PART VI
ACKNOWLEDGEMENTS, REFERNCES APPENDICES, INDICES

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APPENDIX IA - FURTHER DETAILS OF THE MORPHOLOGY OF THE SOIL GROUPINGS

Soil colours are given Munsell notations and the descriptions of soil structure and consistence follow the system outlined in the USDA Soil Survey Manual 1951.

(1) Lithosol.

The following profile was described near Reed's Look-Out in the Grampians. The site was a rock ledge on the scarp face of a cuesta land-form. Here the elevation is 2,300 feet above sea level, the average annual rainfall is about 35 inches and the plant community is a dry scrub of long leaf box and heath species.

0-1 inches	dark grey (10 YR 3/1 moist) loamy sand moderate, fine, granular soft.
1-6 inches	dark grey (10 YR 4/1 moist) loamy sand weak, medium, granular soft.
6-15 inches	grey (10 YR 511 moist) loamy sand single grain loose.
15 inches	undecomposed sandstone.

The second group of lithosols is found on stony rises on the basaltic plains. The profile given here was described near Dunkeld where the average annual rainfall is 27 inches and a native pasture grows on the stony rise.

0-8 inches	reddish brown (5 YR 3/3 moist) loam moderate, very fine, sub-angular blocky and fine, granular friable.
8 inches	decomposing basalt.

The depth of soil on the stony rise is quite variable.

(2) Nomopodzol.

Distinguishing features of the nomopodzols are first, a zone of accumulation of ferric oxide in the subsoil forming a yellow to light brown B horizon which sharply underlies an A horizon discoloured by the leaching of the ferric oxide. Aluminium oxide, organic matter and clay may also move down the profile and be re-deposited in the B horizon. Second, these soils are base unsaturated throughout resulting in moderate to high degrees of acidity. Other important features are the very coarse textures, the looseness of the sand grains and the lack of aggregates throughout the profile except for loose crumb and blocky peds in the surface horizon where organic matter accumulates. Colours change from dark grey or grey in the A, horizon, through light grey or off-white in the A2 horizon, to yellow, orange or brown in the B horizon. At the base of the profile the texture increases quickly to sandy clay or clay at depths usually greater than three feet and commonly between four and five feet.

The *organo-nomopodzol* has not only a zone of accumulation of ferric oxide in the B horizon but also of organic matter. The zone of organic matter occupies the top few inches of the B horizon forming a B, horizon of dark brown (coffee) sand which is often cemented by the organic matter to form a hardpan called "coffee rock”. Below the "coffee” sand or rock, the B, horizon of yellow, orange or light brown sand extends to greater depths.

The organo-nomopodzol now described was sampled in the parish of Panyyabyr on an outwash slope of siliceous sand below Serra Range in the Grampians. The average annual rainfall is about 24 inches and the land is almost flat. A heath woodland of messmate and apple box with a dense understorey of heath species covers the area.

Profile 242 (see Appendix is for analysis)-

A_1	0-4½inches	brownish grey (10 YR 4/1 moist) loamy sand moderate, very fine, granular and sub-angular blocky soft.
A_2	4½-26 inches	off-white (10 YR 7/3 moist) sand apedal very friable.
B_1	26-28 inches	dark brown or coffee (7.5 YR 3 /2 moist) cemented sand apedal firm.
B_2	28-33 inches	yellowish brown (10 YR 6/4 moist) sand apedal very friable.
B_3	33-51 inches	yellow (10 YR 7/6 moist) sand apedal very friable.
	51 inches	sandy clay.

The *iron nomopodzols* lack coffee rock and so have a B horizon of iron oxide accumulation only. The example given now of the Grampians Plains series was described at the foot of Mt. Difficult Range. The annual rainfall averages about 26 inches and the outwash slope is covered by a dry sclerophyll forest of messmate and brown stringybark with a tall heath layer under the trees.

Profile 249 Grampians Plains series (see Appendix TB for analysis)

A_1	0-3 inches	brownish grey (10 YR 5/2 moist) sand apedal except for very fine, granular peds on root hairs very friable.
A_2	3-12 inches	light brownish grey (10 YR 6/2 moist) sand apedal except for very fine, granular peds on root hairs loose.
A_3	12-24 inches	off-white (10 YR 7/3 moist) sand apedal loose.
B_1	24-36 inches	light yellowish brown (10 YR 6/4 to 5/4 moist) sand apedal loose.
B_2	36-46 inches	dark yellowish brown (7.5 YR 5/6 moist) sand apedal loose.
B_3	46-60 inches	pale brown (10 YR 6/3 to 6/4 moist) sand apedal loose.

Soils of the Grampians Ranges series require some explanation. Most of the dip and scree slopes of the ranges give a superficial impression of having shallow, grey lithosols as pockets of soil between masses of rock pieces. However, road cuttings in the mountains reveal that the soils are deeper than was first thought. They are two rock and soil layers superimposed one over the other. The upper layer, which forms the surface of the mountain slope, consists of abundant pieces of grey sandstone separated and surrounded by a grey, sandy soil. The lower layer is made up of strata of yellow sandstone in situ with yellow clay or clay loam above. At the interface between the two layers is a narrow band of yellowish grey sandy loam or sandy clay loam. It is impossible to give any average figures for the depths of the layers because the thickness of the scree layer and the proximity of the underlying strata to the land surface are extremely variable.

If regarded for purposes of classification as a soil profile, the entire mass has descriptive and analytical features that would classify it as a shallow, rocky variant of the iron nomopodzols. The example described below is located on the dip slope of Serra Range along Green's Gap-road. The average annual rainfall is about 30 inches and the vegetation is a short dry sclerophyll forest of brown stringybark and peppermint.

Profile 245 Grampians Ranges series (see Appendix TB for analysis)---

0-4 inches	grey (10 YR 3/1 moist) loamy sand apedal except for moderate, very fine, granular and sub-angular blocky peds on root hairs loose abundant pieces of sandstone.
4-15 inches	light grey (10 YR 4/1 moist) loamy sand apedal except for fine, granular peds on root hairs loose abundant pieces of sandstone.
15-20 inches	light yellowish brown (10 YR 6/3 moist) loamy sand pedal except for fine, granular peds on root hairs soft abundant pieces of sandstone.
20-28 inches	yellow (10 YR 6/6 moist) sandy loam with clay apedal except for fine, granular peds on root hairs soft abundant pieces of sandstone.
28-33 inches	yellow (10 YR 7/4 to 7/6 moist) sandy clay loam apedal except for fine, granular peds on root hairs soft abundant pieces of sandstone. (Elsewhere the texture of this horizon is often clay.)
33 inches	strata of sandstone in situ.

(3) Leptopodzol.

Leptopodzols are closely related to nomopodzols but their podzolic features are not developed to the same degree. Movement of ferric oxide down the profile is incomplete so that there is no discoloured A, horizon or sharply differentiated B horizon of ferric oxide accumulation. Instead the A2 horizon has a definite colour, usually shades of yellow or brown, which gradually becomes stronger in the B horizon. The profile is base unsaturated and acid throughout but generally not to the same degree as in the nomopodzols. Textures can be sand to loamy sand throughout the profile, in which case the soil is structureless and loose, or the textures may gradually change with depth from a loamy sand at the surface to a friable clay loam or light clay in the deep subsoil with an accompanying improvement in structure to weak, angular and sub-angular blocky peds.

