LANDSCAPE UNITS AND GUIDE TO SOIL TYPES

In this section, the soil types are discussed in relation to major features of the landscape. Seven such features, or landscape units as they are termed here, have been recognised; their distribution is shown in Figure 2.

Each of the landscape units has its own array of soil types. In some of the landscape units, certain of the soil types are related to each other through their positions in slope sequences (toposequences).

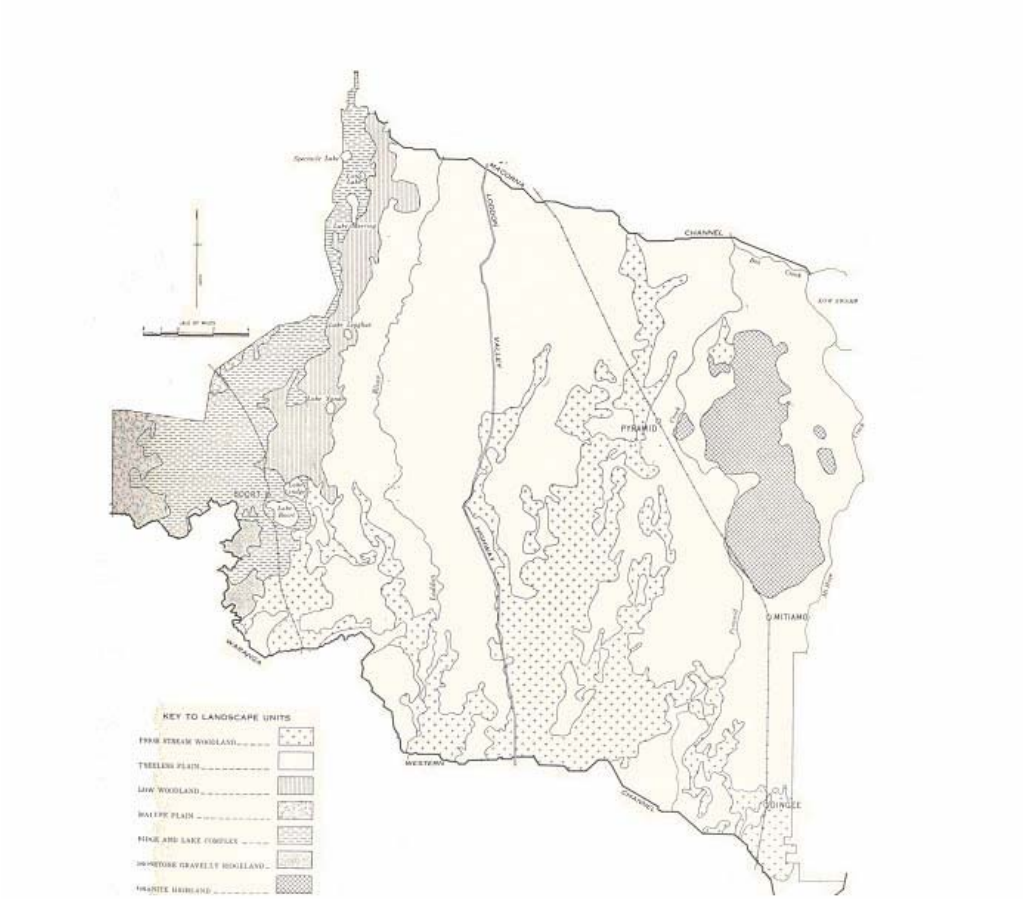

Fig. 2. Landscape Units in the Mid-Loddon Valley Area.

Recurring soil patterns are evident in each of the landscape units. These are the soil associations described in the following section and shown on the Soil Association Map in the envelope at the back of this bulletin. The landscape units and component soil associations, together with their areas, are given in Table 3.

TABLE 3. - Landscape Units and Component Soil Associations.

