

**DEPARTMENT OF AGRICULTURE**

**REPORT OF THE  
SHEPPARTON EXTENSION AND  
KATANDRA SOIL SURVEY**

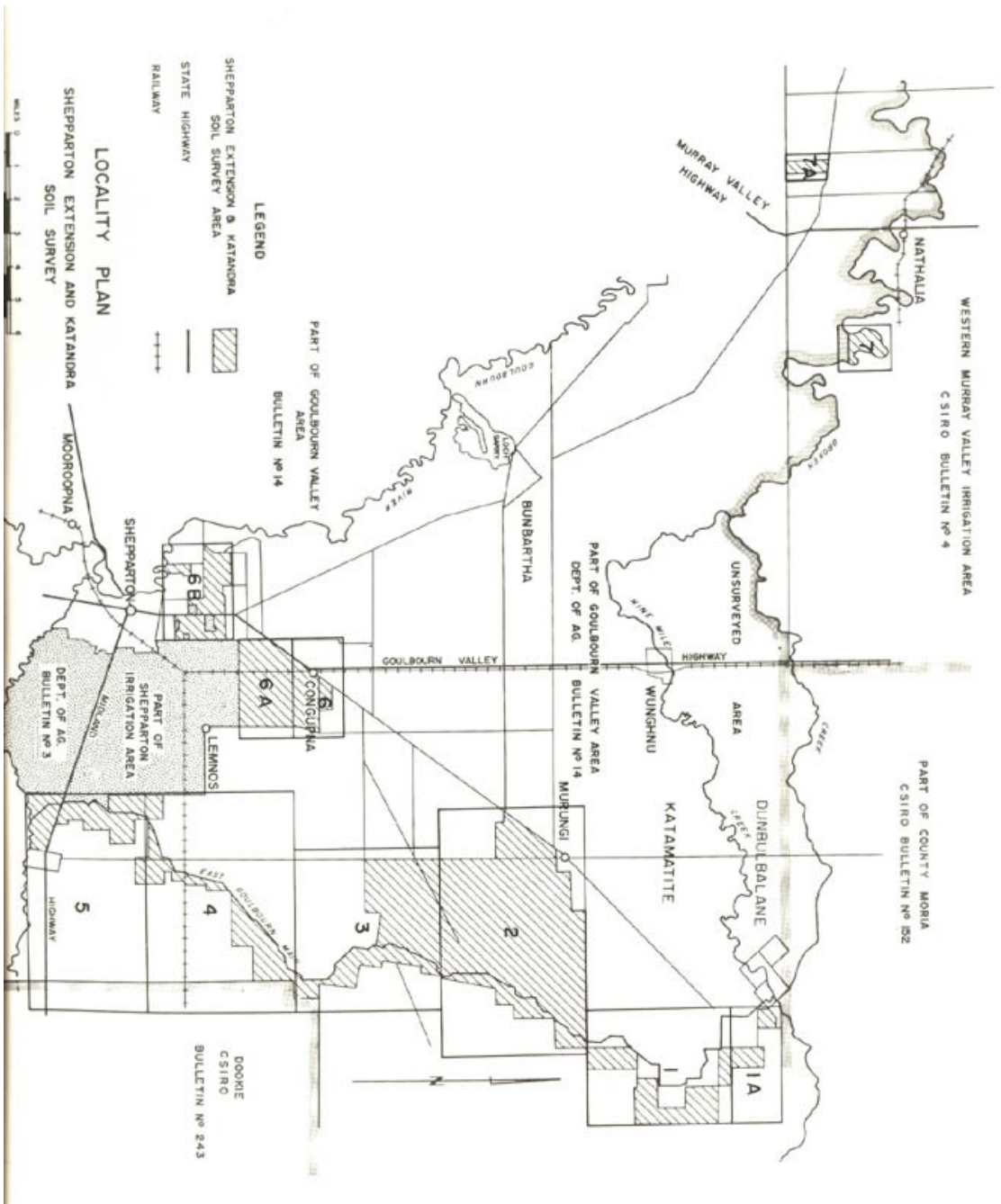
By

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**Report of the  
SHEPPARTON EXTENSION AND<sup>1</sup>  
KATANDRA SOIL SURVEY**

BY

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**INTRODUCTION**

About 29,000 acres located in the northern district of Victoria, in parts of the parishes of Barwo, Congupna, Dundulbalane, Katandra, Pine Lodge, Shepparton, Youenmite and Waaia, County of Moira, were surveyed. These areas are adjacent to three earlier surveys as shown in the locality plan.

This report describes the soil types and is accompanied by soil maps showing their distribution.

***Description of soil types***

Twelve named, and five un-named, soil types beside eight phases have been recorded. Most of the soil types were first described by Skene and Freedman (1944) and Skene and Putsma (1962). Katamatite loam and Sandmount sand were first described by Butler et al (1942).

**Congupna clay loam**

***Surface soil: -***

A 0-6" Grey to brownish grey (2.5Y to 10YR 4/1)<sup>2</sup> clay loam with rusty colours along root channels; weak to moderate angular blocky structure; hard and brittle when dry; sharply separated from:

***Subsoil: -***

B<sub>1</sub> 6-23" Brownish grey to dark yellow grey, sometimes grey (2.5Y 4/2), heavy clay; moderate angular blocky structure; very hard when dry, weakly structured and more crumbly with depth; grades into:

B<sub>2</sub>C 23-48" Brownish yellow-grey (2.5Y to 10YR 4/4). Sometimes diffusely mottled medium clay; structureless to weak blocky structure with slight calcium carbonate at 30 inches as concretions or in small pockets; usually continues beyond 84 inches.