Iron leptopodzols show a partial downward movement of ferric oxide only, and are sands throughout. The following example of the Serra series is found in Victoria Valley on the upper outwash slopes at the foot of Serra Range. It is at a higher position on the same slope as the organo nomopodzol described earlier. The average annual rainfall is about 26 inches and the vegetation is a short dry sclerophyll forest of brown stringybark, messmate and peppermint with an underlying heath layer.

Profile 240, Serra series (see Appendix TB for analysis)-

0-4 inches	light brownish grey (10 YR 6/2 moist) loamy sand weak, very fine, granular and sub-angular blocky, also single grain soft.
4-14 inches	brownish yellow (10 YR 6/6 moist) sand apedal breaking to sub-angular blocky and single grain loose.
14-19 inches	yellow (10 YR 7/6 moist) sand apedal breaking to angular blocky and single grain loose.
19-34 inches	yellow (10 YR 6/8 moist) sand apedal breaking to angular blocky and single grain loose.
34-48 inches	yellow (10 YR 7/6 moist) sand apedal breaking to angular blocky and single grain loose pieces of sandstone abundant.

The following example of the Nekeeya series was described on a lunette of deep sand in the parish of Nekeeya. The vegetation is a heath woodland of manna gum and bracken and the average annual rainfall is 23 inches.

Profile 247, Nekeeya series (see Appendix is for analysis)

0-1½ inches	dark brown (10 YR 3/2 moist) sand apedal breaking to sub-angular blocky very friable.
11-8 inches	dark greyish brown (10 YR 4/2 moist) sand apedal breaking to sub-angular blocky very friable.
8-29 inches	light pinkish brown (7.5 YR 6/4 to 5/4 moist) sand apedal breaking to single grain loose.
29-48 inches	brownish yellow (7.5 YR 6 /6 to 5 /6 moist) sand apedal breaking to single grain loose.
48-60 inches	light brownish yellow (7.5 YR 7/6 to 6/4 moist) sand apedal breaking to single grain loose.

The clay *leptopodzols* show a gradual change in texture down the profile from a loamy sand at the surface to a clay loam or light clay in the subsoil. The Mt. Victory series occurs in the Grampians between Halls Gap and Zumstein's and also on parts of the upper outwash slopes at the foot of the ranges. The following example was described on the Halls Gap-Horsham road near Mt. Victory. The average annual rainfall is about 35 inches and the vegetation is a tall, dry sclerophyll forest of messmate and brown stringybark.

Profile 367, Mt. Victory series (see Appendix is for analysis)-

0-4 inches	greyish brown (10 YR 5/2 to 5/3 moist) loamy sand apedal and sub-angular blocky peds on roots very friable.
4-10 inches	brown (10 YR 514 moist) fine sandy loam apedal and sub-angular blocky peds on roots friable.
10-36 inches	strong brown (7.5 YR 4/4 moist) fine sandy clay loam apedal friable.
36-48 inches	mottles of brownish yellow (7.5 YR 6 /8 wet) and grey (2.5 Y 5 /2 wet) loamy sand to sandy loam apedal friable.

The Illawarra series has a range of colours in the A2 horizon that is characteristic of these soils. The colour is usually strong brown (7.5 YR 5/6 moist and intermediate shades between it and 7.5 YR 4/4, 5/8, 6/6 and 6/8). Also noted were shades of yellowish brown and yellowish red (5 YR 5 /6 to 5 /8). Soil aggregation is superior to that in the Mt. Victory series and granular and sub-angular blocky peds are weakly evident.

The example given here was described and sampled in the parish of Illawarra on the top of a gentle rise where a heath woodland of long leaf box is growing in an area with an average annual rainfall of 21 inches.

Profile 250, Illawarra series (see Appendix is for analysis)-

A_1	0-2 inches	dark brown (10 YR 3/3 moist) gravelly loamy sand weak, fine, granular and single grain very friable.
A_2	2-9 inches	strong brown (7.5 YR 5 /6 to 4/4 moist) gravelly loamy sand weak, fine, granular and single grain very friable.
A_3	9-14 inches	strong brown (7.5 YR 5/6 to 4/4 moist) gravelly loamy sand with clay weak, fine, granular and single grain very friable.

A_4	14-18 inches	strong yellowish brown (7.5 YR 6/6 to 5/6 moist) gravelly sandy clay loam weak, fine, granular and single grain friable.
B_1	18-27 inches	reddish yellow (bet. 5 YR 5 /8 and 7.5 YR 5/8 moist) coarse sandy light clay weak to moderate, fine, sub-angular blocky friable.
B_2	27-41	inches mottles of dark red (10 R 3/6 dry), strong brown (7.5 YR 5/8 dry), white (10 YR 8/2 dry) coarse sandy heavy clay weak, very fine, granular friable.

(4) Podzolic Deep Sand.

Podzolic deep sands are identical to nomopodzols and iron leptopodzols in their texture, lack of structure and loose consistence, but they differ in their colours and pH values both of which suggest less podzolization. The change of colour from cream or off-white near the surface to light yellow in the subsoil suggests that a slight but perceptible downward movement of ferric oxide has occurred. The pH values are much closer to neutral than those in the podzols. In the deep subsoil the clay content increases to give a clayey sand and then a sandy clay.

The profile below was described on an east-west sand dune near the Wimmera River in the parish of Vectis East. The average annual rainfall is 17-11 inches and the soil supports a heath woodland of yellow gum.

Profile 252, series not named (see Appendix is for analysis)-

0-4 inches	greyish brown (10 YR 5 /2 to 412 moist) sand weak, very fine, granular and sub-angular blocky on root hairs, otherwise single grain very friable.
4-24 inches	very pale brown or very pale yellow (10 YR 7/3 moist) sand; apedal breaking to single grain loose.
24-48 inches	pale brown or pale yellow (10 YR 714 moist) sand apedal breaking to single grain loose.
48-60 inches	light yellow (10 YR 7 /6 moist) sand apedal breaking to angular blocky and then to single grain loose.

(5) Solodic Soil.

Solodic soils and solonetzic soils share three characteristic features. They are, first, an A horizon of medium and coarse textures sharply differentiated from a B horizon of heavy clay. Second, the horizon above the clay is bleached and often has nodules of buckshot (iron and aluminium oxides). Third, the exchangeable metal ions in the B, horizon are predominantly magnesium and sodium.

The A horizons of the solodic soils in the survey are generally fine sandy loams although coarse sandy loams, gravelly sandy loams and loams do occur. In some cases the A, and A. horizons are loamy sands. Another feature of the A horizon is its poor structure. There is limited aggregation in the A, horizon where sub-angular blocky and granular peds develop in the root zone of the pasture but the a horizon is structureless. Consistence depends to a large extent on the amount of soil moisture. When dry, the soil is hard and not easy to cultivate although it can be pulverised if sufficient force is exerted. When wet, it again is difficult to cultivate because it is very sticky and builds up into large clods. When the soil is moist, it is friable and easy to work. Many solodic soils have a band of gravel above the clay forming an A, horizon. The gravel is usually secondary ironstone or buckshot, developed in situ above the clay, and it can also be small pieces of fragmented parent rock and quartz.

The change to the clay of the B horizon is sharp and well defined and occurs within one or two inches. Particle size analyses of twelve soils showed that the increase in clay content from the A to the B horizon varied between 22 per cent. and 79 per cent. The structure of the B horizon varies with the moisture content. When drying out, the clay shrinks and cracks giving rise to very hard prismatic and sub-angular blocky aggregates. When wet, the clay swells and becomes tenacious, aggregates lose their identity and the structure changes to weakly developed, very fine angular-blocky peds with a very firm consistence. At all times, the clay is of low permeability to water, although water can move down the cracks that develop when the clay is dry.

