

# **THE LABORATORY EXAMINATION OF SOILS FROM SHIRE OF KOWREE, COUNTY LOWAN, VICTORIA**

(Samples collected 1948-1953)

by

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**THIS REPORT SHOULD BE CONSIDERED IN CONJUNCTION WITH  
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## **I. INTRODUCTION**

During the soil survey of shire of Kowree, County Lowan, Victoria made jointly by the CSIRO Division of Soils and the Soil Conservation Authority of Victoria, 30 profiles were sampled in November 1953. Previously 3 profiles had been sampled in 1948, 1952 and March 1953 and the results of the laboratory examinations of the samples from the 33 profiles are set out in this report.

Details of the climate, topography, geology, etc. associated with these soils, the grouping of them into mapping units and their land use is discussed by Blackburn and Gibbons (1956) and the results reported herein should be considered in association with the data given by them.

## **II. LABORATORY METHODS**

Most of the methods used in the examination of the soil samples were essentially those described by Piper (1942) but as a result of recent investigations newer methods have been used for some determinations. Particle size distribution was studied by using a plummet balance and automatic sand decantation unit after rapid dispersion of the soil using "Calgon". (Hutton 1955). Phosphorus reported is that extracted by 4 hours boiling with constant boiling point hydrochloric acid and determined by a colorimetric method using butanol to extract the ammonium phosphomolybdate prior to its reduction to the blue complex. Exchangeable metal ions were extracted by leaching with  $NH_4Cl$  and the leachate examined either (1) spectrochemically for Ca, Mg, K and Na by the Lundegardh air-acetylene flame technique (Stace and Tucker 1949) or (2) by titration with EDTA for Ca and Mg (Bond and Tucker, 1954 and Hutton 1954) and by the "Eel" flame photometer for K and Na (Hutton and Bond 1955).

## **III. ACKNOWLEDGMENTS**

The help in the laboratory of Mrs Filicia Wark and the advice of Mr J. T. Hutton, under whose direction the laboratory work was carried out, are gratefully acknowledged.

## **IV. REFERENCES**

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#### **ABBREVIATIONS USED IN TABLES**

T.S.	=	Total soluble salts by conductivity of 1:5 suspension
NaCl	=	Chloride calc. as NaCl
Ign	=	Loss on ignition
CaCO <sub>3</sub>	=	Carbonate calc. as CaCO <sub>3</sub>
N	=	Total Nitrogen
P	=	Phosphorus sol. In boiling HCl
C	=	Organic Carbon
CS	=	Coarse sand
FS	=	Fine sand
Si	=	Silt
Cl	=	Clay
{	=	Bulking of these samples for determination reported

All results except moisture calc. on an oven dry basis

**COUNTY LOWAN****SHIRE OF KOWREE****Profile:** Grey Solodic Solonetz of Benayeo Unit. Sampled March 1948

**Morphological Description:** 0-2 in. Light grey compact sand  
 2-5 Very light grey bleached sand, with trace of ironstone gravel.  
 5-6 Very light grey sand with rusty brown mottling. Light ironstone gravel.  
 6-8 Brown and light brown mottled clay with bleached inclusions.  
 8-21 Brown heavy clay with reddish inclusions and dull brown mottling at 18 in. Slight ironstone gravel.

**Location:** County Lowan. Parish Benayeo. Allot. 19

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	Particle Size				Exchangeable Cations					
								CS %	FS %	Si %	Cl %	Total	Ca	Mg	K	Na	H
13613	0-2	5.6	.045	.016	3.0	0.9	.105	29	53	7	9	8.2	1.7	1.4	.29	.54	4.3
13614	2-5	6.0	.008	.004	0.7	0.2	.019	30	56	8	4						
13615	5-6	6.7	.012	.003	0.8	0.4		28	52	10	10						
13616	6-8	6.8	.050	.016	5.7	5.0	.070	16	30	6	46	23.3	3.9	8.5	.63	3.8	6.5
13617	8-21	6.9	.079	.032	5.3	5.6	.056	16	29	6	49	23.5	4.2	8.2	.66	5.2	5.3



**COUNTY LOWAN.****SHIRE OF KOWREE****Profile:** Grey Solodic Solonetz of Edenhope Unit Sampled March 1953.

**Morphological Description:**

0-2 in. Grey crumbly loamy sand.  
 4-7 Very light grey compact fine sand with light ironstone gravel  
 7-10 Off-white compact fine sand with moderate to high amounts of ironstone gravel.  
 12-14 Brown, reddish brown and grey clay; broad columnar. Tough low amount of ironstone gravel.  
 24-29 Yellowish brown and light brown tough clay, low amount ironstone gravel.  
 42-45 Light yellowish grey clay with sand, low carbonate and trace ironstone gravel.

