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SOILS OF THE BALONNE-MARANOA AREA, SOUTH-CENTRAL QUEENSLAND

MORPHOLOGY AND LABORATORY DATA

BY R.H. GUNN

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CONTENTS

I. INTRODUCTION

A reconnaissance land resource survey was carried in the Balonne-Maranoa area covering 110,000 km^2 in south-central Queensland in 1970 and the results were reported by Galloway et al. (1974). During the survey the soils were examined at 962 sites and the described profiles were classified into 7 major groups and 40 families as shown in Table 1 (Gunn 1974). Samples for laboratory analysis were collected from 55 profiles which were later allocated to 18 families. The purpose of this memorandum is to record the analytical data and profile descriptions as a supplement to information on soils given in the abovementioned report.

The locations of the sampling sites are indicated in Figure 1 and are given more accurately in the text by reference to homesteads, aerial photographs, and map co-ordinates. The vegetation is described briefly and the abbreviations E for Eucalyptus, A for Acacia, and C for Casuarina are used throughout. The principal profile form PPF (Northcote 1971) is given for each profile. The following abbreviations in respect of clay minerals are used:

K, kaolin; I, illite; M, montmorillonite; RI, randomly interstratified material.

II. LABORATORY METHODS

pH — A mixture of 1:5 soil: distilled water is shaken for one hour and the pH is read 4 hours later using a combined glass electrode.

Cl — A mixture of 1:5 soil: distilled water is shaken for one hour and read 1 hour later using a chloride specific ion electrode.

Ec_s — Electrical conductivity in millimhos/cm at 25°C of 1:5 soil: water suspension. The mixture is shaken for one hour and read one hour later on a Phillips conductivity meter.

Ec_e — Electrical conductivity in millimhos/cm at 25°C of saturation extract in accordance with USDA (1954) method. Water is added to the soil until a saturated soil paste is obtained and the water is extracted by suction or high speed centrifuge. The conductivity is measured with a conductivity meter.

Phosphate — After Kerr and von Stieglitz (1938). The soil is shaken overnight with N/100 H_2SO_4 (2.5 g soil + 500 ml N/100 H_2SO_4). The solution is filtered, the colour developed with molybdate and stannous chloride, and read on a Unicam colorimeter.

Organic carbon
Walkley and Black (1934)

Particle size
The sample is dispersed with sodium exchange resin (Cullex No. 156201) and readings are taken on a plummet balance.

Exchangeable cations

Modified Keeney and Bremner (1969) method using 1N ammonium chloride at pH 7.0 instead of ammonium acetate. Cations determined on ammonium chloride leachate by atomic absorption spectrophotometer (Techtron AA.5).

Clay minerals

Clay fraction in suspension used to prepare a sample for X-ray powder photograph (by centrifuging) and an oriented sample on a ceramic plate. The sample was treated with Mg^{++} ions, saturated with glycerol and examined on the X-ray diffractometer.

III. ACKNOWLEDGMENTS

Measurements of the chloride, phosphate, and organic carbon contents, pH, electrical conductivity of 1:5 soil:water suspension, and particle size distribution were made by the Queensland Department of Primary Industries, Agricultural Chemical Laboratory, under the direction of Mr F. Chippendale.

Clay mineral analysis was carried out by the Australian Mineral Development Laboratories, South Australia (Report MP 2271-71).

Electrical conductivity of saturation extracts was determined by the Royal Tropical Institute, Department of Agricultural Research, Amsterdam.

Mrs I.M. Aldridge of the Division of Land Use Research carried out the determinations on the exchangeable bases.

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V. PROFILE DESCRIPTIONS AND LABORATORY DATA

1. Brown and Grey-Brown Soils

Ba Family

Profile E70 located 4.0 km east of "Mt Lonsdale" HS (co-ord. 576 727 - map SG55-11). Airphoto - Mitchell 3-5207. Relief - very gently undulating, slope 2%. Vegetation - low *A. harpophylla* forest with frequent *E. thozetiana* emergent and moderately dense understory of *Eremophila mitchellii*. Parent material - weathered labile Cretaceous sediments. Mean annual rainfall - 530 mm. Site drainage - well drained. Profile drainage - imperfect. PPF - Uf6.31

Cm — Sparse surface strew of ferruginized gravel

0-20 — Brown (7.5YR4/4); heavy clay; 3% gravel; subangular blocky; hard

20-60 — Brown (7.5YR4/4); heavy clay; 3% gravel; subangular blocky; firm

60-90+ — Brown (7.5YR4/4), Fe/Mn staining (10%); heavy clay with 5% ferruginized angular rock fragments (6-25 mm); subangular blocky; firm

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-20	5.9	10.7	12.3	0.64	1.77	25.41			27	1.1
20-60	7.0						0.93	749		
60-90	5.1	10.3	14.1	0.36	4.82	29.58	1.40	985		

Bb Family

Profile C74 located 4.0 km north of the Yalebone P.O. (co-ord. 150 666 - map SG55-12). Air photo - Roma 8-5039. Relief - gently undulating, slope - 1-2%.
Vegetation - *C. cristata* forest with frequent *A. harpophylla* and moderately dense *Eremophila mitchellii*.
Parent material - weathered labile Cretaceous sediments.
Mean annual rainfall - 530 mm. Site drainage - well drained.
Profile drainage - well drained. PPF - Uf6.31

Cm	
0-36	Dark reddish brown (5YR3/6); heavy clay; subangular blocky; firm friable
36-60	Dark red (2.5YR3/6); heavy clay; subangular blocky; firm, friable
60-90+	Dark red (2.5YR3/6); heavy clay; subangular blocky grading to massive; firm, friable; 3% gypsum in small pockets

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-36	6.8	18.0	8.3	1.28	3.83	31.41			41	1.8
36-60	8.2						1.20	1440		
60-90	6.6	10.9	11.8	0.89	9.31	32.90	1.60	2000		

Bb Family

Profile E37 located 1.6 km north-east of "Chesterton" HS (co-ord. 544851 - map SG55-7). Air photo - Eddystone 5-5007.
Relief - very gently undulating, slope - 1%.
Vegetation - low *A. harpophylla* forest with frequent *E. populnea* emergent. Sparse shrubs - *Eremophilla mitchellii* and *Geijera parviflora* with *Paspalidium* sp. ground cover.
Parent material - weathered labile sediments.
Mean annual rainfall - 580 mm. Site drainage - moderate. Profile drainage - moderate. PPF - Gn3.12

Cm

0-15 Dark red-brown (5YR3/3); sandy clay loam; massive; firm

15-36 Dark red-brown (5YR3/4); clay loam to light clay; massive; firm

36-60 Dark red-brown (5YR3/4); light clay; medium subangular blocky; hard

60-90+ Red-brown (5YR4/3); medium clay; medium subangular blocky; hard; trace of CO_3

Depth (cm)	Particle size %				pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
	CS	FS	Si	C		Ca	Mg	K	Na					
0-15	28	28	19	25	4.6	3.3	1.0	0.77	<0.05	5.07			14	0.5
15-36	28	25	16	31	4.8						0.15	26		
36-60	19	26	12	43	5.9	9.1	5.0	0.34	0.88	15.32				
60-90	20	19	13	48	7.6						0.22	122		

Bc Family

Profile A21 located 16.1 km north of Mount Bassett, approximately 3.2 km off the Durham Downs Roads (co-ord. 170-727 - Map SG55-12). Air photo - Roma 4-5171. Relief - gently undulating, slope 2%.
Vegetation - tall (to 15 m). *A. harpophylla* forest with a moderately dense understorey of *Geijera parviflora*, *Eremophila mitchellii*, and *Carissa ovata*.
Parent material - weathered labile Cretaceous sediments.
Mean annual rainfall - 580 mm.
Site drainage - well drained. Profile drainage - imperfect.
PPF - Gn3.43

Cm

0-8 Very dark brown (10YR2/2), clay loam; soft friable; weak subangular blocky

8-23 Very dark brown (10YR2/2), light to medium clay; very firm; medium subangular blocky

23-50 Very dark brown (10YR2/2), medium to heavy clay; hard consistency, coarse subangular blocky

50-75 Very dark grey-brown (10YR3/2); medium to heavy clay; hard, subangular blocky; 20-40% CO_3

75-90+ Dark grey (10YR4/1) medium to heavy clay; hard; massive

Depth (cm)	Particle size %				pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
	CS	FS	Si	C		Ca	Mg	K	Na					
0-8	41	29	6	24	5.7	10.5	2.6	0.38	0.25	13.73			18	1.3
8-23	41	24	6	29	5.7						0.22	22	27	
23-50	34	27	7	29	6.4	13.5	4.6	0.22	1.30	19.62				
50-90	43	21	7	29	8.9						0.33	164		

Bc Family

Profile A26 located 2.4 km east of A25 (co-ord. 178-724 map SG55-12). Air photo - Roma 4-5171. Relief - undulating, slope 2%. Vegetation - *A. harpophylla* forest with frequent *E. populnea* and infrequent *C. cristata*. Moderately dense understorey of *Geijera parviflora*, *Eremophila mitchellii* , and *Carissa ovata*.
Parent material - weathered labile sediments. Mean annual rainfall - 580 mm. Site drainage - moderate. Profile drainage - imperfect.
PPF - Uf6.31

Cm

0-15 Dark brown (10YR3/3); light to medium clay; weak subangular blocky; soft friable

15-23 Dark brown (10YR3/3); medium clay; weak subangular blocky; soft friable

23-35 Dark brown (10YR3/3); medium to heavy clay; subangular blocky; hard; 3% soft CO_3

35-50 Dark brown (10YR3/4); medium to heavy clay; subangular blocky; hard; 3-5% CO_3

50-65 Brown (10YR4/3); medium to heavy clay; subangular blocky; hard; 3-5% CO_3

65-107 Brown (7.5YR4/4); medium clay; massive; hard; 3-5% CO_3

107-117 Brown (7.5YR5/4); medium clay with sandstone fragments; massive; hard

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na			
0-15	7.0	15.8	4.3	1.08	0.64	21.82	28	1.4
15-36	8.5							
36-66	6.0	47.9	8.9	0.44	2.65	59.89		

Bc Family

Profile E36 located near "Chesterton" HS (co-ord. 544849 - map SG55-7). Air photo - Eddystone 5-5007. Relief gently undulating - slope <1%.
Vegetation - low *A. harpophylla* forest with sparse shrubs, *Eremophila mitchellii* and *Geijera parviflora*.
Parent material - weathered labile sediments.
Mean annual rainfall - 580 mm. Site drainage - moderate. Profile drainage - imperfect. PPF - Uf6.33
Surface strew of rounded white quartz pebbles and ferruginized sandstone and conglomerate up to 12 cm in diameter.

