SECTION 4 - SURVEY RESULTS

4.1 The Soils

Eight different soil types and eleven phases, grouped under three soil series, were recognised in the survey. Also, three minor soil types of limited occurrence in some parts of the vineyards have been described.

Table G-7 lists all the soil units mapped in the survey. The main morphological features of these units are outlined below, using modal profile descriptions in order to allow for the variability that will occur within each unit. The average values for physical and chemical properties are also listed for each mapping unit using the analytical data obtained for all soil profiles recorded in that unit. For comparison, the data listed are those for the surface (0-7.5 cm) soil layer and three standard depths down the soil profile, i.e.

- depth A : 0 – 10 cm
- " B : The uppermost 30 cm segment of the clayey subsoil
- " C : 60 – 90 cm, unless augering was abandoned at a depth shallower than 90 cm.

The average values for the soil types with regard to the physical properties of their surface soils (0-7.5 cm) are shown in Figure G-5. For each soil type, the particle size distribution is diagrammatically presented for a selected profile.

The areal distribution of the mapping units is discussed separately for the vineyards surveyed in the appropriate parts of the following subsection (4.2).

Table G-7 - Soil Series and their Corresponding Types and Phases

Series	Types	Phases
Concongella	• Concongella loam	- Deep surface - Stony profile - Deep surface & stony profile
	• Concongella sandy clay loam	- Deep surface & stony profile
Great Western	• Great Western loam	-
	• Great Western sandy clay loam	- Deep surface - Deep surface & stony profile
Stawell	• Stawell sandy loam	- Deep surface - Deep surface & stony profile
	• Stawell loam	-
	• Stawell sandy clay loam	- Deep surface - Stony profile - Deep surface & stony profile
	• Stawell clay loam	- Shallow surface

I ***Concongella Series***

Soils included in this series have distinct texture contrasts between hard setting surface soil horizons and moderately to strongly pedal clayey subsoils. The uppermost subsoil layer, that is at least 15 cm thick, is whole-coloured and red. In the present survey, this series includes two soil types and four phases.

CONCONGELLA LOAM (Cl)

Distinguishing Features

Surface Soil:

• 10 – 15 cm thick
• Dark brown or reddish brown. Yellowish colours also occur.
• Loam (occasionally light sandy clay loam).
• A_2 "subsurface soil horizon" is absent.

Subsoil:

• Red to dark reddish brown gradually becoming mottled with yellowish and/or greyish colours at about 40-60 cm. At depth the degree of mottling increases and some gleyed colours may occur.

• Medium to heavy clay, often changing to sandy clay in the deep subsoils.

• Decomposed sandy parent materials usually occur at about 60 cm and the soil becomes impenetrable to a hand auger at about 80 cm due to bedrock.

Soil Inclusions:

• Trace to slight amounts of quartz, ferruginous concretions and shale fragments are commonly found throughout the soil profile. Higher amounts, however, may occur in some surfaces.

• Slight to light amounts of weathered shale, sandstone and other rock fragments are often present in the deep subsoils.

Analytical Data

(i) Analytical data for the surface soil (0-7.5 cm):

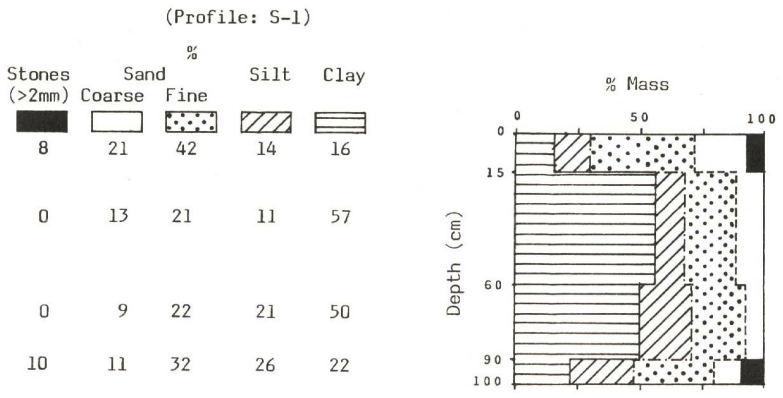
Stoniness (mineral fractions > 2 mm)	%	6.3
Bulk Density		
- Total soil material	g cm^{-3}	1.36
- Stoneless soil material	g cm^{-3}	1.20
Total Porosity	%	49.7
Void Ratio		1.00
Air Capacity	%	25.2
Moisture Retention		
- @ 15-bar	%	8.4
- @ $^1/_3$-bar	%	20.4

(ii) Analytical data for selected depths down the profile:

Depth	pH	Total Soluble Salts	Sodium Chloride	Moisture Retention	
				@ 15-bar	@ $^1/_3$-bar
		%	%	%	%
A	6.3	0.032	0.002	8.2	21.7
B	6.5	0.016	-	15.1	27.2
C	6.7	0.021	0.007	14.1	27.8

* The dashes recorded in this column indicate negligible amounts of sodium chloride

(iii) Particle Size Distribution for a Representative Profile:



Occurrence
Concongella loam is commonly found on the upper slopes and crests of the undulating plains and also on the intermediate slopes in the hilly areas.

Phases:

(a) Deep surface:

- The depth to the clayey subsoil is 30-40 cm.
- A non-bleached A_2 horizon may be present.
- Usually occurs on the upper and intermediate slopes and occasionally on the lower slopes.

(b) Stony profile:

- Light to moderate amounts of stones occur throughout the soil profile.
- On average, the stone content of the surface layer (0-7.5 cm) is about 17%.
- Commonly occurs on the crests and upper slopes.