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<sup>1</sup> It is intended to republish this report together with Bullertins Nos. 3 and 14 metricated and on a common scale for use by primary producers and extension officers.

<sup>2</sup> Munsel colour of moist soil, except in case of A2 horizons, when dry soil is used.

**Variants** - The inscription "light surface" on the soil maps denotes soils with a loam surface. This may be up to 8 inches deep. Yellow variant refers to soils in which the yellow-grey colour of the deep subsoil is replaced by yellowish brown or yellow-brown.

**Occurrence** - Congupna clay loam has been described previously in the adjoining Shepparton Irrigation Area, (Skene and Freedman 1944), and Soils and Land Use in part of the Goulburn Valley, Vic. (Skene and Poutsma 1962). It occupies low plains and shallow depressions in the prior stream sequence. Congupna clay may occur below Congupna clay loam in the more marked depressions and drainage ways.

**Land Use** - Irrigated perennial and annual pastures and pear and plum orchards are grown on Congupna clay loam. However, there is a high hazard of surface waterlogging due to low position and impermeable profile. Consequently, these crops should not be attempted unless there is adequate provision for the removal of surface water.

Wherever there is any doubt about the efficiency of drainage, the soils are best used for irrigated summer fodder crops, cereals, or annual pastures.

### **Congupna clay**

The profile is similar to that of Congupna clay loam, except that the surface is clay, and is usually less than 6 inches deep. The surface is more or less giligaid. There is a yellow variant as in Congupna clay loam.

**Occurrence** - First described by Skene and Freedman (1944) and later by Skene and Putsma (1962), this soil type occupies the well-defined swamps and drainage ways of the district, some of which may hold water for prolonged periods.

**Land Use** - Congupna clay is not generally recommended for irrigation because of drainage difficulties. In some circumstances there may be surmounted and the soils may be used similarly to Congupna clay loam.

### **Dunbulb loam**

#### **Surface soil: -**

A 0-6" Grey-brown (7.5YR 4/2) loam or clay loam; slight buckshot sharply separated from:

#### **Subsoil: -**

B<sub>1</sub> 6-33" Brown to dull yellow-brown (7.5YR 4/4) medium or heavy clay, colours becoming brighter and yellower with depth; moderate subangular blocky structure; friable when moist.

B<sub>2</sub>C 33-73" Variable mottled yellow-brown, brown, and grey subplastic clay; distinct small angular blocky peds with black flecks on the faces; light calcium carbonate concretions.

**Occurrence** - The soil type belongs to the Youanmite sequence which is found only on high plains. Dunbulb loam occurs on fractionally lower parts of the plains and in some depressions.

**Land Use** - Wheat has been grown extensively and successfully on Dunbulb loam, which has also been used for irrigated pastures in the Katandra district. The resemblance of Dunbulb loam and Goulburn loam, - a major irrigated soil type in the Goulburn valley, - suggests that the soil has a similar land use potential and could be used successfully for irrigated summer fodder crops, cereals and both annual and perennial pastures. Since both permeability of the subsoil below 3 feet and surface drainage are poor, Dunbulb loam is not recommended for stone fruits although it should grow pears and plums satisfactorily.

### **East Shepparton fine sandy loam**

#### **Surface soil: -**

- A<sub>1</sub> 0-7" Dull brown (7.5YR 4/4) fine sandy loam; sharply separated from:
- A<sub>2</sub> 7-10" Light brown (7.5YR 5/4) fine sandy loam at 12 inches; sharply separated from:

#### **Subsoil: -**

- B<sub>1</sub> 10-20" Reddish brown (5YR 4/6) light clay, occasionally medium clay; grades into:
- C 20-27" Mottled brown, brownish yellow and light grey fine sandy clay loam or clay loam; grades into:
- 27-36" Fine sandy loam; scattered calcium carbonate concretions
- 36-72" Variable coarse textured (fine sandy to sandy clay\_ and permeable materials resting on impermeable clays at depths up to about 20 feet.

**Occurrence** - East Shepparton fine sandy loam is situated on the leaves of the larger prior streams. It is widely distributed, but individual occurrences are generally only a few acres in area.

**Land Use** - East Shepparton fine sandy loam is used almost exclusively for horticulture. Experience has shown that good permeability characteristics of the soil profile are such that they are very suitable for peach and apricot growing. While high permeability is an advantage under normal conditions, it has proved a hazard in abnormally wet seasons, and stone fruits have been lost, periodically, in many situations, through waterlogging.

Investigation by officers of the Horticultural Research Station as Tatura indicate that the dangerous situations are those where deep impermeable clay layers are within 10 feet of the surface. Such conditions are not defined in the present survey.

Beside fruit trees, East Shepparton fine sandy loam is very suitable for most vegetables, tomatoes and lucerne. It is not recommended for small seeded vegetable crops since the fine texture of the surface soil is conducive to crusting and consequent emergency problems.

