

Report on Soils of areas proposed for Warracknabeal Dairying Project

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This report concerns an area which has been covered by soil survey of approximately 1,750 ac, comprising Allotments 16, 16A, 27A, 18, 89 and parts of Allotments 17, 68, 92 and 96, Parish of Werrigar, County of Borung.

If possible it is desired to select a portion of the area for the investigation of pastures suitable for dairying. A limited amount of water would be made available by the State Rivers and Water Supply Commission for a dairy block with the object of augmenting Warracknabeal's fresh milk supply.

The area is immediately adjacent to the town, has been cleared and at present is either under crop or unimproved pasture. It originally carried black box, mallee and casuarinas.

Five soil types designated Types A, B, C, D and E are recorded and a soil map showing their distribution accompanies this report. The descriptions of the soil types are given in Appendix 1 and analytical data in Appendix 2.

General Features of the Soils

There are low rises of brown soils which carried mallee, gum and casuarina before clearing. These soils belong to the Mallee or solonised brown soils group, although they also have some of the morphological features of the red-brown earths. Types A, B and C in this group of soils, Type C occupying the lower situations and differing principally from Type B in the colour of the soil profile. Whilst these two soil types are of light texture (sandy loam or sandy clay loam) at the surface, this is usually less than 6 in deep and the subsoil is fairly heavy, although exhibiting a sandy influence which would assist permeability to water. Type A is rather lighter, often being sand to 10 inches and then light clay. These soil types all contain moderate amounts of calcium carbonate in both soft and concretionary forms in their subsoils below 2 feet.

The analytical data describes that Types A, B and C are moderately alkaline on the surface but quickly become highly alkaline in the subsoil. The subsoils contain moderate quantities of salt – usually between 0.126 and 0.226 – in each of the 1-2 feet, 2-3 feet and 3-4 feet horizons.

Most of the area is flat, originally carried black box and consists of heavy profile soils. These are Types D and E.

Type D has a clay surface texture and a heavier clay subsoil. Lime is present in the subsoil and sometimes gypsum. The soil profile is moderate alkaline in the surface few inches and then highly alkaline in the subsoil. The salt status of the profile is moderate, most values recorded being between 0.15% and 0.24% at each foot depth from 1 foot to 4 feet. There is some evidence from surface water

at the time of the survey that the soil profile of this soil type has poor permeability. Some situations are deeply crabholey.

Type E is a grey soil which may be compared with the friable, grey clay soils of the Wimmera. Limestone concretions occur throughout the soil profile which absorbs water readily. The profile tends to be highly alkaline throughout and to moderately saline, although somewhat less so than Type D. Crabholes are normal to the type but deep occurrences are few in the situations surveyed.

Relation of the Soils to Irrigation

Probably all the soil types could be put to irrigation successfully except situations marked as deeply crabholey. These occur almost entirely in Type D. This soil type also is the least attractive because of suspected poor permeability to water. On the other hand, Type A occupies rises which may be difficult to command, and also is less desirable as an irrigation soil because of its sandy surface.

Types B (and Type C) and E are widely different in their characteristics, but either should be capable of supporting good pastures under irrigation. Probably Type E is to be preferred, because heavy soils of good structure such as this type has, are capable of greater production than most light textured soils. On the other hand, because of higher situations and absence of crabholes, Type B would be easier to lay out to irrigation and to provide drainage facilities. Factors of accessibility and co-operation of the landholder will need to be considered also and may well influence the choice of site for the project.

All the soil types possess some degree of salinity, and care will be necessary in the application of irrigation water and in providing drainage to prevent salinity troubles. However, this is a question of management over ever present in irrigation projects, and particularly on these Mallee soils and grey and brown soils of heavy texture.

Appendix 1 – Description of the Soil Types

Type A

0-6 inches	Brown loamy sand or sandy loams.
6-20 inches	Reddish brown light or medium clay.
20-30 inches	Brown medium clay with calcium carbonate.
30-40 inches	Mottled brown and yellow-grey light clay with moderate soft calcium carbonate and rubble.

Type B

0-5 inches	Brown to grey-brown sandy clay loam.
5-24 inches	Reddish brown or brown medium clay.
24-30 inches	Brown medium clay with calcium carbonate.
30-40 inches	Mottled brown and yellow-grey medium clay with moderate soft calcium carbonate and rubble.

Type C

0-5 inches	Grey-brown sandy loam or sandy clay loam.
5-14 inches	Grey-brown medium clay.
14-30 inches	Brown heavy clay with calcium carbonate.
30-40 inches	Mottled brown and yellow-grey medium clay with decreasing calcium carbonate.

Type D

0-4 inches	Grey-brown to brownish grey light clay.
4-18 inches	Yellowish brown heavy clay with slight calcium carbonate.
18-27 inches	Brown medium clay with light calcium carbonate. Mottled yellow-grey and brown sodium clay with decreasing calcium carbonate, sometimes with gypsum.

Type E

0-18 inches	Grey clay with slight calcium carbonate concretions; friable.
18-27 inches	Yellowish grey heavy clay with slight calcium carbonate.
27-40 inches	Brownish yellow-grey heavy clay with slight calcium carbonate, sometimes with gypsum.

Appendix 2

Table 1 – Sodium Chloride in the Soil at various locations (See Soil Map)

Depth (ft)	Type A				Type C		
	7	10	14	18	20	21	17
0-1	-	-	0.005	-	-	-	-
1-2	0.180	-	0.023	0.070	-	-	0.130
2-3	0.100	-	0.120	0.120	0.170	0.190	-
3-4	0.160	0.140	0.110	0.090	0.190	0.190	-

Depth ft	Type B					
	3	5	13	15	16	23
0-1	0.058	0.127	-	-	0.010	-
1-2	0.200	-	0.10	0.220	0.093	-
2-3	0.170	-	0.230	0.220	0.150	0.180
3-4	0.160	-	0.200	0.160	-	-

Depth (ft)	Type D								
	1	4	8	9	11	12	23	24	27
0-1	0.016	0.080	0.070	0.012	0.040	0.017	-	-	-
1-2	0.043	-	0.210	0.230	0.170	0.120	0.180	0.003	0.160
2-3	0.030	0.220	0.210	0.170	0.170	-	0.220	-	0.370
3-4	0.180	0.220	0.230	0.190	0.150	0.240	0.240	-	-

Depth (ft)	Type E					
	2	19	22	26	28	29
0-1	0.016	0.020	-	0.040	-	0.050
1-2	0.080	-	0.140	0.130	0.080	0.140
2-3	0.110	0.100	0.160	0.270	-	0.160
3-4	0.150	0.110	-	0.250	-	0.180

Table 2 – Location of the Soil Types

Type A		Type D	
Depth (in)	Loc. 14	Depth (in)	Loc. 1
0-5	7.6	0-12	9.2
5-18	9.5	12-24	9.6
24-36	9.6	24-36	8.4
36-48	9.7	36-48	7.9

Type B				
Depth (in)	3	5	Depth (in)	Loc. 16
0-4	7.6	7.8	0-8	7.1
4-12	8.4	9.0	8-20	9.0
12-24	8.3	-	20-30	9.2
24-36	8.4	-	30-36	9.3
36-48	9.0			

Type E			
Depth (in)	Loc. 2	Depth (in)	Loc. 19
0-12	8.8	0-6	8.7
12-24	9.2	-	-
24-36	9.0	24-36	9.3
36-48	8.2	36-48	9.3