subsoil.

Subsoil clays are variable in their suitability for farm dams. Test borings are required to determine if the subsoil material will hold water. The upper faces of the dam excavations require battering with clay to prevent leakage into the porous topsoils.



Map 1.

|                              |                    |   |
|------------------------------|--------------------|---|
| <b>Classification</b>        |                    | Local name: Yellow sandplain (tamma).   |
| Australian Great Soil Group: | Northcote: Gn 1.21 | Other names: Norpa loamy sand (Bettenay and Hingston 1961). Relevant MIDAS soil class: S2 |
| Earthy Sand                  |                    |   |

## Soil profile description

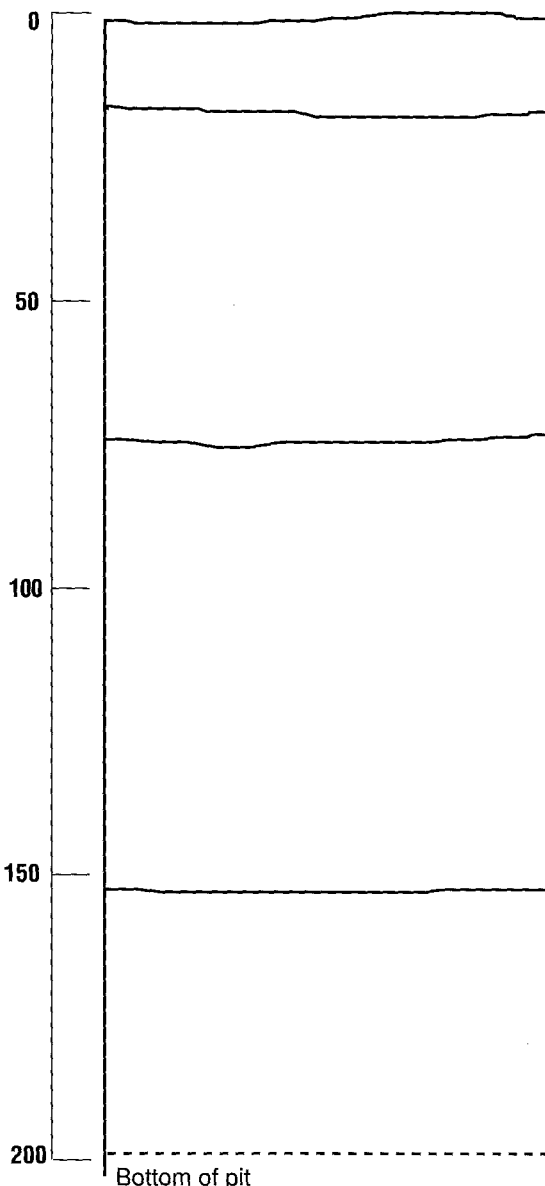
(See Figure 2, colour photograph inside back cover)

0-15 cm reddish yellow sand, pH 6.8 (5.4 CaCl<sub>2</sub>)

15-75 cm brownish yellow clayey sand, pH 6.6 (5.4 CaCl<sub>2</sub>)

75-150 cm yellow clayey sand with very few soft fine ferruginous gravel nodules, pH 6.1 (5.0 CaCl<sub>2</sub>)

150-200 cm yellow sandy loam pH 5.8 (4.8 CaCl<sub>2</sub>).



## Distinguishing features

- The profile is yellow throughout, with textures ranging from sand at the surface to sandy loam at depth. Small amounts of soft ironstone gravels are present below about 75 cm.
- The soil reaction is near neutral at the surface falling to moderately acidic at depth.
- The soil occurs high in the landscape on gently undulating uplands. It commonly occurs in association with Soil 1 (lateritic podzolic), Soil 3 (acid siliceous sand) and areas of shallow cemented ironstone. Soil 2 is very difficult to distinguish visually from Soil 3, except on the basis of native vegetation.
- The native vegetation is a shrubland, which includes *Allocasuarina*, *Callitris*, *Melaleuca*, *Hakea* and *Grevillea* spp. and eucalypt mallees [*E. rigidula* (stiff leafed mallee) and *E. burracoppinensis* (Burracoppin mallee)]. Dominant emergent species are *Grevillea eriostachya* (flame grevillea) and *Eucalyptus leptophylla* (red mallee).
- Map 2 provides an indication of the area within which this soil most commonly occurs in the Merredin advisory district.

## Agricultural use and management

### Soil characteristics

#### *Favourable attributes*

Water entry and drainage - good.

Soil workability - good.

Soil water storage - moderate.

#### *Limitations*

Nutrient status - low inherent fertility, especially phosphorus. In areas where pH is low, plant growth may be inhibited by aluminium toxicity.

### Agronomic considerations

Crops - given appropriate fertilizer and rotation practices wheat, oats, triticale and lupins grow well.

Pastures - subterranean clovers are the appropriate pasture legumes, although continuous cereal/lupin or two cereal/one lupin rotations are commonly practiced. Clover will only persist in rotations with two or more years of continuous pasture.

### Soil conservation

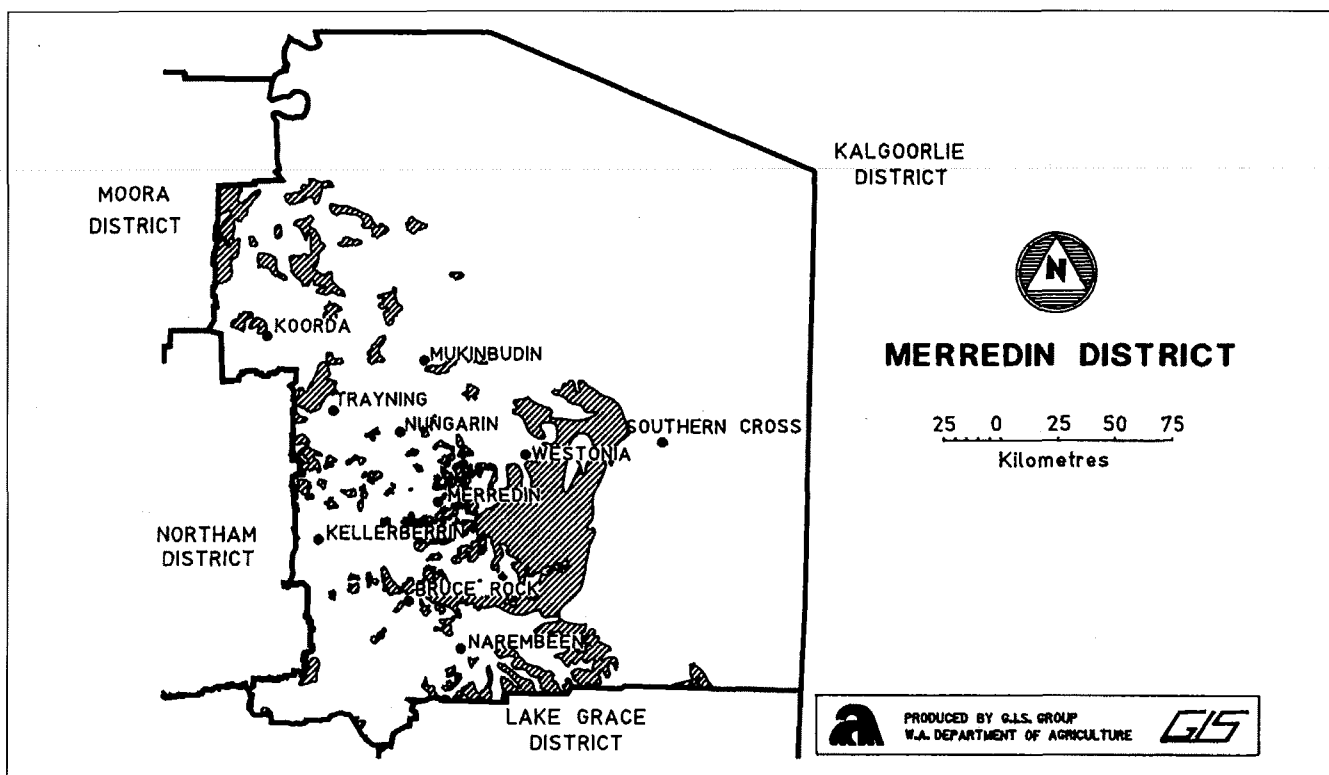
Wind erosion following summer grazing and during crop establishment can occur under poor management. Minimum cultivation techniques with good stubble management are required.

Water erosion, as sheet or rill erosion, can occur in cultivated areas, especially where run-on occurs from upslope. Construction of contour earthworks to intercept run-on water may be necessary, with contour guide-lines for contour cultivation desirable.

Saline sandplain seeps occur frequently on these soils. Trees can be used to transpire excess water to dry out the seepage areas.

### Water conservation

The soil is unsuitable for farm dams or for natural catchments. Roaded catchments usually perform well.



Map 2.