**Location:** County Lowan. Parish Edenhope, on roadside N. of Sect. 28, 28, 2 miles W. of Edenhope.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	CaCO <sub>3</sub> %	N %	P %	Particle Size				Exchangeable Cations					
										CS %	FS %	Si %	Cl %	Total	Ca	Mg	K	Na	H
										m.e./100g									
18619	0-2	5.7	.030	.013	8.3	2.5		.252	.015	42	38	14	6	22.0	8.5	2.2	.35	.45	10.5
18620	4-7	5.6	.020	.007	1.2	0.7				40	40	14	6						
18621	7-10	6.5	.013	.004	0.8	0.4													
18622	12-14	5.9	.11	.045	6.6	8.3		.068	.008	18	20	6	56	29.4	3.5	8.7	1.1	6.3	9.8
18623	24-29	7.2	.15	.072	2.7	4.9				28	27	10	35						
18624	42-45	9.3	.26	.11	2.8	5.8	.30			24	27	11	37						

**COUNTY LOWAN.****SHIRE OF KOWREE****Profile A1:** Grey Solodic Soil (depression in gilgai) of Glenelg Unit.**Location:** County Lowan. Parish Kadnook. On road reserve at mid E. boundary of Allot. 7.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	Morphological Description
19004	0-3	5.8	.015	.001	4.0	1.3	Grey brown friable sandy loam with lt. Fe gravel
19005	3-6	5.9	.011	.002	1.6	0.8	Light grey brown friable sandy loam with lt. Fe gravel
19006	6-9	6.3	.008	Nil	1.2	0.6	Grey & yellow brown mottled loamy sand with lt. Fe gravel
19007	9-12	6.6	.007	Nil	0.8	0.5	Grey & yellow brown mottled sand with lt. Fe gravel
19008	12-15	6.7	.013	.002	2.3	1.8	Grey & yellow brown mottled clay with sand & lt. Fe gravel
19009	15-24	6.4	.026	.008	2.6	2.0	“ “ “ “ “ “ “ “ “ “ pockets Fe “
19010	24-36	6.2	.17	.066	6.3	6.6	“ “ “ “ “ “ “ “ “ “ lt. Fe gravel
19011	36-48	7.9	.18	.076	5.3	6.5	“ “ “ “ “ “ “ “ “ “ lt. Fe gravel
19012	49-60	8.4	.29	.12	5.6	8.3	Light yellow clay with low carbonate content & lt. Fe gravel

**COUNTY LONAN.**

**SHIRE OF KOWREE**

**Profile A2:** Grey Solodic Soil (puff in gilgai) of Glenelg Unit.

**Location:** On roadside adjacent to Profile A1.

<b>Soil No.</b>	<b>Depth in.</b>	<b>pH</b>	<b>T.S. %</b>	<b>NaCl %</b>	<b>Ign %</b>	<b>H<sub>2</sub>O %</b>	<b>Morphological Description</b>
19013	0-3	5.7	.013	.001	4.7	1.5	Greyish brown friable fine sandy loam with mod. Fe gravel
19014	3-6	6.0	.011	.001	2.7	1.2	Very light grey brown fine sand with mod. Fe gravel
19015	6-12	6.5	.045	.019	8.0	6.4	Light yellowish brown & reddish brown clay with lt. Fe
19016	12-24	7.3	.045	.016	8.9	6.8	Yellow brown, light reddish brown and grey clay
19017	24-36	7.8	.063	.021	5.8	5.1	Grey and light yellow clay with Fe gravel
19018	36-45	8.3	.14	.049	5.1	4.7	Grey and yellowish grey clay and lt. Fe gravel (carbonate at 48")