(c) Deep surface and stony profile:

- The depth to the clayey subsoil is 20-30 cm.
- Light to moderate amounts of stones occur throughout the soil profile. Some profiles, however, have only trace to slight amounts of stones in the upper segments of their subsoils.
- On average, the stone content of the surface layer (0-7.5 cm) is about 17%.
- Occurs in small areas on the upper slopes.

CONCONGELLA SANDY CLAY LOAM (Cscl)

Distinguishing Features

Surface Soil:

A_1 horizon:

- 10 – 15 cm thick
- Reddish brown to dark reddish brown
- Sandy clay loam to fine sandy clay loam

A_2 horizon:

- About 10 cm thick.
- Strong brown to yellowish red (moist), conspicuously bleached light reddish brown to pink (dry).
- Sandy clay loam to fine sandy clay loam.

Subsoil:

- Red, gradually becomes mottled with yellowish and/or greyish colours at about 50 to 80 cm.
- Medium to heavy clay, often becomes sandy clay at depth.
- Decomposed sandy parent materials usually occur at about 70 cm and the soil profile becomes impenetrable to a hand auger below about 80 cm due to bedrock.

Soil Inclusions:

- Trace to slight amounts of quartz, ferruginous concretions and shale fragments are commonly found throughout the soil profile. Higher amounts, however, may occur in the A_2 horizons.
- Slight to light amounts of weathered sandstone and other rock fragments are commonly found in the deep subsoils.

Analytical Data

(i) Analytical data for the surface soil (0-7.5 cm):

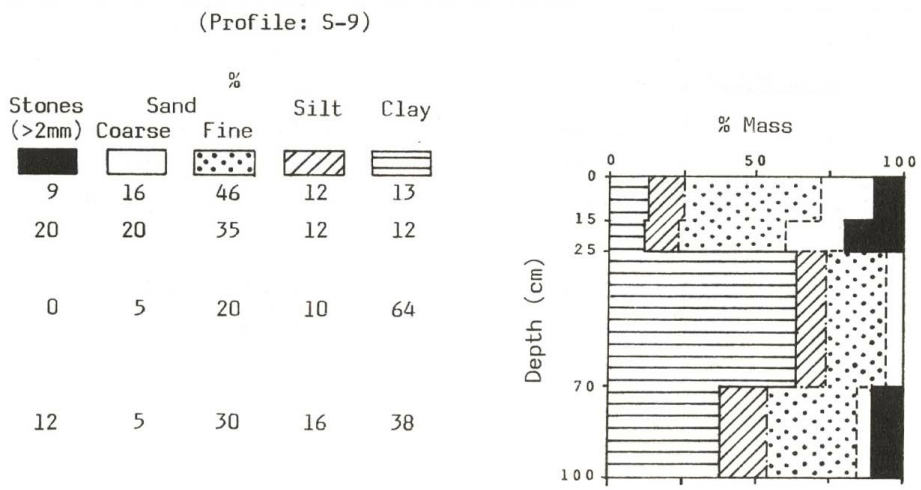
Stoniness (mineral fractions > 2 mm)	%	8.9
Bulk Density		
- Total soil material	g cm^{-3}	1.35
- Stoneless soil material	g cm^{-3}	1.12
Total Porosity	%	50.0
Void Ratio		1.00
Air Capacity	%	23.2
Moisture Retention		
- @ 15-bar	%	8.7
- @ $^1/_3$-bar	%	23.9

(ii) Analytical data for selected depths down the profile:

Depth	pH	Total Soluble Salts	Sodium Chloride	Moisture Retention	
				@ 15-bar	@ $^1/_3$-bar
		%	%	%	%
A	6.1	0.031	-	9.9	21.5
B	6.4	0.020	-	18.4	28.5
C	6.7	0.023	-	18.4	29.2

* The dashes in this column indicate negligible amounts of sodium chloride

(iii) Particle Size Distribution for a Representative Profile:



Occurrence

Concongella sandy clay loam is commonly found on the intermediate slopes in the undulating plains and hilly areas.

Phases:

Deep surface and stony profile:

- The depth to the clayey subsoil is 30-40 cm.
- The A_2 horizon is 20-30 cm thick.
- Light to moderate amounts of stones occur throughout the soil profile.
- On average, the stone content of the surface layer (0-7.5 cm) is about 14%.
- Commonly occurs on the crests and upper slopes.

II Great Western Series

Soils included in this series have distinct texture contrasts between hard setting surface soil horizons and moderately to strongly pedal clayey subsoils. The uppermost subsoil layer, that is at least 15 cm thick, is mottled and dominantly red. In the present survey, this series includes two soil types and two phases.

GREAT WESTERN LOAM (GWl)

Distinguishing Features

Surface Soil:

A_1 horizon:

- 15 – 20 cm thick
- Brown to yellowish brown
- Loam to loam fine sandy, occasionally fine sandy clay loam.

A_2 horizon:

- About 15 cm thick.
- Light brown (moist), conspicuously bleached pink to white (dry).
- Loam to fine sandy loam

Subsoil:

- Mottled red and yellowish brown. The red colour decreases gradually at about 60 to 80 cm.
- Medium to heavy clay. Sandy clay to sandy clay loam textures may occur in the deep subsoils.

Soil Inclusions:

- Trace amounts of quartz and ferruginous concretions or shale fragments may occur in the surface soils.
- Trace to slight amounts of weathered sandstone and other rock fragments may occur in the deep subsoils.