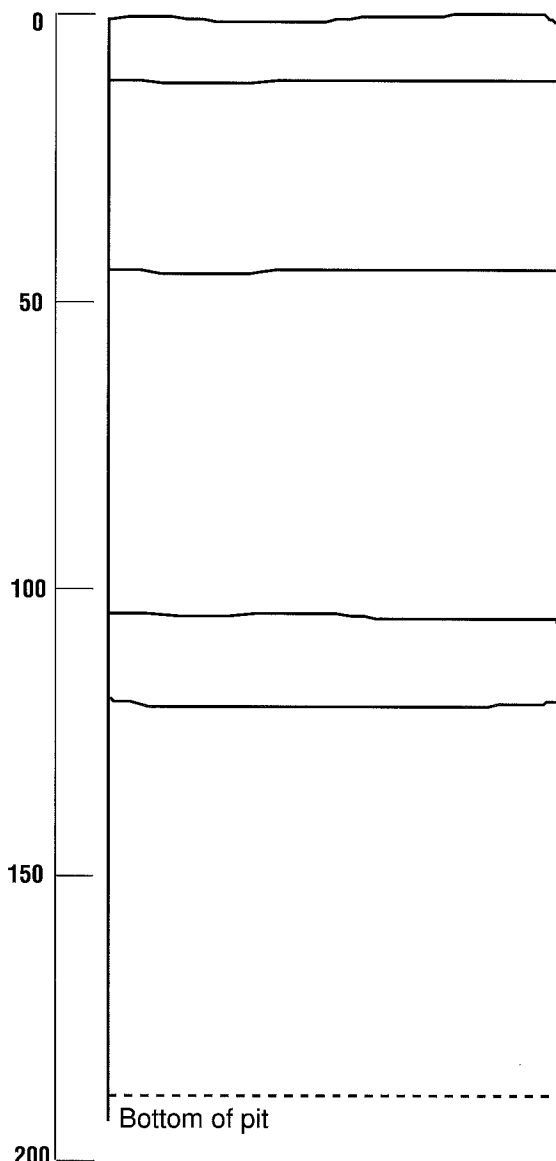


|  |                    |  |
|--|--------------------|--|
| <b>Classification</b><br>Australian Great Soil Group:<br>Earthy Sand | Northcote: Uc 5.22 | Local name: Wodjil sands, acid sands. Other names:<br>Norpa loamy sand, acidic (Bettenay and Hingston,<br>1961). Relevant MIDAS soil class: S1 |
|--|--------------------|--|

## Soil profile description

(See Figure 3, colour photograph inside back cover)

- 0-10 cm light brownish grey loamy sand, pH 5.4 (5.0 CaCl<sub>2</sub>)
- 10-45 cm yellow sandy loam, pH 4.5 (4.2 CaCl<sub>2</sub>)
- 45-105 cm yellow sandy loam with very few soft fine ferruginous nodules, pH 4.6 (4.1 CaCl<sub>2</sub>)
- 105-120 cm yellow light sandy clay loam with soft ferruginous nodules common, pH 6.5 (4.8 CaCl<sub>2</sub>)
- 120-170 cm yellow light sandy clay loam, pH 5.0 (4.9 CaCl<sub>2</sub>)



## Distinguishing features

- The soil profile is yellow throughout, with a slight increase in texture with depth from loamy sand at the surface to light sandy clay loam below 1 m. Similar soils may be light in texture throughout the profile - sand to clayey sand with depth.
- The soil reaction is moderately acidic at the surface becoming strongly acidic with depth.
- The soil occurs high in the landscape on gently undulating uplands. It commonly occurs in association with Soil 1 (lateritic podzol), Soil 2 (earthy sand) and areas of shallow cemented ironstone. Soil 3 is very difficult to distinguish visually from Soil 2, except on the basis of native vegetation. Subsoil pH values, and aluminium toxicity tests can be used to

identify these soils, and past agricultural performance provides a ready indication.

- The native vegetation is a shrubland, generally with *Acacia* spp (wodjil) dominant: *A. assimilis* (fine leaf wodjil), *A. neurophylla* (wodjil), *A. resinomarginea* (post wodjil), *Eucalyptus burracoppinensis* (Burracoppin mallee) and *Grevillea* spp. Dominant emergent species are *E. leptopoda* (Tammin or whipstick mallee), *Grevillea eriostachya* (flame grevillea) and following fire, *Codonocarpus cotinifolius* (fire tree).
- Map 3 provides an indication of the area within which this soil most commonly occurs in the Merredin advisory district.

## Agricultural use and management

### Soil characteristics

#### *Favourable attributes*

Water entry and drainage - good.

Soil workability - good.

Soil water storage - moderate.

#### *Limitations*

Nutrient status - low inherent fertility and strongly acidic soil conditions severely restrict agricultural productivity because of aluminium toxicity and possibly molybdenum deficiency.

### Agronomic considerations

Crops - cereal rye, triticale and oats are the most tolerant of the cereals to acidic soil conditions, but productivity is generally low. Lupins can grow reasonably well depending on the degree of acidity.

Pastures - subterranean clovers can be grown if acidity is not severe. Medics are not suitable.

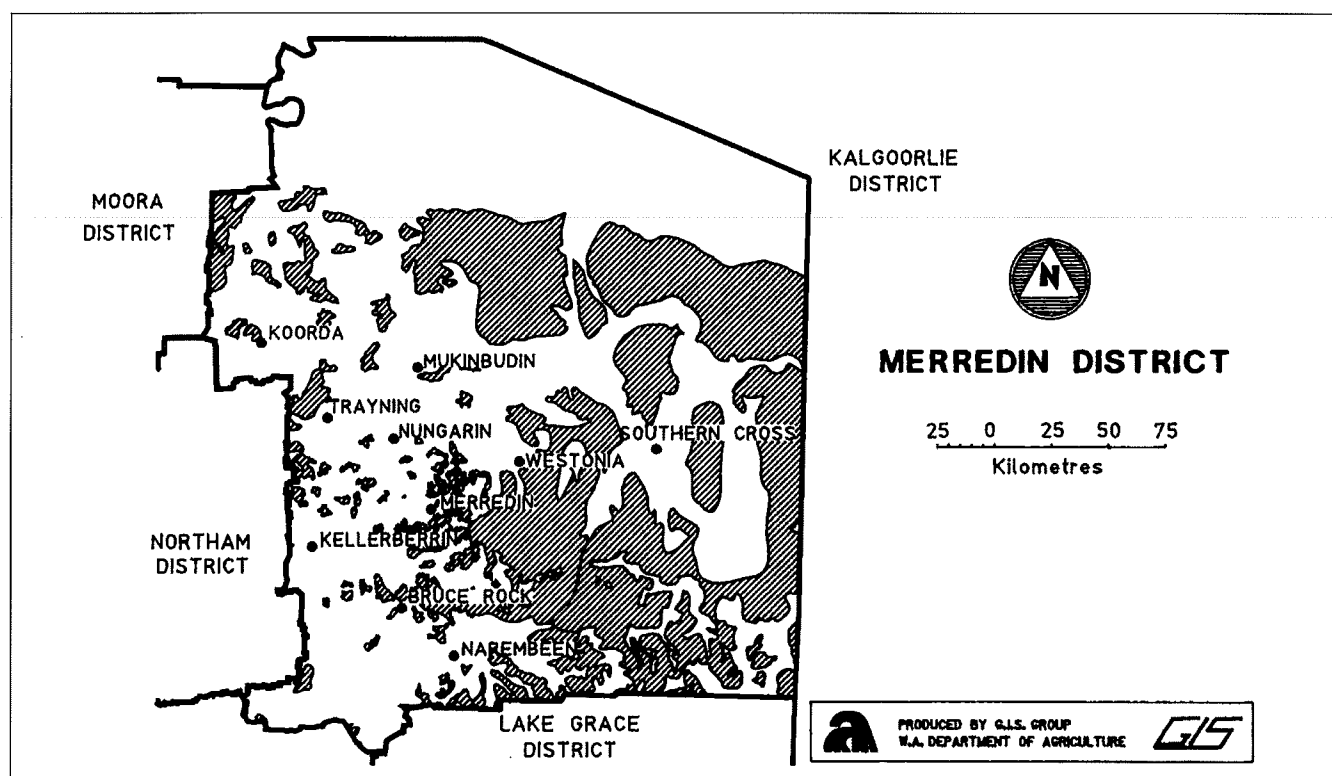
### Soil conservation

As crops and pastures are usually sparse, wind erosion following summer grazing and during crop establishment can be severe under poor management.

If soil acidity is extreme, developed areas may have to be retired from agriculture. Undeveloped areas should not be cleared.

### Water conservation

The soil is unsuitable for dams and for catchment areas.



