Soils Section
Department of Agriculture

Soil Survey Report No. 22
18th October, 1954.

Report on Soils of Proposed Soldier Settlement area, Murtoa

By J. K. M. Skene, Senior Chemist (Soil)

Soil survey of an area of 1,702 acres (689 hectares), in the Murtoa district, comprising Allotments 20, Part 21, 22, 23, 27, 59, 61 and 62, Parish of Ashens, has been completed. This area has been selected by the Soldier Settlement Commission with the object of establishing several dairy farms in the area. Irrigation water will be available from the Wimmera-Mallee Scheme through the Kollallac channel, a spur from the Taylor's Lake outlet.

Topography and Vegetation

The area concerned is in undulating country of extensive high plains, slopes, local rises and lower plains. The difference in elevation in some places may be considerable, the higher plains falling away to much lower levels. Such is the case in the western section of the area, where a relatively high plain occupying most allotment 27 falls away gradually to much lower levels tot he east of this allotment.

A low rise, 20 chains (402 metres) or more in width, extends from the extreme southern boundary of the area to about the southern boundary of allotment 21.

An undulating plain of intermediate levels is enclosed by the boundaries of allotment 23 and the north-western section of allotment 21.

Large, generally shallow, gilgai occur over most of the area although, in places, these have been obscured by cultivation.

Most of the area has been cleared for cultivation of cereals but originally carried woodland for buloke, grey box, black box and a hybrid variety of the last two known locally as bastard box. The buloke and grey box are found principally on the higher levels of brown soils, and the black box and bastard box on the lower-lying grey soils.

General Soil Characteristics

The soils have developed from unconsolidated sediments and belong to the soil group of red-brown earths and grey soils of heavy texture.

Five soil types have been recorded. One, Horsham friable clay, has been found previously in the Horsham district; while four are unnamed and are referred to as Types A, B, C and D.

Generally, the higher areas are dominated by brown soils and the lower areas by grey, but this is not invariable. Grey soils occur on the slopes, but usually in intimate mixture with brown soils. It has not been possible, at the scale of mapping used, to separate the soil types in these mixed associations, consequently much of the area is shown as a complex of soil types. Two such complexes are shown on the soil map, viz., a Type A – Type C complex in which the brown soils predominate, and a Type B – Type C complex in which the grey soils tend to dominate the brown.

The brown soils, Types A and B are red-brown earths. The surface textures are relatively light compared with that of the subsoil, i.e. sandy clay loams or sandy clay over heavy clay, but the depth of surface is usually fairly shallow (5 inches (12.7 cm) or less). The surface soils set very hard when dry, a characteristic associated with their gritty nature. Calcium carbonate occurs in the subsoil but not in the surface.

Type C is a grey, heavy profile soil found only in association with Types A and B. This is a more attractive soil then these types, but nevertheless it has a somewhat gritty influence in the surface which confers an inferior structure compared with that of the other grey soils, Type D and the Horsham friable clay. Type C is calcareous only in the subsoil.

Horsham friable clay and Type D are typical Wimmera "black" soils, sometimes called "chernozem-like". Both are calcareous and heavy textured throughout the profile, although the friable nature of the surface, particularly in the Horsham friable clay, confers "self mulching" properties which counteract the adverse properties of the clay content. Both soil types occur on the relatively lower situations within the area. Type D has some browner soils within its limits.

Description of Soil Types

Mr J. D. Anderson who carried out the soil survey describes the soil types and soil associations as follows:

Type A – Type C Complex

Brown soils (Type A) predominate over the grey soils (Type C). The situation is one of high plain and slopes, as well as local rises.

There is an uneven micro-relief which changes considerably. The pattern may be one of shallow depressions and crests, each about 20 ft (6.1 metres) in diameter, with differences of a few inches in elevation. Another formation shows mounds possibly several feet in height and 1-2 chains (20-40 metres) in diameter, with accompanying depressions. The depressions coalesce in places, as may also the crests to form extended areas of several chains width. The patterns described are found under the varying topographical situations associated with the Type A – Type C complex.

The profiles of the two components of this complex are described below.

Type A

0-5 inches (0-13 cm)	Brown to grey brown sandy clay loam
5-15 inches (13-38 cm)	Dark brown medium clay, sometimes with a sandy influence
15-27 inches (38-69 cm)	Yellowish brown slightly calcareous medium clay.
27-48 inches (69-122 cm)	Mottled yellow-brown and yellowish grey, slightly calcareous medium clay with slight concretionary calcium carbonate.
48-84 inches (122-213 cm)	Light yellowish grey, with odd yellow-brown mottling, calcareous medium clay.