Solodic soils are divided into *red, yellow* and *brown* sub-groups according to the predominant colour of the clay. In this survey such a grouping can sometimes be related to a hydromorphic sequence, that is, the red soils occur on the highest and driest sites and the brown soils occur on the lowest and wettest sites, but this is by no means a rule.

The profile description now given refers to a site in the Victoria Valley near Mirranatwa Gap where a brown solodic soil has developed on an alluvial plain at the foot of Serra Range. The average annual rainfall is 27 inches and the vegetation is a savannah woodland of red gum and native grasses.

Profile 278, series not named (see Appendix is for analysis)-

A_1	0-2 inches	very dark greyish brown (10 YR 3/2 moist) fine sandy loam apedal breaking to sub-angular blocky soft.
A_2	2-12 inches	greyish brown (10 YR 4/1 to 4/2 moist) fine sandy loam apedal breaking to angular blocky slightly hard.
A_3	12-16 inches	light greyish brown (10 YR 5/2 moist), bleached when dry (10YR 8/1) fine sandy loam apedal breaking to angular blocky slightly hard.
B_1	16-33 inches	mottles of greyish brown (10 YR 5/2 moist) and strong brown (7.5 YR 516 moist) heavy clay weak, coarse, prismatic, prisms show weak, very fine, angular blocky very firm.
B_2	33-48 inches	mottles of pale brown (10 YR 7/3 to 6/3 moist), dark red (10 R 316 moist) and strong brown (7.5 YR 518 moist) sandy clay weak, very fine, angular blocky firm.

(6) Solonetzic Soil.

This example of the Warratong series was sampled in the Nurrabiel district between two sand dunes. The average annual rainfall is 181 inches and the vegetation is a tall woodland of yellow gum and native grasses.

Profile 283, Warratong series (see Appendix is for analysis)-

A_1	0-2 inches	dark brown (10 YR 2/2 moist) sand apedal breaking to sub-angular blocky soft.
A_2	2-9 inches and 15 inches	greyish brown (10 YR 5/2 moist) sand apedal breaking to angular blocky loose; becoming light grey (10 YR 512 moist) with depth.
B_2	9 and 15 inches-42 inches	columns of yellowish brown (10 YR 5/6 dry) and strong brown (7.5 YR 5 /6 dry) sandy heavy clay apedal very hard.

The following description of an example of the Darracourt series was taken in the parish of Illawarra under a tall woodland of yellow gum and in an area with an average annual rainfall of 21 inches.

Profile 272, Darracourt series (see Appendix is for analysis)-

A_1	0-1 inch	brown (10 YR 4/3 moist) fine sandy loam apedal breaking to sub-angular blocky slightly hard occasional small quartz stones.
A_2	1-3½ inches and 5½ inches	light brown (7.5 YR 6/4 moist) fine sandy loam apedal breaking to angular blocky soft considerable quantities of small quartz stones.
A_3	3½ and 5½ inches-4 and 6 inches	pinkish grey (7.5 YR 7/2 moist) fine sandy loam bleached when dry (7.5 YR 8/1) apedal breaking to angular blocky soft considerable quantities of small quartz stones.
B_1	4 and 6 inches-20 inches	yellowish brown (10 YR 5/6 dry) heavy clay weak, medium, prismatic, prisms show weak, medium, sub-angular blocky very hard.
B_2	20-30 inches	mottles of yellowish red (5 YR 5/6 dry) and light yellowish brown (10 YR 6/4 dry) clay moderate, very fine, angular blocky hard calcium carbonate as marl.

(7) **Red-Brown Earth.**

This example of a red-brown earth was sampled near the Western Highway in the parish of Drung Drung. The area is a flat depositional plain almost totally cleared and used for wheat growing and it has an average annual rainfall of 18 inches.

Profile 280, series not named (see Appendix is for analysis)-

A_1	0-1 inch	brown (7.5 YR 4/2 moist) fine sandy loam apedal with sub-angular blocky peds on root hairs slightly hard.
A_2	1-4½ inches and 6½ inches	reddish brown (5 YR 4/4 moist) fine sandy clay loam apedal breaking to angular blocky hard.
A_3	4½ and 6½ inches-5 and 7 inches	pinkish grey (5 YR 7/2 moist) fine sandy clay loam bleached when dry (5 YR 8/1) apedal breaking to angular blocky hard.
B_1	5 and 7 inches-1 5 inches	dark red (2 - 5 YR 3 /6 dry) heavy clay strong, medium prismatic, prisms show weak, medium, sub-angular blocky hard.
B_2	15-21 inches	brown (7.5 YR 5/4 dry) clay weak. very fine, angular blocky slightly hard.

B_3	21-48 inches	light yellowish grey (2.5 Y 6/2 to 6/4 dry) clay weak, very fine, angular blocky slightly hard calcium carbonate as marl.

(8) Acidic Brown Clay.

The following gilgai complex was described and sampled on a treeless basaltic plain in the parish of Karabeal between Dunkeld and Cavendish. The average annual rainfall is 24 inches. Scattered nodules of buckshot are found throughout those soils of the group that have formed on basalt.

Profile 277, series not named (see Appendix is for analysis)

Shelf

0-2 inches	dark brown (10 YR 3/2 moist) clay loam apedal with moderate, fine, sub-angular blocky peds on root hairs slightly hard some buckshot nodules.
2-7inches	dark brown (10 YR 3 /2 moist) clay loam apedal breaking to sub-angular blocky hard some buckshot nodules.
7-12 inches	brown (10 YR 5/3 to 4/3 moist) clay apedal breaking to sub-angular blocky hard some buckshot nodules.
12-24 inches	brown (10 YR 5/3 to 4/3 moist) clay apedal hard some buckshot nodules.
24-40 inches	mottles of dark grey (10 YR 4/1 dry) and red (2.5 YR 4/8 dry) clay apedal very firm.

Profile 276, series not named (see Appendix is for analysis)

Puff

0-6 inches	dark greyish brown (10 YR 4/2 to 3/2 moist) clay moderate, fine and medium, sub-angular blocky slightly hard some buckshot nodules.
6-24 inches	brown (10 YR 4/4 dry) clay moderate, coarse, prismatic, prisms are apedal very hard scattered buckshot nodules.
24-36 inches	light olive-brown (2.5 Y 5/4 moist) clay moderate, very fine, angular blocky very firm.
36 inches	decomposing basalt.

(9) Brown Soil of Heavy Texture.

These two profiles were described on a flat depositional plain in the parish of Nurrabiel near the headwaters of Darragan Creek. The average annual rainfall is 18 inches and the area is covered with a woodland of buloke and grey box.

Profile 264, series not named (see Appendix ID for analysis)

Shelf

0-2 inches	dark greyish brown (10 YR 4/1 to 3/2 moist) clay loam moderate, medium, sub-angular blocky hard.
2-20 inches	greyish brown (10 YR 4/1 moist) clay weak, coarse, prismatic, prisms show moderate, medium, sub-angular blocky very firm.
20-30 inches	light brown (10 YR 6/3 moist) clay weak, very fine, angular blocky firm.
30-60 inches	light yellowish grey (5 Y 6/3 moist) clay weak, very fine, angular blocky firm calcium carbonate as marl and nodules.