Landscape Unit	Soil Association	Area Acres
Prior Stream Woodland		136,400
	Yarrowalla	25,800
	Mologa	87,900
	Mysia	22,700
Treeless Plain		355,600
	Fernihurst	180,700
	Macorna	106,800
	Tragowel	68,100
Low Woodland		27,700
	Boort	13,600
	Wandella	14,100
Mallee Plain		9,400
	Marmal	9,400
Ridge and Lake Complex		49,300
	Catumnal	14,800
	Coombatook	7,800
	Woolshed	

Landscape Unit	Soil Association	Area Acres
Ironstone Gravelly Ridgeland		4,800
	Wychitella	4,800
Granite Highland		37,300
	Terricks	37,300
	Total	**620,500**

In the descriptions that follow, the *principal* soil types comprising each landscape unit are shown in italics, the main distinguishing features of the soil types in the unit are given, while in some cases, reference is mad to differences between equivalent soil types in different landscape units.

Prior Stream Woodland

Although much of the timber has been cleared form this unit, sufficient remains to identify its original woodland character. Grey box is easily the dominant species with buloke a minor component. The lighter-textured soils on an near the levees of the prior streams carry yellow box as well as grey box. Black box occupies the more pronounced depressions. The unit is most stongly developed in the south of the area as shown in Figure 2, but the prior streams gradually become weaker passing northward and finally merge into the treeless plain.

Prior stream woodland occurs extensively in other parts of northern Victoria, and many of the associated soil types have been mapped and described in the Murray Valley (Butler et al. 1942, Johnstone 1952) , Goulburn Valley (Skene and Poutsma 1962), Deakin Irrigation Area (Skene 1963), and the Rochester–Echuca district (Skene and Harford 1964) . The soil types associated with the prior streams in the Mid-Loddon Valley have not been recorded previously, although they do have features in common with soil types in similar situation in the prior stream landscapes of the above localities.

Prior stream woodland occurs both to the east and to the west of the Loddon Rive With one exception, the soil types are different

Prior stream woodland east of the Loddon River.—The beds and levees of the prior streams are usually clearly evident. The soil in the beds of the stream channels range from well-drained brown or grey-brown soils with light- and medium-textured profiles (Type 1 to poorly drained grey soils with clayey profile (Type 2). The Type 1 depressions are readily identified as prior stream channels by the brownish colour and the fact that they occur as winding, high-level depressions flanked by levees. The grey Type 2 depressions are not as readily identified, since some act as present day drainage ways, and superficially the channel between the soils resembles Towangurr clay loam. However sandy deposits occur below the clay horizon but usually not before a depth of 6 ft.

The soil types on the levees of the prior streams are Pompapeil sandy loam, *Yarrowalla fine sandy loam* and *Yarrowalla loam*. These are all soil types with brown surface, red-brown clay subsoil, and fine sandy clay and light. textures in the deep subsoil between the 18 in. and 48 in. depths. Pompapeil sandy loam has the lightest profile, and differs from Yarrowalla fine sandy loam in that the red-brown subs, has a light clay instead of a medium clay texture, and the fine sandy textures occur before 24 in. in the profile. The Yarrowalla series has a light phase in which the fine sandy texture; also occur before 24 in., but this phase distinguished from Pompapeil sandy loam by its finer surface texture and heavier subsoil Pompapeil sandy loam is only found where the prior stream levees are strongly developed.

Yarrowalla series occurs much more widely with Yarrowalla loam usually on the more subdued levees as well as on near-flood plain.

Mologa loam is found on near to mid, situations of the prior stream flood plain. It a soil type with a brown surface and red-brown clay subsoil, but unlike Yarrowalla loam has light clay instead of fine sandy textures between the 24 in. and 48 in. depths. Loga clay loam occurs at slightly lower levels in the plain, and is a soil type with a grey-brown to grey surface and yellowish grey-brown heavy clay subsoil. The dull colours and heavier textures distinguish it from Mologa loam. Loga friable clay designates profiles that are strongly structured and friable. It occurs only in gilgaied areas of Loga clay loam.

Lyndger loam occurs on subdued rises where the prior streams merge into the treeless plains to the north of Durham Ox and Pyramid. It occupies a similar place in the landscape to Mologa loam and has similar texture and colour profiles. The main difference is that gypsum occurs below 2 ft. in the profile of Lyndger loam, but is rarely present in Mologa loam. Where Lyndger loam merges with Macorna clay or Fernihurst clay loam on the treeless plains, the only difference between Lyndger loam and these two soil types is the lighter-textured surface of Lyndger loam.