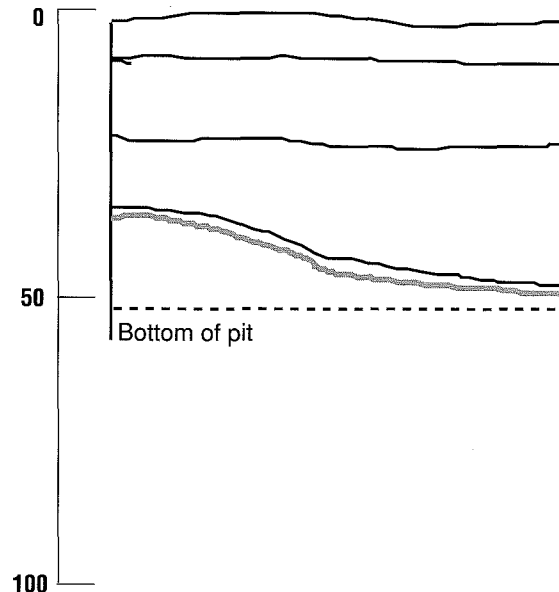
Map 3.

|   |                    |   |
|---|--------------------|---|
| <b>Classification</b><br>Australian Great Soil Group:<br>Lithosol | Northcote: Uc 5.11 | Local name: Granite soil. Other name: Jura loamy sand (Bettenay and Hingston 1961).<br>Relevant MIDAS soil class: No relevant class |
|---|--------------------|---|

### Soil profile description

(See Figure 4, colour photograph inside back cover)

- 0-5 cm dark reddish brown coarse loamy sand  
pH 7.6 (6.3 CaCl<sub>2</sub>)
- 5-20 cm yellowish red coarse loamy sand  
pH 7.8 (6.6 CaCl<sub>2</sub>)
- 20-40 cm yellowish red coarse loamy sand with  
few small rock fragments pH 7.8 (6.3 CaCl<sub>2</sub>)
- 40+ cm granite



### Distinguishing Features

- The profile is a yellowish red coarse loamy sand over decomposing granite at about 40 cm depth. Depth to rock is very variable.
- The soil reaction is moderately alkaline throughout the profile.
- This soil occurs usually on upper and mid slopes in the vicinity of rock outcrops.
- The native vegetation is a woodland with some mallee. Dominant emergent species are *E. wandoo* (white gum) and *E. redunca* (white gum mallee). Common large shrubs are *E. sheathiana* (ribbon gum mallee), *Callitris columellaris* (pine), and *Allocasuarina acutivalvis* (black tamma).
- Map 4 proves an indication of the areas within which this soil most commonly occurs in the Merredin advisory district.

## Agricultural use and management

### *Soil characteristics*

#### *Favourable attributes*

Soil workability - good.

Nutrient status - moderate, apart from phosphorus.

#### *Limitations*

Soil water storage - low.

Water entry and drainage - impeded by shallow rock with consequent waterlogging in wet periods.

### *Agronomic considerations*

Crops - given appropriate fertilizer and rotation practices, and provided that soil depth over rock is adequate, wheat, barley and peas grow well.

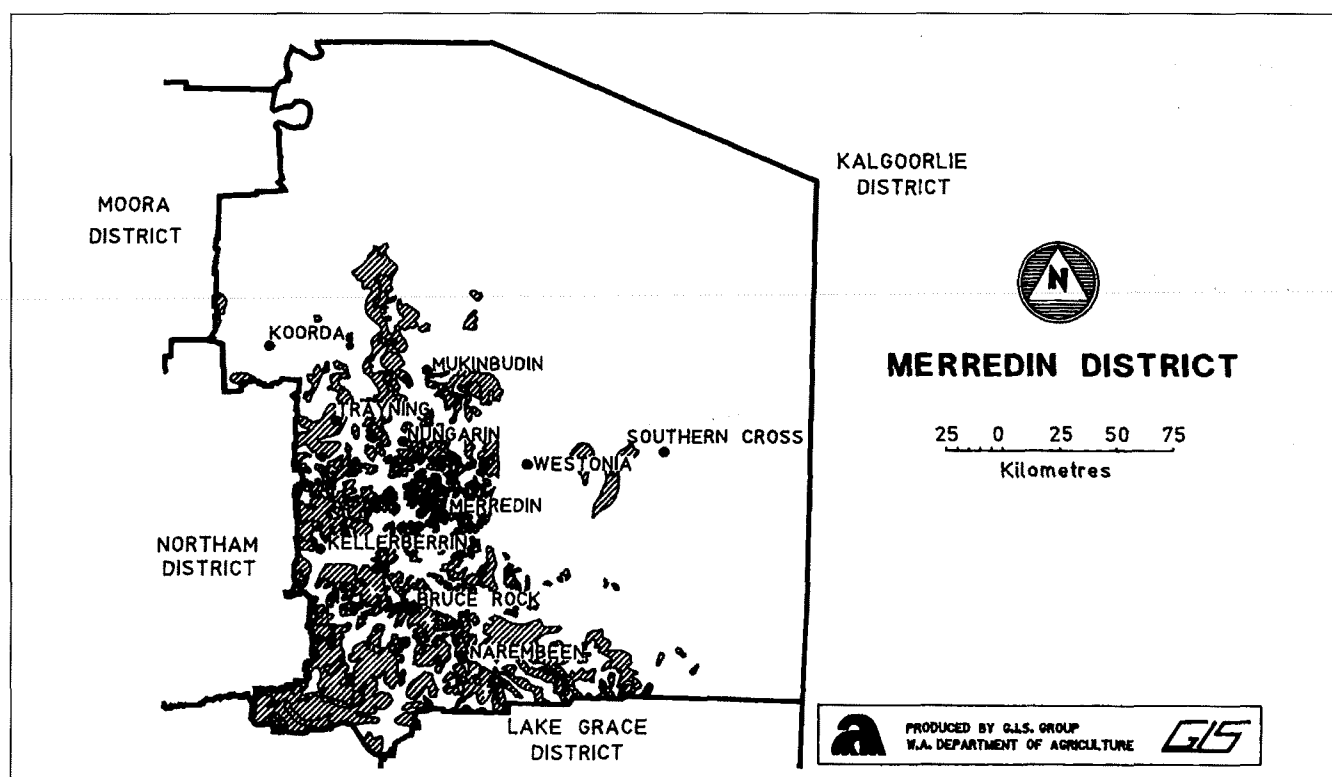
Pastures - Serena, Circle Valley and Santiago burr medics and Cyprus barrel medic are more suited than subterranean clover.

### *Soil conservation*

The soil has moderate susceptibility to water erosion and may generate run-off to lower slopes. Contour earthworks are frequently necessary.

### *Water conservation*

The soil is unsuitable for farm dams, because of shallow rock, but provides good catchments for surface water collection.



Map 4.

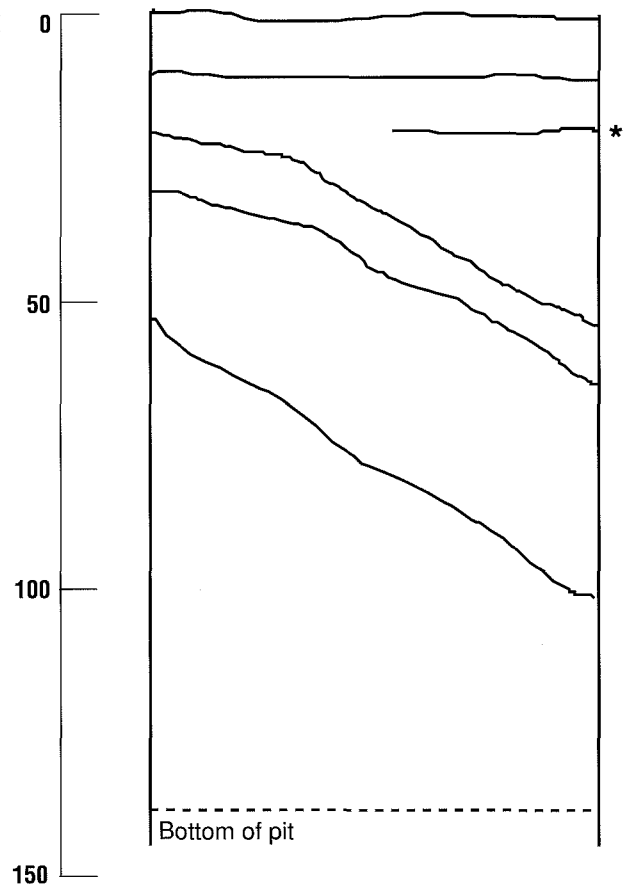
|   |                    |  |
|---|--------------------|--|
| <b>Classification</b><br>Australian Great Soil Group:<br>Soloth | Northcote: Dy 4.83 | Local names: Mallee, duplex.<br>Other name: Collgar sandy loam (Bettenay and Hingston 1961). Relevant MIDAS soil class: S4 |
|---|--------------------|--|

### Soil profile description

(See Figure 5, colour photograph inside back cover)

- 0-10 cm reddish brown coarse loamy sand, pH 6.6 (5.3 CaCl<sub>2</sub>)
- 10-30 cm yellow brown coarse loamy sand pH 7.7 (6.1 CaCl<sub>2</sub>)
- 30-35 cm pinkish grey coarse clayey sand pH 8.1 (6.5 CaCl<sub>2</sub>)
- 35-70 cm brown coarse clayey sand, very hard material (faint columnar structure), with few fine ferruginous nodules, pH 6.8 (5.3 CaCl<sub>2</sub>)
- 70-130+ cm pale brown sandy clay with very few ferruginous nodules and granite fragments, pH 8.3 (6.4 CaCl<sub>2</sub>)

\* Discontinuous cemented brown band 3 mm wide at 20 cm depth



### Distinguishing features

- The profile is coarse loamy sand over sandy clay at about 70 cm depth. The soil is noticeably gritty, and cemented layers are present in the soil above the sandy clay subsoil.
- The soil reaction is neutral at the surface and moderately alkaline to neutral in the subsoil.
- The soil occurs on lower slopes adjoining valley floors.
- The native vegetation is mallee with dominant emergent species *Eucalyptus loxophleba* (York gum mallee), *E. sheathiana* (ribbon gum mallee) and *E. eremophila* (tall sand mallee).
- Map 5 provides an indication of the areas within which this soil most commonly occurs in the Merredin advisory district.