Analytical Data

(i) Analytical data for the surface soil (0-7.5 cm):

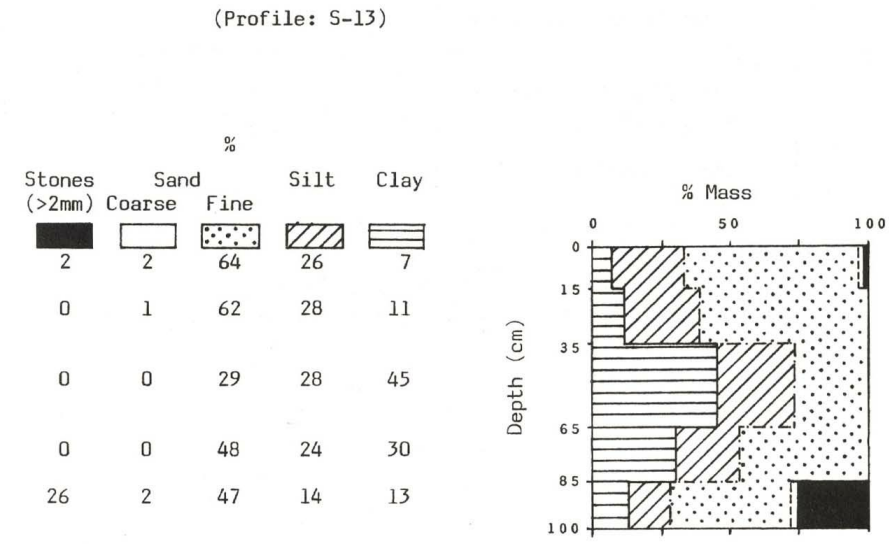
Stoniness (mineral fractions > 2 mm)	%	0.3
Bulk Density		
- Total soil material	g cm^{-3}	1.35
- Stoneless soil material	g cm^{-3}	1.35
Total Porosity	%	49.9
Void Ratio		1.00
Air Capacity	%	25.6
Moisture Retention		
- @ 15-bar	%	3.8
- @ $^1/_3$-bar	%	18.0

(ii) Analytical data for selected depths down the profile:

Depth	pH	Total Soluble Salts	Sodium Chloride	Moisture Retention	
				@ 15-bar	@ $^1/_3$-bar
		%	%	%	%
A	7.1	0.015	-	4.1	21.0
B	7.3	0.021	-	15.2	28.1
C	7.9	0.042	0.015	15.1	29.4

* The dashes recorded in this column indicate negligible amounts of sodium chloride.

(iii) Particle Size Distribution for a Representative Profile:



Occurrence
Great Western loam is commonly found on the intermediate slopes in the undulating plains and hilly areas.

GREAT WESTERN SANDY CLAY LOAM (GWscl)

Distinguishing Features

Surface Soil:

A_1 horizon:

- 10 – 15 cm thick
- Brown to dark brown
- Sandy clay loam

A_2 horizon:

- 5 – 10 cm thick
- Brown to grey (moist) with sporadically bleached near white (dry) soil material. The sporadic bleach may occur only in nests at the interface between the A and B horizons.
- Sandy clay loam.

Subsoil:

- Mottled red and yellowish brown. The red colour decreases gradually at about 50 to 70 cm.

- Medium to heavy clay. Sandier textures may occur in the deep subsoils.

• Decomposed sandy parent materials usually occur at about 70 cm and the soil profile becomes impenetrable to a hand auger below about 90 cm due to bedrock.

Soil Inclusions:

• Trace to slight amounts of quartz, ferruginous concretions and shale fragments are usually found in the surface soil horizons and nil to trace amounts in the upper parts of the clayey subsoils.

• Slight to light amounts of weathered sandstone and other rock fragments are commonly found in the deep subsoils.

Analytical Data

(i) Analytical data for the surface soil (0-7.5 cm):

Stoniness (mineral fractions > 2 mm)	%	4.3
Bulk Density		
- Total soil material	g cm^{-3}	1.32
- Stoneless soil material	g cm^{-3}	1.21
Total Porosity	%	51.2
Void Ratio		1.05
Air Capacity	%	28.9
Moisture Retention		
- @ 15-bar	%	6.7
- @ $^1/_3$-bar	%	18.4

(ii) Analytical data for selected depths down the profile:

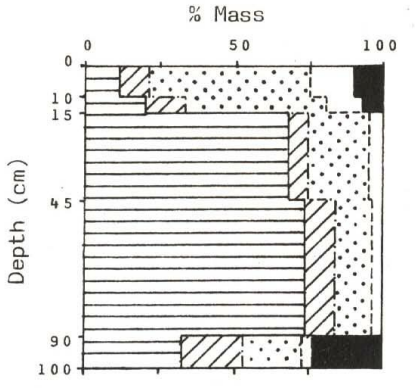
Depth	pH	Total Soluble Salts	Sodium Chloride	Moisture Retention	
				@ 15-bar	@ $^1/_3$-bar
		%	%	%	%
A	6.0	0.043	0.007	7.0	18.2
B	6.5	0.023	0.006	19.0	29.7
C	6.9	0.037	0.013	18.6	31.2

* The dashes in this column indicate negligible amounts of sodium chloride

(iii) Particle Size Distribution for a Representative Profile:

(Profile: S-15)

Stones (>2mm)	Sand Coarse	Sand Fine	Silt	Clay
		%		
10	15	54	10	12
8	13	47	13	21
0	5	21	7	68
0	4	12	10	74
25	4	20	20	33



Occurrence

Great Western sandy clay loam is commonly found on the intermediate slopes in the undulating plains and hilly areas. In some areas, however, this soil type occurs on the lower slopes.