There are some extensive, shallow depressions and superimposed drainage ways on the lowest parts of the prior stream landscape. These form part of the drainage network of the district. Towangurr clay loam and Towangurr clay are the soil types in such situations. These are heavy-textured grey soils with diffusely mottled grey and yellow-grey subsoils.

Prior stream woodland west of the Loddon River.—The principal defined channel-bed is Johnson's Creek, but in some situations the courses of the defunct streams are marked by barely discernible, high level depressions, or by continuous, subdued rises which finally dissipate in the vicinity of Lake Boort.

The soil types on the levee and near-flood plain positions are *Mysia fine sandy loam*, *Mysia loam*, *Lyndger fine sandy loam* and *Lyndger loam*. The Mysia, like the Lyndger series, has brown surface soils, red-brown clay subsoils and light clay deep subsoils, but is distinguished by the absence of gypsum. The two series are intermingled to some extent, but the Mysia series is dominant in the southern part, and the Lyndger in the northern part of the landscape unit. Both series have light deep subsoil variants in which fine sandy clay replaces light clay below 3 ft. in the profile. The Mysia series closely resembles the Mologa series, and the light deep subsoil variant resembles the Yarrowalla series. The principal difference between the Mysia series and these two series is a slightly greater depth of surface soil in the Mysia series.

Myella loam adjoins Mysia loam at slightly lower levels and is distinguished from that soil type by its grey-brown surface and yellowish grey-brown clay subsoil. It corresponds to Loga clay loam in the eastern part of the prior stream landscape.

Grey loam, *clay loam*, and *clay soils* with *yellow-grey clay subsoils*, designated swamp soils Sw2 and Sw3, occur in shallow depressions on this part of the prior stream landscape.

Treeless Plain

This is easily the most extensive landscape unit, and is marked by an almost level plain having but little topographical relief, and practically devoid of trees. However, black box grows in some of the drainage lines. Lignum is associated with most of the low-lying situations which are seasonally inundated. Although included in the treeless plain, the larger areas of lowland associated with the plain in the southern parts of the area carry black box and occasionally red gum.

Toposequences on treeless plain in northern Victoria have been described previously by Skene and Poutsma (1962), Skene (1963) and Skene and Harford (1964), but none of the soil types recorded occurs in the Mid-Loddon Valley area. The toposequences which occur here are the *Macorna clay—Kerang clay—Tragowel clay* catena in the northern parts, and the *Fernihurst clay loam—Kinypanial clay loam—Towangurr clay loam* and *clay* in the southern parts. The soil types of the Macorna catena have been recorded previously by Baldwin et al. (1939) in the adjoining Kerang Irrigation Area.

Macorna clay occurs on only fractionally higher situations than Kerang clay. The types are distinguished by their subsoil colours immediately below the surface, that of Macorna clay ranging from dark red-brown to brown, and Kerang clay from dark grey-brown to dark yellowish grey. In the uncultivated state, Macorna clay has a brown or greyish brown surface, and Kerang clay grey-brown or grey, but the surfaces are very thin and when the soils are cultivated these distinctions are lost. Gypsum occurs deeper in the profile of Kerang clay, the usual depth being about 30 in. compared with 21 in. in Macorna clay.

Tragowel clay occurs on extensive areas of lowland slightly below Kerang clay in the plain. In the virgin state, it has distinctive features such as a conspicuous gilgai surface, and strong structure and friability in the upper part of the profile. These characteristics may be obscured when Tragowel clay is laid out to irrigation, and then its yellow-grey clay profile is superficially like that of the greyer occurrences of Kerang clay. However, the types may be distinguished by the presence of occasional fine concretions of calcium carbonate in the surface 1 ft. of Tragowel clay, and the absence of gypsum in the zone between 2 ft. and 4 ft.

Yando clay is similar to Tragowel clay except that the colour of its profile is yellowish grey-brown.

Passing southward of Pyramid, the Macorna clay–Kerang clay sequence changes gradually to the Fernihurst clay loam–Kinypanial clay loam sequence. Fernihurst clay loam has the same colour profile as Macorna clay, but differs in having 3 in. or more of surface, conspicuous instead of inconspicuous calcium carbonate in the subsoil, and less gypsum. Kinypanial clay loam corresponds to Kerang clay in the same way.