## Agricultural use and management

### Soil characteristics

#### *Favourable attributes*

Soil water storage - good.

Soil workability - good.

Nutrient status - moderate, apart from phosphorus.

#### *Limitations*

Water entry and drainage - impeded drainage leads to waterlogging in wet periods.

### Agronomic considerations

Crops - given appropriate fertilizer and rotation practices, wheat grows well. The performance of lupins and peas is dependent on depth of surface sandy soil.

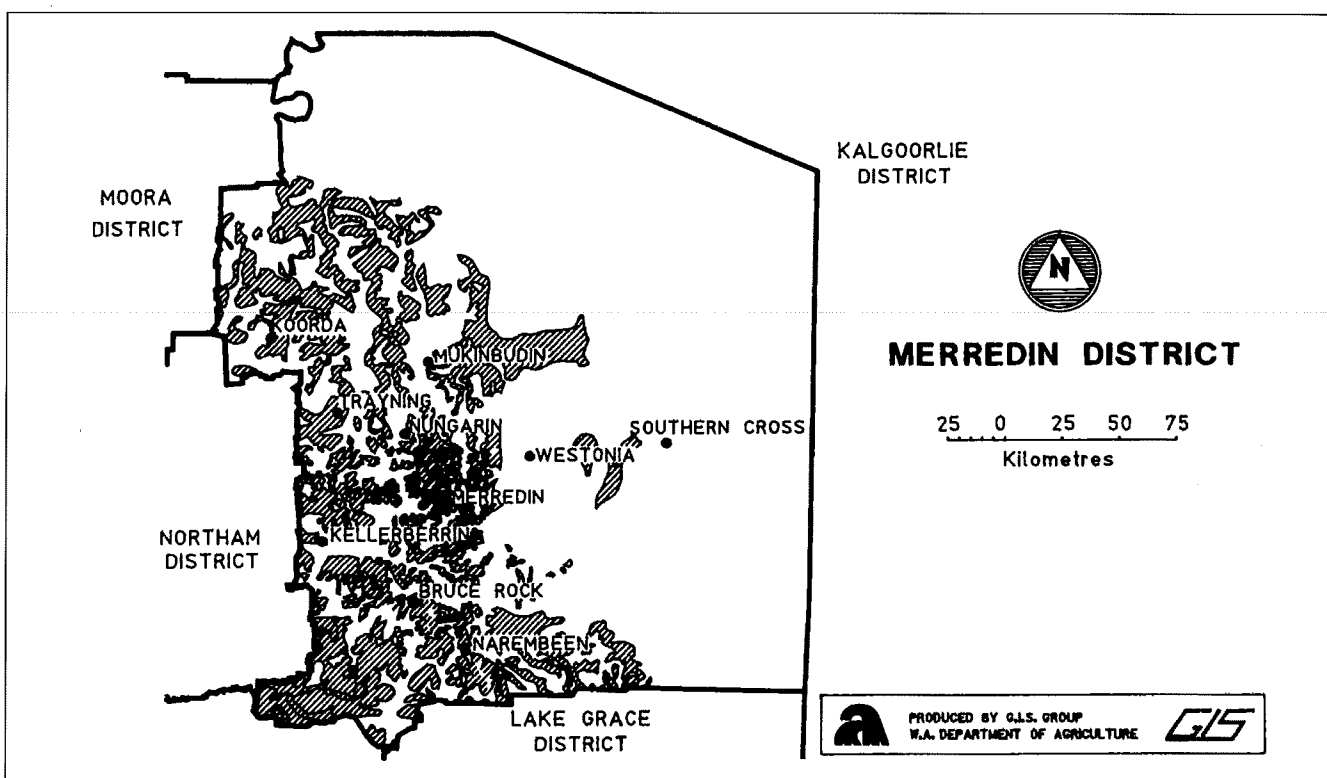
Pastures - subterranean clover and burr medics are suited to this soil.

### Soil conservation

Wind erosion following summer grazing or during crop establishment occurs under poor management, especially with pea crops. Reduced cultivation techniques with good stubble management are desirable. Waterlogging can be a problem, especially in the western parts of the Merredin advisory district. Reverse bank interceptors may be effective in controlling waterlogging.

### Water conservation

The soil is generally suitable for natural water catchments and for farm dams.

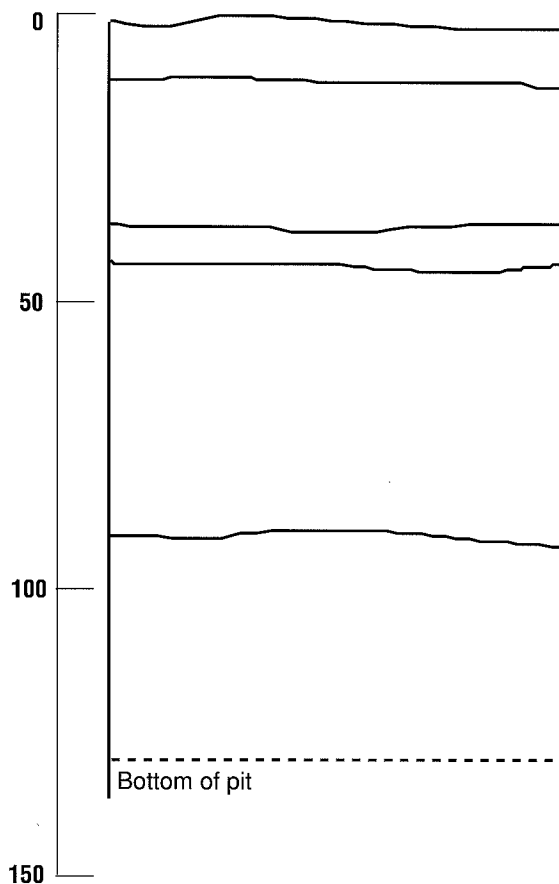


|   |                    |   |
|---|--------------------|---|
| <b>Classification</b>                           |                    | Local names: Hillside (sandy salmon gum).<br>Other name: Booraan loamy sand (Bettenay and Hingston 1961). Relevant MIDAS soil class: S5 |
| Australian Great Soil Group:<br>Red Brown Earth | Northcote: Dy 3.13 |   |

## Soil profile description

(See Figure 6, colour photograph inside back cover)

- 0-10 cm yellowish red loamy sand pH 5.8 (4.9 CaCl<sub>2</sub>)
- 10-35 cm yellowish red sandy loam pH 5.2 (4.6 CaCl<sub>2</sub>)
- 35-40 cm strong brown clayey sand pH 6.0 (4.7 CaCl<sub>2</sub>)
- 40-90 cm reddish yellow with few 5-15 mm faint yellow mottles, sandy clay pH 7.6 (6.4 CaCl<sub>2</sub>)
- 90-130 cm red with few 5-15 mm faint grey mottles, sandy clay pH 8.5 (7.2 CaCl<sub>2</sub>)



## Distinguishing features

- The soil profile is a mainly yellowish red loamy sand to sandy loam over very hard reddish yellow faintly mottled sandy clay at about 40 cm.
- The surface soil reaction is moderately acidic becoming moderately alkaline in the subsoil. The deeper subsoil below 90 cm is strongly alkaline.
- The soil occurs on the valley slopes.
- The native vegetation is woodland dominated by *E. salmonophloia* (salmon gum), *E. loxophleba* (York gum), *E. wandoo* (white gum) and *E. redunca* (white gum mallee). Common large shrubs are *Melaleuca* spp. (boree), *Allocasuarina campestris* (tamma) and *Santalum acuminatum* (quandong).
- Map 6 provides an indication of the areas within which this soil most commonly occurs in the Merredin advisory district.

## Agricultural use and management

### Soil characteristics

#### Favourable attributes

Soil water storage - good.

Nutrient status - moderate, apart from phosphorus.

#### Limitations

Water entry and drainage - restricted internal drainage leads to waterlogging in wet periods.

Soil workability - often poor due to surface soil structural deterioration.

### Agronomic considerations

Crops - the soil is suitable for all cereals and field peas. It is not suitable for lupins.