**COUNTY LOWAN.****SHIRE OF KOWREE****Profile A3:** Grey Solodic Solonetz of Apsley Unit.

**Morphological Description:**

0-3 in. Light grey brown firm sand.  
 3-6 Very light greyish brown sand.  
 6-10 Very light greyish brown sand with rusty flecks.  
 10-13 Grey & yellow-brown, slightly reddish, mottled tough massive clay with thin bleached sand capping at top. The clay appears to have columns, about 30 inches broad.  
 13-24 Yellowish brown, greyish brown and reddish brown mottled stiff clay.  
 24-30 Yellowish brown firm sandy clay, faintly mottled with grey and reddish tinges.  
 30-36 Yellowish brown firm clay and with pockets of lime at 36".

**Location:** County Lowan. Parish Bringalbert. Approx. mid S. boundary of Allot 79a.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19019	0-3	6.0	.013	.001	2.8	0.7	.091	.005	2.5	1.7	0.6	.07	.13
19020	3-6	6.2	.007	.001	1.0	0.4							
19021	6-10	6.7	.006	Nil	0.4	0.2							
19022	10-13	6.6	.047	.010	5.8	4.1	.077	.006	17.5	4.1	8.9	.47	4.0
19023	13-24	7.0	.070	.020	4.7	3.7							
19024	24-30	8.1	.092	.048	3.0	2.6	.027	.004					
19025	30-36	9.4	.25	.088	6.3	3.6							
19026	36-42	9.7	.24	.078	5.3	3.2							
19027	42-45	9.7	.23	.073	3.8	3.1							



**COUNTY LOWAN.****SHIRE OF KOWREE****Profile A4:** Sandy Solodic Soil of Tallageira Unit.

**Morphological Description:**

0-3 in.	Light grey sand, spongy to loose.
3-6	Light brown sand, loose
6-15	Very light brown loose sand with moderate amount of ironstone gravel.
15-18	Yellow-brown, grey brown and red mottled friable columnar clay.
18-24	Yellow, red and red brown friable clay with low amounts of ironstone gravel.
24-36	Yellow and red clay.
36-45	Yellow and red clay.

**Location:** County Lowan. Parish Boorookpi. SW part of Allot. 77 near NE cnr. Allot. 96.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19028	0-3	6.0	.005	.001	2.0	0.4	.035	.002	2.1	1.6	0.4	.05	.02
19029	3-6	6.2	.004	Nil	0.5	0.2							
19030	6-15	5.9	.005	Nil	0.6	0.2							
19031	15-18	6.0	.023	.007	8.5	5.4	.050	.007	13.5	2.1	9.9	.37	1.1
19032	18-24	6.3	.032	.011	7.8	5.2							
19033	24-36	5.9	.11	.060	7.8	5.2							
19034	36-45	5.9	.16	.094	7.4	5.4							

**COUNTY LOWAN.****SHIRE OF KOWREE****Profile A5:** Sandy Solodic Soil of Tallageira Unit.**Morphological Description:**

0-3 in. Light grey loose sand.  
 3-13 Very light grey loose sand.  
 13-20 Very light grey sand with black smudges.  
 20-26 Light brown and dark brown sand with soft rusty and organic sandy lumps (“Coffee rock”).  
 26-29 Yellowish brown sandy clay loam & grey sandy clay forming massive columns four inches across with bleached capping ½” thick.  
 29-36 Yellowish brown, red and light grey sandy clay.  
 36-47 Dull yellow and yellowish grey firm sandy clay.  
 48-58 Yellow and yellow grey sandy clay with lime visible from 50 inches.