Profile 263, series not named (sec Appendix is for analysis)

Puff

0-3 inches	light grey (5 Y 511 moist) clay; 0-1, inch strong, very fine, granular (self-mulching), ½ - 3 inches strong, very fine and fine, sub-angular blocky loose calcium carbonate nodules abundant.
3-30 inches	grey (5 Y 5/2 moist) clay strong, coarse, prismatic, prisms show weak, fine, sub-angular blocky firm calcium carbonate nodules and marl abundant and then becoming less frequent with depth.
30-60 inches	light yellowish grey (5 Y 6/3 moist) clay weak, very fine, angular blocky friable occasional nodules of calcium carbonate.

(10a) Gilgaied Grey Soil of Heavy Texture.

This gilgai complex was described and sampled on a flat depositional plain in the parish of Bungalally in an area with an average annual rainfall of 18 inches.

Profile 260, series not named (see Appendix is for analysis)-

Shelf

0-2 inches	dark grey (10 YR 4/1 moist) clay moderate, medium and fine, sub-angular blocky slightly hard.
2-28 inches	dark grey (10 YR 4/1 moist) clay strong, medium, prismatic, prisms show medium, angular blocky hard.
28-42 inches	light yellowish brown (10 YR 6 /3 moist) clay; moderate, very fine, angular blocky friable calcium carbonate marl.
42-60 inches	light yellowish grey (5 Y 6/3 moist) clay moderate, very fine, angular blocky friable.

Profile 259, series not named (see Appendix is for analysis)-

Puff

0-3 inches	grey (10 YR 511 moist) clay strong, medium to fine, sub-angular blocky soft calcium carbonate nodules.
3-36 inches	grey (10 YR 511 moist) clay strong, medium, prismatic, prisms show fine and medium, angular blocky hard calcium carbonate nodules.
36-60 inches	light grey (10 YR 5/2 moist) clay, becoming light yellowish grey (5 Y 6/3 moist) with depth moderate, very fine, angular blocky friable calcium carbonate nodules and marl.

(10b) Non-Gilgaied Grey Soil of Heavy Texture.

This soil was described and sampled on the margin of a swamp on a basaltic plain in the parish of Willaura. The average annual rainfall is 21 inches.

Profile 268, series not named (see Appendix is for analysis)-

0-9 inches	dark grey (2.5 Y 4/2 moist) clay weak, fine, sub-angular blocky at 0-1 inches and weak, very fine, angular blocky at 1-9 inches firm occasional buckshot nodules.
9-18 inches	grey (2.5 Y 5/2 moist) clay apedal firm occasional buckshot nodules.
18-32 inches	yellowish grey (2.5 Y 5/2 to 6/4 moist) clay apedal very firm.
32-48 inches	olive-brown (2.5 Y 5/4 to 4/4 moist) clay apedal very firm occasional small coatings of calcium carbonate.

(11) Meadow Soil.

The following example of a meadow soil was described on the margin of a swamp in the parish of Parrie Yalloak where the average annual rainfall is 23 inches. The regional topography is a slightly undulating alluvial plain.

Profile 271, series not named (see Appendix is for analysis)-

0-3	inches black (10 YR 2 /1 moist) clay loam moderate, very fine and fine, granular friable.
3-10 inches	black (10 YR 2/1 moist) clay weak, medium, prismatic, prisms apedal firm.
10-36 inches	finely mottled yellow (10 YR 6/6 wet) and dark grey (2.5 Y 4/0 wet) clay moderate, fine, angular blocky slightly sticky.
36-60 inches	coarsely mottled yellow (10 YR 6/6 wet) and light grey (5 Y 6/1 wet) clay moderate, very fine, angular blocky slightly sticky.

Free water at 54 inches.

APPENDIX IB - SOIL ANALYTICAL METHODS

All analytical results have been expressed in terms of the oven-dry soil passing through a 2 mm sieve, except that of gravel, which is shown as a percentage of the air-dry field sample.

Electrical conductivity (E. C. WC.)-A 1:5 soil-water suspension was shaken for one hour and the conductivity was measured with a "Philips" conductivity bridge and dip cell. A 0.005 M. potassium chloride solution at the same temperature as the soil suspensions was used to standardise the dip cell.

Soil reaction (pH)-This was determined in the above suspension with a "Jones" Model M glass electrode pH meter.

Chloride ion (Cl^-)-The electrometric silver nitrate titration of R. J. Best was used, as described by Piper (1942).

Particle size analysis-The plummet balance method described by Hutton (1956) was employed, with removal of organic matter and carbonates where necessary. The coarse and fine sand were separated from the finer fractions by hand decantation as described by Piper (1942). The "International" system of size fractionation was employed, i.e., coarse sand 2 mm-0.2 mm, fine sand 0.2 mm-0.02 mm, silt 0.02 mm-0.002 mm, clay < 0.002 mm.

Calcium carbonate ($CaCO_3$)-Carbonate ion was determined by a manometric procedure described by Martin and Reeve (1955). Results are reported as calcium carbonate.

Organic carbon (Org. C) - The method used was the wet combustion technique of Walkley and Black, as in Piper (1942). No recovery factor has been applied to the results listed, but in calculating carbon nitrogen ratios the factor 1.3C : N was used.

Total nitrogen (N.)-Nitrogen was determined by the semi-micro Kjeldahl method described by Metson (1956), in which a finely ground sample of soil weighing 0.2-0.5g is digested in concentrated sulphuric acid with selenium catalyst, and the ammonia recovered by distillation in a "Markham" still.

Free iron oxide (Fe_20_3)-The method of Haldane (1956) was employed, in which a finely ground sample of soil is extracted with an oxalic acid-ammonium oxalate buffer solution containing powdered zinc, and the ferrous ion in the treated extract is titrated with standard potassium dichromate solution.

Available phosphorus (Av.P) - Extractions were made with Truog's solution (ammonium sulphate-sulphuric acid at pH = 3.0) at a soil : water ratio of 1 : 100, by shaking the suspension for 30 minutes. After filtration, phosphorus was determined in a "Unicam SP600" spectrophotometer by the molybdenum-blue method, with stannous chloride as the reducing agent. Readings were taken 20 minutes after colour development.

Hydrochloric acid extract-The extract was prepared by boiling 4 g of soil with 20 ml of concentrated hydrochloric acid for four hours with refluxing, with subsequent filtration and dilution to 200 ml. Phosphorus was determined on a aliquot of this extract by a colorimetric method (molybdenum-blue) with ascorbic acid as the reducing agent (Hutton et al. personal communication). Absorbance measurements were made with a "Unicam SP600" spectrophotometer at wavelength 825 mu. Potassium was determined by flaming a portion of the extract (suitably diluted) in a "Lange" flame photometer.

Exchangeable cations-Non-calcareous samples were treated by the method of Hutton and Bond in (unpublished data) in which ammonium chloride is used as the leaching agent for the individual cations, and cation exchange capacity is determined by subsequent leaching of the ammonium ion in saturated soil with sodium sulphate.

Sodium and potassium were determined by direct flaming of the ammonium chloride leachate in the "Lange" flame photometer, and calcium and magnesium by titration with E.D.T.A. (Diamino-ethane-tetra-acetic acid disodium salt) with Eriochrome Black T as a visual indicator for calcium plus magnesium, and Murexide as indicator in the calorimetric titration for calcium, in an "Eel Titrator." Ammonium ion in the sodium sulphate leachate was determined by the Nessler method, and chloride ion by electrometric titration. The difference between these two gave the cation exchange capacity.