Phases:

(a) Deep surface:

- The depth to the clayey subsoil is 30-40 cm.
- The A_2 horizon is about 20 cm thick.
- Usually occurs on the intermediate slopes.

(b) Deep surface and stony profile:

- The depth to the clayey subsoil is 30-50 cm.
- The A_2 horizon is about 15-30 cm thick.
- Light to moderate amounts of stones occur throughout the soil profile.
- On average, the stone content of the surface layer (0-7.5 cm) is about 20%.
- Usually occurs on the crests and upper slopes.

III Stawell Series

Soils included in this series have distinct texture contrasts between hard setting surface soil horizons and moderately to strongly pedal clayey subsoils. The uppermost subsoil layer, that is t least 15 cm thick, is mottled and dominantly yellow. In the present survey, this series includes two soil types and six phases.

STAWELL SANDY LOAM (Ssl)

Distinguishing Features

Surface Soil:

A_1 horizon:

- 10 – 15 cm thick
- Brown
- Sandy loam to loamy sand

A_2 horizon:

- 10 – 20 cm thick
- Pale brown to yellowish brown (moist), conspicuously bleached very pale brown to white (dry).
- Sandy loam

Subsoil:

- Mottled brown, yellow and red.
- Medium to heavy clay, occasionally sandy clay.
- Decomposed sandy parent materials may occur at about 90 cm.

Soil Inclusions:

- Trace to slight amounts of quartz, ferruginous concretions and shale fragments are usually found in the surface soils.
- Commonly, no stones occur in the main horizons of the clayey subsoils. Weathered sandstone and other rock fragments, however, may be found in the deep subsoils (i.e. below about 90 cm).

Analytical Data

(i) Analytical data for the surface soil (0-7.5 cm):

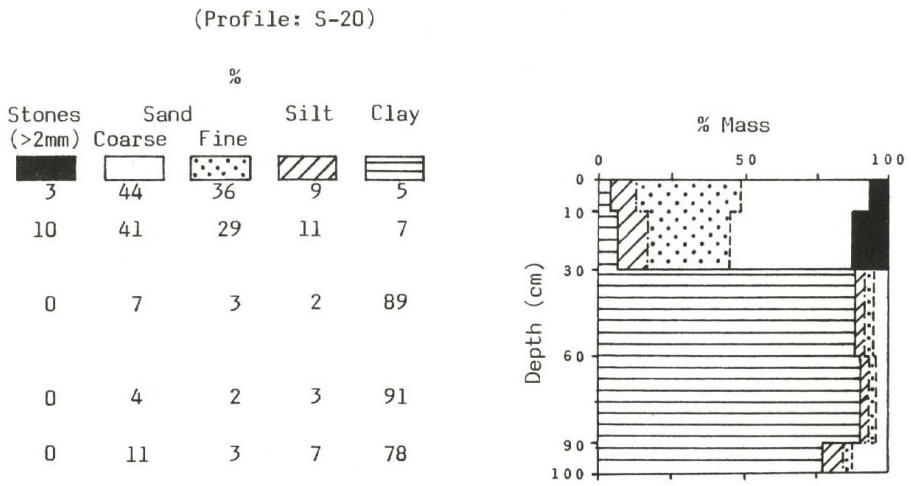
Stoniness (mineral fractions > 2 mm)	%	4.9
Bulk Density		
- Total soil material	g cm^{-3}	1.46
- Stoneless soil material	g cm^{-3}	1.34
Total Porosity	%	45.8
Void Ratio		0.85
Air Capacity	%	28.6
Moisture Retention		
- @ 15-bar	%	3.6
- @ $^1/_3$-bar	%	12.8

(ii) Analytical data for selected depths down the profile:

Depth	pH	Total Soluble Salts	Sodium Chloride	Moisture Retention	
				@ 15-bar	@ $^1/_3$-bar
		%	%	%	%
A	6.6	0.011	-	3.7	12.1
B	6.9	0.016	-	18.3	27.7
C	6.8	0.029	0.006	18.5	28.7

* The dashes recorded in this column indicate negligible amounts of sodium chloride

(iii) Particle Size Distribution for a Representative Profile:



Occurrence

Stawell sandy loam is commonly found on the intermediate and upper slopes in the undulating plains and hilly areas.

Phases:

(a) Deep surface:

- The depth to the clayey subsoil is 35-60 cm.
- The A_2 horizon is 25-50 cm thick.
- Stone content increases slightly in the surface soils, particularly in the zone immediately above the B horizon. Also, trace amounts of stone fragments are often found throughout the subsoil layers.
- Commonly occurs on the lower slopes and slight gullies, with occasional occurrence on the upper and intermediate slopes.

(b) Deep surface and stony profile:

- The depth to the clayey subsoil is about 50 cm.
- The A_2 horizon is about 40 cm thick.
- Light to moderate amounts of stones occur throughout the soil profile.
- On average, the stone content of the surface layer (0-7.5 cm) is about 17%.
- Usually occurs on the upper and intermediate slopes.

STAWELL LOAM (Sl)

Distinguishing Features

Surface Soil:

A_1 horizon:

- 15 – 20 cm thick
- Brown to yellowish brown
- Loam to loam fine sandy

A_2 horizon:

- 3 – 5 cm thick
- Brown to pink (moist), sporadically bleached white to very pale brown (dry).
- Loam to sandy loam

Subsoil:

- Mottled yellowish brown, red and greyish brown
- Medium to heavy clay.