### **Shepparton fine sandy loam**

#### **Surface soil: -**

- A<sub>1</sub> 0-6" Brown (5YR 4/4) fine sandy loam or loam; sharply separated from;
- A<sub>2</sub> 5-9" Weakly bleached light brown fine sandy loam; sharply separated from:

#### **Subsoil: -**

- B<sub>1</sub> 9-22" Red-brown (2.5YR 4/6) medium clay; grades into:
- 22-26/30" Yellowish brown medium clay to light clay; grades into:
- 28-48" Mottled yellow-grey with yellowish brown fine sandy clay to fine sandy clay loam.

### **Goulburn loam**

#### ***Surface soil: -***

A Grey-brown (10YR 4/2) loam; occasional or not buckshot; hard when dry; weak bleaching at the lowest part of the horizon is not common; sharply separated from:

#### ***Subsoil: -***

B<sub>1</sub> 6-20" Dull yellowish-brown (10 YR 5/6) heavy clay; or medium clay; occasionally reddish brown; plastic when moist; grades into:

B<sub>2</sub>C 20-48" Variably mottled yellow-grey with yellow-brown and brown heavy clay or medium clay, and occasionally light clear; hard and soft lime from 26-32"

Surface deeper than 7/8" has been inscribed (deep surface).

### **Goulburn clay loam**

#### ***Surface soil: -***

A 0-4" Grey-brown (10YR 4/2) brownish grey clay loam; hard when dry; sometimes with weak bleaching at the lower part of the A horizon; sharply separated from:

#### ***Subsoil: -***

B<sub>1</sub> 4-20" Yellowish brown (7.5YR 4/4) to dull yellowish grey-brown medium clay or heavy clay; grades into:

B<sub>2</sub>C 20-48" Mottled yellow-grey with yellowish brown medium clay sometimes light clay, otherwise similar to Goulburn loam.

### **Grahamvale sandy loam**

#### ***Surface soil: -***

A<sub>1</sub> 0-8" Dull brown fine sandy loam or sometimes loamy fine sand.

A<sub>2</sub> 8-16" Light brown to light greyish yellowish brown fine sandy loam or loamy fine sand; grades into:

#### ***Subsoil: -***

B 16-28" Yellow-brown clay loam to fine sandy clay; grades into:

C 28-72" Yellow-brown or mottled yellow-grey fine sandy loam and lighter textures.

These soils are finer textured than the Shepparton soils.

### **Gupna fine sandy loam**

#### ***Surface soil: -***

A<sub>1</sub> 0-7" Brownish grey to yellowish grey fine sandy loam; friable when moist; sharply separated from:

A<sub>2</sub> 7-12" Light grey (10YR 7/2) fine sandy loam; strongly bleached; grades into:

**Subsoil: -**

- B<sub>1</sub> 12-24" Yellowish grey (2.5Y 5/2) or diffusely mottled yellow-grey light clay; grades into:
- B<sub>2</sub>C 24-28" Mottled yellow-grey, light grey and yellow-brown light clay, fine sandy clay or clay loam; more crumbly than above; trace calcium carbonates; textures usually become heavier below 48 inches.

**Occurrence** - This is the lowest member of the zeerust sequence which is found mostly between Shepparton and Tallygaroopna in the central part of the North Shepparton Irrigation Area.

**Land use** - Gupna fine sandy loam carries good pastures under irrigation. It has not been used for horticulture or vegetables. Indifferent surface drainage characteristics constitute a hazard to plants sensitive to waterlogging, consequently it is rated as suitable, under irrigation, only for Group IV crops (see page 13).

**Gupna loam**

The surface is a loam while the subsurface bleached horizon is either fine sandy loam or fine sandy clay loam. In other respects the profile is similar to that described above for Gupna fine sandy loam.

**Land use** - No distinction is made between this type and Gupna fine sandy loam in regard to either present or potential land use.

**Orrvale loam**

**Surface soil: -**

- A 0-7" Grey-brown to greyish brown loam or sandy loam; sharply separated from:
- A<sub>1</sub> 7-11" Light grey-brown sandy loam or loam; sharply separated from:

**Subsoil: -**

- B<sub>1</sub> 11-34" Mottled reddish brown to brown with yellowish grey or yellowish brown to brownish grey medium clay, passing to light clay; grades into:
- B<sub>2</sub>C 34-48" Mottled brown, yellow-grey clay loam, fine sandy clay or lighter textures; slight calcium carbonate. Below 48 inches the light textures may continue or, more often, revert to impermeable clay before 72 inches.

**Occurrence** - Orrvale loam and Orrvale sandy loam are included in the Orrvale series which is of very minor importance. They type occurs on the lower part of the levees and near-flood plains of the prior stream sequence. It originally carried grey boxwood.

**Land use** - Since Orrvale loam occupies situations of restricted surface drainage and is moderately permeable in the subsoil, it may develop a water table under irrigation. In consequence, peaches, apricots, deep-rooted vegetables and lucerne should not be attempted on this soil type, but pears, plums, summer fodder crops, cereals and perennial and annual pastures can be grown.

**Katamatite loam**

This is the main soil type in the Katandra area. There are two phases of Katamatite loam, namely, a brown phase, in which the subsoil clay (B horizon) has brown to reddish brown colour, and a yellow phase in which the subsoil is yellow-brown.