For calcareous soils the method of Tucker (1954) was used, which utilises a leaching solution of normal ammonium chloride in 60 per cent ethanol of pH 8.5 to restrict the solubility of calcium and magnesium carbonates. Leachates were evaporated to dryness and re-dissolved in distilled water to remove the ethanol and excess ammonia before determining the individual cations as above.

Analytical Data for Individual Soil Profiles

In the particle size analysis, the figures for gravel are expressed as a percentage of the air dry field sample and the figures for coarse sand, fine sand, silt and clay are expressed as a percentage of the oven-dry fine earth sample. Figures for calcium are expressed as a percentage of the oven dry fine earth sample. An asterisk for chloride means the value of <0.005%. For field textures, s = sandy, S = sand, l = loamy, L = Loam,. C = clay, gr = gravelly. A blank space means that no determination was made

Soil Grouping	Horizon	Depth of Sample	Field Texture	Particle Size Analysis: gravel	coarse sand	fine sand	silt	clay	$CaCO_3$	pH	Cl	org. C	Total N	Total P	Total K	Exchangeable Cations, m. equiv. %: Ca	Mg	K	Na	Total Exchange Capacity	% of T.E.C.: Ca	Mg	K	Na	H
		ins.		%	%	%	%	%	%		%	%	%	%	%										
Organo nomopodzol																									
Profile 242 ..	A_1	0–3	lS	0	16	75	5	4	..	4·9	0·001	2·0	0·06	0·003	0·03	1·0	0·3	0·06	0·01	3·5	29	9	2	..	60
	A_2	12–26	S	0	17	77	2	1	..	5·1	0·001	..	..	0·002	0·02	0·1	0·08	0·01	0·01	0·3	33	27	3	3	34
	B_1	26–28	S	0	17	72	3	6	..	5·8	0·002	1·1	0·06	0·003	0·04	0·1	0·4	0·05	0·09	7·7	1	5	1	1	92
	B_2	28–33	S	0	18	75	3	3	..	6·2	0·001	..	..	0·002	0·02	0·2	0·3	0·04	0·03	1·3	15	25	5	5	50
Profile 243 ..	A_1	0–1½	lS	0	31	60	3	4	..	4·7	0·002	2·3	0·09	0·004	0·02	1·6	0·4	0·09	0·02	5·5	29	7	2	..	62
	A_2	12–22	S	0	36	59	3	1	..	5·0	*	..	..	0·001	0·01	0·2	0·01	0·01	0·01	0·3	66	3	3	3	25
	B_1	33–50	S	0	31	59	3	5	..	5·1	0·001	0·6	0·03	0·002	0·03	0·1	0·1	0·03	0·01	3·0	3	3	1	..	93
	B_2	50–60	S	0	30	65	2	1	..	5·8	0·001	..	..	0·001	0·01	0·1	0·06	0·01	0·01	1·0	10	6	1	1	82
Iron nomopodzol																									
Profile 249 ..	A_1	0–3	S	0	54	40	3	4	..	5·4	0·001	0·8	0·03	0·002	0·02	0·6	0·3	0·06	0·3	3·1	19	10	2	1	68
Grampians ..	A_3	12–24	S	0	54	42	4	0	..	5·2	0·001	0·08	0·01	0·001	0·01	0·06	0·2	0·02	0·02	0·6	10	33	3	3	50
Plains series ..	B_1	24–36	S	0	54	40	2	3	..	5·4	0·001	..	..	0·003	0·02	0·04	0·2	0·03	0·03	0·5	8	40	6	6	40
	B_3	46–60	S	0	59	37	2	2	..	4·6	0·001	..	..	0·003	0·03	0·02	0·2	0·03	0·03	0·6	3	33	5	5	55
Profile 245 ..	..	0–4	lS	9	29	57	5	7	..	5·0	0·001	1·9	0·06	0·004	0·08	0·8	0·5	0·07	0·06	5·3	15	10	1	1	73
Grampians ..	..	15–20	lS	9	26	59	9	7	..	5·3	0 001	0·5	0·02	0·005	0·12	0·02	0·4	0·06	0·05	2·3	1	17	3	2	77
Ranges series ..	..	28–33	sCL	4	24	51	7	19	..	5·5	0·001	..	..	0·008	0·23	0·02	0·8	0·1	0·08	3·1	1	26	3	3	67
Iron leptopodzol																									
Profile 240 ..	A	0–4	lS	0	17	75	2	7	..	5·1	0·002	2·0	0·06	0·003	0·03	1·4	0·3	0·07	0·02	5·9	24	5	1	..	70
Serra series ..	B_1	6–14	S	0	18	76	3	4	..	5·6	0·001	0·3	0·01	0·002	0·03	0·2	0·09	0·03	0·01	1·1	18	8	3	1	80
	B_4	34–48	S	10	21	73	3	4	..	6·5	0·001	..	..	0·002	0·03	0·2	0·3	0·04	0·01	0·9	22	33	4	1	40
Profile 247 ..	A_1	0–1½	S	0	67	27	2	4	..	6·0	0·003	1·3	0·09	0·008	0·03	2·9	0·9	0·1	0·02	4·5	64	20	2	..	14
Nekeeya ..	A_3	8–12	S	0	76	22	1	1	..	6·2	0·001	0·1	0·01	0·003	0·01	0·5	0·1	0·03	0·02	0·9	55	10	5	5	25
series ..	B_1	29–36	S	0	78	20	1	1	..	6·5	*	..	..	0·003	0·02	0·5	0·1	0·02	0·02	0·6	83	16	2	2	0
	B_2	48–60	S	0	86	14	0	0	..	6·7	*	..	..	0·003	0·01	0·3	0·06	0·01	0·01	0·5	60	10	5	5	20