Soil Inclusions:

- Trace amounts of quartz, ferruginous concretions occasionally occur in the soil profile.

Analytical Data

(i) Analytical data for the surface soil (0-7.5 cm):

Stoniness (mineral fractions > 2 mm)	%	2.8
Bulk Density		
- Total soil material	g cm^{-3}	1.46
- Stoneless soil material	g cm^{-3}	1.39
Total Porosity	%	46.0
Void Ratio		0.87
Air Capacity	%	23.9
Moisture Retention		
- @ 15-bar	%	4.9
- @ $^1/_3$-bar	%	15.9

(ii) Analytical data for selected depths down the profile:

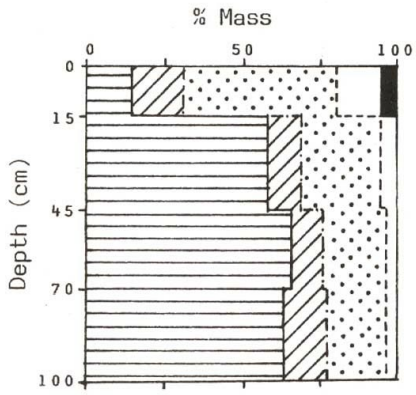
Depth	pH	Total Soluble Salts	Sodium Chloride	Moisture Retention	
				@ 15-bar	@ $^1/_3$-bar
		%	%	%	%
A	6.9	0.014	-	5.6	18.0
B	8.0	0.060	0.018	18.9	32.8
C	8.8	0.165	0.080	20.5	36.4

* The dashes recorded in this column indicate negligible amounts of sodium chloride

(iii) Particle Size Distribution for a Representative Profile:

(Profile: S-26)

Stones (>2mm)	Sand % Coarse	Sand % Fine	Silt	Clay
7	15	49	16	15
0	7	26	10	58
0	6	20	10	66
0	6	19	14	63



Occurrence
Stawell loam occurs on the lower slopes and slight gullies.

STAWELL SANDY CLAY LOAM (S scl)

Distinguishing Features

Surface Soil:

A_1 horizon:

- 15 – 25 cm thick
- Brown to dark brown
- Sandy clay loam to fine sandy clay loam

A_2 horizon:

- 3 – 7 cm thick
- Pale brown to light yellowish brown (moist), conspicuously bleached white, pink or very pale brown (dry).
- Sandy clay loam to sandy loam

Subsoil:

- Mottled brown, yellow and red.
- Medium to heavy clay, occasionally sandy clay.
- Decomposed sandy parent materials may occur at about 100 cm.

Soil Inclusions:

- Trace to slight amounts of quartz, ferruginous concretions and shale fragments are usually found in the surface soils.
- Commonly, no stones occur in the main horizons of the clayey subsoils. Weathered sandstone and other rock fragments, however, may be found in the deep subsoils (i.e. below about 90 cm).

Analytical Data

(i) Analytical data for the surface soil (0-7.5 cm):

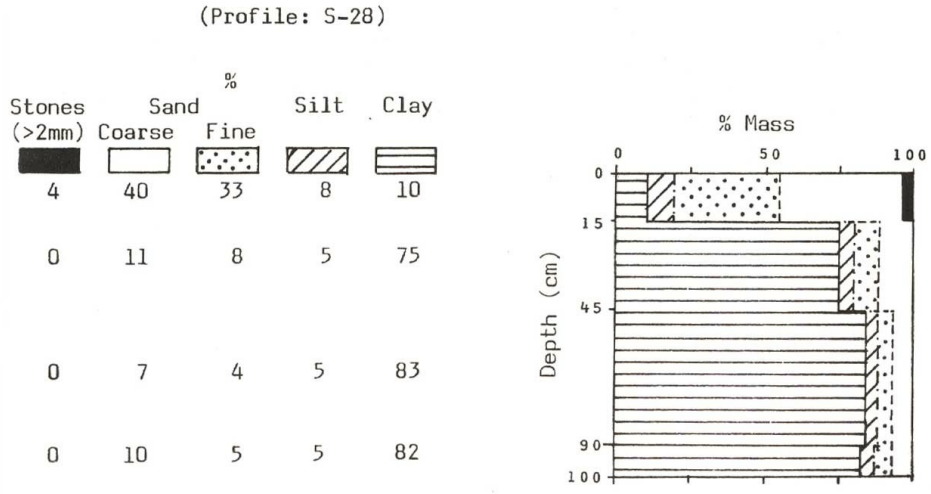
Stoniness (mineral fractions > 2 mm)	%	2.5
Bulk Density		
- Total soil material	g cm^{-3}	1.34
- Stoneless soil material	g cm^{-3}	1.23
Total Porosity	%	50.6
Void Ratio		1.03
Air Capacity	%	25.6
Moisture Retention		
- @ 15-bar	%	6.4
- @ $^1/_3$-bar	%	20.3

(ii) Analytical data for selected depths down the profile:

Depth	pH	Total Soluble Salts	Sodium Chloride	Moisture Retention	
				@ 15-bar	@ $^1/_3$-bar
		%	%	%	%
A	6.5	0.018	0.002	6.5	20.2
B	7.0	0.031	0.003	17.7	30.4
C	7.6	0.047	0.011	16.9	29.6

* The dashes recorded in this column indicate negligible amounts of sodium chloride

(iii) Particle Size Distribution for a Representative Profile:



Occurrence

Stawell sandy clay loam is commonly found on the intermediate slopes in the undulating plains and hilly areas.