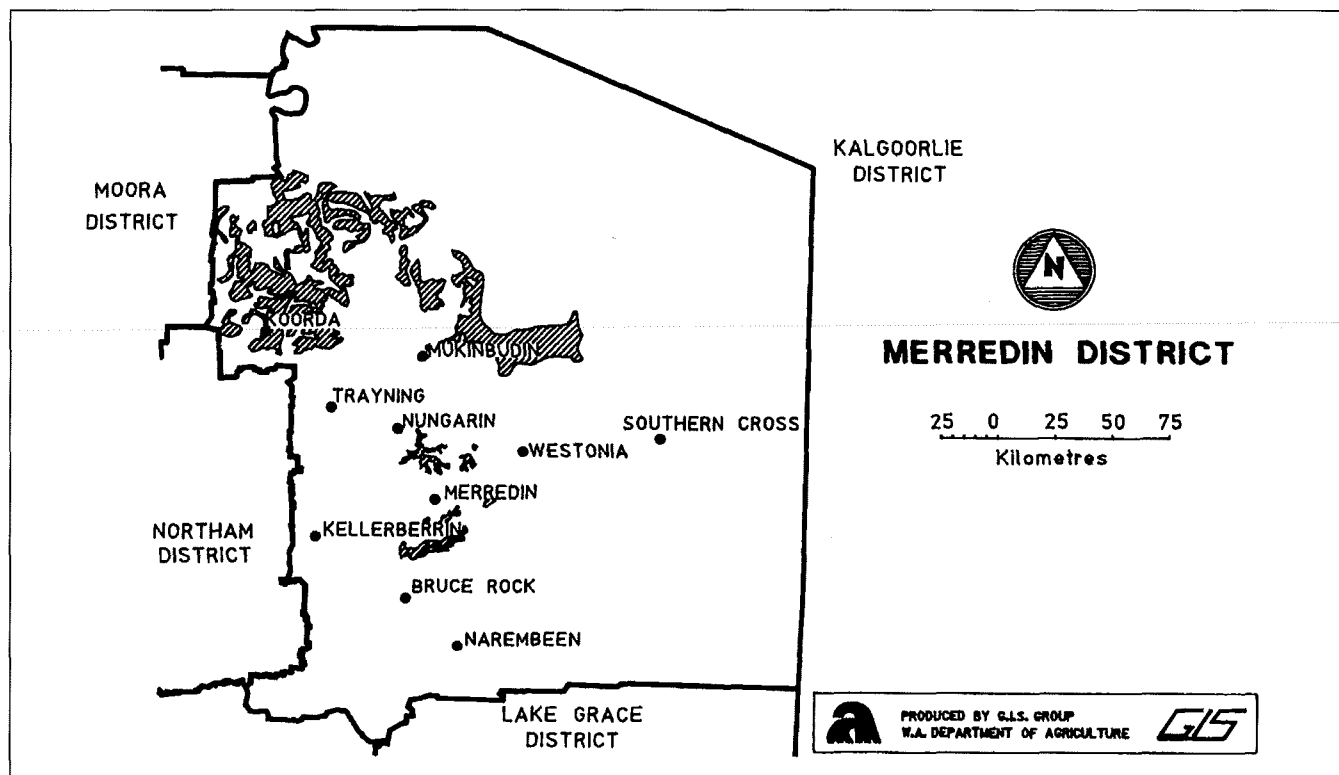
Pastures - burr and barrel medics are the appropriate pasture legumes.

### Soil Conservation

Wind erosion following summer grazing and during crop establishment can occur under poor management. Minimum cultivation techniques with good stubble management are required.

### Water Conservation

The soil is suitable for farm dams, but test borings are desirable to ensure that saline groundwater is not present. The sandy soil surface does not provide good run-off for water catchments.



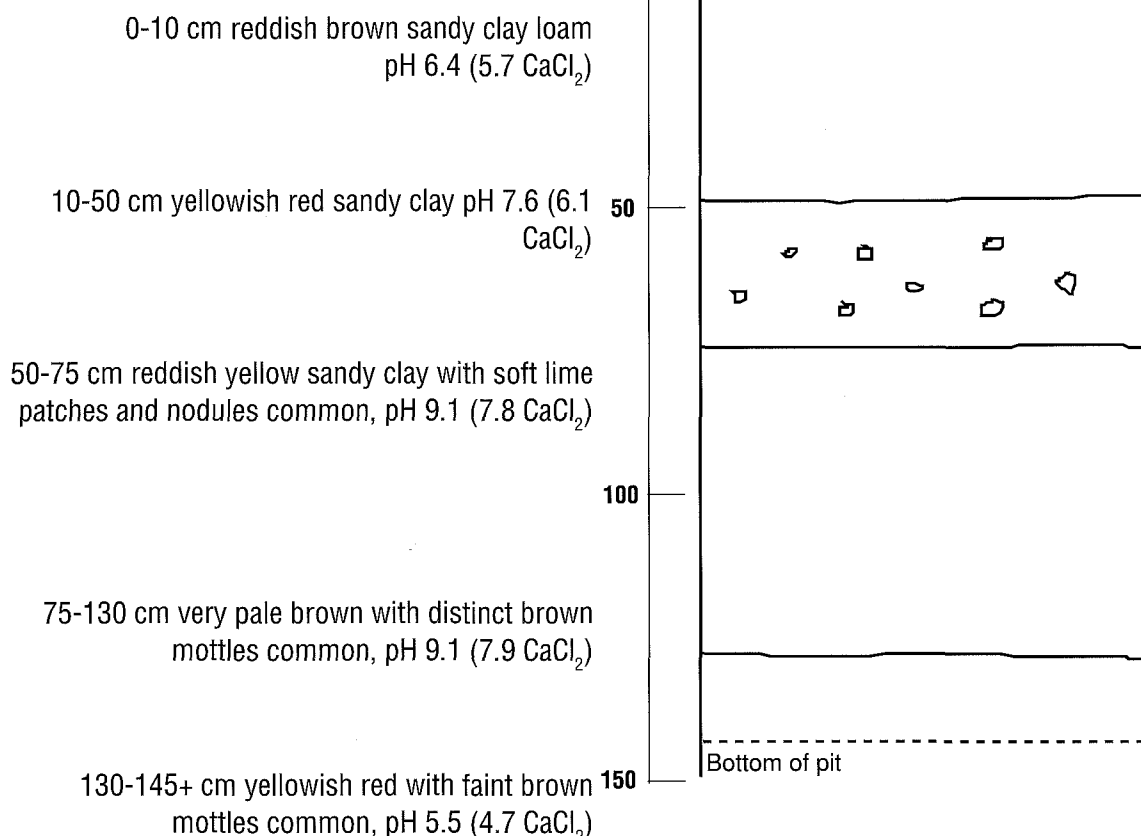
Map 6.



|   |                    |  |
|---|--------------------|--|
| <b>Classification</b><br>Australian Great Soil Group:<br>Solonized Brown Soil over truncated laterite profile | Northcote: Dr 2.12 | Local name: Salmon gum-gimlet, heavy soil.<br>Other name: Merredin sandy clay loam (Bettenay and Hingston 1961). Relevant MIDAS soil class: S6 |
|---|--------------------|--|

### Soil profile description

(See Figure 7, colour photograph inside back cover)



### Distinguishing features

- The soil profile is sandy clay loam over sandy clay at 10 cm depth. Calcium carbonate is present between 50 and 75 cm, and the soil overlies acid material (below 130 cm) derived from the lower part of a laterite profile.
- The surface soil reaction is slightly acidic, the subsoil is strongly alkaline. The truncated laterite reaction is moderately acidic.
- The soil occurs on the upper broad valley flats adjacent to the sloping land.
- The native vegetation is a mixed woodland of *Eucalyptus salmonophloia* (salmon gum) and *E. salubris* (gimlet). Where gimlet is dominant, the soil is usually heavier.
- Map 7 provides an indication of the area within which this soil most commonly occurs in the Merredin advisory district.

## Agricultural use and management

### Soil characteristics

#### *Favourable attributes*

Nutrient status - good, apart from phosphorus.

Soil water storage - good.

#### *Limitations*

Soil workability - deterioration of soil structure frequently causes problems. These soils often respond to gypsum applications and soil tests are currently being developed to identify responsive soils.

Water entry and drainage - reasonable, but low surface gradients can lead to waterlogging in wet periods.

#### *Agronomic considerations*

Crops - given appropriate fertilizer and rotation practices, wheat, barley and peas are the most appropriate crops.