Cm

0-20 Dark brown (10YR3/3); light to medium clay; 10% gravel (up to 3.8 cm); subangular blocky; hard

20-45 Brown (10YR4/3); medium to heavy clay; subangular blocky; firm; CO_3 concentration

45-90 Yellowish brown (10YR5/4); medium to heavy clay; subangular blocky grading to massive; firm

90-107 Weathered yellow siltstone

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-20	6.3	20.2	6.3	0.65	1.10	28.25			22	1.5
20-45	8.1						0.86	887		
45-90	6.4	20.9	15.5	0.18	5.96	42.54	1.45	1064		

Bf Family

Profile A22 located 16 km north of Mount Basset, east of A21 (co-ord. 172 727 - map SG55-12). Air photo - Roma 4-5171. Relief - rolling to low hilly, slope of 3-5%.
Vegetation - semi thicket with *E. orgadophila* emergent. *Geijera parviflora, Eremophila mitchellii, Hovea* sp., *Carissa ovata, Ehretia* sp., *Brachychiton* sp.
Parent material - weathered labile sediments.
Mean annual rainfall - 580 mm. Site drainage - well drained.
Profile drainage - well drained. PPF - Gn3.13

Cm

0-23 Dark reddish grey (5YR4/2); fine sandy loam; massive to very weak subangular blocky; soft friable

23-38 Yellowish red (5YR4/8); fine sandy clay loam; subangular blocky; very firm

38-51 Reddish yellow (7.5YR4/8); fine sandy clay loam; subangular blocky; very firm

38-51 Reddish yellow (7.5YR6/6), light to medium clay with weathered rock fragments; massive; 5-10% soft CO_3

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-23	8.4	7.7	2.0	0.98	<0.05	10.68			37	1.2
23-38	7.4	16.7	3.3	1.18	<0.05	21.18	0.21	79		

Bf Family

Profile A25 located 14.5 km NE of Mount Bassett 6.4 km SE of site A21 (co-ord. 177 724, map SG55-12). Air photo - Roma 4-5171. Relief - rolling, slope 5%. Vegetation - *A. harpophylla* and *C. cristata* (co-dominant) forest with occasional *E. populnea, Brachychiton,* and *Heterodendrum diversifolium.* Moderately dense shrubs consisting of *Geijera parviflora, Eremophila mitchellii, Carissa ovata, Ehretia* sp., *Flindersia dissosperma, A. fasciculifera.* Parent material - weathered labile sediments.
Mean annual rainfall - 580 mm. Site drainage - well drained. Profile drainage - imperfect. PPF - Gn3.13

Cm

0-8 Dark brown (5YR3/3); sandy loam; weak subangular blocky; soft friable

8-20 Dark brown (5YR3.5/3); sandy clay loam; subangular blocky; slightly hard

20-36 Brown (5YR4/3); light to medium clay; subangular blocky; hard

36-61 Soft weathered rock; massive

Depth (cm)	pH	Avail.P. p.p.m.	Org. C %
0-20	7.4	30	1.4
20-36	6.3		

Bf Family

Profile F34 located 9.6 km south of Morven near the Morven to Charleville road (co-ord. 523 707, map SG55-11). Air photo - Mitchell 4-5057. Relief - gently undulating, slope 2%.
Vegetation - *A. harpophylla* forest with frequent *Cadellia pentastylis* and sparse shrubs, *Eremophilia mitchellii*, mainly bare ground.
Parent material - weathered labile sediments.
Mean annual rainfall - 510 mm. PPF - Uf6.31
Surface - sparse strew of ferruginized Tertiary sandstone gravel, quartz and shale (13-75 mm diameter).

Cm

0-23 Dark red-brown (5YR3/4); medium to heavy clay; trace of gravel; fine subangular blocky (6 mm); friable

23-50 Dark red-brown (5YR3/4); heavy clay; trace of gravel; subangular blocky; firm

50-60 Red-brown (5YR4/3); heavy clay; trace of gravel; subangular blocky; firm; 3% soft CO_3

60-90 Yellow-brown (10YR5/6); medium clay with fragments of white shale grading to soft white pallid shale with yellow mottles

Depth (cm)	Particle Size %				pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	EC_e	Cl p.p.m.	Avail.P p.p.m.	Org.C %
	CS	FS	Si	C		Ca	Mg	K	Na						
0-23	7	9	19	65	6.4	16.5	8.3	0.87	1.24	26.91				14	1.6
23-50	6	8	13	73	7.6						0.25		152		
50-60	6	2	15	77	8.4	33.9	18.1	0.38	4.18	56.56					
60-90	3	5	15	77	8.0						0.94	5.56	985		

Bf Family

Profile F46 located 8.0 km NE of "The Sugarloaf" near the Warrong Road (co-ord. 628 723, map SG55-11). Air photo - Mitchell 3-5191. Relief - mountainous, slope 30%.
Vegetation - low forest, (softwood scrub) *Geijera parviflora, C. cristata, Eremophila mitchellii, Trema aspera, Brachychiton, Carissa ovata, Ventilago viminalis, Planchonia* sp., and *Hovea* sp.
Parent material - weathered Tertiary olivine basalt. Mean annual rainfall - 580 mm. Site drainage - excessive. PPF - Ufl.3

Cm

0-15 Olive (5YR5/3); light clay, structureless; soft friable; high CO_3 content

15-107 Pale olive (5YR6/3) to light yellowish brown (2.5YR6/4); 20% yellow mottling; light clay, mainly soft pale yellow CO_3

Depth (cm)	pH	$CaCo_3$ %	Avail P p.p.m.	Org. C %
0-15	8.3	18.4	80	1.4
15-113	8.8	14.9		

2. Cracking Clay Soils

Ca Family

Profile A54 located 4.8 km NW of A53 (co-ord. 263 678 map SG55-12). Air photo - Roma 7-5165. Relief - level, slope <1%. Vegetation - *A. harpophylla* forest with frequent *C. cristata* and moderately dense shrubs, mainly *Geijera parviflora* with *Leptochloa* sp. in depressions.
Parent material - weathered labile sediments. Mean annual rainfall - 600 mm. Site drainage - poor. Profile drainage - impeded, seasonally ponded. PPF - Ug5.34

Cm

0-18 Dark yellowish brown (10YR3-5/4); medium to heavy clay; weak platy crust and subangular blocky below; friable to firm

18-60 Dark yellowish brown (10YR3.5/4); heavy clay; subangular blocky; firm

60-90 Dark brown (10YR3/4); heavy clay; subangular blocky; firm

90-150 Brown (10YR4/3); heavy clay; subangular blocky grading to massive; firm

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-18	5.0	9.5	10.0	0.62	4.1	24.22			25	2.3
18-60	4.6						1.35	2200		
60-90	4.5	2.0	9.2	0.22	10.8	22.22				
90-150	4.4						1.60	2800		

Ca Family

Profile B6 located 8.0 km NW of "Rostock" HS (co-ord. 223 664 - map SG55-12). Air photo - Roma 8-5019. Relief - level, slope <1%. Vegetation - *A. harpophylla, C. cristata* forest with moderately dense shrubs, *Geijera parviflora, Carissa ovata.* Parent material - weathered labile sediments. Mean annual rainfall - 580 mm. Site drainage - impeded. Profile drainage - impeded. PPF - Ug5.24

Cm

0-10 Very dark grey-brown (10YR3/2); medium clay; 0-3 cm weak platey, 3-10 cm subangular blocky; 0-3 cm loose friable. 3-10 cm firm; plant roots

10-38 Dark grey (10YR4/1); heavy clay; subangular blocky; hard; plant roots

90-120 Grey-brown (10YR5/1.5); heavy clay; massive; hard; plant roots

120-150+ Grey-brown (10YR5/1.5); heavy clay; massive; hard; plant roots

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-10	7.4	30.8	8.7	2.23	1.42	43.15			25	2.3
10-38	8.5	26.8	13.3	1.74	4.96	46.80	0.75	749		
38-90	8.5									
90-120	5.7	6.1	15.3	1.89	10.44	33.73				
120-150	4.8						1.25	1872		

Ca Family

Profile B16 located 8.0 km south of "Moraby" HS to 1.6 km south of site B15 (co-ord. 266 648 - map SG55-16). Air photo - Roma 9-5079. Relief - level, slope <1%. Vegetation - *C. cristata* forest with frequent *A. harpophylla* and moderately dense shrubs, mainly *Geijera parviflora* frequent *Carissa ovata*. Parent material - weathered labile Cretaceous sediments. Mean annual rainfall - 580 mm. Site drainage - seasonally ponded. Profile drainage - impeded. PPF - Ug5.24

Cm

0-10 Very dark grey-brown (10YR3/2); medium to heavy clay; subangular blocky; firm

10-45 Dark grey-brown (10YR4/2); medium to heavy clay; subangular blocky; very hard; trace of CO_3

45-90 Grey-brown (10YR4.5/2); medium to heavy clay; subangular blocky; hard

90-150+ Grey-brown (10YR4.5/2); pale yellow-brown mottling (15%); medium !to heavy clay; hard; subangular blocky

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	EC_e	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na						
0-10	7.2	17.4	7.6	0.87	1.57	27.44				17	1.0
10-45	8.1										
45-90	8.6	12.1	9.5	0.36	7.13	29.09	0.63	4.2	611		
90-150	6.0						0.66	4.8	670		

Ca Family

Profile B22 located 1.6 km north of "Glenleigh Park" HS (co-ord. 282 639 - map SG55-12). Air photo - Surat 2-5049. Relief - level, slope <1%.
Vegetation - *A. harpophylla, C. cristata* forest with moderately dense shrubs - *Geijera parviflora*. Parent material - weathered labile Cretaceous sediments. Mean annual rainfall - 580 mm. Site drainage - seasonally ponded. Profile drainage - impeded. PPF - Ug5.24

Cm

0-15 Dark brown (10YR3/3); medium clay; coarse subangular blocky; hard; roots

15-45 Dark grey (10YR4/1); heavy clay; subangular blocky; hard; roots

45-90 Dark grey-brown (10YR4/2); heavy clay; subangular blocky; hard; roots

90-150+ Grey (10 YR 4.5/2); heavy clay; massive; hard; roots

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-15	6.5	14.0	4.9	0.58	0.09	19.57			17	2.4
15-45	7.4									
45-90	7.2	9.7	9.9	<0.05	6.52	26.17	0.86	1261		
90-150	4.3						1.00	1438		

Ca Family

Profile F6 located near "Bonus Downs" HS (co-ord. 58˜ 582 - map SG55-11). Air photo - Mitchell 6-5109. Relief - very gently undulating, slope <1%.
Vegetation - low open *A. harpophylla* forest/woodland with infrequent *Eremophila mitchellii* and *Santalum* sp. Parent material - weathered sediments. Mean annual rainfall - 480 mm. Site drainage - seasonally ponded. Profile drainage - impeded. PPF - Ug5.24
Scattered blocks of conglomerate (silcrete and ferricrete) up to 60 cm long on surface of mounds (none in soil).