Phases:

(a) Deep surface:

- The depth to the clayey subsoil is 30-40 cm.
- The A_2 horizon is 15-25 cm thick.
- Slight amounts of stones may be present in the B horizons.
- Gleyed colours and/or hard clay material may occur in the deep subsoils.
- Usually, the soil is impenetrable to a hand auger at about 80 cm due to bedrock or calcium hardened clay pans.
- Commonly occurs in the gullies and lower slopes.

(b) Stony profile:

- The total depth to the clayey subsoil is about 25 cm.
- The A_2 horizon is about 15 cm thick.
- Light to moderate amounts of stones occur throughout the soil profile.
- On average, the stone content of the surface layer (0-7.5 cm) is about 13%.
- Usually occurs on the upper and intermediate slopes.

(c) Deep surface and stony profile:
Similar to the stony soil phase (above) but; depth to the clayey subsoil ranges between 40 cm and 65 cm, with the A_2 horizon being about 30 to 50 cm thick.

This soil phase usually occurs in the gullies and lower slopes.

STAWELL CLAY LOAM (Scl)

Distinguishing Features

Surface Soil:

- 40 – 60 cm thick
- Dark brown to dark reddish brown
- Clay loam (occasionally with some sand)
- A_2 (subsurface soil horizon) may be present but not bleached

Subsoil:

- Mottled brown, yellowish brown and red.
- Sandy clay to medium or heavy clay with some sand.
- Decomposed sandy parent materials are commonly found in the deep subsoils. The soil profile may become impenetrable to a hand auger at depths which vary from 60 cm to more than 100 cm due to bedrock.

Soil Inclusions:

- Slight to light amounts of quartz, shale fragments and/or ferruginous concretions commonly occur throughout the soil profile.
- Higher amounts of stones may occur in the zone immediately above the B horizon (subsoil).
- In some profiles, however, the main horizons of the clayey subsoils may have nil to only trace amounts of stones.

Analytical Data

(i) Analytical data for the surface soil (0-7.5 cm):

Stoniness (mineral fractions > 2 mm)	%	9.7
Bulk Density		
- Total soil material	g cm^{-3}	1.44
- Stoneless soil material	g cm^{-3}	1.19
Total Porosity	%	46.9
Void Ratio		0.89
Air Capacity	%	22.8
Moisture Retention		
- @ 15-bar	%	7.3
- @ $^1/_3$-bar	%	20.3

(ii) Analytical data for selected depths down the profile:

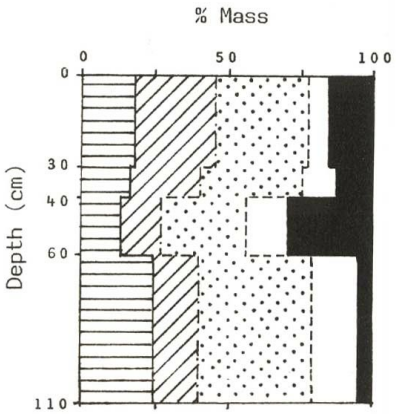
Depth	pH	Total Soluble Salts	Sodium Chloride	Moisture Retention	
				@ 15-bar	@ $^1/_3$-bar
		%	%	%	%
A	6.2	0.023	-	9.6	23.5
B	7.1	0.013	-	11.8	25.1
C	6.9	0.019	-	13.0	26.1

* The dashes recorded in this column indicate negligible amounts of sodium chloride

(iii) Particle Size Distribution for a Representative Profile:

(Profile: S-33)

Stones (>2mm)	Sand Coarse	Sand Fine	Silt	Clay
		%		
15	7	32	27	17
11	12	35	24	16
30	14	29	14	13
7	16	39	15	24



Occurrence

Stawell clay loam commonly occurs in gullies and shallow depressions.

Phases:

Shallow surface:

- The depth to the clayey subsoil is 10-15 cm.
- The A_2 horizon is absent.

IV Minor Soil Types

Discussed below are three minor soil types, none of which fitted the descriptions of any of the soil series mentioned above. Because of the limited extent of all minor types, the descriptions and analyses given below have been generally based on only few observations.

MINOR SOIL TYPE 1 (M.T.1)

Distinguishing Features

- Duplex texture profile; i.e., distinct texture contrasts between the surface soils and the clayey subsoils.
- The surface soils are hard setting.
- The A_1 (surface soil horizon) is 20-25 cm thick, brown sandy loam to fine sandy loam.
- The A_2 (subsurface soil horizon) is 40-70 cm thick, reddish yellow sandy loam to fine sandy loam, massive.
- The B horizons (the clayey subsoils) are red to yellowish red sandy clay loam (heavy) to sandy clay, weakly pedal.
- Generally, the soil profile is deep (i.e. the total depth is greater than 100 cm), well drained and is almost stone free.