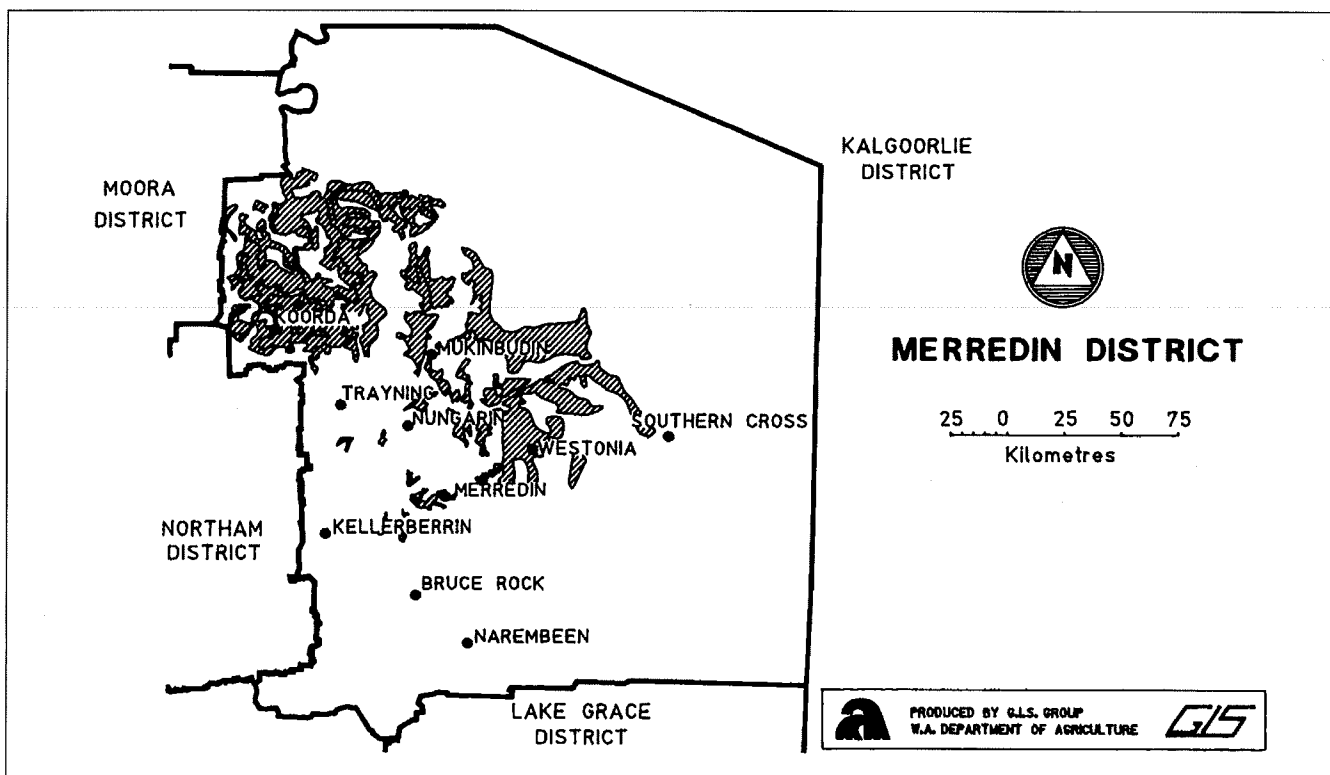
Pastures - Cyprus barrel medic and burr clovers (Serena, Circle Valley, Santiago) are the most suited to this soil.

### Soil conservation

Structural deterioration of the surface soil is the most serious land degradation problem in this soil. No more than one cultivation should be made before seeding. Direct drilling is a viable option, particularly with continuous cropping. Where soil structure is badly degraded, gypsum application may be beneficial, in combination with direct drilling.

### Water conservation

The soil is suitable for surface water catchments if sufficient slope is available. It is also suitable for farm dams, but care is needed to ensure that saline groundwaters are not present within the depth of excavation.

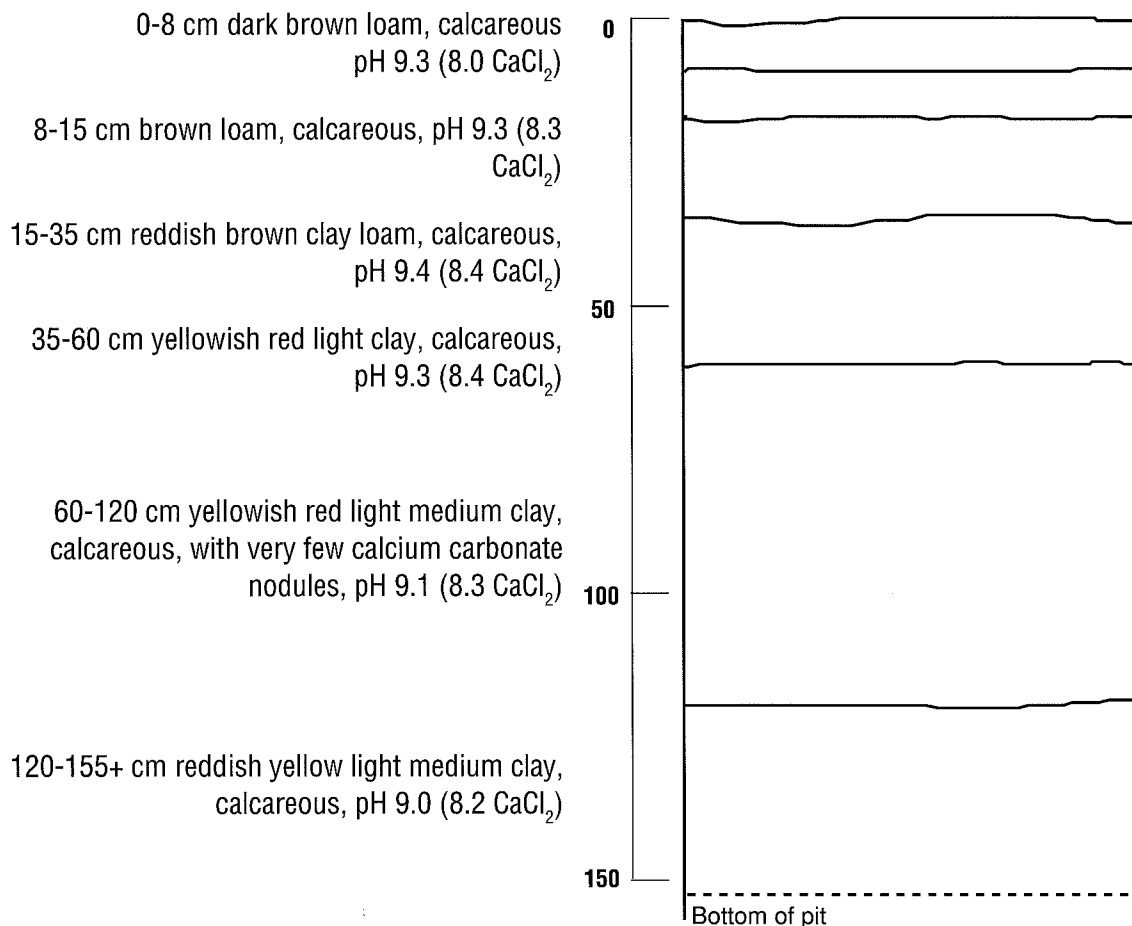


Map 7.

|  |                    |  |
|--|--------------------|--|
| <b>Classification</b>                                |                    | Local name: Morrel. Other name: Hines Hill loam (Bettenay and Hingston 1961).<br>Relevant MIDAS soil class: S6 |
| Australian Great Soil Group:<br>Solonized Brown Soil | Northcote: Gc 1.12 |  |

### Soil profile description

(See Figure 8, colour photograph inside back cover)



### Distinguishing features

- The soil profile consists of surface horizons of loam gradually increasing in texture with depth to light medium clay. The soil contains finely divided calcium carbonate throughout the profile.
- The soil is highly alkaline throughout the profile.
- Large amounts of finely divided calcium carbonate (approximately 10 per cent) are present in the top 0.5 m of soil. This soil type frequently has large quantities of calcareous nodules present in the profile.
- The soil usually occurs on undulating land close to salt lake drainage systems. It is comprised of wind blown material and commonly lies to the east and south-east of salt lakes.
- The native vegetation is a woodland dominated by *Eucalyptus longicornis* (red morrel) and *E. gracilis* (yorrel).
- Map 8 provides an indication of the area within which this soil most commonly occurs in the Merredin advisory district.

## Agricultural use and management

### *Soil characteristics*

#### *Favourable attributes*

Nutrient status - reasonably good, particularly for potassium.

Soil workability - good under favourable moisture conditions.

#### *Limitations*

Salinity - subsoils are always saline, and removal of surface soil by erosion results in serious salinity problems.

Wind erosion - the fine textured surface soils are very vulnerable to wind erosion when exposed by cultivation or overgrazing.

Soil water storage - limited by the osmotic effects of high concentrations of soluble salts in the soil solution.

#### *Agronomic considerations*

Crops - soil salinity and alkalinity limit productivity of cereals. Cereal rye is the most adapted to these condi-

tions. Barley and oats are usually more tolerant than wheat.

Pastures - medics are the most suitable pasture legume because of the alkaline conditions. In many areas, particularly those where salinity problems have been aggravated by wind erosion, salt tolerant shrubs (saltbush and bluebush) can provide a viable alternative.