Cm

0-15	Dark grey (10YR4/1); medium clay; subangular blocky; hard
15-60	Grey-brown (10YR5/2); heavy clay; subangular blocky; very firm; trace of soft CO_3
60-90	Grey-brown (10YR5/2); heavy clay; massive; very firm
90-150+	Grey-brown (10YR5/2); heavy clay; occasional sub-angular gravel (19-25 mm diameter); massive; very firm

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-15	5.9	9.2	7.2	0.55	1.22	18.17			7	1.4
15-60	8.1	11.7	10.0	0.66	7.05	29.41	0.91	1160		
60-90	7.0									
90-150	5.3	6.9	9.2	0.49	9.70	26.29	1.25	1774		

Ca Family

Profile G49 located 8.0 km, NW of "Landridge" HS (co-ord. 609 576 - map SG55-15). Air photo - Homeboin 5-5113.
Relief - level, slope <1%.
Vegetation - *A. harpophylla* and *C. cristata*.
Parent material - weathered sediments. Mean annual rainfall - 460 mm.
Site drainage - seasonally ponded. Profile drainage - impeded.
PPF - Ug5.24

Cm

0-37 Dark grey (10YR4/1); heavy clay; subangular blocky; hard

37-60 Dark grey-brown (10YR4/2); heavy clay; subangular blocky; hard; trace of soft CO_3

60-150+ Brown (10YR5/3); heavy clay; massive; firm; 3-5% soft CO_3 and gypsum

Depth (cm)	pH	EC_s	EC_e	Cl p.p.m.	Avail.P p.p.m.	Org.C %
0-37	8.2				12	0.6
37-60	8.3	0.69		158		
60-120	8.0	1.10	7.80	611		

Ca Family

Profile J33 located 1.6 km SE of "Openbah" HS (co-ord. 640 489 - map SH55-3). Air photo - Dirranbandi 2-5103.
Relief - gently undulating, slope 1-2%.
Vegetation - *A. harpophylla, C. cristata, Geijera parviflora* originally - now cleared.
Parent material - weathered clay (transported?). Mean annual rainfall - 430 mm. Site drainage - seasonally ponded depressions.
Profile drainage - impeded. PPF - Ug5.24

Cm

0-15 Dark grey (10YR4/1); heavy clay; subangular blocky; firm; some CO_3 in soil

15-60 Dark grey-brown (10YR4/2); heavy clay; subangular blocky; firm; CO_3 in soil

60-110 Dark grey-brown (10YR4/2); heavy clay; subangular blocky grading to massive; firm; 3% soft CO_3

110-265 Grey-brown (10YR4/2); Fe/Mn staining; 10% brown to yellow mottling; heavy clay; massive; firm; 3-5% gypsum

265-325 Grey-brown (10YR5/2); 15% prominent yellow-brown mottling; heavy clay; massive; firm

325-385 Light brownish grey (10YR6/2); 30% prominent red-yellow mottling; heavy clay; massive; firm

385-490 Light brownish grey (2.5YR6/2); 30% prominent, very large red mottles; heavy clay; massive; firm

490-520+ Light brownish grey (2.5YR6/2); 30% prominent, very large red mottles; heavy clay; massive; firm

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	EC_e	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na						
0-15	8.5	28.2	5.9	1.48	0.09	35.67	0.19		32	37	0.5
15-60	8.9							1.92			
60-110	8.9	16.8	6.7	0.70	6.44	30.64	0.17		650	23	
110-265	8.1										
365-325	5.9	5.9	7.1	0.38	8.18	21.56	0.71	3.88	650	10	
325-385	5.5										
385-490	4.7	4.1	7.4	0.24	8.18	19.92	0.72		965	7	
490-520	4.5	2.8	7.1	0.15	7.83	17.88	0.90	4.52	985		

Ca Family

Profile L39 located 3.2 km east of "Bengrove" HS (co-ord. 253 558 - map SG 55-16). Air photo-Surat 6-5139.
Relief - very gently undulating, slope ± 1%.
Vegetation - *C. cristata* forest with frequent *A. harpophylla* and moderately dense shrubs - *Geijera parviflora* and *Eremophila mitchellii*.
Parent material - weathered labile Cretaceous sediments. Mean annual rainfall - 530 mm. Site drainage - seasonally ponded. Profile drainage - impeded. PPF - Ug5.34

Cm

3-6 Dark brown (10YR3/3); medium to heavy clay; massive surface crust; firm; A few CO_3 concretions on surface

6-20 Dark brown (10YR3/3); heavy clay; subangular blocky (1.3 cm diameter); firm

20-60 Dark yellowish brown (10YR3/4); heavy clay; subangular blocky; firm; 10-15% soft CO_3

60-90 Brown (7.5YR4/2); heavy clay; subangular blocky; grading to massive; very firm

90-150+ Brown (7.5YR4/4); 15% faint pale brown mottling; heavy clay; massive; hard

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-20	8.6	21.6	7.9	1.12	0.09	30.71			20	1.2
20-60	9.0						0.86	808		
60-90	8.7	21.2	13.5	0.08	9.31	44.09				
90-150	6.5						1.0	1458		

Cb Family

Profile A2 located 1.6 km west of Pickanjinnie (co-ord. 193 697 - maps G55-12) near the Warrego Highway to Western Railway. Air photo - Roma 6-5203. Relief - gently undulating, slope 1-2%. Vegetation - *A. harpophylla* forest with frequent *E. thozetiana* and sparse shrubs consisting of *Geijera parviflora* and *Eremophila mitchellii*.
Parent material - weathered labile Cretaceous sediments. Mean annual rainfall - 580 mm. Site drainage - medium. Profile drainage - imperfect. PPF - Ug5.32

Cm

0-0.3 Dark brown (10YR3/3); light clay, soft friable, weak platy crust

0.3-45 Very dark grey-brown (10YR3/2), medium to heavy clay, soft friable

45-80+ Dark reddish brown (5YR3/4), grey-brown mottling (>10%), medium to heavy clay with weathered rock fragments; 15-20% gypsum

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-45	7.2	13.0	16.1	0.77	7.8	37.67	0.81	493	18	0.8
45-80	4.5	29.9	14.0	0.66	9.0	53.56	2.45	788		

Cb Family

Profile A37 located 11.2 km ENE of "Bendemere" HS to 6.1 km NE of Yuleba (co-ord. 237 708 - map SG55-12). Air photo - Roma 5-5123. Relief - level, slope <1%.
Vegetation - *C. cristata* forest with frequent *A. harpophylla* and moderately dense shrubs - *Geijera parviflora* and *Carissa ovata*. Parent material - weathered labile Cretaceous sediments. Mean annual rainfall - 610 mm. Site drainage - imperfect. Profile drainage - imperfect. PPF - Ug5.15

Cm

0-0.3 Very dark grey-brown (10YR3/2); medium clay; crusty weak platy to granular structure; friable

0.3-23 Very dark grey-brown (10YR3/2); medium to heavy clay; subangular blocky; hard

23-35 Very dark grey (10YR3/1); heavy clay; subangular blocky; hard; 5% soft CO_3

35-55 Very dark grey (10YR2/1); heavy clay; subangular blocky; hard

55-80 Dark brown (10YR3/4); heavy clay; massive; hard

80-135 Brown (7.5YR4/4); heavy clay; massive; hard; 10-15% gypsum

135-150 Brown (5YR5/4); heavy clay; massive; hard

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	EC_e	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na						
0-23	7.5	15.2	10.0	0.97	3.0	29.17				32	1.7
23-35	8.5						0.72		611		
35-55	8.2	17.0	21.7	0.66	10.7	50.06		6.80			
55-80											
80-135		23.6	16.5	0.56	9.0	49.66					
135-150	4.5							5.60			

Cb Family

Profile A46 located 8.0 km of "Bogandilla" HS (co-ord. 2~5-704 - map SG55-12). Air photo - Roma 6-5183.
Relief - gently undulating, slope 1%.
Vegetation - low forest of *A. harpophylla* with frequent tall *E. thozetiana* and infrequent *E. microcarpa* emergent.
Parent material - weathered labile Cretaceous sediments. Mean annual rainfall - 610 mm. Site drainage - imperfect. Profile drainage - imperfect. PPF - Ug5.32

Cm

0-15 Dark brown (10YR3/4); medium to heavy clay; 0-03 cm weak platy crust; friable; plant roots

15-30 Dark brown (10YR3/4); medium to heavy clay; sub-angular blocky; very firm; plant roots

30-60 Dark brown (10YR3/4); medium to heavy clay; sub-angular blocky; very firm; plant roots

60-100 Dark brown (7.5YR3/2); medium to heavy clay with increasing fragments of weathered rock; massive; very firm

100-120+ Mainly soft weathered rock

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	EC_e	Cl p.p.m.	Avail. P p.p.m.	Org.C %
		Ca	Mg	K	Na						
0-15	5.3	13.5	10.9	0.87	1.9	27.17				18	2.0
15-30	5.9						0.21		149		
30-60	4.3	6.7	14.0	0.51	5.1	26.31					
60-100	4.3							10.8			

Cb Family

Profile A53 located 1.6 km west of Dulacca South (co-ord. 267 676 - map SG55-12). Air photo - Roma 7-5165. Relief - gently undulating, slope 1-2%.
Vegetation - low *A. harpophylla* forest with frequent *C. cristata* and moderately dense shrubs, *Geijera parviflora* dominant.
Parent material - weathered labile Cretaceous sediments.
Mean annual rainfall - 580 mm. Site drainage - moderate.
Profile drainage - imperfect. PPF - Ug5.34

Cm

0-18 Dark brown (10YR3/3); medium to heavy clay; firm; subangular blocky

18-60 Dark brown (10YR3/3); medium to heavy clay; hard; trace of CO_3

60-120 Dark brown (10YR3/3); medium to heavy clay; subangular blocky; hard

120-150+ Dark yellowish brown (10YR4/4); medium to heavy clay; subangular blocky; hard

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P. p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-18	7.9	19.5	9.1	0.77	6.70	36.07			18	0.8
18-60	8.3	17.0	12.3	0.56	14.27	44.13	1.50	2600		
60-120	4.5									
120-150	4.4	7.6	13.5	0.66	15.48	37.24	1.75	3400		

Clay minerals (18-60 cm) - K(dominant), M(accessory), Q (10%), feldspar (trace).

Cb Family

Profile C47 located 3.2 km SW of "Gambier Park" HS and 3.2 km north of "Russell Park" HS (co-ord. 216 636 - map SG55-16). Air photo - Surat 1-5073. Relief - gently undulating, slope 1.5%. Vegetation - *C. cristata* forest with occasional *A. harpophylla* and sparse shrubs - *Eremophila mitchellii*, and occasional *Bauhinia* sp., *Owenia acidula*, and *Elaeodendron* sp.
Parent material - weathered labile Cretaceous sediments. Mean annual rainfall - 580 mm. Site drainage - well drained. Profile drainage - impeded. PPF - Ug5.14
Sparse surface strew of silcrete and ferruginized rock fragments (1.3 - 7.6 cm diameter).