Analytical Data

(i) Analytical data for the surface soil (0-7.5 cm):

Stoniness (mineral fractions > 2 mm)	%	0.2
Bulk Density		
- Total soil material	g cm^{-3}	1.40
- Stoneless soil material	g cm^{-3}	1.40
Total Porosity	%	48.2
Void Ratio		0.94
Air Capacity	%	25.8
Moisture Retention		
- @ 15-bar	%	3.9
- @ $^1/_3$-bar	%	16.0

(ii) Analytical data for selected depths down the profile:

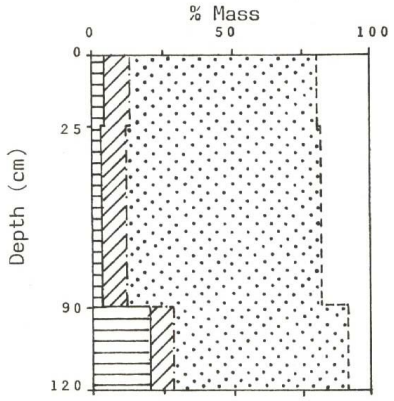
Depth	pH	Total Soluble Salts	Sodium Chloride	Moisture Retention	
				@ 15-bar	@ $^1/_3$-bar
		%	%	%	%
A	7.1	0.011	-	2.8	13.9
B	7.5	0.005	-	4.7	13.4
C	7.1	0.010	-	6.0	13.4

* The dashes recorded in this column indicate negligible amounts of sodium chloride

(iii) Particle Size Distribution for a Representative Profile:

(Profile: B-17)

Stones (>2mm)	Sand % Coarse	Fine	Silt	Clay
0	18	67	9	4
0	18	69	9	3
0	9	63	9	20



Occurrence

This minor soil type (M.T.1) occurs on the intermediate slopes in the gently undulating plains.

MINOR SOIL TYPE 2 (M.T.2)

Distinguishing Features

- Gradational soil profile, i.e., the soil texture gradually becomes finer (more clayey) with depth.
- The surface soils (A horizons) are dark reddish brown clay loam to fine sandy clay loam, moderately to strongly pedal, crumb to fine blocky, friable (moist) and slightly hard (dry); gradual change to B horizons.
- The subsoils (B horizons) are reddish brown to yellowish red sandy light clay to light clay with some sand, clay contents gradually increase with depth. Structure is strongly pedal, fine and medium angular blocky, smooth peds, friable (moist) and hard (dry).
- The A_2 (subsurface soil horizon) is 40-70 cm thick, reddish yellow sandy loam to fine sandy loam, massive.
- The B horizons (the clayey subsoils) are red to yellowish red sandy clay loam (heavy) to sandy clay, weakly pedal.
- Generally, the soil profile is deep (i.e. the total depth is greater than 100 cm), well drained and is almost stone free.

Analytical Data

(i) Analytical data for the surface soil (0-7.5 cm):

Stoniness (mineral fractions > 2 mm)	%	3.6
Bulk Density		
- Total soil material	g cm^{-3}	1.16
- Stoneless soil material	g cm^{-3}	1.07
Total Porosity	%	57.3
Void Ratio		1.34
Air Capacity	%	28.0
Moisture Retention		
- @ 15-bar	%	10.5
- @ $^1/_3$-bar	%	27.4

(ii) Analytical data for selected depths down the profile:

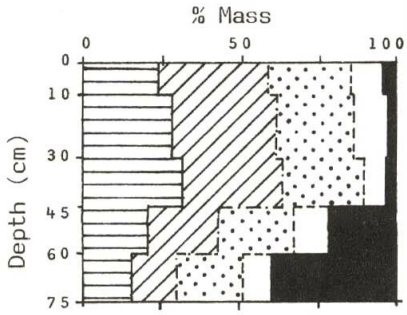
Depth	pH	Total Soluble Salts	Sodium Chloride	Moisture Retention	
				@ 15-bar	@ $^1/_3$-bar
		%	%	%	%
A	6.5	0.016	-	11.5	27.8
B	6.9	0.009	-	10.9	22.4
C	7.2	0.009	-	10.4	21.4

* The dashes recorded in this column indicate negligible amounts of sodium chloride

(iii) Particle Size Distribution for a Representative Profile:

(Profile: K-11)

Stones (>2mm)	Sand % Coarse	Sand % Fine	Silt	Clay
2	9	27	35	24
3	11	24	33	28
3	10	26	31	32
22	11	24	22	21
40	9	20	14	16



Occurrence

This minor soil type (M.T.2) occurs in gullies and shallow depressions.

MINOR SOIL TYPE 3 (M.T.3)

Distinguishing Features

- Uniform medium-textured soil profile, i.e., small, if any, texture differences occur throughout the profile.
- The soil material is almost massive and has an earthy fabric.
- The surface soil is dark reddish brown sandy clay loam.
- The subsoil is brown to reddish brown sandy clay loam to sandy clay.
- Slight to light amounts of quartz, ferruginous concretions and shale fragments commonly occur in the surface soil, increasing to moderate amounts with depth.
- The soil profile becomes impenetrable to a hand auger at 50-60 cm due to bedrock.

Analytical Data

(i) Analytical data for the surface soil (0-7.5 cm):

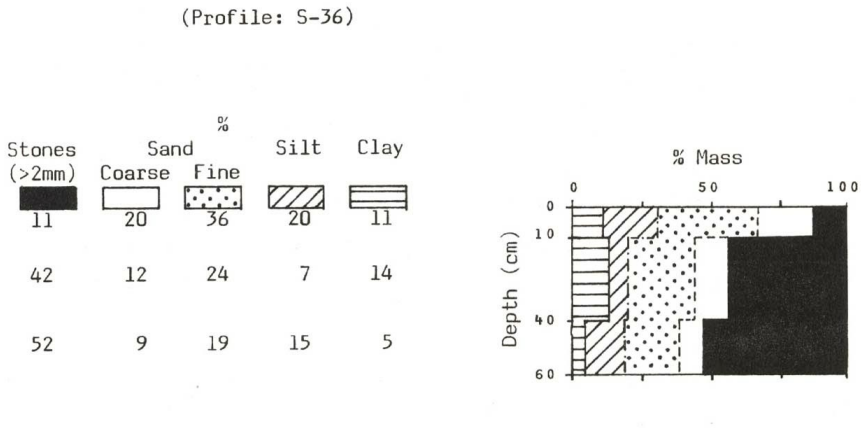
Stoniness (mineral fractions > 2 mm)	%	6.5
Bulk Density		
- Total soil material	g cm^{-3}	1.27
- Stoneless soil material	g cm^{-3}	1.10
Total Porosity	%	53.0
Void Ratio		1.13
Air Capacity	%	24.4
Moisture Retention		
- @ 15-bar	%	8.1
- @ $^1/_3$-bar	%	26.0