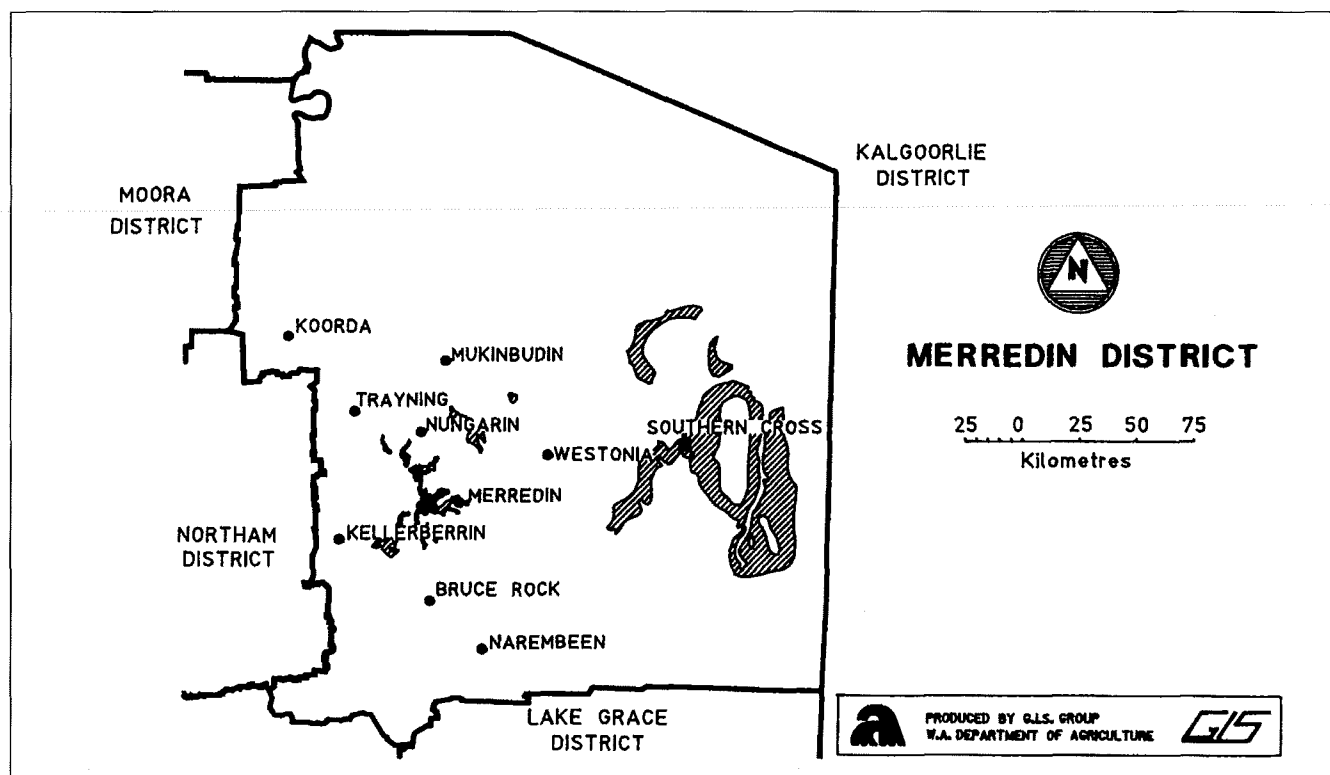
### *Soil conservation*

Wind erosion and salinity problems are closely associated on this soil. Adoption of farming practices to minimize wind erosion of the fine and loose surface soil is essential if serious loss of production resulting from soil salinity in the exposed subsoil is to be avoided. Soil salinity resulting from shallow groundwater does not usually occur on this soil.

### *Water conservation*

Dams excavated in this soil do not usually hold water satisfactorily.

Natural catchments do not shed water well and improved catchments are also unsatisfactory.



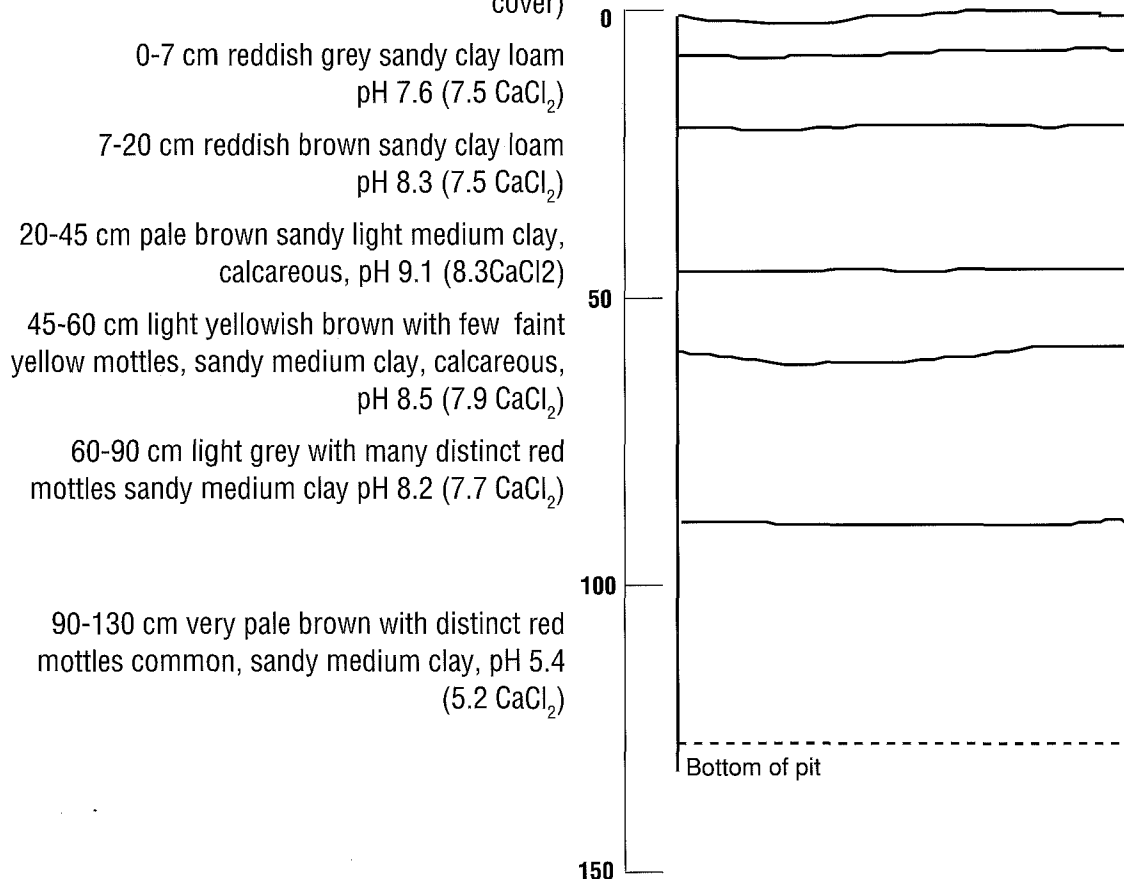
Map 8.

Merredin

|  |                    |   |
|--|--------------------|---|
| <b>Classification</b>                                |                    |   |
| Australian Great Soil Group:<br>Solonized Brown Soil | Northcote: Dy 3.13 | Local name: Heavy land. Other name: Betka<br>sandy clay loam (Bettenay and Hingston 1961).<br>Relevant MIDAS soil class: S6 |

### Soil profile description

(See Figure 9, colour photograph inside back cover)



### Distinguishing features

- The profile is generally brown and increases in texture from sandy clay loam at the surface to sandy clay by 20 cm depth. The soil overlies acid grey mottled clay below about 1 m and saline ground water occurs at 1.8 m depth.
- The soil reaction is moderately to strongly alkaline from the surface to about 90 cm depth, and becomes acidic below that depth.
- The soil occurs on the floor of the lower parts of the broad valleys adjacent to the salt lake channel systems.
- The native vegetation is a woodland dominated by *Eucalyptus salubris* (gimlet) and *E. gracilis* (yorrel).
- Map 9 provides an indication of the area within which this soil most commonly occurs in the Merredin advisory district.

## Agricultural use and management

### *Soil characteristics*

#### *Favourable attributes*

Nutrient status - good, apart from phosphorus.

Soil water storage - inherently good, but usually limited by the osmotic effects of high concentrations of soluble salts in the soil solution.

#### *Limitations*

Soil workability - frequently poor due to surface soil structure breakdown.

Water entry and drainage - often limited by surface soil structure deterioration.

### *Agronomic considerations*

Crops - given appropriate fertilizer and rotation practices, cereal crops grow satisfactorily unless excess soil salinity is a factor. The soil is not suitable for lupins.