Cm

0-36 Very dark brown (10YR2/2); heavy clay; coarse subangular blocky; hard

36-71 Brown (7.5YR4/2); heavy clay; subangular blocky; firm

71-97 Brown (7.5YR4/2); heavy clay; subangular blocky; firm; 5-10% finely divided gypsum

97-132 Brown (7.5YR4/4); heavy clay; massive; firm

132-142+ Light yellowish brown (2.5YR6/5); prominent yellow mottling (40%); light clay with fragments of weathered shale; massive; soft

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	EC_e	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na						
0-36	7.7	18.6	13.7	0.77	6.7	39.77				22	1.1
36-71	5.2	11.5	13.5	0.51	10.0	35.51	1.60	9.00	1870		
71-97	4.3										
97-132	4.5	9.5	13.2	0.56	11.1	34.36	1.93	9.00			

Clay minerals (97-132 cm) - K(dominant), M(sub-dominant), Q (15%)

Cb Family

Profile E61 located 4.8 km west of "Hazeleigh" HS (co-ord. 517 742 - map SG55-11). Air photo - Mitchell 2-5009.
Relief - undulating, slope 3%.
Vegetation - low *A. harpophylla* forest with occasional *C. cristata* and *Eremophila mitchellii* in places.
Parent material - weathered labile Cretaceous sediments. Mean annual rainfall - 510 mm. Site drainage - well drained. Profile drainage - imperfect. PPF - Ug5.37
Surface strew of ferruginized gravel and stones in places.

Cm

0-15 Dark reddish brown (5YR3/3); heavy clay; 0-2.5 cm fine subangular blocky.
2.5-15 cm medium sub-angular blocky; hard.

15-60 Dark reddish brown (5YR3/3); heavy clay; subangular blocky; firm

60-80 Brown (7.5YR4/4); heavy clay; subangular blocky; firm

80-109+ Yellow-brown (10YR5/4); massive; firm; weathered grey shale

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	EC_e	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na						
0-15	6.2	16.6	16.0	1.01	0.52	34.13				15	1.4
15-60	6.6	26.2	18.8	0.30	4.78	50.08	1.25	8.0	1675	10	
60-80	4.3	11.2	17.3	0.30	4.87	33.67				7	
80-109	4.1	12.6	12.8	0.37	6.22	31.99	1.55	10.6	2050	7	

Clay minerals (15-60 cm) - K(dominant), M(subdominant), I(accessory), Q(20%)
(80-109 cm) - M(dominant), K(subdominant), I(accessory), Q(20%)

Cb Family

Profile SM21 - located 4 km west of "Hazeleigh" (co-ord. 510 744 map SG55-11). Air photo - Mitchell 2-5009. Relief - undulating, in saddle between red earth residuals.
Vegetation - disturbed *A. harpophylla - E. thozetiana* shrub woodland, *Eremophila mitchellii* frequent, sparse *Astrebla* sp. and *Bassia* sp.
Parent material - weathered labile Cretaceous sediments. Mean annual rainfall - 550 mm. Site drainage - moderately well drained.
Profile drainage - moderately well drained. PPF - Ug5.37
Surface - sparse fine gravel of angular ferruginized rock fragments 5-25 mm dia. some silcrete and mottled zone fragments

Cm

0-20 Dark reddish brown (5YR3/4) medium clay; weak platy crust on surface coarse subangular blocky beneath, soft (moist); pH 6.5-7.0

20-45 Dark reddish brown (5YR3/4) medium clay; weak platy crust on surface, coarse subangular blocky structure

45-90 Dark reddish brown (5YR3/6) heavy clay; coarse blocky structure, very firm; 5% gypsum; pH 6.7-6.0

90-105+ Reddish brown (5YR4/3) heavy clay with fragments of weathered shale; massive firm; 3-5% gypsum; pH 5.0

Depth (cm)	Particle Size %				C.E.C	Exch. Cations m-equiv./100 g				ESP	E C_e mmhos/cm
	CS	FS	Si	C		Ca	Mg	K	Na		
0-20	6	21	18	55							
20-45	4	22	6	69	36.9	17.1	17.0	0.68	1.34	4	
90-105					31.5	16.0	16.7	0.79	1.80	6	11.4

Clay minerals (0-20 cm) - RI(dominant), M and K(accessory), I(trace),Q(15%), geothite(trace)
(90-105 cm) - RI(dominant), M and K(subdominant), I(accessory)

Cb Family

Profile F64 located 3.2 km SW of "Heather Downs" HS and 1.6 km south of F63 (co-ord. 636 729 - map SG55-11). Air photo - Mitchell 2-5033.
Relief - level, slope 1%.
Vegetation - low *A. harpophylla* forest with occasional *C. cristata* and *Brachychiton*. Ground cover of *Aristida leptopoda* and *Capparis* sp.
Parent material - weathered sediments. Mean annual rainfall - 580 mm.
Site drainage - moderate. Profile drainage - impeded. PPF - Ug5.16
Few basalt stones on surface

Cm

0-8 Very dark grey-brown (10YR3/2); heavy clay; weak crust to fine granular; loose friable

8-23 Very dark grey-brown (10YR3/2); heavy clay; subangular blocky; firm

23-85 Very dark grey (10YR3/1); heavy clay; subangular blocky; firm; 3-5% soft CO_3

85-117 Very dark grey-brown (10YR3/2); 30% brown mottling; heavy clay; massive; firm

117-150+ Grey-brown (2.5YR5/2); prominent large red mottles (40%); heavy clay; massive; firm; 5% gypsum

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	EC_e	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na						
0-23	8.6	62.7	12.5	0.90	2.22	98.32	0.46		26	27	1.1
23-85	9.1	48.2	16.3	0.36	5.31	70.17	0.44	1.30	300	18	
85.117	8.8	45.4	16.5	0.44	8.40	70.74	0.75		551	22	
117-150	4.7	24.3	14.0	0.09	8.00	46.39	1.90	7.20	828	7	

Clay minerals (23-85 cm) - M(dominant), K(accessory), Q(20%)
(117-150 cm) - M(dominant), K(accessory), Q(30%)

Cb Family

Profile L45 located 1.6 NW west of "Green Hills" HS (co-ord. 276 583 - map SG55-16). Air photo - Surat 5-5065. Relief - very gently undulating, slope 1%. Vegetation - low *A. harpophylla* forest with infrequent *Geijera parviflora* and occasional *Eremophila mitchellii*. Parent material - weathered labile Cretaceous sediments. Mean annual rainfall - 530 mm. Site drainage - moderate. Profile drainage - impeded. PPF - Ug5.16

Cm

0-10 Very dark grey-brown (10YR3/2); heavy clay; 0-0.6 cm platy crust, 0.6-10 cm; subangular blocky; firm

10-40 Very dark grey (10YR3/1); heavy clay; coarse subangular blocky; firm; some CO_3 in soil

40-90 Dark brown (7.5YR3/2); 30% dark grey mottles; heavy clay; subangular blocky grading to massive; very firm; trace of CO_3

90-150+ Dark reddish grey (5YR4/2); 30% dark grey mottles; heavy clay; massive; very firm; 3% soft CO_3 and small concretions

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-10	7.0	20.7	10.9	0.55	<0.05	32.15			27	1.9
10-40	8.4						0.62	847		
40-90	8.8	33.6	19.7	<0.05	5.65	58.95				
90-150	8.8						0.69	1044		

Cc Family

Profile E62 located 3.2 km west of "Hazeleigh" HS (co-ord. 519 742 - map SG55-11). Air photo - Mitchell 2-5009. Relief - very gently undulating, slope ± 1%. Vegetation - grassland.
Parent material - Cretaceous labile sediments, mudstones and minor sandstone, Doncaster Member, Wallumbilla Formation.
Mean annual rainfall - 510 mm. Site drainage - moderate. Profile drainage - imperfect. PPF - Ug5.34

Cm

0-23 Dark brown (7.5YR3/2); heavy clay; subangular blocky; hard; trace of small CO_3 concretions

23-60 Brown (7.5YR4/4); heavy clay; subangular blocky; hard

60-107 Reddish brown (5YR3.5/4); heavy clay; subangular blocky; hard

107-137 Reddish brown (5YR3.5/4); heavy clay; subangular blocky; hard; trace of soft CO_3

137-152+ Yellowish red (7.5YR5/6); medium to heavy clay; massive; firm; white flecks which are *not* CO_3

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	EC_e	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na						
0-23	7.0	13.3	11.2	1.05	<0.05	25.60				22	0.8
23-60	7.0	13.6	13.7	0.49	1.13	28.92	0.41		158	8	
60-107	7.3	11.6	15.6	0.46	1.65	29.31				12	
107-137	7.9	18.9	18.4	0.51	1.91	39.72	1.10	5.20	236	12	

Clay minerals (23-60 cm) - K(dominant), M and I(accessory), Q(15%), Hematite(trace)
(107-137 cm) - K(dominant), M(subdominant), I(accessory), Q(20%), calcite (trace).

Cc Family

Profile E71 located 7.2 km ENE of "Mt Lonsdale" HS (co-ord. 580-729 - map SG55-11). Air photo - Mitchell 3-5208.
Relief - very gently undulating, slope 1-2%. Vegetation - grassland.
Parent material - Cretaceous laminated mudstone and sandstone, Doncaster Member, Wallumbilla Formation. Mean annual rainfall - 530 mm.
Site drainage - moderate. PPF - Ug5.34
Very sparse surface strew of ferruginized sandstone and conglomerate fragments.

Cm

0-23 Dark brown (10YR3/3); heavy clay; fine subangular blocky; hard

23-76 Dark brown (10YR3/3); heavy clay; subangular blocky; hard

76-107 Dark grey-brown (10YR4/2); heavy clay; subangular blocky; hard; 3-5% gypsum; some CO_3

107-152 Strong brown (7.5YR4/6); heavy clay; massive; firm friable; 10-15% gypsum

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P. p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-23	6.5	12.5	21.5	1.31	<0.05	35.31			8	0.6
23-76	7.0						0.39	65		
76-107	7.9	20.4	27.3	0.92	0.52	49.14				
107-152	7.5						0.20	90		

Clay minerals (23-76 cm) - K and I (co-dominant), M (accessory), Q (50%)
(107-152 cm) - I (dominant), K (sub-dominant), M(accessory), Q (40%)

Cc Family

Profile F53 located 3.2 km, north of "Massey Downs" HS (co-ord 665 693 - map SG55-11). Air photo - Mitchell 5-5009.
Relief - very gently undulating, slope ± 2%.
Vegetation - grassland with *Astrebla lappacea* dominant and *Sporobolus caroli* frequent.
Parent material - Cretaceous labile sediments, Wallumbilla Formation.
Mean annual rainfall - 530 mm. Site drainage - well drained. Profile drainage - imperfect. PPF - Ug5.22

Cm

0-1 Dark grey (10YR4/1); heavy clay; fine subangular blocky; friable

1-15 Dark grey (10YR4/1); heavy clay; subangular blocky; very hard

15-35 Dark grey-brown (10YR4/1); heavy clay; subangular blocky; hard

35-65 Very dark grey-brown (10YR3/2); heavy clay; massive; firm; trace of soft CO_3

65-110 Light olive brown (2.5YR5/4); 30% grey mottling; heavy clay; massive; firm; 3-5% fine typsum

110-150+ Light olive-brown (2.5YR5/4); heavy clay; increasing fragments of grey shale

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-15	7.8	24.4	11.8	0.95	8.70	45.85			30	0.6
15-35	7.7						0.31	165		
35-65	8.2	26.0	12.8	0.80	3.48	43.08				
65-110	7.5						1.20	473		

Clay minerals (36-65 cm) - M(dominant), K and I(accessory), Q (25%).