**Location:** County Lowan. Parish Boorookpi. On roadside between Allot. 81a and 78a, approx. 0.5 m from SE cnr. of Allot 81a.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19035	0-3	6.1	.003	Nil	0.9	0.2	.018	.001	0.7	0.5	0.2	.01	.03
19036	3-6	5.6	.003	Nil	0.4	0.1							
19037	6-13	5.7	.005	.001	0.4	0.1							
19038	13-20	6.0	.005	.001	0.3	0.1							
19039	20-26	6.7	.010	.002	1.0	0.5	.019	.002					
19040	26-29	7.3	.036	.012	3.0	2.2	.036	.003	7.5	1.7	3.5	.11	2.2
19041	29-36	8.2	.084	.036	3.9	4.5							
19042	36-47	8.6	.10	.048	3.3	4.6							
19043	48-58	9.7	.18	.051	3.2	4.0							

**COUNTY LOWAN.**

**SHIRE OF KOWREE**

**Profile A6a:** Gilgai puff soil of Neuarpur Unit.

**Morphological Description:** 0-3 in. Grey crumbly clay, with moderate amount of lime.  
3-9 Grey & light yellowish grey clay with marked vertical & horizontal cracks. Lime occurrence more patchy than above.  
9-20 Grey and yellowish grey mottled massive clay with lime.  
20-36 Yellowish grey clay with moderate amount of lime.  
36-48 Greyish yellow limey clay.

**Location:** County Lowan. Parish Neuarpur. Allot. 26 at mid pt. of S end, 1 chn. N of main road Frances-Neuarpur.

Soil No.	Depth	pH	T.S.	NaCl	Ign	H <sub>2</sub> O	N	P
	in.							
19044	0-3	8.6	.042	.007	6.3	6.3	.094	.009
19045	3-9	9.0	.043	.006	4.4	5.8	.046	
19046	9-20	9.4	.075	.015	4.0	5.5	.032	.005
19047	20-36	9.5	.18	.053	5.6	7.1	.033	
19048	36-48	9.6	.26	.095	18.0	6.5		

**COUNTY LOWAN.**

**SHIRE OF KOWREE**

**Profile A6b:** Gilgai shelf profile (solonetzic) of Neuarpur Unit.

**Morphological Description:** 0-2 in. Light grey fine sandy loam, hard, slightly laminar  
3-9 Dark grey brown hard uneven clay with vertical cracking and diffuse bleached top to clay.  
9-22 Yellowish grey and grey clay becoming brownish yellow with depth.  
22-36 Brownish yellow clay with lime from 26 inches

**Location:** County Lowan. Parish Neuarpur. Allot. 26 at mid pt. of S end, 1 chn. N. of main road Frances-Neuarpur.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19050	0-2	6.9	.025	.015	3.9	1.6	.011	.005	23.0	8.9	8.8	.71	4.6
19051	3-9	7.8	.063	.033	3.9	4.8	.051	.005					
19052	9-22	8.6	.22	.12	4.2	6.3	.052						
19053	22-36	9.0	.59	.34	8.0	7.2							
19054	36-48	9.0	.62	.36	6.6	7.5							

**COUNTY LOWAN.****SHIRE OF KOWREE****Profile A6c:** Gilgai depression profile (solonetzic) of Neuarpur Unit.

**Morphological Description:**

0-½ in.	Grey fine sandy clay loam with clay.
½ -3	Dark grey brown clay with sand (with veins of sandier material).
3-6	Dark grey and grey brown clay with veins of light brown sand.
6-12	Grey and yellow grey clay with sand.
12-24	Yellow grey brown with yellowish greyish brown inclusions clay with sand.
24-36	Yellowish grey with light brown smudges clay with sand. Low carbonate content.
36-48	Light yellowish grey clay with sand, with moderate to high carbonate in pockets.

**Location:** County Lowan. Parish Neuarpur. Allot. 26 at mid pt. of S end, 1 chn. N. of main road Frances-Neuarpur.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19055	0-½	6.7	.025	.015	4.8	2.6	.074	.006	16.0	6.0	7.3	.47	2.2
19056	½ -3	7.0	.026	.016	3.8	4.0							
19057	3-6	7.7	.044	.025	3.5	4.5	.031	.004					
19058	6-12	8.4	.095	.051	3.2	4.5							
19059	12-24	8.7	.34	.17	3.4	5.6							
19060	24-36	9.0	.49	.25	4.3	6.6							
19061	36-48	9.1	.55	.28	5.3	8.2							

**COUNTY LOWAN.****SHIRE OF KOWREE****Profile A7:** Sandy Solodic Soil of Goroke Unit.

**Morphological Description:**

0-3 in.	Light brown loose lumpy sand.
3-9	Greyish brown loose sand.
9-17	Very light brown compacted gravelly (ironstone) sand.
17-19	Light brown and very light brown slightly compact clayey sand with slight gravel.
19-24	Bright red and light yellowish grey mottled massive friable clay.
24-36	Bright red and light yellowish grey mottled massive friable clay.