### **Brown phase:**

#### ***Surface soil: -***

- A<sub>1</sub> 0-5" Greyish brown (5YR 3/4) loam sometimes sandy loam; scattered buckshot; sharply separated from:
- A<sub>2</sub> 5-12/14" Weakly bleached brown to yellowish brown loam or sandy clay loam; scattered to light buckshot; at 10 to 15"; grades into:

#### ***Subsoil: -***

- B<sub>1</sub> 12-22" Reddish brown (5YR 4/6) or bright brown, medium clay; slightly subplastic; very friable when moist; grades into:
- B<sub>2</sub> 22-34" Weakly mottled yellowish brown and yellow-brown medium clay; slightly subplastic; friable; slight trace calcium carbonate from 28 inches.
- 34-48" Mottled greyish yellow-brown with yellowish brown and reddish brown medium clay or heavy clay; subplastic' friable when moist and hard when dry; strong small angular blocky structure; with black flecks on ped faces; trace calcium carbonate.

### **Yellow phase**

#### ***Surface soil: -***

- 0-4" Greyish brown to brownish grey loam; scattered buckshot; hard and brittle when dry; separated from:
- 4-12/14" Weakly bleached greyish brown or yellowish brown sandy clay loam to clay loam; with light to moderate buckshot; grades into:

#### ***Subsoil: -***

- 13-24" Yellow-brown with slight yellowish brown mottled medium clay; slightly subplastic; trace to occasional buckshot; very friable when moist, hard and brittle when dry; black staining present to a varying degree, and increasing with depth.
- 24-34" Weakly mottled yellow-grey and yellow-bran clay; otherwise similar to the brown phase.
- 34-48" Mottled yellow-grey, yellow-brown, and reddish brown medium to heavy clay, subplastic.

**Note:** - Generally, more buckshot is present in the yellow phase than in the brown phase.

**Occurrence** - Previously described by Butler et al (1942) and Skene and Poutsma (1962).

**Land use** - Supports good perennial and annual pastures. (In this regard the brown phase is slightly better than the yellow phase, probably due to slightly better permeability and weaker cementing in the A<sub>2</sub> horizon (stronger in the yellow phase). In the adjoining irrigation district the soil supports good peach trees.

## **Lemnos loam**

### **Surface loam: -**

0-5" Greyish brown or grey-brown loam; weak bleaching may or may not occur at the lower part of the A horizon; a sharp transition to:

### **Subsoil: -**

Reddish brown to brown medium or heavy clay; moderate angular blocky structure; varies from hard to friable; grades into:

22-30/34" Brown or yellow-brown medium clay; slightly crumbly; with trace to slight hard lime from 28 to 32 inches; grades into:

32-48" Variably mottled yellow-grey – yellow-brown, and brown medium clay or light clay.

Inscriptions are noted on the map where surface textures depart from the above, viz. FSL.

**Occurrence** - Previously described by Skene and Freedman (1944) and Skene and Poutsma (1962).

**Land use** - Where it is not irrigated, Lemnos loam is used for cereal cropping, and for grazing sheep on volunteer and improved pastures. Under irrigation it supports good perennial and annual pastures, but is variable in suitability with regard to lucerne, vegetables and fruit trees. Such variability is due to differences in the permeability of the subsoil and in the depth of the surface soil. Apples, pears and tomatoes can be grown satisfactorily on Lemnos loam.

## **Youanmite loam**

### **Surface soil: -**

A 0-6" Greyish brown loam and occasionally fine sandy loam; scattered buckshot; generally bleached in the lower part of the surface soil

### **Subsoil: -**

B<sub>1</sub> 6-22" Reddish brown to red-brown light clay grading into medium clay or heavy clay; colour brightens with depth; very friable when moist; subplastic; grades into"

B<sub>2</sub> 22-32/36" Brown or yellow-reddish brown light or medium clay; slightly subplastic; friable; with slight hard lime at 30/34" inches.

C 39-48" Mottled yellow-brown, yellow-grey and reddish brown clay; subplastic; black flecks on ped faces; hard when dry; friable when moist; slight to light lime.

**Occurrence** - This is a minor soil type occurring on the high plains in the northern section of the surveyed area.

**Land use** - Cereal cropping in conjunction with grazing sheep on volunteer pasture is practised under dry farming.

Youanmite loam is regarded very favourably for irrigated pastures and fruit trees and is being utilised along with Katamatite loam. The type is considered to have a slightly better potential for stone fruits than Katamatite loam, brown phase.

**Zeerust fine sandy loam: -**

**Surface soil: -**

- A<sub>1</sub> 0-6" Greyish brown or grey-brown sandy loam; sharply separated from:
- A<sub>2</sub> 6-12" Moderately to strongly bleached light brownish grey fine sandy loam; sharply separated from:

**Subsoil: -**

- B<sub>1</sub> 12-27" Mottled yellow-brown and grey-brown medium clay, sometimes yellowish brown with yellowish grey; weak to moderate subangular blocky structure; friable when moist; grades into:
- B<sub>2</sub>C 27-48" Mottled yellow-brown light grey and reddish brown light clay or sandy clay, sometimes with sandy loam in the deep subsoil; slight calcium carbonate.

**Occurrence** - Zeerust fine sandy loam is used for cereal cropping and the grazing of irrigated pastures. It has not been used for horticulture. It is rated as a good soil for irrigated summer fodder crops, cereals and both annual and perennial pastures, but is not recommended for vegetables, tomatoes, apples or stone fruits because of doubt concerning surface drainage. However, its permeability appears to be good and there may be situations where these crops could be grown. It should be suitable for pears and plums.