Cc Family

Profile F63 located 2.4 km west of "Heather Downs" HS (co-ord. 636 732 - map SG55-11). Air photo - Mitchell 2-5033.
Relief - gently undulating, slope 3%.
Vegetation - grassland, possibly with scattered clumps of *A. harpophylla* and *E. orgadophila* originally.
Parent material - Cretaceous labile sediments, Minmi Member, Blythesdale Formation. Mean annual rainfall - 580 mm. Site drainage - well drained.
Profile drainage - imperfect. PPF - Ug5.15
Surface strew of gravel and stones (quartz, billy and basalt) round to subround, and up to 30 cm diamater

Cm

0-15 Very dark grey-brown (10YR3/2); medium clay; trace of subround quartz gravel (6-13 mm diameter); fine granular; soft loose

15-36 Very dark grey (10YR3/1); heavy clay; subround quartz gravel; subangular blocky; firm

36-90 Very dark grey (10YR3/1); heavy clay; trace of subround quartz gravel; subangular blocky; firm; 3-5% soft CO_3

90-150 Strong brown (7.5YR5/6); heavy clay with fragments of weathered shale; massive; firm; 10-20% gypsum

Depths(cm)	pH	Exch.Cations m-equiv./100 g				EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na				
0-15	7.9	29.9	8.4	1.31	1.14			15	0.9
15-36	8.0					0.31	45		
36-90	8.6	41.9	13.5	0.51	5.52				
90-150	7.2					2.40	1064		

Ce Family

Profile B56 - located 9.6 km north of "Overston" HS, and 6.4 km SW of "Warton" HS (co-ord. 233 642 - map SG55-16). Air photo - Surat 1-5065. Relief - level, slope <1%.
Vegetation - open woodland with *E. microtheca* dominant.
Parent material - alluvium. Mean annual rainfall - 580 mm.
Site drainage - seasonally flooded. Profile drainage - impeded.
PPF - Ug5.24

Cm

0-13 Dark grey (10YR4/1); light to medium clay; 0-3 mm soft friable, weak platy crust, 3-13 cm hard subangular blocky; trace of CO_3

13-46 Dark grey (10YR4/1); heavy clay; subangular blocky; hard; trace of small CO_3 concretions

46-90 Dark brown (10YR3/3); heavy clay; subangular blocky; hard; CO_3

90-150+ Dark grey-brown (10YR4/1.5); heavy clay; massive; CO_3

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	EC_e	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na						
0-13	8.5	27.0	10.0	0.93	0.09	38.02				61	0.8
13-46	8.8										
46-90	8.6	25.6	12.8	0.18	4.09	42.67	0.67	3.52	631		
90-150	6.7						1.05		1360		

Ce Family

Profile C44 located 4.0 km NW of "Rockdale" HS near Noorindoo lagoon (co-ord. 207 642 - map SG55-16). Air photo - Surat 1-5073. Relief - level, slope <1%.
Vegetation - *E. microtheca* woodland with infrequent *Heterodendrum oleifolium*. Mainly sparse *Bassia* sp., ground cover.
Parent material - alluvium. Mean annual rainfall - 530 mm.
Site drainage - imperfect. Profile drainage - impeded. PPF - Ug5.16

Cm	
0-30	Dark grey (10YR3.5/1); heavy clay; 0-2.5 cm, fine granular, 2.5-30 cm subangular blocky; loose friable; CO_3
30-60	Very dark grey-brown (10YR3/2); heavy clay; subangular blocky; very firm; trace of small CO_3 concretions
60-90	Dark grey (10YR4/1); heavy clay; massive; firm; trace of small CO_3 concretions
90-150+	Dark grey-brown (10YR4/2) to brown (10YR4/2.5) heavy clay; massive; firm

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-30	8.3	23.0	9.9	1.02	1.6	35.52			112	0.7
30-60	8.8	23.8	11.5	0.66	3.7	39.66	0.29	276		
60-90	8.7									
90-150	7.2	11.3	11.2	0.41	5.5	28.41	0.79	926		

Ce Family

Profile H27 located 3.2 km south of "Somerset" HS (co-ord. 643 417 - map SH55-3). Air photo - Dirranbandi 8-0033.
Relief - level, slope <1%.
Vegetation - very open grassy woodland - *E. microtheca* dominant; *A. pendula* infrequent. *Astrebla* sp. ground cover.
Parent material - alluvium. Mean annual rainfall - 430 mm.
Site drainage - imperfect. Profile drainage - imperfect. PPF - Ug5.24

Cm

0-1 Dark grey (10YR4/1); medium clay; weak platy crust grading to granular; soft friable

1-15 Dark grey (10YR4/1); medium clay; subangular blocky; hard

15-46 Grey (10YR4.5/1); medium to heavy clay; subangular blocky; hard

46-90 Grey (10YR5/1); medium to heavy clay; subangular blocky; hard; 3-5% soft CO_3

90-150+ Grey (10YR5/1); heavy clay; massive; firm; 5-10% gypsum

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-15	8.3	31.8	7.8	1.58	<0.05	41.18			23	0.7
15-46	8.7						0.26	75		
46-90	8.5	26.2	11.5	0.98	4.00	42.68				
90-150	8.3						1.5	729		

Ce Family

Profile H55 located 4.8 km SW of "Springwell" HS (co-ord. 14[illegible] 501 - map SH-4). Air photo - St. George 2-5103.
Relief - level, slope <1%.
Vegetation - grassy woodland - *E. microtheca* dominant with *Astrebla* spp. ground cover.
Parent material - alluvium. Mean annual rainfall - 480 mm.
Site drainage - moderate. Profile drainage - imperfect. PPF - Ug5.24

Cm

0-18 Very dark grey-brown (10YR3/1.5); medium to heavy clay; 0-2.5 granular, 2.5-18 subangular blocky; 0-25 cm loose friable; 2.5-18 hard

18-76 Very dark grey-brown (10YR3/1-3/2); medium to heavy clay; subangular blocky; hard; trace of CO_3 and gypsum

76-122 Dark brown (10YR4/3); 30% yellow-brown mottling; medium to heavy clay; massive; firm; trace of CO_3

122-152+ Brown (10YR5/3); medium to heavy clay; massive; firm; some CO_3

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-18	7.6	13.3	7.6	0.70	0.17	21.77			20	0.6
18-76	7.7						0.90	73		
76-122	8.1	18.2	10.0	0.38	2.87	31.45				
122-152	8.7						0.43	124		

Ce Family

Profile I46 located 3.2 km north of "Dolgelly House" HS (co-ord. 279 426 - map SH55-4). Air photo - St. George 7-5013.
Relief - level, slope <1%.
Vegetation - grassland. *Astrebla* spp. dominant with *Bassia* sp. frequent; occasional *A. farnesiana*.
Parent material - alluvium. Mean annual rainfall - 530 mm.
Site drainage - seasonally waterlogged for short periods.
Profile drainage - impeded. PPF - Ug5.16

Cm

0-1 Very dark grey (10YR3/1); heavy clay; weak platy grading to fine granular; soft friable

1-15 Very dark grey (10YR3/1); heavy clay; coarse subangular blocky (30-55 mm diameter); soft friable

15-60 Very dark grey (10YR3/1); heavy clay; coarse subangular blocky; soft friable; trace of small CO_3 concretions to CO_3

60-90 Very dark grey (10YR3/1); heavy clay; massive; soft friable; trace of small CO_3 concretions and soft CO_3

90-150+ Very dark grey (10YR3/1); heavy clay; massive; soft friable; trace of small CO_3 concretions and soft CO_3

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-15	8.0	38.8	16.8	2.16	0.96	58.72			200	0.2
15-60	8.6						0.39	191		
60-90	8.7	27.0	19.5	1.70	12.53	60.73				
90-150	8.6						0.94	1064		

Ce Family

Profile K46 located 5.6 km south of Addis No. 1. Bore (co-ord. 14? 682 - map SG55-12). Air photo - Mitchell 7-5037.
Relief - level, slope <1%.
Vegetation - short grassland, bare of vegetation in places - *Tripogon loliiformis* dominant grass.
Parent material - alluvium. Mean annual rainfall - 530 mm.
Site drainage - subject to overflow flooding. Profile drainage - impeded.
PPF - Ug5.5. Fine layer of silt and very fine sand on surface. Numerous cracks at surface (± 6 mm wide)

Cm

0-15 Dark grey-brown (10YR3.5/2); medium clay; weak subangular blocky; firm

15-60 Dark grey brown (10YR3.5/2); medium clay; weak subangular blocky; firm

60-90 Dark grey-brown (10YR3.5/2); medium clay; weak subangular blocky; firm

90-127 Brown (10YR4/3); medium clay; massive; firm; 3-5% gypsum and soft CO_3

127-150+ Yellowish brown (10YR5/4); medium clay; massive; firm

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-15	6.1	14.3	7.4	0.80	0.09	22.59			45	0.9
15-60	7.7						0.46	532		
60-90	7.8	17.7	11.2	0.22	6.96	36.08				
90-127	8.0						0.87	1162		
127-150	(8.0)									

3. Duplex Soils

Da Family

Profile A32 located 11.2 km north of Wallumbilla (co-ord. 205 710 - map SG55-12). Air photo - Roma 5-5115.
Relief - gently undulating, slope 1-2%.
Vegetation - *C. cristata* forest with sparse shrubs - *Eremophila mitchellii* and *Geijera parviflora*
Parent material - weathered labile cretaceous sediments.
Mean annual rainfall - 600 mm.
Site drainage - well drained. Profile drainage - imperfect.
PPF - Dr2.23

Cm

0-13 Dark brown (7.5YR3/2); fine sandy clay loam; massive; soft

13-20 Reddish brown (moist - 5YR4/3, dry - 7.5YR4/4); fine sandy loam; massive; slightly firm

20-66 Dark reddish brown (5YR3/4); medium clay; angular blocky; hard

66-107+ Reddish brown (5YR4/4); medium to heavy clay; angular blocky; hard; 3-5% hard CO_3

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-13	6.0	4.0	2.4	0.96	0.30	7.66			20	1.3
13-20	7.3									
20-66	7.5	2.9	9.6	0.45	5.57	18.52	0.53	592		
66-107	9.2						0.80	867		

Clay minerals (20-66 cm) - K(dominant), illite (accessory)
Q 10%, calcite and feldspar (trace).