Gilgai puffs which coalesce in places to form wide mounds are associated with both Fernihurst clay loam and Kinypanial clay loam. The soil types on the puffs are *Fernihurst friable clay* and *Kinypanial friable clay*, respectively. Both have strongly structured, friable, clay profiles containing calcium carbonate concretions. Fernihurst friable clay resembles Yando clay in these features and in the colour of its profile, while Kinypanial friable clay resembles Tragowel clay.

Towangurr clay, and less frequently Towangurr clay loam, occupies the low elements of the treeless plain landscape where these are shallow, but defined drainage ways. These two soil types also occur in some broad, extensive depressions at slightly lower levels than Kinypanial clay loam. In other such depressions, the soil type is *Janiember clay*. Like Towangurr clay, its profile is dominated by grey and yellowish grey colours, but its structure is more strongly developed, while the surface soil is moderately friable and a few calcium carbonate concretions may be present. Janiember clay resembles

Wandella clay found in the low woodland landscape unit. The Towangurr and Janiember series do not occur on the plain to the west of the Loddon River. There the *swamp soils Sw2, Sw3* and *Sw4* occur in similar situations.

Low Woodland.

The low woodland landscape unit is confined to a strip of lowland to the north of Boort which carries water northward when the Loddon River is in high flood.

Boort clay and *Wandella clay* are the principal soil types. The former is found only in the vicinity of Boort. It is less subject to inundation than Wandella clay and, where uncleared, carries black box, never red gum. Wandella clay may support either black box or red gum, while lignum is an important associate.

Both soil types are gilgaied, calcareous, and have dominantly grey colour profiles, but the profile of Boort clay is modified by brownish influences, particularly in the deep subsoil, whereas yellow-grey predominates in Wandella clay. The more friable situations of Wandella clay such as the gilgai puffs resemble Tragowel clay.

Swamp soils classified as *Sw4* occur in situations which may remain inundated for a considerable time. The soils are massive grey clays similar to Towangurr clay.

There are some low rises which are not subject to flooding associated with Boort clay. Casuarina grows on these situations. The soil type is *Minmindie clay* which differs from Boort clay in having grey-brown and yellowish grey-brown colours in the profile.

Ridge and Lake Complex.

The ridge and lake complex is conspicuous around Boort and fringes most of the western boundary of the surveyed area. It includes aeolian ridgeland intermingled with terminal drainage basins and their lunettes (see "Geology and Physiography") . The soil associations present are the Catumnal, Coombatook and Woolshed associations. Tree species remaining from the original woodland are grey box, black box, casuarina, mallee and yellow box.

Catumnal loam and *clay loam, Tumnal clay loam* and *swamp soil Sw5* comprise a toposequence in the more subdued part of the landscape unit. The Catumnal series occurs on high plain situations and on low lunettes. These soils have brown surfaces with red-brown clay subsoils and light clay deep subsoils. In these features Catumnal loam resembles the prior stream woodland soil types, Mologa loam and Mysia loam. However, the coarse sand and calcium carbonate components of the profile are higher in Catumnal loam. *Type G* is a minor soil type which occurs with Catumnal loam, but is more sandy. Tumnal clay loam occupies slightly lower levels in the topography than Catumnal loam and is the equivalent of Loga clay loam and Myella loam in the prior stream landscape.

From the vicinity of Lake Meering north-ward, there is a complex array of soils where the undulating sandy mallee landscape meets the riverine plain. The soils of this fringe area form the Coombatook soil association. This includes much unclassified high land, and dry lakes classified as Sw5 swamp soils. *Types A,* B and C form a textural sequence of coarse sandy brown soils on the slopes of the ridges, while *Types D, E,* and F form a textural sequence of more or less sandy grey-brown soils at the base of the slopes. All of these soil types contain appreciable calcium carbonate in their subsoils. *Coombatook sandy loam* and *Coombatook sandy clay loam* occur mainly on broad flats extending from the base of the ridges to the low woodland unit of the riverine plain. The Coombatook series has a brownish grey or grey-brown surface, columnar yellow-grey clay subsoil and calcareous deep subsoil. Coarse sandiness in the surface is typical of both of the Coombatook soil types.