**Location:** County Lowan. Parish Gymbowen. On roadside 0.1 m E of SW cnr. Allot 71.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19062	0-3	6.2	.009	.002	2.4	0.6	.066	.005	2.4	1.7	0.5	.11	.05
19063	3-9	6.1	.007	.001	2.0	0.6							
19064	10-17	6.4	.006	.001	0.9	0.3	.021						
19065	17-19	6.4	.006	.001	1.2	0.5							
19066	19-24	6.2	.013	.003	7.4	4.4	.062	.008	10.4	1.3	7.6	.52	.95
19067	24-36	6.0	.022	.007	9.0	6.1							
19068	36-46	5.8	.027	.012	9.5	6.0	.032	.008					

**COUNTY LOWAN.****SHIRE OF KOWREE****Profile A8:** Solodic Solonetz of Telangatuk Unit.

**Morphological Description:**

0-3 in.	Light grey brown compact sand breaking to crumbs and small clods.
3-6	Lighter grey brown sand with rusty smudges, more compact than above.
6-12	Yellow, grey and red mottled clay in columns with dark grey cleavage faces and brown sandy clay loam capping.
12-24	Yellow grey, red, dark grey and brown stiff clay.
24-34	Light brown and brown more friable sandy clay with visible lime at 34 inches.

**Location:** County Lowan. Parish Telangatuk. Alongside Allot. 32, 0.2 m N of S boundary.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19069	0-3	6.4	.010	.004	1.4	0.6	.041	.004	2.4	1.4	0.7	.17	.11
19070	3-6	6.7	.010	.004	1.4	0.8							
19071	6-12	6.8	.028	.012	7.4	6.3	.092	.009	2.7	6.7	11.3	.98	3.7
19072	12-24	7.6	.061	.021	5.1	5.1							
19073	24-34	8.8	.085	.027	3.7	4.2	.037	.005					
19074	34-45	9.4	.15	.037	4.1	4.8							

**COUNTY LOWAN.****SHIRE OF KOWREE**

**Profile A9:** Solodic Solonetz of Ullswater Unit.

**Location:** County Lowan. Parish Jallakin. On roadside between Allot. 90 and 24, 0.2 m from SE cnr. of Allot 90.

<b>Soil No.</b>	<b>Depth</b>	<b>pH</b>	<b>T.S.</b>	<b>NaCl</b>	<b>Ign</b>	<b>H<sub>2</sub>O</b>	<b>Morphological Description</b>
	<b>in.</b>		<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
19075	0-3	6.5	.020	.003	4.8	1.5	Grey brown loamy sand
19076	4-6	6.5	.042	.008	4.3	4.0	Yellow brown, red brown columnar clay (bleached top)
19077	24-26	9.4	.22	.090	6.6	4.2	Yellow brown sandy clay
19078	36-38	9.5	.26	.12	7.8	43	Calcareous clay (marl)

**Profile A10:** Sandy Solodic-solonetz of Goroke Unit.

**Location:** County Lowan. Parish Morea. N.W. cnr. Allot. 35c

<b>Soil No.</b>	<b>Depth</b>	<b>pH</b>	<b>T.S.</b>	<b>NaCl</b>	<b>Ign</b>	<b>H<sub>2</sub>O</b>	<b>Morphological Description</b>
	<b>in.</b>		<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
19079	0-3	6.9	.009	.002	0.9	0.3	Light greyish brown sand
19080	12-15	6.8	.018	.008	7.8	4.6	Yellow brown and red columnar clay
19081	40-42	9.2	.26	.092	7.6	5.2	Yellowish brown clay with high carbonate content