Soil Grouping	Horizon	Depth of Sample	Field Texture	Particle Size Analysis: gravel	coarse sand	fine sand	silt	clay	$CaCO_3$	pH	Cl	org. C	Total N	Total P	Total K	Exchangeable Cations: m. equiv. %: Ca	Mg	K	Na	Total Exchange Capacity	% of T.E.C.: Ca	Mg	K	Na	H
		ins.		%	%	%	%	%	%		%	%	%	%	%										
Clay leptopodzol																									
Profile 367 ..	A_1	0–4	lS	3	16	66	6	8	..	4·8	0·006	1·9	0·07	0·005	0·05	1·6	0·8	0·3	0·05	11·8	14	7	3	1	76
Mt. Victory series ..	A_2	6–10	sL	1	14	63	7	16	..	5·0	0·004	0·8	0·04	0·005	0·12	0·6	0·5	0·2	0·05	7·8	8	6	3	1	83
	A_3	18–24	sCL	5	12	56	5	25	..	4·8	0·006	..	..	0·008	0·22	0·3	1·0	0·3	0·05	9·3	3	1	3	1	93
	C	36–48	sL	0	16	67	4	12	..	4·8	0·004	..	..	0·006	0·16	0·1	0·7	0·1	0·05	5·9	2	12	2	1	84
Profile 250 ..	A_1	0–2	gr, lS	11	49	36	5	10	..	4·9	0·004	1·7	0·08	0·006	0·01	0·1	0·1	0·01	0·01	5·4	2	2	..	..	96
Illawarra ..	A_2	6–9	gr, lS	31	45	38	4	10	..	5·6	0·002	0·4	0·02	0·004	0·01	0·1	0·8	0·01	0·06	2·9	3	28	..	2	61
series	A_4	14–18	gr,sCL	22	43	30	7	20	..	6·2	0·001	..	..	0·006	0·12	0·08	2·4	0·2	0·1	4·1	2	59	5	2	32
	B_2	27–41	sC	17	44	9	3	44	..	6·3	0·003	..	..	0·006	..	0·02	5·3	0·3	0·1	7·4	..	72	4	1	23
Podzolic deep sand																									
Profile 252 ..	A_1	0–4	S	0	60	37	2	1	..	6·1	0·001	0·4	0·03	0·002	0·02	1·8	0·1	0·04	0·01	2·6	69	4	2	..	25
	A_2	12–24	S	0	70	29	1	0	..	6·7	*	0·04	0·00	0·001	0·00	0·4	0·08	0·02	0·01	0·5	80	15	3	2	0
	B_2	48–60	S	0	64	37	0	0	..	6·4	*	..	..	0·001	0·01	0·3	0·1	0·02	0·01	0·6	50	16	3	2	29
Solodic soil																									
Profile 278 ..	A_1	0–2	sL	0	6	73	12	8	..	5·4	*	1·1	0·08	0·005	0·05	1·1	0·6	0·2	0·01	4·2	26	14	5	..	55
(alluvium) ..	A_3	12–16	sL	2	8	73	14	10	..	5·8	*	0·1	0·01	0·003	0·02	0·2	0·4	0·06	0·05	0·9	20	45	5	5	25
	B_1	16–24	C	1	6	49	9	36	..	5·6	*	..	..	0·004	0·24	1·3	6·8	0·6	0·9	12·6	10	54	5	7	24
	B_3	48–60	sC	0	7	59	5	27	..	5·2	0·001	..	..	0·004	0·18	0·9	4·0	0·3	0·9	9·6	9	42	3	9	37
Profile 258 ..	A_1	0–3	L	0	10	48	20	17	..	6·3	0·003	2·0	0·13	0·010	0·07	3·1	2·6	0·3	0·2	7·5	41	35	4	3	17
(on basalt)	A_3	10–13	grL	34	24	46	18	11	..	6·7	0·001	0·4	0·03	0·009	0·05	1·0	1·2	0·06	0·3	3·0	33	40	2	10	15
	B_1	13–21	C	5	3	11	2	79	..	6·7	0·012	..	..	0·008	0·29	4·1	12·3	0·3	3·2	24·3	17	51	1	13	18
	B_3	40–48	C	12	4	13	3	75	..	5·8	0·045	..	..	0·005	0·21	2·9	12·0	0·3	4·1	21·1	14	57	1	19	9
Solonetzic soil																									
Profile 283 ..	A_1	0–2	S	1	78	14	1	3	..	6·2	0·006	1·2	0·06	0·003	0·03	2·0	0·5	0·08	0·06	4·0	50	13	2	2	23
Warratong series ..	A_2	6–9, 15	S	0	73	22	3	1	..	6·6	*	0·2	0·01	0·002	0·01	0·5	0·1	0·04	0·1	1·0	50	14	5	10	25
	B_1	9, 15–24	sC	0	47	17	3	32	..	6·6	0·008	..	..	0·005	0·30	..	..	..	..	..	..	..	..	..	..
Profile 272 ..	A_1	0–1	sL	10	14	61	12	8	..	6·4	0·012	3·3	0·10	0·009	0·13	4·1	1·6	0·4	0·05	7·7	53	21	5	1	20
Darracourt series ..	A_2	1–4, 6	sL	23	13	68	13	7	..	6·0	0·002	1·2	0·02	0·004	0·09	0·9	0·7	0·2	0·1	3·5	26	20	6	3	45
	B_1	4, 6–12	C	4	4	22	10	62	<0·1	7·5	0·070	..	..	0·008	0·61	3·5	11·7	0·8	5·8	..	16	54	4	26	0
Red-brown earth																									
Profile 280 ..	A_1	0–1	sCL	1	19	46	11	19	<0·1	6·5	0·001	2·3	0·19	0·020	0·36	7·9	3·8	1·2	0·6	15·8	50	24	8	4	14
	A_2	1–5, 7	sCL	1	20	49	15	14	<0·1	6·8	0·001	0·7	0·07	0·013	0·26	4·4	2·6	0·1	0·6	8·5	52	31	1	7	9
	B_1	5, 7–15	C	0	7	21	4	63	<0·1	7·1	0·152	..	..	0·011	1·02	9·6	2·4	1·6	9·0	32·8	29	7	5	27	32
	B_3	36–48	C	0	6	19	6	53	8·2	8·7	0·330	..	..	0·012	1·04	9·2	13·7	2·1	11·6	..	25	37	6	32	0