Da Family

Profile B15 located 9.6 km south of "Moraby" HS and 8.0 km NE of "Riverglen" HS (co-ord. 266 646 - map SG55-16). Aerial photo - Roma 9-5079. Relief - level, slope <1%.
Vegetation - *C. cristata* forest with frequent *A. harpophylla* and moderately dense shrubs - mainly *Geijera parviflora*, frequent *Carissa ovata*.
Parent material - weathered labile Cretaceous sediments, Griman Creek Beds.
Mean annual rainfall - 600 mm.
Site drainage - moderate. Profile drainage - imperfect.
PPF - Dr2.33

Cm

0-9 Dark brown (7.5YR3/2); clay loam; massive; firm

9-10 Brown (10YR5/3 dry); clay loam; massive; firm

10-35 Reddish brown (5YR4/3); medium clay; medium subangular blocky; very firm

35-65 Reddish brown (5YR4/3); heavy clay; medium subangular blocky; very firm; 3-5% CO_3

65-90 Brown (7.5YR4/2); pale brown mottling (15%); heavy clay; massive; firm; trace of CO_3

Depth (cm)	Particle Size %				pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
	CS	FS	Si	C		Ca	Mg	K	Na					
0-10	30	34	13	23	6.3	7.3	2.5	0.36	0.35	10.51			15	1.3
10-35	23	29	10	38	8.0						0.24	104		
35-65	19	23	11	47	9.0	20.8	11.6	0.21	6.09	38.70				
65-90	16	24	12	48	8.4						0.67	670		

Da Family

Profile B30 located 3.2 km SE of "Windermere" HS (co-ord. 261 597 - map SG55-16). Air photo - Surat 4-5229.
Relief - gently undulating, slope 2-3%.
Vegetation - *C. cristata* forest with infrequent *A. harpophylla*.
Parent material - weathered labile Cretaceous sediments, Griman Creek Beds.
Mean annual rainfall - 560 mm. Site drainage - well drained. Profile drainage - well drained. PPF - Dr2.23

Cm	
0-23	Dark reddish brown (5YR3/3); clay loam; massive; soft friable
23-30	Reddish brown (5YR5/3); clay loam; 15% gravel; massive; soft friable
30-60	Dark reddish brown (5YR3/3); medium to heavy clay; subangular blocky; hard
60-90	Reddish brown (5YR4/4); medium clay; subangular blocky; hard
90-167	Reddish brown (5YR4/4); medium clay; massive; hard

Depth (cm)	Particle Size %				pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
	CS	FS	Si	C		Ca	Mg	K	Na					
0-23	19	48	13	20	5.1	7.3	2.3	0.43	0.50	10.53			15	2.3
23-30	21	46	13	20	6.1						0.20	48		
30-60	13	33	10	44	7.7	5.0	12.5	0.20	5.22	22.92				
60-90	13	31	10	46	8.3						0.44	630		

Clay minerals (30-60 cm) - K(dominant), M(accessory)
Q (15%), Hematite (trace)

Da Family

Profile B43 location 2.4 km SW of "Billenbah" HS (co-ord. 223 594 - map SG55-16). Air photo - Surat 4-5221.
Relief - gently undulating, slope 2%.
Vegetation - *C. cristata* forest with occasional *A. harpophylla*.
Parent material - weathered Cretaceous labile sediments, Griman Creek Beds.
Mean annual rainfall - 560 mm. Site drainage - well drained.
Profile drainage - imperfect. PPF - Dr2.13

Cm	
0-10	Dark reddish brown (5YR3/3); clay loam; 10% gravel; massive; firm friable; plant roots
10-55	Dark reddish brown (5YR3/3); heavy clay; 5% gravel; subangular blocky; firm; 3-5% soft CO_3
55-90	Dark reddish brown (2.5YR3/4); heavy clay; 5% gravel; subangular blocky grading to massive; firm

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-10	6.4	11.6	3.6	1.35	0.48	17.03			37	2.9
10-55	8.6	30.9	17.4	0.30	8.90	57.50	1.00	1261		
55-90	8.4									

Clay minerals (10-56cm) - K(dominant), M(sub-dominant), illite (trace)
Q(20%), Hematite (trace)

Da Family

Profile G54 located 0.8 km NE of "Mansfield" HS (co-ord. 626 574 - map SG55-15). Air photo - Homeboin 5-5109.
Relief - level, slope <1%.
Vegetation - shrub woodland - *E. populnea* dominant with moderately dense shrubs - mainly *Eremophila mitchellii*, frequent *Eremocitrus glauca*, infrequent *Geijera parviflora*, and occasional *Callitris columellaris*.
Parent material - weathered labile Cretaceous sediments.
Mean annual rainfall - 480 mm.
Site drainage - moderate. Profile drainage - imperfect. PPF - Dr2.13

Cm

0-41 Dark reddish brown (5YR3/4); fine sandy clay loam; massive; firm

40-60 Dark red (2.5YR3/6); medium to heavy clay; subangular blocky; hard; moderate CO_3 content

60-110 Yellowish red (5YR5/6); light to medium clay; massive; firm; high CO_3 content (20-30% CO_3 concretions and soft accumulations)

Depth (cm)	Particle size %				pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Org.C %
	CS	FS	Si	C		Ca	Mg	K	Na				
0-40	31	39	9	21	7.4	8.0	2.0	1.48	0.24	11.72			0.7
40-60	26	30	6	38	8.3	19.2	4.3	1.58	0.45	25.53	0.29	39	
60-110	19	21	17	43	8.8	39.9	8.3	2.04	0.50	50.74	0.21	95	

Clay minerals (40-60 cm) - K(dominant), I(sub-dominant)
Q (20%), Hematite (trace)

Db Family

Profile F7 located 1.6 km north of "Bonus Downs" HS (co-ord. 583 684 - map SG55-11). Air photo - Mitchell 6-5109.
Relief - very gently undulating, slope ± 1%.
Vegetation - low *A. harpophylla* clumps (3-4 m) with *E. populnea* emergent. Sparse shrubs, mainly *Eremophila mitchellii* with patches of bare ground common.
Parent material - weathered labile Cretaceous sediments.
Mean annual rainfall - 480 mm. Site drainage - moderately well drained. Profile drainage - imperfect. PPF - Dd1.22. Moderately dense surface gravel in scattered areas, 1-10 cm dia. ferruginized rock and silcrete fragments.

Cm	
0-8	Dark brown (5YR3/3); silt loam; massive; firm
8-10	Reddish brown (5YR5/3 & 5YR6/3.5 when dry), silt loam; massive; firm
10-65	Dark reddish brown (5YR3/2); heavy clay; coarse subangular blocky (2.5-5cm); very hard
65-90	Reddish brown (5YR4/3); heavy clay; subangular blocky grading to massive; hard

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-10	5.9	5.8	3.8	0.41	0.23	10.24			12	0.9
10-65	7.7	15.6	12.5	0.14	7.83	36.07	0.85	808		
65-90	6.9						0.82	709		

Dd Family

Profile B14 located 4.8 km east of "Moraby" HS (co-ord. 273 657 - map SG55-12). Air photo - Roma 9-5079.
Relief - gently undulating.
Vegetation - shrub woodland with *E. populnea* dominant and moderately dense *Eremophila mitchellii, Carissa ovata, Eremocitrus glauca,* and *Canthium* sp.
Parent material - weathered sediments. Mean annual rainfall - 580 mm.
Site drainage - well drained. Profile drainage - imperfect. PPF - Db1.23

Cm

0-4 Very dark grey-brown (10YR3/2); sandy clay loam; massive; firm

4-5 Dark grey-brown (10YR4/2); sandy clay loam; massive; firm

5-90+ Dark brown (10YR3/3); medium clay; fine columnar grading to coarse subangular blocky; hard, grading to firm

Depth (cm)	Particle size %				pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
	CS	FS	Si	C		Ca	Mg	K	Na					
0-5	42	32	8	18	6.4	5.8	3.8	0.41	0.23	10.24			30	1.0
5-30	39	23	9	29	8.3	13.9	10.9	0.11	5.13	30.04	0.54	394	14	
60-90	41	21	9	29	8.3	7.6	12.5	0.11	6.79	27.00	0.60	591		

Dd Family

Profile B61 located 4.8 km SW of "Salisbury Creek" HS (co-ord. 237 652 - map SG55-12). Air photo - Roma 9-5071.
Relief - very gently undulating, slope 1%.
Vegetation - shrub woodland, *E. populnea* dominant, moderately dense shrubs - *C. luehmannii, Eremophila mitchellii, Callitris columellaris* and very sparse grasses.
Parent material - Tertiary quartz sandstone and conglomerate.
Mean annual rainfall - 580 mm. Site drainage - moderate. Profile drainage - imperfect. PPF - Dy3.43

Cm

0-18 Brown (10YR4/3); medium sand; massive; soft

18-20 Light grey (10YR7/2 dry), bleached on columns; medium sand; massive; soft

20-35 Brown (10YR4/3); yellow-brown mottling (30%); sandy clay; coarse columnar (30 cm); very hard

35-65 Brown (10YR4/3); yellow-red mottling (40%), light to medium clay; massive; hard; trace of CO_3

65-90+ Grey (10YR5/1); yellow-brown mottling (30%); light to medium clay; massive; firm; 15-20% soft CO_3

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	EC_e	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na						
0-20	5.9	2.3	1.0	0.20	0.09	3.59				27	0.5
20-35	6.7						0.32		144		
35-65	9.2	9.7	8.2	0.50	4.00	22.40					
65-90	9.5						0.60	3.08	571		

De Family

Profile C33 located 5.6 km SW of "Garrabarra" HS (co-ord. 180 648 - map SG55-16). Air photo - Surat 1-5085.
Relief - very gently undulating, slope 1-2%.
Vegetation - shrub woodland with *E. populnea* dominant and *A. haropohylla* frequent. Moderately dense shrubs - *Eremophila mitchellii, Carissa ovata, Canthium odoratum.*
Parent material - Tertiary quartz sandstone, conglomerate and some clayey ferruginous sandstone. Mean annual rainfall - 560 mm. Site drainage - moderate. Profile drainage - imperfect. PPF - Dd1.21

Cm

0-13 Dark brown (7.5YR3/2); sandy clay loam; massive; firm

13-23 Brown (10YR4/3 moist, grey-brown 10YR5/2, dry), sandy clay loam; massive; firm

23-60 Dark brown (7.5YR3/2); medium clay; columnar - 2.5 cm cracks; very hard

60-90 Dark reddish brown (5YR3/3); medium to heavy clay; angular blocky to massive

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-23	5.4	1.6	3.0	0.62	0.34	5.56			10	1.4
23-60	5.3						0.22	197		
60-90	5.5	0.6	7.6	0.37	4.35	12.92	0.47	571		

Dh Family

Profile M15 located 6.4 km SW of "Arakoola" HS, near Wallum Creek (co-ord. 563 544 - map SG55-15). Air photo - Homeboin 6-5161. Relief - very gently sloping, slope <1%.
Vegetation - mainly bare - very sparse succulants and *Tripogon loliiformis* ground cover.
Parent material - alluvium.
Mean annual rainfall - 430 mm. Site drainage - moderate.
Profile drainage - imperfect. PPF - Dr2.22
Hard crusty surface.