**Unnamed soil types**

**Type A:**

- A<sub>1</sub> 0-5" Grey brown loam.
- A<sub>2</sub> 5-9" Light brownish grey fine sandy loam or loam; light buckshot; slightly separated from:
- B<sub>1</sub> 9-21" Yellow-brown or greyish brown medium clay; grading into:
- 21'48" Mottled yellow-grey clay; slight calcium carbonate.

**Occurrence and Land use** - Type A occurs in small depressions on the flood plain of the prior stream sequence, often in areas of Lemnos loam and Goulburn loam. It can be used for group IV crops.

**Type E**

- A<sub>1</sub> 0-6" Dull brown sand, loose.
- A<sub>2</sub> 6-20" Light brown sand with buckshot at junction with B horizon
- B 20-36" Variably mottled red-brown, grey and yellow-brown sandy clay, moderate angular block structure.
- 36-48" Mottled material medium clay

**Occurrence** - This soil type occurs on or near the levees of the prior streams, as a sand sheet of variable depth over the finer alluvial deposits or the plain.

### **Type M**

- 0-5" Grey or brownish grey loam with slight buckshot
- 5-18" Bleached or pale grey fine sandy loam to fine sandy clay loam; moderate to heavy buckshot; hard and brittle when dry; grades into:
- 18-30" Mottled pale yellow-grey, pale grey and yellow-brown light clay, grading into medium clay with slight buckshot.
- 30-48" Pale yellow-grey or pale brownish yellow-grey with yellow-brown mottled medium clay; slight buckshot; black flecks on red faces; lime at 30 inches.

***Occurrence and Lane use*** - This is a minor soil type and is associated with the Katamatite series. It occurs in small, usually land-locked, depressions and supports reasonably good perennial and annual pastures. It has poor water penetration.

### **Type U**

- 0-4/6" Greyish brown loam; hard and brittle when dry; slightly vesicular; trace of coarse sand.
- 5-26/32" Red-brown or reddish brown light clay grading to medium clay; slightly vesicular; hard and brittle when dry; some coarse sand; grades into:
- 30-48" Brown with reddish brown or mottled yellow-brown, brown, and reddish brown medium clay or light clay; hard and brittle when dry, crumbly to friable; trace to slight iron concretions.

***Occurrence*** - This is a minor soil type occupying hill slopes in the southeast corner of Katandra areas.

### **Soils if the Prior Stream Beds**

The soils of this group are found in the beds of the more or less continuous depressions running through the higher parts of the country. These are old, non-functional streambeds.

The soils vary considerably, not only along and across the streambeds, but also with depth. Since the soil changes are too frequent to map the depressions have been broadly separated into only three types, mainly on difference in the permeability of their soils.

### **Type 2**

These depressions have restricted downward drainage and water may lie on the surface for extended periods. The surface soil is from 2 to 12 inches thick and ranges from grey to grey-brown in colour and from loam, or even sandy loam, to light clay in texture. The subsurface is commonly bleached to light grey, in the deeper soils, and is separated sharply from the clay subsoils beneath. This is usually medium or heavy clay, with colours varying from mottled brownish grey to yellow-grey. The clay may extend downward for more than 6 feet, eventually grading into a sandy material.

Sometimes the soil in the upper 4 feet of the Profile resemble those of the Goulburn or the Congupna series. Such occurrences are inscribed on the soil map (Goulburn profile) and (Congupna profile).

***Land Use*** - Since type 2 depressions are liable to hold water for prolonged periods, they are considered to be unsuitable for irrigation. Some are used for sites for constructed drains.

### ***Suitability of the Soils for Various Irrigated Crops***

All the soils have been classified into soil types, or other units, and have been given descriptive names. All the soil types are grouped together in regard to irrigated crops. The common crops, that normally can be grown satisfactorily, are listed at the head of each group, followed by the summarised features of the main soil types and the names of all the soil types in the group.

Even where the crop suitability grouping does indicate an order of productivity, as with horticultural crops, this is not necessarily the order of economic return.

#### **Group I**

Very good soils, if given careful irrigation, for all horticultural crops, vegetables and tomatoes. Perennial and annual pastures can also be grown successfully.

Brown sandy soils with red brown permeable clay subsoils, underlain by sandy layers. A horizon mostly 9-18 inches thick.

- East Shepparton fine sandy loam
- East Shepparton sandy loam
- Grahamvale sandy loam

These soils can be watered by furrow and flood irrigation, but care is necessary to prevent overwatering as the soils are liable to high watertables.

Some situations have impermeable clay layers within 10 feet of the surface and these places are dangerous for stone fruits in wet years. The tendency for the surface to crust makes East Shepparton sandy loam or Grahamvale sandy loam, unsuitable for small seeded vegetable crops such as carrots and lettuce, sown directly in drill rows.

#### **Group II**

Good soils for all horticultural crops (except citrus), pumpkins, peas, beans, tomatoes, summer fodder crops, cereals, lucerne and annual pastures.

- a) Brown loams, mostly 5-13 inches thick, overlying well structured permeable clays below 2 feet.

- Katamatite loam
- Youanmite loam

These two soil types require care in watering by flood or furrow irrigation because of the fairly high permeability of the upper 2 feet. There may be some danger to peaches and apricots in wet years from surface waterlogging, but otherwise both soil types are considered very satisfactory for stone fruits.

The soils are untried for vegetables and tomatoes, but there seems to be no reason why these crops should not do well.

- b) Brown soils, mostly 6-10 inches thick, with red-brown permeable clay subsoils and lighter and more permeable layers below 2 feet.