Soil Grouping	Horizon	Depth of Sample	Field Texture	Particle Size Analysis					$CaCO_3$	pH	Cl	org. C	Total N	Total P	Total K	Exchangeable Cations: m. equiv. %					Exchangeable Cations: % of T.E.C.				
				gravel	coarse sand	fine sand	silt	clay								Ca	Mg	K	Na	Total Exchange Capacity	Ca	Mg	K	Na	H
		ins.		%	%	%	%	%	%		%	%	%	%	%										
Acidic brown clay																									
Profile 277 (Shelf)	..	0–2	CL	4	13	39	22	24	..	5·8	0·002	3·0	0·22	0·016	0·13	4·1	4·0	0·5	0·4	13·7	30	29	4	3	34
	..	7–12	CL	4	19	37	23	20	..	6·4	*	0·5	0·05	0·010	0·09	1·7	2·5	0·1	0·5	6·9	25	36	1	7	31
	..	24–40	C	12	20	28	12	40	..	7·5	0·004	..	..	0·011	0·18	3·2	6·2	0·2	3·2	14·7	22	42	1	22	13
Profile 276 (Puff) ..	..	0–3	C	22	20	37	16	24	..	6·0	0·002	1·9	0·14	0·016	0·12	3·0	3·8	0·6	0·4	12·2	25	31	5	3	36
	..	6–12	C	10	6	13	9	68	..	6·7	0·004	0·8	0·08	0·008	0·31	7·8	15·7	1·0	3·4	33·0	24	48	3	10	15
	..	24–36	C	7	8	16	8	68	..	6·6	0·028	..	..	0·009	0·65	7·1	15·0	0·8	4·5	31·0	23	48	3	15	11
Brown soil of heavy texture																									
Profile 264 (Shelf)	..	0–2	CL	0	21	26	12	37	<0·1	6·6	0·019	1·8	0·15	0·012	0·36	10·5	7·4	1·0	1·5	21·2	50	35	5	7	3
	..	6–12	C	0	20	23	10	43	<0·1	7·6	0·030	0·4	0·04	0·006	0·41	14·3	8·9	0·8	3·7	25·3	52	32	3	13	0
	..	20–30	C	0	17	20	10	48	0·1	8·5	0·134	..	..	0·005	0·46	21·7	10·4	0·8	6·5	..	55	26	2	17	0
	..	48–60	C	0	12	12	10	54	6·6	9·0	0·180	..	..	0·006	0·49	24·3	12·6	0·8	8·6	..	52	27	2	19	0
Profile 263 (Puff) ..	..	0–3	C	0	16	14	8	54	1·1	8·5	0·003	0·5	0·05	0·009	0·62	32·9	10·1	1·7	0·8	..	72	22	4	2	0
	..	6–12	C	0	11	13	7	60	1·5	9·2	0·002	0·2	0·03	0·007	0·62	20·9	13·7	1·5	3·2	..	53	35	4	8	0
	..	24–30	C	2	12	14	8	62	1·8	9·4	0·037	..	..	0·007	0·66	28·2	13·3	1·5	8·4	..	55	26	3	16	0
	..	48–60	C	0	11	13	10	60	0·6	9·0	0·136	..	..	0·005	0·48	28·1	13·4	1·1	11·5	..	52	25	2	21	0
Gilgaied grey soil of heavy texture																									
Profile 260 (Shelf)	..	0–2	C	1	8	44	9	37	<0·1	7·0	0·003	1·2	0·10	0·011	0·28	10·5	8·4	1·0	1·4	23·0	46	37	4	6	7
	..	6–12	C	1	11	48	7	29	<0·1	8·0	*	0·4	0·03	0·005	0·28	10·0	6·9	0·7	2·1	19·8	50	35	4	11	0
	..	28–36	C	0	3	28	9	47	5·4	8·4	0·292	..	..	0·006	0·55	17·5	13·1	1·4	10·2	..	41	31	3	24	0
	..	48–60	C	0	2	24	9	59	0·1	8·4	0·361	..	..	0·005	0·52	14·8	15·4	1·3	12·1	..	34	35	3	28	0
Profile 259 (Puff) ..	..	0–3	C	0	5	33	7	46	1·3	8·5	0·006	1·3	0·13	0·010	0·55	32·0	8·0	1·6	0·3	..	76	19	4	1	0
	..	6–12	C	1	4	28	7	50	4·4	9·3	0·009	0·5	0·05	0·008	0·55	27·0	12·0	1·1	0·6	..	67	29	3	1	0
	..	24–36	C	5	3	24	7	54	5·4	9·4	0·064	..	..	0·008	0·58	17·0	13·0	1·3	10·0	..	38	33	3	26	0
	..	48–60	C	0	3	26	8	54	7·8	9·2	0·223	..	..	0·006	0·35	15·0	12·0	1·3	10·0	..	38	31	3	28	0
Non-gilgaied grey soil of heavy texture																									
Profile 268 ..	..	0–3	C	17	11	43	17	24	<0·1	7·0	0·014	0·7	0·06	0·013	0·34	5·4	3·9	0·9	1·6	11·6	46	33	8	13	0
	..	9–12	C	12	6	28	13	48	<0·1	8·2	0·072	..	..	0·019	1·16	4·5	9·5	1·8	6·4	..	20	43	8	29	0
	..	18–24	C	7	6	23	6	59	<0·1	8·6	0·126	..	..	0·011	0·67	5·0	13·8	3·0	8·9	..	16	45	10	29	0
	..	32–48	C	10	2	9	1	80	2·1	9·2	0·168	..	..	0·009	1·48	6·9	16·7	4·2	11·3	..	18	43	11	29	0
Meadow soil																									
Profile 271 ..	..	0–3	CL	0	7	22	22	41	<0·1	6·1	0·166	5·5	0·58	0·021	0·55	16·7	11·8	2·3	3·8	39·2	43	30	6	10	11
	..	6–10	C	0	12	40	11	35	<0·1	7·0	0·058	1·4	0·18	0·006	0·43	10·7	6·8	1·3	2·4	22·2	48	31	6	11	4
	..	24–36	C	0	8	23	4	59	<0·1	8·0	0·44	..	..	0·008	0·94	11·1	10·3	2·2	6·5	..	37	34	7	22	0
	..	48–60	C	7	11	30	9	46	0·1	9·0	0·072	..	..	0·006	0·30	9·1	8·4	1·2	4·9	..	39	36	5	20	0

APPENDIX IIA - THE COMMON NAMES, SCIENTIFIC NAMES AND AUTHORITIES OF SPECIES OF NATIVE PLANTS RECORDED IN THE GRAMPIANS SURVEY

Eucalypts.

Apple box	*Eucalyptus aromaphloia,* L. D. Pryor and J. H. Willis.
Black box	E. *largiflorens, F.* Muell.
Blue mallee	*E. fruticetorum,* F. Muell.
Brown stringybark	*E. baxteri,* Maiden and Blakely.
Grampians gum	*E. alpina,* Lindl.
Grey box	*E. hemiphloia,* F. Muell.
Kamarooka mallee	*E. froggattii,* Blakely.
Long leaf box	*E. goniocalyx,* F. Muell, ex Miq. (formerly *E. elaeophora)*
Manna gum	E. *viminalis,* Labill.
Messmate	*E. obliqua,* L'Herit.
Mountain grey gum	E. *cypellocarpa,* L. Johnson (formerly *E. goniocalyx)*
Peppermint	*E. vitrea,* R. T. Baker.
Peppermint box	*E. porosa,* F. Muell. ex Miq.
Red gum	E. *camaldulensis,* Dehn,
Red stringybark	*E. macrorrhyncha,* F. Muell.
Swamp gum	*E. ovata,* Lab.
Yellow box	*E. melliodora,* A. Cunn.
Yellow gum	*E. leucoxylon,* F. Muell.

Other trees.

Black wattle	*Acacia mollissima,* Willd.
Blackwood	A. *melanoxylon,* R. Br.
Buloke	*Casuarina luehmanni,* R. T. Baker.
Drooping sheoke	*G. stricta,* Ait.

Common shrub species in the heath layers of the heath, scrub, Mallee, heath woodland and dry sclerophyll forest sub-formations.

Acacia, spike	*Acacia oxycedrus,* Sieb,
Banksia, desert	*Banksia ornata,* F. Muell.
Banksia, silver	B. *marginata,* Cav.
Beard-heaths	*Leucopogon spp.*
Bracken	*Pteridium esculentum* (Forst. f.) Makai.
Broombush	(see broom honey-myrtle)
Bush-Peas	*Pultenaea spp.*
Cypress Pine	*Callitris rhomboidea,* R.Br. (ex L. C. Rich.).
Fringe-myrtle, common	*Calytrix tetragona,* Labill.
Fringe-myrtle, Grampians	C. *sullivanii, F.* Muell.
Grass-tree, austral	*Xanthorrhoea australis* R.Br.
Grass-tree, small	*X. minor* R.Br.
Guinea-flowers	*Hibbertia spp.*
Guinea-flower, twiggy	H. *virgata* R.Br.
Hakea, beaked	*Hakea rostrata,* F. Muell.
Hakea, silky	H. *sericea,* Schrad.
Heath, common	*Epacris impressa,* Labill.
Heath, daphne	*Brachyloma daphnoides,* Bth.
Heath, flame	*Astroloma conostephioides,* F. Muell.
Honey-myrtle, broom	*Melaleuca uncinata,* R.Br.
Honey-myrtle, cross-leaf	M. *decussata,* R.Br.
Parrot-peas	*Dillwynia spp.*
Sheoke, slaty	*Casuarina muelleriana* Miq.
Tea-tree, prickly	*Leptospermum juniperinum,* Sm.
Tea-tree, shiny	*L. nitidum,* Hook. f.
Tea-tree, silky	L. *myrsinoides,* Schlech.
Tea-tree, woolly	L. *lanigerum* (Ait.) Sm.

Understorey species in the wet sclerophyll forest.

Clematis	*Clematis aristata* R.Br.
Coprosma, rough	*Coprosma hirtella,* Labill.
Correa, hairy	*Correa aemula,* F. Muell.
Fishbone fern	*Blechnum nudum* (Labill.) Mett. ex Luerss.
Pomaderris, hazel	*Pomaderris apetala,* Labill.
Shield-fern, common	*Polystichum aculeatum* (L.), Schott.
Tree-Fern, soft.	*Dicksonia antarctica,* Labill.

Grasses.