**Profile A11:** Solodic-solonetz of Benayeo Unit.

**Location:** County Lowan. Parish Benayeo. On roadside near NW cnr. Allot. 17, 0.1 m W of x roads.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	Morphological Description
19082	0-3	6.3	.011	.003	3.8	1.2	Grey brown friable sand
19083	12-15	8.2	.027	.010	4.7	3.9	Red and yellow diffusely mottled tough clay (uneven upper boundary)
19084	36-38	9.2	.17	.048	12.1	6.6	Yellow clay with moderate carbonate content

**Profile A12:** Grey Solodic Solonetz of Kybybolite Unit

**Location:** County Lowan. Parish Tallageira. On side of main Apsley-Binum Road, 0.1 m S of x roads

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	Morphological Description
19085	0-2	6.6	.021	.008	4.2	1.6	Light grey friable sandy loam
19086	5-8	7.3	.069	.034	3.4	4.0	Dark grey brown and yellowish grey clay (bleached top)
19087	27-30	9.0	.50	.29	7.5	7.1	Light brown clay with high carbonate content

**Profile A13:** Grey Solodic-Solonetz of Neuarpur Unit.

**Location:** County Lowan, Parish Neuarpur. On roadside at SW cnr. Allot. 15a.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	Morphological Description
19088	0-2	6.7	.023	.008	3.5	1.3	Grey friable sandy loam
19089	8-11	7.6	.037	.015	4.7	4.5	Yellowish brown, grey and reddish columnar clay (bleached top)
19090	20-22	9.3	.17	.065	12.2	5.1	Yellowish brown clay with moderate carbonate content

**Profile A14:** Grey Solodic Soil of Neuarpur Unit.

**Location:** County Lowan, Parish Neuarpur. On side of main Frances-Neuarpur road alongside Allot. 42, 0.1 m of E of SW cnr.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	Morphological Description
19091	0-3	7.3	.018	.006	4.9	1.7	Light brownish grey compact loamy sand
19092	10-13	8.5	.062	.017	7.8	6.6	Yellowish brown cloddy clay (uneven top)
19093	27-30	9.5	.14	.019	6.3	4.9	Yellowish brown and brown clay with low carbonate content

**Profile A15:** Solodic-solonetz of Neuarpur Unit.

**Location:** County Lowan. Parish Boorookpi. On roadside on W. Parish boundary, 0.1 N of SW cnr. of Allot. 32.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	Morphological Description
19094	0-3	6.1	.007	.002	2.0	0.8	Light grey brown sand
19095	10-12	6.7	.032	.013	5.7	4.9	Yellowish brown, grey and red mottled clay with uneven top
19096	27-30	9.5	.19	.046	8.9	5.0	Yellowish brown clay with low carbonate content

**Profile A16:** Grey Solodic Soil of Ullswater Unit.

**Morphological Description:** 0-3 in. Very light grey brown compact fine sand.  
 12-14 Yellowish brown, grey (with red inclusions), stiff clay (cemented capping)  
 33-36 Mustard yellow clay with moderate carbonate content (N.P. at 36 in)

**Location:** County Lowan, Parish Bringalbert. On roadside, 0.1 m N of SE cnr. of Allot. 26.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19097	0-3	5.7	.016	.007	4.3	1.3	.111	.007	3.4	2.0	1.0	.18	.21
19098	12-14	6.2	.11	.061	7.0	4.7	.051	.007	17.5	4.4	8.2	.44	4.5
19099	33-36	9.0	.27	.11	6.2	4.5	.021	.005					

**Profile A17:** Solodic-solonetz of Neuarpur Unit.

**Morphological Description:** 0-2 in. Light brownish grey coherent fine sand.  
 4-7 Yellowish brown sub-columnar clay with marked vertical cleavages  
 24-27 Yellowish brown clay with low carbonate content.

**Location:** County Lowan, Parish Ding-a-Ding. On roadside at mid N boundary of Allot. 15.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19100	0-2	6.8	.018	.010	3.4	1.3							
19101	4-7	6.6	.080	.033	5.2	5.2			22.6	6.1	11.1	.80	4.6
19102	24-27	9.1	.46	.25	5.3	5.2							

**Profile A18:** Brown Solonetzic Soil of Goroke Unit.

**Morphological Description:** 0-3 in. Brown friable crumbly loamy sand.  
 3-4/8 Light brown bleached sand, compact  
 4/8-12 Dark brown and reddish brown uneven, columnar tough clay  
 24-30 Brown and yellow grey friable clay with high content of soft lime.