Type C

0-3 inches (0-8 cm)	Dark grey light or medium clay with a sandy influence which sometimes reaches sandy clay.
3-15 inches (8-38 cm)	Dark brownish grey medium clay.
15-27 inches (38-69 cm)	Yellowish grey-brown, slightly calcareous medium clay.
27-60 inches (69-152 cm)	Greyish yellow-brown, slightly calcareous medium clay; some fine concretions of calcium carbonate.

Type B – Type C Complex

Brown soils (Type B) are subordinate to the grey soils (Type C). This complex is closely associated with the Type A – Type C complex and occurs on a similar topography, but at slightly lower levels.

The gilgai pattern of these soils is usually rather subdued, and does not reach the proportions in either size or height differences found in the gilgai of the Type A – Type C Complex.

Type C is described above. Type B differs only to a small degree from Type A; its average profile is described below.

Type B

0-4 inches (0-10 cm)	Dark grey-brown to brown sandy clay
4-15 inches (10-38 cm)	Greyish yellow-brown medium clay
15-30 inches (38-76 cm)	Greyish yellow-brown, slightly calcareous medium clay with pockets of calcium carbonate
30-60 inches (76-152 cm)	Greyish yellow-brown slightly calcareous medium clay
60-84 inches (152-213 cm)	Mottled light yellowish grey and yellow-brown medium clay.

Erosion under intense cultivation appears to have changed the texture of the surface soils from sandy loam or sandy clay loam to sandy clay or even heavier texture.

Type D

Although this is a grey soil some brown soils may occur in the areas defined; these occur as low crests of weekly defined gilgais of about 20 ft (6 m) diameter.

Type D is found in most aspects, but most usually at lower levels than the soil complexes.

The average profile is as follows:

0-5 inches (0-13 cm)	Dark grey, somewhat friable medium clay, sometimes with fine concretions of calcium carbonate.
5-15 inches (13-38 cm)	Dark grey, slightly calcareous medium clay.
15-39 inches (38-99 cm)	Brown grey, passing to yellowish grey-brown, slightly calcareous medium clay with slight calcium carbonate concretions.
39-64 inches (99-163 cm)	Light brownish grey, slightly calcareous medium clay with slight calcium carbonate concretions.
64-84 inches (163-213 cm)	Diffusely mottled light brownish grey and grey, calcareous, medium clay.

The profiles of the brown soils associated with this type are variable, but most exhibit slight to moderate friability in the surface, and in this differ from Types A and B.

Horsham Friable Clay

This soil type is found on the lower plains. The surface is faintly gilgai but the effect has probably been reduced by cultivation. The profile varies but little from the crest to the shelf – there is no apparent depression – and shows the following features:

0-12 inches (0-30 cm)	Dark grey, slightly calcareous, very friable clay with a few calcium carbonate concretions.
12-24 inches (30-61 cm)	Dark grey, slightly calcareous, medium clay with increased calcium carbonate accumulation at 18-24 inches (46-61 cm).
24-36 inches (61-91 cm)	Mottled dark grey and light brownish grey strongly calcareous medium clay.
36-84 inches (91-213 cm)	Light brownish yellow-grey, slightly calcareous medium clay with a few concretions of calcium carbonate.

Unclassified Soils

One area of unclassified soils has been mapped in a situation of low plain between rises. Here sandy accumulations appear to have been deposited by wind action over Horsham friable clay or Type D. The generalised profile is sandy loam over calcareous medium clay.

Soil Salinity

The percentage of salt (sodium chloride) found at the 2-3 feet (0.6-0.9 m) zone in the soil is shown on the soil map for each location examined.

The pattern of salt distribution in the subsoils is erratic. The highest value found was 0.49% in Type D and there are several situations in this soil type showing values above 0.3%. However, there are many much lower values also. The situation is similar in the Horsham friable clay.

In general, salt values are lower in the areas mapped as complex although a number of values are between 0.2% and 3%.

Whilst the overall salinity status of the soils is fairly good, there are situations of potential hazard in some of the low-lying situations of Horsham friable clay and Type D. This would make provision for removal of surface drainage water imperative.

Extent of Soil Types

The areas of the individual soil types in each of the three separate ownerships are shown on the soil map and in the following table:

Area (Acres) of Soil Types

Ownership	A-C Complex	B-C Complex	Type D	Horsham Friable Clay	Unclassified	Total
Allotments 22 23	118	41	 127	 185		159 312
Allotments 20 Part 21	84	27	 60	 239		111 299
Allotments 27 59 61 62	402	50	 271	 65	 32	452 368
Total	604	118	458	489	32	1,701

Irrigation Potential of the Area

The Horsham friable clay has characteristics which should make it an attractive soil for irrigated pastures. Cereals, clovers and grasses do well under natural rainfall while irrigated pastures are excellent.