Cm

0-2.5 Dark reddish brown (5YR3/4); silty loam; massive; firm

2.5-5 Brown (5YR5/4 moist, 7.5YR6/4 dry); silty loam; massive; firm

5-35 Dark reddish brown (5YR3/4); silty clay; fine subangular blocky; hard

35-90 Yellowish red (5YR4/8); medium clay; fine subangular blocky; hard

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	EC_e	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na						
0-5	6.6	4.9	2.6	0.62	0.39	8.51				57	0.5
5-35	7.2	9.2	4.7	0.32	1.06	15.28	0.09		30	10	0.3
35-90	8.0							0.86			

Di Family

Profile B49 located 1.6 km south of "Earlwood" HS (co-ord. 229 618 - map SG55-16). Air photo - Surat 2-5065.
Relief - level, slope <1%.
Vegetation - *E. populnea* woodland with occasional *Heterodendrum oleifolium* and *A. pendula*, sparse shrubs - *Eremophila mitchellii*.
Parent material - alluvium. Mean annual rainfall - 580 mm. Site drainage - moderate. Profile drainage - imperfect. PPF - Dd1.13

Cm	
0-8	Dark brown (10YR3/3); silty clay loam; massive; firm
8-40	Very dark brown (10YR2/2); heavy clay; subangular blocky; hard
40-65	Dark brown (10YR3/3); heavy clay; subangular blocky; hard; 3-5% soft CO_3
65-90+	Dark yellowish brown (10YR4/4); heavy clay; subangular blocky grading to massive; hard; trace of soft CO_3

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-8	5.9	5.0	4.3	0.75	0.56	10.61			61	1.5
8-40	7.3						1.10	1015		
40-65	8.4	26.1	15.1	0.47	9.83	51.50				
65-90	8.6						1.20	1734		

Di Family

Profile H25 located 3.2 km west of "Boorumbirra" HS, near the Narran River (co-ord. 623 409 - map SH55-3). Air photo - Dirranbandi 8-0037. Relief - level, slope ± 1%.
Vegetation - *Atalaya hemiglauca* - *Flindersia dissosperma*, scattered. Mostly bare ground.
Parent material - alluvium. Mean annual rainfall - 430 mm.
PPF - Dy2.33

Cm

0-5 Dark brown (7.5YR3/2); sandy clay loam; massive; firm

5-30 Brown (7.5YR4/2); sporadically bleached; medium clay; coarse prismatic grading to fine angular blocky (6-12 mm diameter); very hard

30-70 Brown (10YR4/3); medium clay; angular blocky; very hard; trace of small white CO_3 concretions.

70-90+ Grey-brown (2.5YR5/2); 15% brown mottles; medium to heavy clay; massive; firm; 5-10% finely divided gypsum.

Depth (cm)	pH	Exch.Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-5	6.6	3.1	2.1	0.48	<0.05	5.73			12	0.6
5-30	8.8	9.8	5.9	0.65	1.79	18.14	0.25	217	18	0.5
30-70	8.5	26.6	11.2	0.66	5.22	43.68				
70-90	7.8						2.00	1380		

4. Massive Earths

Ea Family

Profile G18 located 10.4 km east of "Tongy" HS (co-ord. 549 608 - map SG55-11). Air photo - Homeboin 3-5131.
Relief - very gently undulating, slope <1%.
Vegetation - *E. populnea* and *A. aneura* co-dominant with sparse shrubs - *Eremophila mitchellii*.
Parent material - weathered sediments. Mean annual rainfall - 460 mm.
Site drainage - well drained. Profile drainage - well drained.
PPF - Gn 2.11

Cm

0-15 Dark red (2.5YR3/6); fine sandy clay loam; massive; firm

15-60 Dark red (2.5YR3/6); clay loam; massive; firm

60-90 Dark red (2.5YR3/6); clay loam; massive; firm

90-120 Dark red (2.5YR3/6); light clay; massive; firm

120-135 Yellowish red (5YR4/8; light clay with fragments of mottled zone; massive; firm

Depth (cm)	Particle Size %				pH	Exch. Cations m-equiv./100 g				Sum of Cations	Avail.P p.p.m.	Org.C %
	CS	FS	Si	C		Ca	Mg	K	Na			
0-15	28	38	11	23	5.6	1.8	1.0	0.55	<0.05	3.35	5	0.5
15-60	27	37	15	21	6.0	1.4	1.3	0.51	<0.05	3.21	5	
60-90	30	35	8	27	5.7	1.4	1.0	0.44	0.59	3.43		
90-120	28	38	13	21	5.3	1.4	1.0	na	<0.05			

Clay minerals (15-60 cm) - K(dominant), I(accessory)
Q (35%), Hematite (trace).

Ea Family

Profile L26 located 0.8 km west of "Dunmara" HS (co-ord. 204 549 - map SG55-16). Air photo - Surat 7-5119.
Relief - very gently undulating, slope ± 2%.
Vegetation *E. populnea* shrub woodland with *Eremophila mitchellii* frequent; sparse (± 30%) grass cover.
Parent material - weathered labile Cretaceous sediments.
Mean annual rainfall - 530 mm. Site drainage - well drained.
Profile drainage - well drained.
PPF - Gn2.12
Hard-setting, crusty surface with a little fine gravel of ferruginized rock fragments.

Cm

0-15 Dark reddish brown (5YR3/4); sandy clay loam; massive; slightly firm

15-31 Dark reddish brown (5YR3/4); clay loam; 5% subround (0.6 cm diameter) gravel; massive; firm

31-60 Dark reddish brown (5YR3/4); light to medium clay; 5% subround (0.3 - 0.6 cm diameter) gravel; massive; firm

60-90+ Reddish brown (10YR4/3); medium clay; 5% subrounded (0.3 - 0.6 cm diameter) gravel; massive; very firm

Depth (cm)	Particle Size %				pH	Exch. Cations m-equiv./100 g				Sum of Cations	Avail.P p.p.m.	Org.C %
	CS	FS	Si	C		Ca	Mg	K	Na			
0-15	10	46	22	22	5.2	3.6	2.3	0.67	0.30	6.87	10	1.1
15-30	9	40	20	31	6.0	3.0	3.6	0.19	1.57	8.36		
30-60	7	26	13	54	7.1	4.8	7.3	0.13	4.96	17.19		
60-90	7	26	15	52	7.9	4.6	9.2	0.12	7.40	21.32		

Ec Family

Profile I25 located 2.4 km north of "Tabooba" HS (co-ord. 202 486 - map SH55-4). Air photo - St. George 3-5067.
Relief - very gently undulating, slope ± 1%.
Vegetation - shrub woodland *E. populnea* dominant with moderately dense, tall *Eremophila mitchellii*.
Parent material - weathered sediments. Mean annual rainfall - 510 mm.
Site drainage - mmoderate. Profile drainage - well drained. PPF - Gn2.13

Cm

0-15 Dark reddish brown (5YR3/3); clay loam; massive; soft

15-45 Reddish brown (5YR3/6); light clay; massive; firm

45-75 Dark red (2.5YR3/6); light to medium clay; massive; hard

75-107+ Dark red (2.5YR3/6); light to medium clay; massive; hard

Depth (cm)	pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	Cl p.p.m.	Avail.P p.p.m.	Org.C %
		Ca	Mg	K	Na					
0-15	6.0	6.2	2.0	1.14	<0.05	9.34			14	1.2
15-45	6.0	5.0	2.1	0.70	0.06	7.86			8	
45-75	8.1	6.2	4.3	0.85	0.89	12.24				
75-107	8.5	6.7	4.6	0.80	1.57	13.67	0.15	22		

Ec Family

Profile J15 located 7.2 km east of "Argyle" HS near the Bollon-Dirranbandi Road (co-ord. 580 516 - map SH55-3). Air photo - Dirrabandi 1-5217. Relief - level, slope <1%.
Vegetation - *E. populnea* shrub woodland with frequent *C. cristata* and moderately dense shrubs - *Eremophila mitchellii, Geijera parviflora,* and *A. aneura.*
Parent material - weathered sediments. Mean annual rainfall - 430 mm.
Site drainage - moderate. Profile drainage - moderate. PPF - Gn2.13 Cm

0-8	Dark reddish brown (2.5YR3/4); loamy sand; massive; soft
8-30	Dark red (2.5YR3/6); sandy loam; massive; fine.
30-55	Dark red (2.5YR3/6); sandy clay loam; massive; fine
55-150	Yellowish red (5YR4/8) grading to pale grey; gritty sandy clay loam (grit probably weathered Tertiary material); massive; firm

Depth (cm)	pH	EC_s	Cl p.p.m.
55-150	8.5	0.27	140

Ec Family

Profile N38 located 14.5 km north of "Tambingey" HS (co-ord. 517 461 - map SH55-3). Air photo - Dirranbandi 5-5085
Relief - level, slope <1%.
Vegetation - *E. populnea - A. aneura* (mostly cleared) and moderately dense *Eremophila mitchellii* and *Geijera parviflora* in open areas. *Bassia tetracuspis* on bare ground.
Parent material - weathered sediments. Mean annual rainfall - 400 mm.
Site drainage - moderate. Profile drainage - well drained. PPF - Gn2.13
Crusty flakes on surface.

Cm

0-10 Dark reddish brown (5YR3/4); fine sandy clay loam; massive; soft

10-30 Dark reddish brown (5YR3/6); clay loam; massive; soft

30-60 Dark red brown (5YR3/6); light clay; massive; soft

60-107 Reddish brown (5YR4/4); gritty clay loam; 15-20% angular to sub-angular ferruginized sandstone fragments (0-6 - 1.3 cm diameter); massive; soft; 5% soft CO_3

Depth (cm)	Particle Size %				pH	Exch. Cations m-equiv./100 g				Sum of Cations	EC_s	EC_e	Cl p.p.m.	Avail.P p.p.m.	Org.C %
	CS	FS	Si	C		Ca	Mg	K	Na						
0-10	17	49	10	24	6.1	3.8	1.6	1.10	<0.05	6.50	0.08		20	22	0.5
10-30	20	41	11	28	5.5	3.8	1.6	1.28	<0.05	6.68	0.32		120	12	
30-60	19	33	9	39	8.3	9.6	2.7	1.68	0.25	14.23	0.09		22		
60-107	13	29	18	40	8.9	20.7	4.9	2.31	1.30	29.21	0.20	1.98	122		

Clay minerals (60-107 cm) - K(dominant), I(accessory), Q 20%.

Eh Family

Profile E2 located 16.1 km NE of "Mt Moffatt" HS (co-ord. 628 897 - map SG55-3). Air photo - Springsure 4-5222.
Relief - gently undulating, slope ± 1%.
Vegetation - tall (30-45 m) *E. eugenioides* forest with frequent *Macrozamia moorei* and *Themeda australis* ground cover.
Parent material - weathered Tertiary basalt.
Mean annual rainfall 600 mm. PPF - Gn2.11

Cm

0-30 Dark brown (7.5YR3/2); clay loam to light clay; weak subangular blocky; firm

30-45 Dark reddish brown (2.5YR3/2); light clay; weak subangular blockey; firm

45-90 Dark reddish brown (5YR3/3 to 2.5YR3/4); light to medium clay; massive; firm

90-110+ Dark reddish brown (2.5YR3/4); light to medium clay; massive; firm

Depth (cm)	Particle Size %				pH	Exch. Cations m-equiv./100 g				Sum of Cations	Avail.P p.p.m.	Org.C %
	CS	FS	Si	C		Ca	Mg	K	Na			
0-30	11	23	31	35	6.3	16.9	7.9	0.46	<0.05	25.26	45	4.0
30-45	8	17	29	46	6.0	8.9	5.0	0.16	0.08	14.14		
45-90	6	15	27	52	5.9	3.3	3.3	0.05	0.34	6.99		
90-110	5	30	27	38	5.7	2.4	3.3	<0.05	0.32	6.02		

Clay minerals (45-90 cm) - K(dominant), inhibited vermiculite? (trace).