- Shepparton fine sandy loam
- Shepparton sandy loam
- Shepparton loam

Good soils for fruit trees and representative of good quality horticultural land although less so than the soils of group I and IIa. The soils can be used for stone fruits.

Penetration of irrigation water is usually greater than 18 inches and is adequate for reasonable growth of fruit trees and lucerne.

Since water does not readily pass through impeding clay subsoil into the more permeable layers below 2 feet, water tables usually do not build up in years of normal rainfall. However, because of the restricting clay subsoil, some of the soils may suffer from surface waterlogging in excessively wet years with consequent danger to stone fruits.

### **Group III**

Good soils for apricots, apples, pears, plums, summer fodder crops, cereals, and perennial and annual pastures; fair soils for peaches, tomatoes, pumpkins, peas, beans and lucerne.

Brown soils, mostly 4-8 inches thick, with subsoil red-brown heavy clay subsoil and variable clay layers below 2 feet.

- Lemnos sandy loam
- Lemnos fine sandy loam
- Lemnos loam

Lemnos loam is a very widespread soil type and is used extensively for horticulture and irrigated pastures.

The vigour of fruit trees grown on Lemnos loam is very variable because of differences in the depth of the surface soil and in the permeability of the heavy clay subsoil. These features are particularly important where peaches are concerned. These trees should not be planted on the above soil types unless the site is known to have sufficiently deep surface and satisfactory permeability. The same situation applies to vegetables and lucerne. The grey surface and dull variants of Lemnos loam are not suitable before planting.

Generally, it is advisable, wherever stone fruits, vegetables or lucerne are contemplated on soils in Group III, to have the proposed site checked for suitability before planting.

The soils are liable to surface waterlogging in wet years because the heavy clay subsoil does not allow sufficiently rapid downward movement of water. Apricot growth under these circumstances is greatest in the best soils in these Groups, i.e. those with the deepest surface. Water tables do not often develop in group III soils.

### **Group IV**

Fair soils for pears and plums, good soils for summer fodder crops, cereals, and perennial and annual pastures.

Mainly loams and clay loams, varying from 3-10 inches thick and overlying clays, with dull mottled colours through the soil profile.

- Goulburn loam
- Goulburn clay loam
- Gupna fine sandy loam
- Type E
- Type M
- Gupna loam
- Orrvale sandy loam
- Orrvale loam
- Zeerust fine sandy loam
- Zeerust loam
- Type A

With one or two minor exceptions these soils occur on intermediate plains or in slight depressions and, since the permeabilities of their clay subsoils are mostly low, they are liable to surface waterlogging.

Goulburn loam and clay loam, Orrvale sandy loam and loam, and Type A have been used for horticulture (mainly pears).

The remaining soil types in this Group do not occur in horticulturally developed areas, and while not particularly attractive even for pears and plums, they could be so used if necessary. Water tables are absent except in Orrvale sandy lam and Orrvale loam.

#### **Group V**

Pears, plums, and perennial pastures can be grown only if the soils are well drained, summer fodder crops, cereals and annual pastures can be grown.

- Congupna loam
- Congupna clay loam

Adequacy of drainage is the main factor determining the utilisation of these soils. Both soil types have been used, more or less successfully, for pears and plums, but the trees are usually small and often unproductive. The other soils are all minor occurrences outside the horticultural area.

Generally the soils in this Group are best avoided for horticultural and should be so used only when there is not alternative.

Sometimes the soils are crabholey making difficult and uneconomic the efficient grading necessary for perennial pastures. Such situations, if irrigated, should be used only for annual pastures and cereals.

#### **Group VI**

These soils are not recommended for irrigation because of swampiness or uneven surface features making layout for irrigation impracticable.

Low-lying heavy textured, grey soils and mixed crabholey and pitted soils.

- Congupna clay
- Soils of prior stream beds Type 2
- Permanent and intermittent swamps
- River frontage
- Unclassified depressions

#### **VEGETATION**

Most of the surveyed area originally carried a woodland tree cover.

Grey box (*Eucalyptus hemiphloia*) is by far the most important tree of the woodland communities. Where it occurs with other trees, it nearly always dominates, and over larger areas of the heavier soils it is the sole component. Buloke (*Casuarina leuhmanni*) is another widespread associate of grey box. With yellow box it is also a common component of the tree story on some of the coarser soils. It also occurs irregularly but extensively on the heavier Lemnos loam and Goulburn loam soil types.

Murray pine (*Callitro columellais*) with yellow box and buloke, forms a distinct community in which grey box may or may not be present as a minor component. This Murray pine commonly occurs on the coarser textured, but drained soils, viz. Shepparton fine sandy loam, East Shepparton fine sandy loam, and on Youanmite and Katamatite loams.

The forest along the Goulburn River comprises a tree storey composed exclusively of river red gum (*E. camaldulensis*).

Little remains of the original woodland which has been modified to varying degrees by logging, bushfires and grazing. The red gum forest along the Goulburn River is still largely intact, partly because recurrent flooding prevents the land from being used for agriculture and partly because certain sections have been kept as State Forest Reserves.