**Location:** County Lowan, Parish Minimay. On roadside alongside SW cnr. of Allot. 15.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19103	0-3	6.1	.015	.006	4.3	1.8	.130	.011	29.2	9.0	12.6	4.4	3.2
19104	3-12	7.3	.031	.013	7.2	8.2	.114	.013					
19105	24-26	9.5	.23	.082	14.9	7.7							

**Profile A19:** Red Brown Earth of Ullswater Unit.

**Morphological Description:** 0-3 in. Brown friable sandy loam.  
 3-6 Dark brown and brown weakly mottled friable clay with uneven top.  
 18-20 Very light brown soft marl  
 38-40 Very light brown soft marl

**Location:** County Lowan. Parish Karnak. On roadside opposite E. corner Allot. 4, on lunette of Lake Karnak.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19106	0-3	6.7	.011	.004	3.0	1.3	.090	.008	7.3	5.3	1.1	.76	.12
19107	3-6	7.2	.017	.005	6.2	5.8	.123	.011	24.4	16.9	5.3	2.0	.22
19108	18-20	8.7	.057	.011	22.8	5.7							
19109	38-40	9.3	.066	.010	15.3	5.6							

**Profile A20:** Brown earth of Ullswater Unit.

**Morphological Description:** 0-3 in. Dark brown friable loamy sand.  
 4-7 Dark brown stiff sandy clay loam with low carbonate content  
 33 Mellow marl

**Location:** County Lowan, Parish Charam. On lunette crest, 0.1 m S of N.E. cnr. of Allot. 24.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19110	0-3	7.8	.042	.005	4.6	2.0	.166	.015	13.6	11.7	0.8	1.0	.08
19111	4-7	7.8	.019	.004	3.5	2.9	.079	.011	14.7	12.3	1.2	1.1	.08
19112	33	8.8	.047	.007	17.9	3.3							

**Profile A21:** Solodic-solonetz of Ullswater Unit.

**Morphological Description:** 15-18 Yellowish brown , broad columnar sandy clay (column 30 in. across)  
 27 Grey and light reddish brown clay

**Location:** County Lowan, Parish Charam. On roadside cutting, near SE cnr. of Allot. 34.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19113	15-18	7.5	.017	.006	3.8	4.4			16.4	10.0	4.3	1.3	0.21
19114	27	7.0	.016	.006	5.3	6.8			23.6	14.8	6.7	1.7	0.42

**Profile A22:** Grey Solodic Soil of Ullswater Unit.

**Morphological Description:** 0-3 in. Light grey compact sandy loam.  
 12-15 Yellow brown, grey and light red dark brown, firm mottled clay with an even top (no columns)  
 33-36 Yellowish brown and brown clay with low carbonate content

**Location:** County Lowan, Parish Konnepra. On roadside approx. mid W. bdy. Allot 9.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19115	0-3	5.8	.012	.005	2.5	1.0	.058	.006	3.3	1.9	0.9	.28	.17
19116	12-15	6.8	.028	.013	7.4	5.6	.070	.010	18.1	5.4	9.0	.61	3.1
19117	33-36	9.3	.18	.051	5.0	4.3							

**Profile A23:** Sandy Solod of Kowree Unit.

**Morphological Description:** 0-3 in. Light greyish brown loose sand.  
 36-39 Bright red and grey sandy clay

**Location:** County Lowan. Parish Toolongrook. On roadside at mid N end of Allot. 102

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19118	0-3	5.4	.005	.001	1.3	0.3	.028	.003	0.9	0.7	0.1	.03	.03
19119	36-39	5.5	.040	.021	4.3	4.5	.018	.005	8.0	0.2	5.2	.17	2.4

**Profile A24:** Sandy Solodic Solonetz of Kowree Unit

**Morphological Description:** 0-3 in. Light brownish grey loose sand.  
 13-16 Grey, reddish brown, yellowish brown diffusely mottled stiff clay with broadly irregular domes  
 33-36 Brownish yellow and slightly reddish brown clay with low carbonate content