TABLE 1

MAJOR SOIL GROUPS AND FAMILIES IN THE BALONNE-MARANOA AREA

Major Group	Family	Summary Description	Appropriate or Approximate Equivalent Name (Stace et al. 1968)	Principal Profile Form (Northcote 1971)
Alluvial soils	Aa	Uniform medium-to fine-textured soils on sandy substrata	Alluvial Soils	Um5.5
	Ab	Uniform medium-to fine-textured soils on layered materials		Um1
	Ac	Uniform coarse-textured soils on clayey substrata		Uc1
Brown and grey-brown soils	Formed on weathered zone materials			
	Ba	Moderately deep to deep, uniform or gradational, reddish brown, neutral to acid throughout	Euchrozems	Uf6.31, Gn3.12
	Bb	Moderately deep to deep, uniform or gradational, reddish brown, strongly alkaline subsoils		Uf6.31, Gn3.13
	Bc	Moderately deep to deep, uniform or gradational, dark brown to grey-brown strongly alkaline subsoils		Uf6.31, 6.51, Gn3.23
	Formed on various sedimentary rocks			
	Bd	Moderately deep to deep, uniform or gradational, dark brown to grey-brown strongly alkaline subsoils	Prairie soils	Uf6.31, 6.32, Gn3.93
	Formed on alluvium			
	Be	Deep, uniform or gradational, dark brown to grey-brown, strongly alkaline subsoils		Uf6.32, 6.51
	Shallow soils on various parent rocks			
	Bf	Shallow (< 60 cm) grey, brown, and red soils		Uf6.31, 6.32, Gn3.23

Cont.

Major Group	Family	Summary Description	Appropriate or Approximate Equivalent Name (Stace et al. 1968)	Principal Profile Form (Northcote 1971)
Cracking clay soils		Formed on weathered zone materials		
	Ca	Gilgaied, very deep, mainly grey, alkaline-acid, less commonly brown or reddish brown	Grey, Brown, or Red Clays	Ug5.24, 5.34
	Cb	Moderately deep to deep, grey, brown, or reddish brown, alkaline at or near the surface and acid beneath	Grey, Brown, or Red Clays	Ug5.24, 5.34, 5.16
		Formed on 'fresh' argillaceous sedimentary rocks		
	Cc	Moderately deep to deep, grey or brown, strongly alkaline subsoils with carbonate and/or gypsum	Grey or Brown Clays	Ug5.32, 5.22, 5.12
		Formed on basalt		
	Cd	Moderately deep, dark grey, strongly self-mulching, alkaline subsoils	Black Earths	Ug5.12
		Formed on alluvium		
	Ce	Deep, grey and brown, strongly alkaline subsoils	Grey or Brown Clays	Ug5.24, 5.16
		Shallow soils on various rocks		
	Cf	Shallow (< 60 cm) grey and brown	Grey or Brown Clays	Ug5.12
Duplex or texture-contrast soils		Weakly solonised soils formed mainly on weathered argillaceous sediments		
	Da	Thin sandy or loamy surface horizons over strongly alkaline, red or brown, blocky subsoils	Red-brown Earths/ Solodic soils	Dr2.23, 2.13, Db1.23, 1.33
	Db	Thin sandy or loamy surface horizons over strongly alkaline, yellow or dark, blocky subsoils	Solodic soils	Dy2.23, 2.33, Dd1.13 1.23
	Dc	Thin sandy or loamy surface horizons over neutral to acid, mainly red or brown blocky subsoils	Red or Brown Podzolic soils	Dr2.21, 2.22, Db1.21, 1.22

Cont.

Major Group	Family	Summary Description	Appropriate or Approximate Equivalent Name (Stace et al. 1968)	Principal Profile Form (Northcote 1971)
Duplex or texture-contrast soils		Halomorphic soils with columnar structure formed mainly on weathered sediments		
	Dd	Thin sandy or loamy surface horizons over strongly alkaline, mainly brown subsoils	Solodized Solonetz or solodic soils	Db1.23, 1.43, 2.43
	De	Mainly thin sandy or loamy surface horizons over neutral to acid, mainly yellow subsoils	Soloths	Db1.21, Dy3.41
		Soils formed on quartzose materials		
	Df	Thick sandy surface horizons over strongly alkaline, red or yellow blocky subsoils	Solodic soils	Dr3.23, 2.23, Dy3.43, 3.23
	Dg	Thick sandy surface horizons over neutral to acid, mainly mottled, blocky to massive subsoils	Yellow Podzolic soils	Dy3.42, 3.82, Dr3.62
		Soils formed on alluvial materials		
	Dh	Mainly thin sandy or loamy surface horizons over strongly alkaline red or brown subsoils	Solodic soils	Dr2.23, 2.43, Db1.23
	Di	Mainly thin sandy or loamy surface horizons over strongly alkaline yellow or dark subsoils	Solodic soils	Dy3.23, Dd1.13, 1.43
	Dj	Thick sandy surface horizons over neutral to acid, mainly yellow subsoils	Yellow Podzolic soils	Dy3.42, 5.82

Major Group	Family	Summary Description	Appropriate or Approximate Equivalent Name (Stace et al. 1968)	Principal Profile Form (Northcote 1971)
Massive	Ea	Loamy red earths, gravelly, mainly on reworked materials, neutral to acid	)	
	Eb	Loamy red earths on Cainozoic deposits, neutral to acid	) Red earths	Gn2.12, 2.11
	Ec	Loamy red earths, strongly alkaline subsoils	)	
	Ed	Sandy red earths, neutral to acid throughout	Calcareous Red Earths	Gn2.13
	Ee	Loamy yellow or brown earths, neutral to acid throughout	Red Earths	Gn2.12, 2.11
	Ef	Alluvial red earths, neutral reaction	Yellow Earths	Gn2.81, 2.42
	Eg	Shallow red earths (< 60 cm), generally gravelly and acid throughout	)	Gn2.12, 2.15
	Eh	Humic red earths on elevated basalt tablelands	) Red Earths	Gn2.11, 2.41
			)	Gn2.11
Uniform sandy soils	Deep soils on transported materials			
	Fa	Red sands, acid to neutral	)	Uc1.23
	Fb	Yellow and brown sands, acid to neutral	) Siliceous sands	
	Formed on materials derived from quartzose sediments		)	Uc1.21, 1.22
	Fc	Shallow sands (< 90 cm)		Uc1.21
	Fd	Moderately deep to deep, red sands	)	Uc5.11, 1.23
	Fe	Moderately deep to deep, yellow or brown sands	) Siliceous sands	
			)	Uc5.11, 4.2
Skeletal	Ga	Very shallow, uniform coarse textures, generally gravelly or stony	)	Uc1.21, 1.23
	Gb	Very shallow, uniform medium to fine textured, generally gravelly or stony	) Lithosols	
			)	Um1.43
			)	

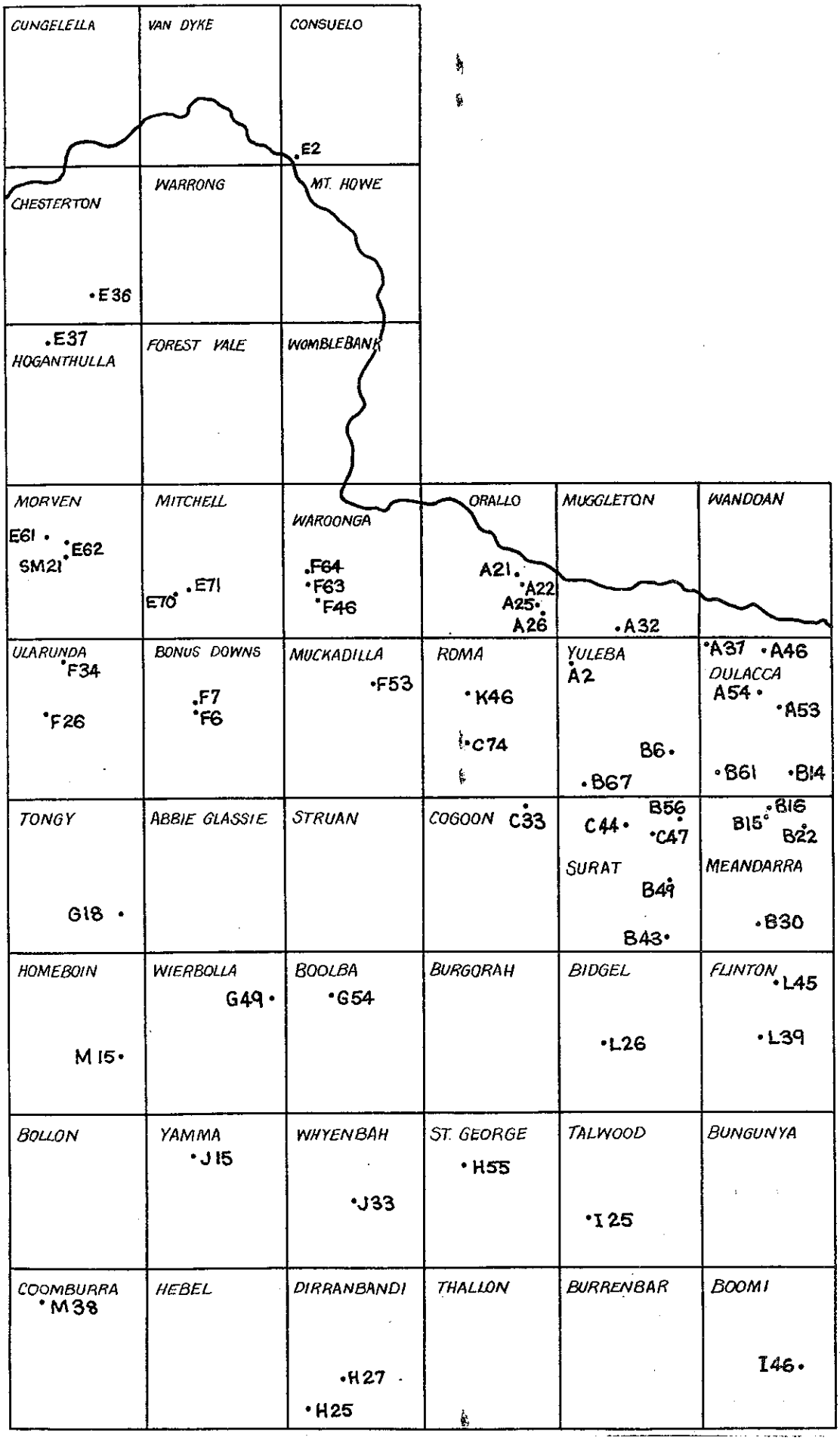

Fig. 1.- Sites at which soil samples were collected in the Balonne-Maranoa area.