The present plant cover variously reflects the hand of man. These are annual pastures or subterranean clover (*Trifolium subterranean*), Wimmera rye grass (*Loilium sigidum*), and perennial pastures usually based on perennial rye grass (*L. perenne*) and white clover (*T. rycence*). Paspalum (*Paspalum olilatatum*), Cocksfoot (*Dactylis glamerate*), Lucerne (*Medicago sativa*), and strawberry clover (*T. fragiferum*), and other plants commonly but less widely known. Sorghum millet is grown over small areas for summer fodder. A small proportion of the area is under orchards.

The non-irrigated land carries native or volunteer pastures, or is cropped to cereals. The volunteer pastures comprise mostly annual grasses and herbs, and they vary considerably in composition with Capeweed (*Cryptostemma calendulu*), barley grass (*Hordeum murinem*) and wile geranium (*Erodium* sp.) as widespread components.

Weeds: - Common weeds in the area

- Skeleton weed
- Pattisons curse
- Lemon rush
- Lemon dock
- Nutgrass
- Barley grass
- Wild tomato
- Hérons bill – Erodium species
- Onion weed
- Watercouch grass
- Spotted thistle
- Saffren thistle
- Spear Scotch thistles

### ***Classification and Formation***

#### **Great Soil Groups**

The area lies in the red brown earth zone originally defined by Prescott (1944) and more recently modified by Stephen (1961).

All soils in well drained positions are typical red brown earths (Stephens, 1956); examples among others, are East Shepparton fine sandy loam; Shepparton fine sandy loam and Lemnos loam. Downslope, as drainage becomes restricted, the soils lose their red brown coloration and are common considered to be hydromorphic variants; an example is Goulburn loam.

The lowest and least well drained grey members seem out of place as hydromorphic red-brown earths and are sometimes thought as grey soils of heavy texture. While the heaviest textured of these, Congupna clay, probably approximates to the morphology of a grey soil of heavy texture (Stephens, 1956), Congupna clay loam has a well developed A horizon which seems to excluded it from this great soil group. The A1 and A2 horizons are even more pronounced in Gupna fine sandy loam and this soil type seemingly remains as a hydromorphic variant on present concepts of classification.

#### **Formation**





The principal soil types are formed from fine textured parent materials. Practically all of the material is less than 50 microns and much of it is less than 2 microns. Some of the parent material is know to be riverine and some of it may be parna. But, irrespective of whether the depositions are riverine, aeolian or both, they contain much clay. It is suggested that the various texture profiles, can be explained by eluviation of the parent clay, and that little clay formation by weathering of course particles in situ has taken place.



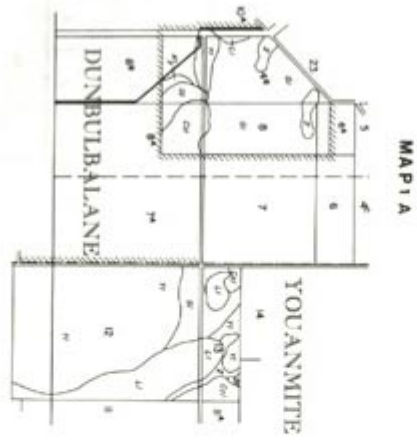
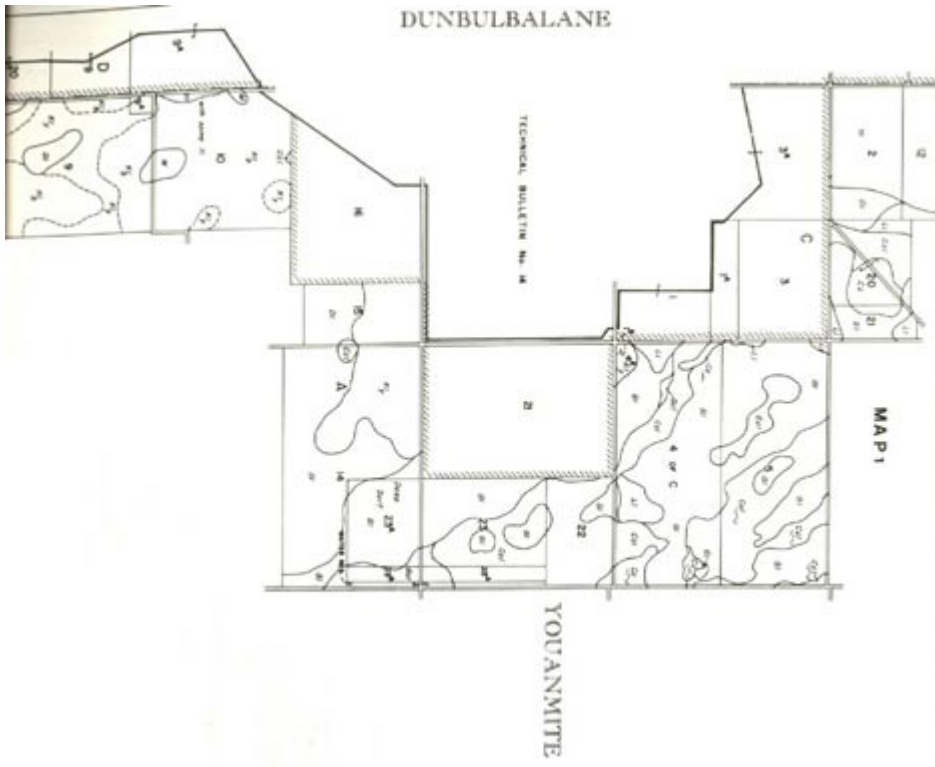
### **Key to Soil Types**