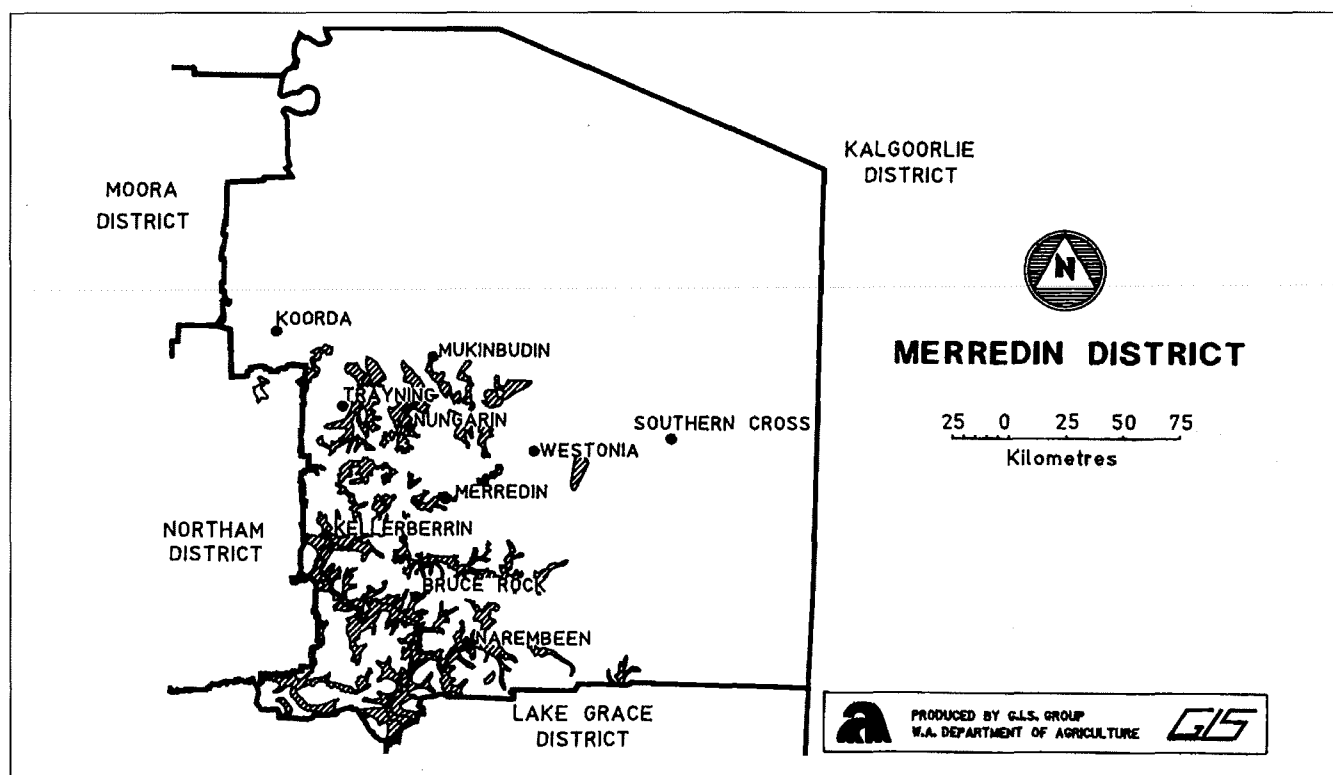
Pastures - medics are the appropriate pasture legumes, but persistence can be affected adversely by emergence problems due to poor soil structure.

### *Soil conservation*

Structural deterioration of the surface soil is a major degradation problem on this soil. No more than one cultivation should be carried out prior to seeding. Direct drilling is a viable option, particularly with continuous cropping. Where soil structure is badly degraded, gypsum applications may be beneficial in combination with direct drilling.

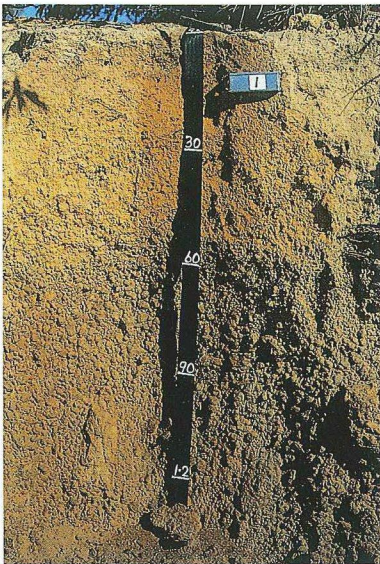
### *Water conservation*

The soil is usually unsuitable for farm dams due to the presence of saline groundwater within the depth of dam excavations. The soil is suitable for surface water catchments if slope is sufficient.

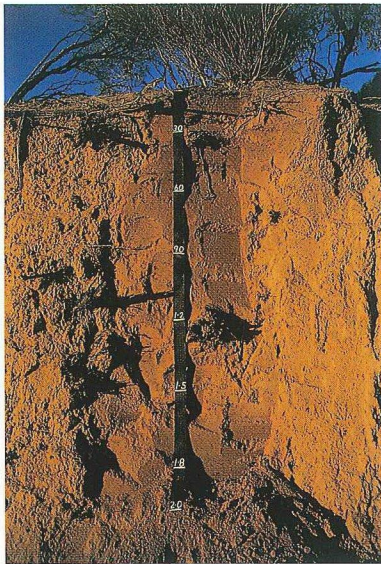


Map 9.

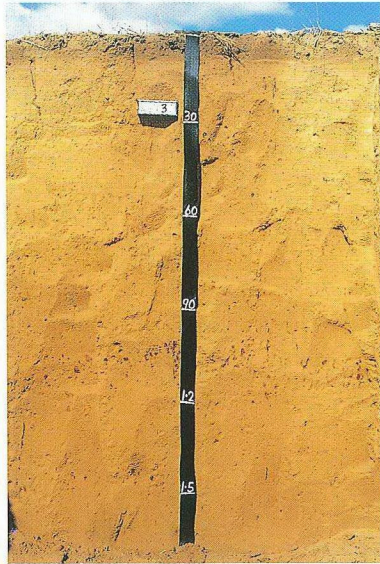




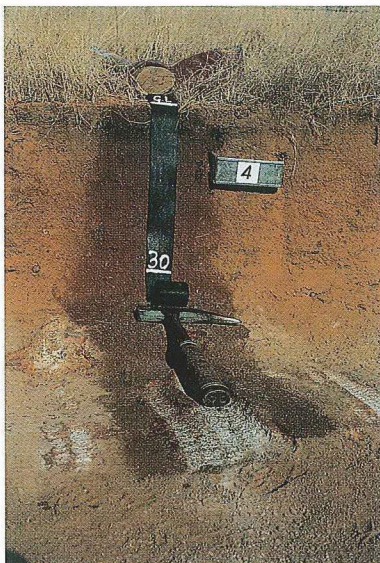
**FIGURE 1. Lateritic podzolic  
(Gravelly sand)**



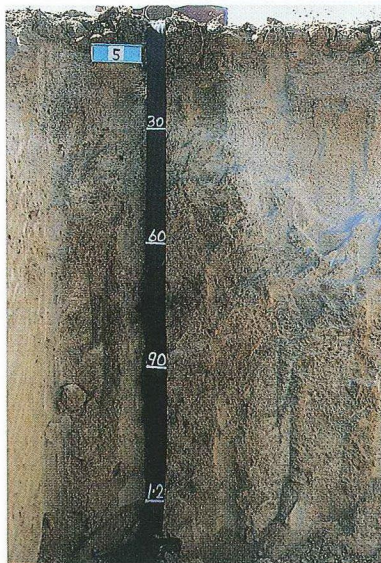
**FIGURE 2. Earthy sand  
(Yellow sandplain)**



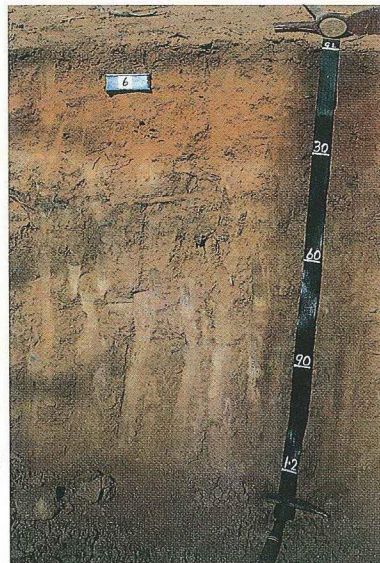
**FIGURE 3. Earthy sand  
(Wodjil sand)**



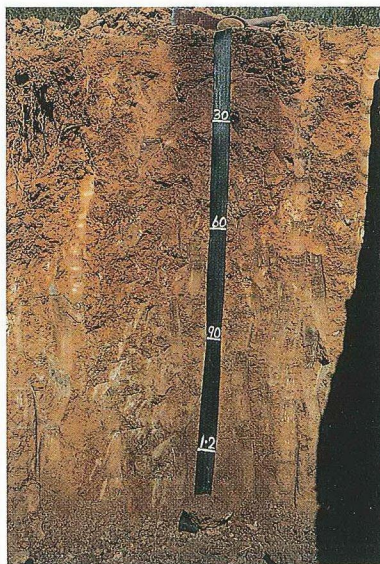
**FIGURE 4. Lithosol  
(Granite soil)**



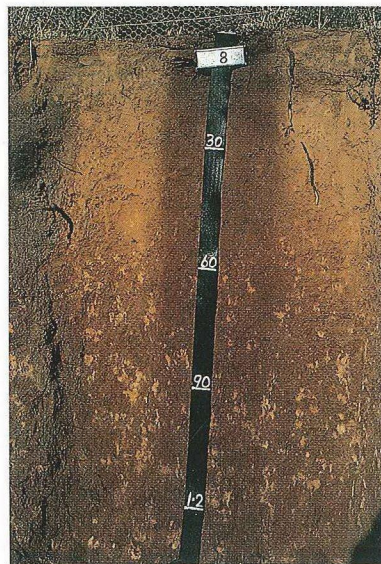
**FIGURE 5. Soloth  
(Mallee)**



**FIGURE 6. Red brown earth  
(Hillside)**



**FIGURE 7. Solonized brown soil  
(Salmon gum - gimlet)**



**FIGURE 8. Solonized brown soil  
(Morrel)**



**FIGURE 9. Solonized brown  
soil (Heavy soil)**