Brome grasses	*Bromus spp.*
Kangaroo grass	*Themeda australis* (R.Br.) Stapf.
Spear Grasses	*Stipa spp.*
Tussock grass	*Poa caespitosa,* G. Forst.
Wallaby grasses	*Danthonia spp.*

Sedges.

Bristle-rush, black	*Chorizandra enodis,* Lehm.
Rapier-sedge, black	
Sword-sedge, clustered	

APPENDIX IIB - CLASSIFICATION OF NATIVE VEGETATION IN THE GRAMPIANS SURVEY.

Structure		Floristics	
Formation	Sub-Formation	Alliance	Association
Grassland . .	Grassland	*Danthonia – Stipa – Bromus* species	*Danthonia–Stipa–Bromus* species
Heath	Heath	*Leptospermum juniperinum–Banksia marginata*	*L. juniperinum–B. marginata–Xanthorrhoea minor* *L. juniperinum* *Melaleuca decussata*
		Banksia ornata	*B. ornata–B. marginata*
		Leptospermum nitidum–Calytrix sullivanii	*L. nitidum–C. sullivanii*
Scrub	Wet	*Melaleuca decussata*	*M. decussata*
	Dry	*Eucalyptus alpina–E. goniocalyx*	*E. alpina* *E. goniocalyx* *E. alpina–E. goniocalyx* *E. goniocalyx–E. baxteri* *E. baxteri*
Mallee	Dry	*E. fruticetorum–Melaleuca uncinata*	*E. fruticetorum–E. froggattii–M. uncinata* *E. fruticetorum–E. porosa–M. uncinata* *E. fruticetorum–M. uncinata*
Woodland	Heath	*E. baxteri–E. obliqua–E. aromaphloia*	*E. baxteri* *E. baxteri–E. obliqua* *E. baxteri–E. aromaphloia* *E. baxteri–E. obliqua–E. aromaphloia* *E. baxteri–E. obliqua–E. aromaphloia–E. vitrea* *E. obliqua–E. aromaphloia–E. vitrea* *E. obliqua–E. aromaphloia* *E. obliqua–E. vitrea* *E. aromaphloia–E. vitrea* *E. aromaphloia* *E. obliqua*
		E. baxteri–B. ornata	*E. baxteri–B. ornata*
		E. leucoxylon–E. aromaphloia	*E. leucoxylon* *E. leucoxylon–E. melliodora* *E. aromaphloia*
		E. viminalis–Pteridium esculentum	*E. viminalis–P. esculentum*
		E. goniocalyx	*E. goniocalyx–E. leucoxylon* *E. goniocalyx–E. melliodora* *E. goniocalyx*
	Short	*E. goniocalyx–E. macrorrhyncha*	*E. goniocalyx–E. macrorrhyncha* *E. goniocalyx–E. leucoxylon* *E. goniocalyx–E. melliodora* *E. goniocalyx–E. macrorrhyncha–E. leucoxylon* *E. goniocalyx–E. macrorrhyncha–E. melliodora*

Structure		Floristics	
Formation	Sub-Formation	Alliance	Association
	Savannah	*E. camaldulensis–E. melliodora–E. aromaphloia*	*E. ovata* *E. melliodora* *E. camaldulensis* *E. camaldulensis–E. melliodora* *E. camaldulensis–E. melliodora–E. aromaphloia* *E. camaldulensis–E. melliodora–Casuarina stricta* *E. melliodora–E. leucoxylon–E. aromaphloia–C. stricta* *E. melliodora–E. leucoxylon–E. goniocalyx–C. stricta* *E. aromaphloia–E. camaldulensis–E. melliodora–E. leucoxylon* *E. aromaphloia–E. camaldulensis–E. goniocalyx* *E. aromaphloia–E. camaldulensis–E. obliqua* *E. aromaphloia–E. melliodora–E. obliqua*
		Casuarina luehmanni	*C. luehmanni*
		E. largiflorens	*E. largiflorens*
Woodland	Shrub	*E. melliodora–Acacia mollissima*	*E. melliodora–E. leucoxylon–A. mollissima* *E. melliodora–E. leucoxylon–E. aromaphloia–A. mollissima* *E. melliodora–E. aromaphloia–E. camaldulensis–A. mollissima* *E. camaldulensis–E. melliodora–A. mollissima*
	Tall	*E. hemiphloia–C. luehmanni*	*E. hemiphloia–C. luehmanni* *E. hemiphloia–E. largiflorens–C. luehmanni*
		E. melliodora–E. leucoxylon–E. hemiphloia	*E. melliodora* *E. leucoxylon* *E. hemiphloia* *E. melliodora–E. leucoxylon–E. hemiphloia* *E. melliodora–E. leucoxylon* *E. hemiphloia–E. leucoxylon*
		E. camaldulensis	*E. camaldulensis* *E. camaldulensis–E. melliodora* *E. camaldulensis–E. leucoxylon* *E. leucoxylon–E. melliodora–E. camaldulensis* *E. leucoxylon–E. melliodora–E. hemiphloia–E. camaldulensis*
Sclerophyll Forest	Dry	*E. baxteri–E. obliqua–E. goniocalyx*	*E. baxteri* *E. obliqua* *E. baxteri–E. obliqua* *E. baxteri–E. goniocalyx* *E. obliqua–E. goniocalyx* *E. baxteri–E. obliqua–E. goniocalyx* *E. baxteri–E. vitrea* *E. obliqua–E. vitrea* *E. baxteri–E. obliqua–E. vitrea*

Structure		Floristics	
Formation	Sub-Formation	Alliance	Association
Sclerophyll Forest	Dry	*E. obliqua–E. aromaphloia*	*E. aromaphloia* *E. obliqua–E. aromaphloia* *E. obliqua–E. aromaphloia–E. vitrea* *E. obliqua–E. aromaphloia–E. baxteri* *E. baxteri–E. aromaphloia* *E. baxteri*
		E. baxteri	*E. baxteri* *E. baxteri–E. obliqua* *E. baxteri–E. obliqua–E. aromaphloia*
		E. ovata	*E. ovata* *E. ovata–E. obliqua* *E. ovata–E. obliqua–E. viminalis*
	Wet	*E. cypellocarpa–E. obliqua*	*E. cypellocarpa–E. obliqua*

APPENDIX III - LAND-USE CLASSES.

Forms of land-use required to bring land to, or maintain it in its most productive state. (Classification is according to the known potential of the land under average management).

LAND CLASS.

1. Land suitable for cropping without the need for erosion control measures.
2. Land suitable for cropping, but in need of erosion control measures
   - (A) no mechanical works are needed, but broad rotations (e.g. pasture for at least three years out of five) and/or special cultivation practices (e.g., stubble mulch) are required.
   - (B) in need of the use of the contour principle, namely contour cultivation alone or together with closed banks or graded banks and waterways.
3. Land suitable for grazing without the need for erosion control measures.*
4. Land Suitable for grazing but in need of erosion control measures
   - (A) can be ploughed for pasture improvement and can be contour banked, furrowed, or ripped.
   - (B) cannot be ploughed but can be surface-worked for pasture improvement and can be contour furrowed or ripped.
5. Land suitable for strictly controlled grazing where no mechanical erosion control measures can be undertaken and a vegetative cover must be carefully maintained.
6. Land not suitable for agricultural production because of roughness, stoniness, wetness, dryness, infertility or extreme erosion hazard.

* Not suitable for cropping because of unfavourable soils, topography, surface conditions, or climate. e.g., On the stony rises stone outcrops prohibit cultivation. Some heavy soils are not suited to cropping because of climatic limitations.