Congupna Clay Loam	C <sub>c</sub> l
Congupna Clay	C <sub>c</sub>
East Shepparton Fine Sandy Loam	E <sub>FSL</sub> l
Dunbulb Loam	Dl
Goulburn Loam	Gl
Goulburn Clay Loam	G <sub>c</sub> l
Grahamvale Sandy Loam	G <sub>s</sub> <sup>r</sup> l
Gupna Fine Sandy Loam	G <sub>FSL</sub> <sup>u</sup> l
Gupna Loam	G <sup>u</sup> l
Katamatite Loam	Kl
Lemnos Sandy Loam	L <sub>s</sub> l
Lemnos Loam	Ll
Orrvale Sandy Loam	O <sub>s</sub> l
Orrvale Loam	Ol
Shepparton Fine Sandy Loam	S <sub>FSL</sub> l
Shepparton Loam	Sl
Youanmite Loam	Yl
Zeerust Fine Sandy Loam	Z <sub>FSL</sub> l
Zeerust Sandy Loam	Z <sub>s</sub> l
Type A	A
Type E	E
Type M	M
Type U	U
Type 2	2

### **Other Symbols**

Deep Surface	DS
Shallow Surface	Sh Surf
Fine Sandy Loam Surface	FSL Suf
Heavy Deep Subsoil	HDSS
Sandy Profile	SP
Unclassified depression	UD
Gilgai	
Swamp Semi-Permanent	
Swamp Permanent	
Channel	

DUNBULBALANE

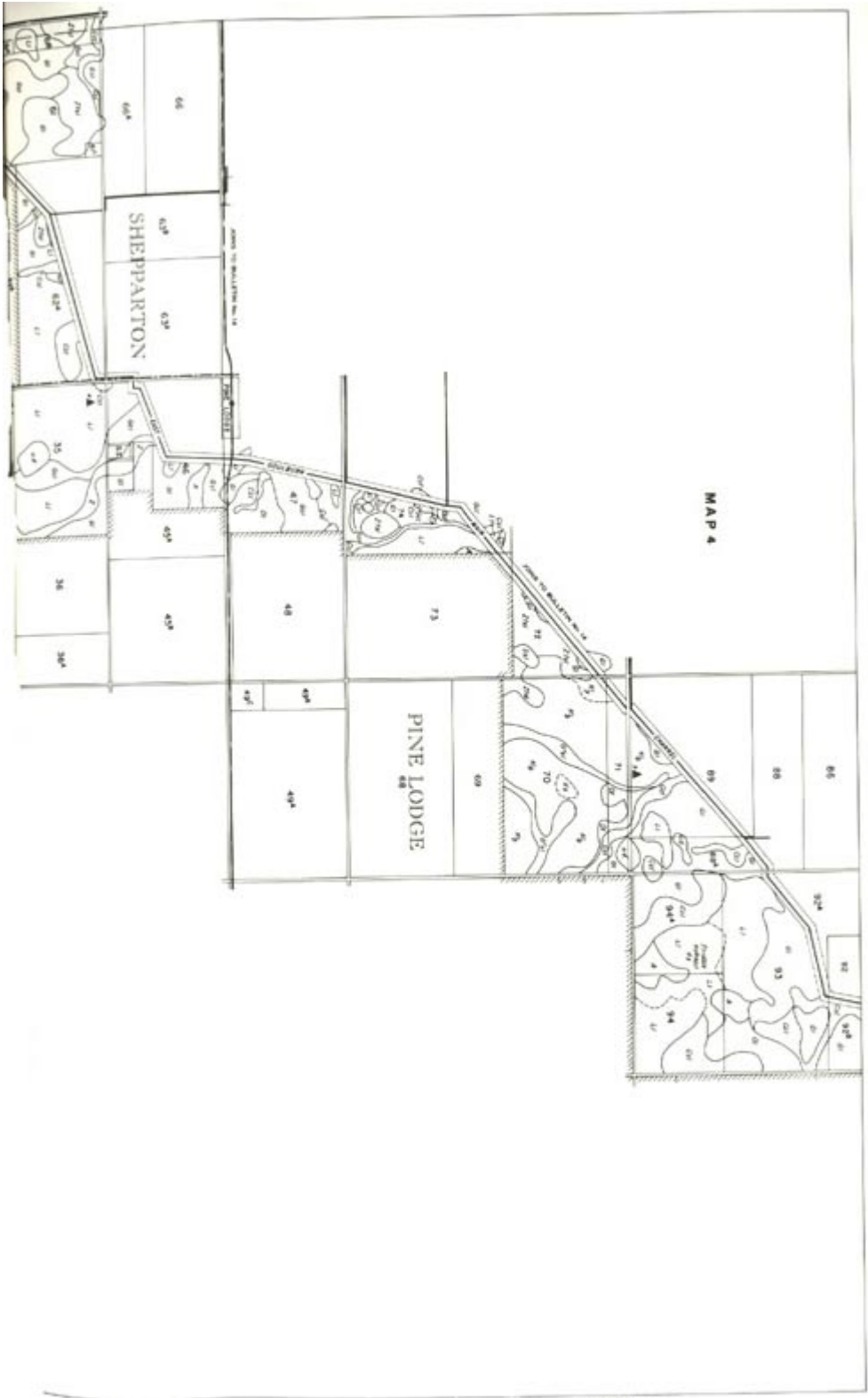




MAP 2



MAP 3



MAP 5