**Location:** County Lowan. Parish Tela Central part of Allot. 147 on bush track from Lake Kanagulk to White Lake

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19120	0-3	6.6	.007	.002	1.2	0.4	.034	.003	2.0	1.5	0.4	.09	.03
19120a	13-16	6.6	.041	.015									
19121	33-36	9.2	.29	.13	9.5	4.2							

**Profile A25:** Grey Solodic Solonetz of White Lake Unit

**Morphological Description:** 0-3 in. Light brownish grey sand  
 7-10 Very light grey and light grey brown bleached bricklike clayey sand  
 10-12 Reddish brown and grey tough columnar clay  
 29-32 Bright yellowish brown clay with moderate carbonate content

**Location:** County Lowan. Parish Toolongrook. On roadside at SE cnr. of Allot 71, ½ mile E of centre of Lake.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19122	0-3	6.2	.013	.004	4.3	1.2	.150	.008	4.5	3.0	1.0	.42	.07
19122a	7-10	7.5	.021	.007			.052	.007					
19123	10-12	8.3	.067	.029	5.4	5.6							
19124	29-32	9.2	.34	.16	5.8	5.5							

**Profile A26:** Sandy Solodic Solonetz of Telangatuk Unit.

**Morphological Description:**

0-3 in.	Light greyish brown weakly coherent sand
4-12	Very light greyish brown loose sand
12-16	Yellowish brown, yellowish grey and red brown stiff columnar clay
16-30	Yellowish brown sandy clay with reddish stripes
30-40	Yellowish brown, red and light brown sandy clay

**Location:** County Lowan, Parish Toolondo, Near roadside at NE corner Allot. 116.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	
19125	0-3	5.4	.011	.002	2.0	0.6	
19126	12-16	6.1	.031	.010	7.7	6.1	
19127	30-40	7.4	.20	.10	3.5	3.2	



**Profile A27:** Grey Solodic Soil of Glenelg Unit

**Morphological Description:**  
 0-3 in. Grey brown coarse sand  
 12-14 Light grey bleached sand with heavy Fe and quartz gravel (stones to 3 in. long)  
 14-19 Yellowish brown, grey and red finely mottled stiff columnar clay  
 40-42 Yellow, grey and red finely mottled firm clay with occasional quartz gravel

**Location:** County Lowan, Parish Kout-Narin. On roadside at mid N boundary of Allot. 5.

Soil No.	Depth in.	pH	T.S. %	NaCl %	Ign %	H <sub>2</sub> O %	N %	P %	Exchangeable Cations				
									Total	Ca	Mg	K	Na
									m.e./100g				
19128	0-3	6.4	.016	.007	2.0	0.6	.045	.005	2.3	1.4	0.4	.37	.10
19129	12-14	6.5	.010	.001	0.4	0.1	.005	.008					
19130	14-19	6.3	.034	.014	7.9	4.7	.053		14.5	2.7	8.8	.28	2.7
19131	40-42	5.7	.10	.049	4.4	3.3							

**Profile A28:** Grey Solodic Soil of Glenelg Unit.

**Morphological Description:**

0-3 in.	Grey crumbly loamy sand
3-6	Light greyish brownish coherent sand
6-18	Very light brownish yellow compact sand
18-20	Very light brown indurated sand with small amount of ironstone gravel
20-25	Grey, light yellowish brown and light red brown mottled massive clay
25-42	Yellowish brown clay with reddish brown and grey mottling
42-46	Yellowish brown and grey clay with moderate content of free lime

**Location:** County Lowan, Parish Connewirrecoo. In NE cnr. Allot 30 near road junction.

Soil No.	Depth		pH	T.S.	NaCl	Ign	H <sub>2</sub> O	N	P	Exchangeable Cations				
	in.									Total	Ca	Mg	K	Na
										m.e./100g				
19132	0-3		6.6	.018	.005	5.3	1.3	.150	.011	9.0	6.9	1.6	.35	.10
19133	18-20		5.6	.021	.007	1.8	0.8	.017						
19134	23-25		5.6	.052	.025	7.6	4.3	.062	.010	9.6	0.9	5.4	.43	2.9
19135	44-46		9.1	.17	.047	5.0	4.8							