Type D should also be a suitable soil for irrigated pastures.

The area of sandy surface soil (unclassified) in allotment 61 can be considered suitable for irrigation.

The Horsham friable clay and Type D naturally have a more or less gilgai micro-relief, but this has largely been obliterated by cultivation for cereals. Experience has shown that much soils can be graded satisfactorily for irrigation.

The need for drainage has been referred to previously and, provided a satisfactory investigation can be attained, the above soils can be recommended for the irrigation of permanent pastures.

The soils of the complexes are unattractive for irrigation. On the brown soils Types A and B, native pastures are relatively poor, while growth of cereals is conspicuously inferior. Growth is better on Type C, but still doesn't compare well with that supported by Horsham friable clay.

The surface soils of Types A and B, and, to a lesser extent Type C, are shallow and have a gritty nature. The shallowness would be a disadvantage when grading, possibly resulting in exposure of the subsoil in places, while the texture imparts a concrete-like consistency to the soils when dry. The infiltration characteristics of the brown soils are visualised as poor. This opinion is supported by Mr A. Morgan, Senior Irrigation Officer, who has experience with these soils under irrigation. In his opinion, such soils are not suitable for irrigated permanent pastures, but could be best developed under irrigation using Wimmera rye grass and subterranean clover.

The general undulating nature of the topography of the area raises the question of accessibility and suitability for irrigation lay-out. Some of the rises in the Type A – Type C complex are isolated and probably not commendable, but these areas are likely to be large in the aggregate. Some slopes in the complexes are also greater than desirable for soils of poor absorptive capacity as these appear to be. Whilst these disadvantages are probably not serious when considered alone, they do add to the overall unattractiveness of the soil complexes.

The utilisation as a whole of the Type A – Type C and Type B – Type C complexes cannot be recommended for permanent pastures. The individual Type C occurrences could be recommended, but these are mostly intermingled with the inferior Type A and Type B. However, Type C does tend to occupy the perimeter of the complexes. In so-far as these situations could be used, the area of recommended soils would be increased.

On the basis of the above considerations the ownership incorporating allotments 27, 59, 61 and 62 would provide very little useful area. It seems that development would need to be restricted to the 2 northern ownerships. These together would give 611 acres of recommended soil types. It is understood that subdivision for a minimum of 8 farms, each with 80 acres of permanent pastures, is desired. Obviously this could not be attained without considerable encroachment onto the complex areas. Further, it would probably be necessary to locate one or more farms very largely on non-recommended soils because of their localised distribution.

Soils Section
Department of Agriculture

Soil Survey Report No. 24
22nd February, 1955

Report on Soils of Extension to Proposed Soldier Settlement Area, Murtoa

By J. K. M. Skene, Senior Soils Officer

This report concerns the soil survey of allotments 15, 16 and part 21, parish of Ashens, comprising an area of 430 acres, adjoining 1,702 acres previously soil-surveyed for purposes of Soldier Settlement and covered by Soil Survey Report No. 22 of 18th October, 1954.

The topography and general characteristics of the soils conform to those described previously.

Minor variations from the soil type descriptions given in Report No. 22 are:

Type A Includes sandy loams as well as sandy clay loam surface. Sandy clay may occur in the subsoil below 3 ft (0.9 m).

Type C Light surface. A pronounced sandy influence in the surface gives an unattractive physical condition similar to that of Type A.

Some individual occurrences of Type A, B and C are shown on the soil map; these soil types are shown only in un-differentiated associations in the main area.

As found previously, salt contents are erratic. Moderate values of 0.22% at 2-3 ft (0.6-0.9 m) in the subsoil occur in two situations of the Horsham friable clay while low values of 0.01% and 0.08% occur in four situations. A similar variation occurs in Types A, B and C. The extension can be considered with the main area in regards to need for drainage provisions.

Whilst the acreage of each individual soil occurrence is marked on the soil map, the total area of each soil type in the present ownership is given below:

	Acres
Type A	56
Type B	16
Type C	17
Type C “light surface”	20
Type D	35
Type A-C	18
Type B-C	23
Horsham friable clay	238

The irrigation potential of the soils is as discussed in Report No. 22. In addition, Type C “light surface” is included with the unattractive soil types.

There is an area of 273 acres in allotments 16 and 21 comprised of soils entirely suitable for the irrigation of permanent pastures. Almost all of allotment 15 is unattractive.