The Woolshed association is the third and most extensive soil association in the ridge and lake landscape unit. The principal soil types are *Woolshed sandy loam* and *Woolshed loam,* although much unclassified ridge and depression land is included in the area defined on the Soil Association Map. The Woolshed series occurs on the higher levels and slopes of the ridgeland. Both soil types have a brown surface, and red-brown light clay or sandy clay subsoil. Similar textures occur in the deep subsoil, together with appreciable calcium carbonate, while frequently soft sandstone is present below a depth of about 5 ft. Coarse sandiness throughout the profile is more pronounced than in Catumnal loam and this, together with the underlying sandstone, are distinguishing features. *Woolappee clay loam* is associated with the Woolshed series, but occurs on lower flat areas. It has a shallow brown surface, dark brown clay subsoil, and light clay deep subsoil passing to soft sandstone. A few ferruginous concretions are present in the profile. Woolappee clay loam is distinguished from Woolshed loam by its heavier texture profile, and from Catumnal clay loam by the presence of ferruginous concretions and, in the deep subsoil, soft sandstone. *Type H* is a minor soil type characteristically with aggregates of ferruginous sandstone on the surface. It is also distinguished from Woolappee clay loam by its deeper and sandier grey-brown surface, and from Woolshed loam by its colour profile.

The drainage basins which occur throughout all of the ridge and lake landscape unit are numerous, and vary from large to small. The lake-bed soils all have grey profiles, but their textures are variable. The soils are grouped collectively as Sw5 swamp soils. Some of these soils resemble Wandella clay and a few situations have been classified as such.

Mallee Plain.

This unit defines relatively small areas in the extreme west where the topography levels out to a plain carrying mallee vegetation. It also delineates the Marmal soil association.

The principal constituent soil types are *Marmal loam, Marmal clay loam* and *Terrappee clay loam.* The soils of the Marmal series have dull brown surface horizons and brown clay subsoils containing calcium carbonate from a depth of 12 in. or earlier. These are distinguishing differences from the Catumnal series in which colours are brighter and calcium carbonate is deeper in the profile.

Terrappee clay loam occupies the lower situations in the mallee plain landscape unit, and is distinguished from Marmal clay loam by its grey-brown surface, and diffusely mottled brownish yellow-grey subsoil. The texture profile, and to some degree the colour profile, of Terrappee clay loam resemble those of Tumnal clay loam, but the amount and distribution of calcium carbonate are different. Calcium carbonate is prominent in Terrappee clay loam from just below the surface, but usually only slight amounts are present between 24 in. and 48 in. in the profile of Tumnal clay loam.

Barraport sandy clay loam is a minor soil type distinguished from Marmal clay loam by its grey-brown and sandier surface horizon.

Ironstone Gravelly Ridgeland.

This, the smallest landscape unit, describes areas to the south-west of Boort, where the ridge component of the ridge and lake landscape unit is mantled with hard, angular fragments of sandstone which are heavily impregnated with iron oxide.

The soil types which comprise the Wychitella soil association are *Wychitella loam* and *Wychitella clay loam.* These are two soil types not to be confused with any of the other recorded soil types. The distinctive features of the Wychitella series are the marked redness of the profile, the ferruginous sandstone fragments, and the presence of sandstone strata at relatively shallow depth.

Granite Highland.

This landscape unit which delineates the Terricks soil association covers the granite hills that rise conspicuously above the riverine plain east of Pyramid.

Granite rock is exposed on some of the higher parts of the unit, but most of the occurrence is mantled by soil. *Terricks sandy loam* and *Terricks sandy clay loam* occur on the upper and intermediate slopes with the former soil type usually, but not invariably, occupying the higher situations. The surface soils of the Terricks series are brown sandy loams and sandy clay loams with a fairly high coarse sand component, the subsoils are red-brown clays, and calcium carbonate appears in the profile below 24 in. approximately. In these features, the Terricks series resembles the Woolshed series. However, the presence of fine quartz gravel in the profile is evidence of granitic parent material in the Terricks series. Also, decomposing granite rock usually occurs before a depth of 72 in.

Sylvaterre sandy clay loam is an associated soil type found in shallow valleys in the granite hills, and on lower slopes merging with the treeless plains. The profile is like that of Terricks sandy clay loam except that the coarse sand and quartz grit components of the profile are less evident and the clay materials of the deep subsoil extend below a depth of 72 in. *Type* K is a grey-brown clay loam soil with a calcareous profile found with Sylvaterre sandy clay loam.