(ii) Analytical data for selected depths down the profile:

Depth	pH	Total Soluble Salts	Sodium Chloride	Moisture Retention	
				@ 15-bar	@ $^{1}/_{3}$-bar
		%	%	%	%
A	5.7	0.032	-	7.8	25.6
B	6.0	0.008	-	8.1	20.5

* The dashes recorded in this column indicate negligible amounts of sodium chloride

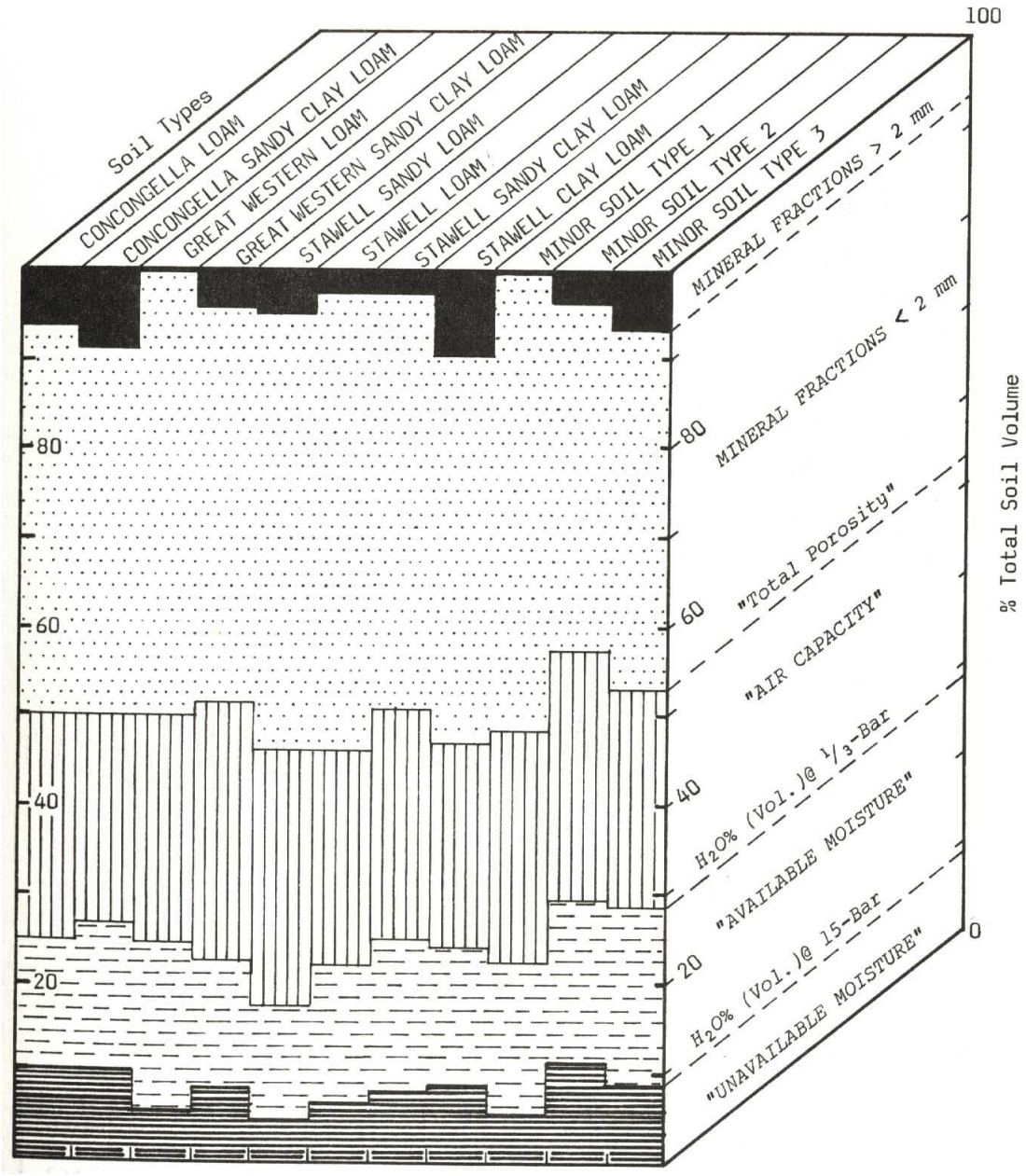
(iii) Particle Size Distribution for a Representative Profile:



Occurrence

This minor soil type (M.T.3) occurs in very small locations on crests and upper slopes in the hilly areas.

Figure G-5: Physical Properties of the Surface Soils (0-7.5 cm)



4.2 The Vineyards

In order to facilitate data presentation, this subjection is divided into four Parts corresponding to the four groups of vineyards outlined earlier in this report (subsection 2.1). The information recorded in each Part includes the areal distribution of the soils, the source and quality of the irrigation water and much other data specifically related to the vineyards concerned.