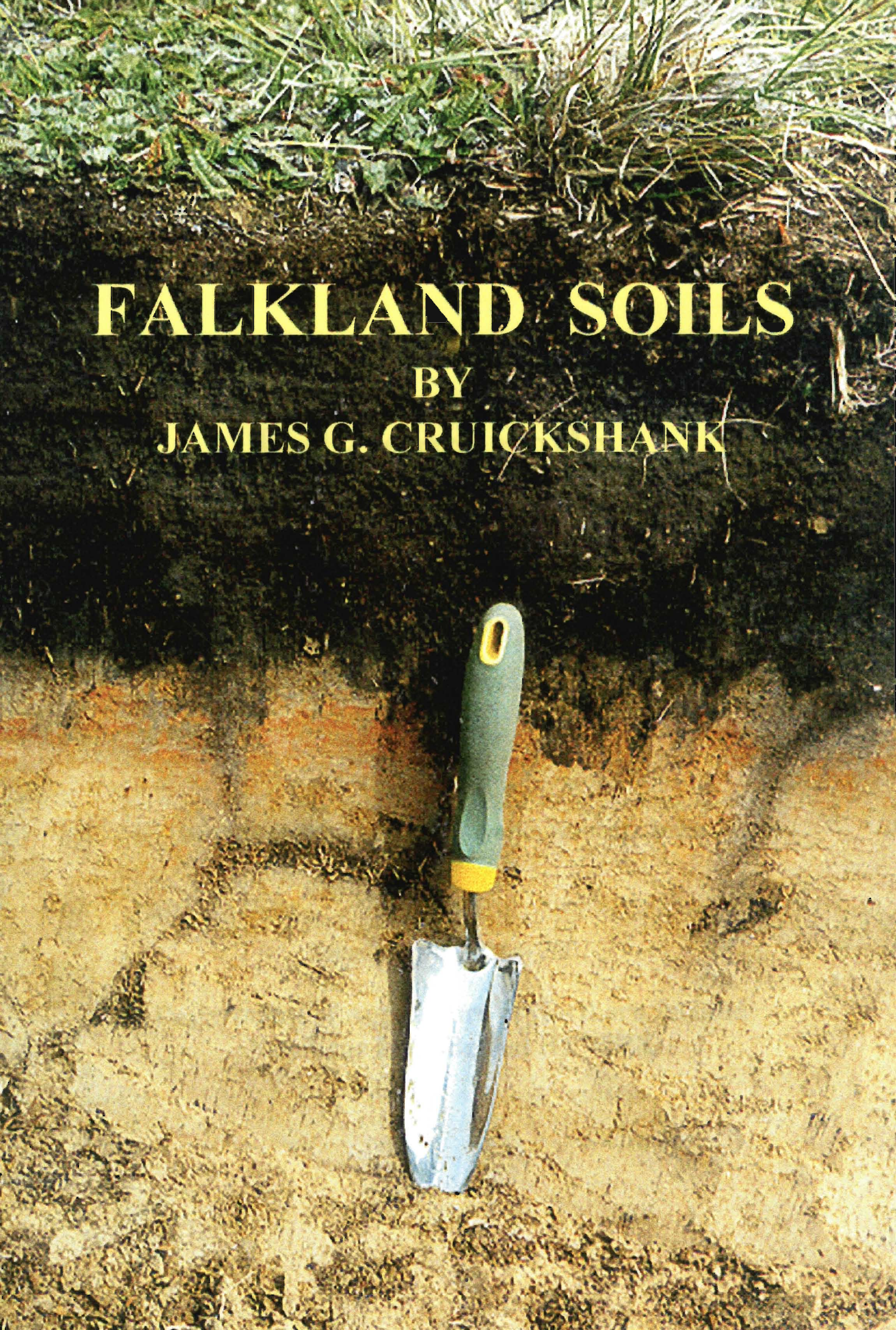
FALKLAND SOILS

BY

JAMES G. CRUICKSHANK



Final Report

Falkland Soils - Origins and Prospects

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(1) Introduction

Soil is man's most vital resource on earth. Combined with sunlight or solar energy, soil provides a growth medium for plants, wild and cultivated. Soil includes space for plant rooting, oxygen, moisture and a nutrient supply for plants. Its importance to man can never be overstated, and that applies everywhere, even in the Falklands. Soil is such a valuable resource that when removed or eroded, it cannot be replaced easily.

Soil Survey is not an end in itself. It is an inventory, a stocktaking of the soil store. A recent reconnaissance survey of soils in both West and East Falkland (January 2001), during which over 30 vertical sections were inspected and sampled, (plus other samples taken for advisory work) confirmed a theoretical soil to rock relationship. Laboratory soil analyses were used for property data for these mineral soils, in relation to their underlying rock type, as well as analytical data on organic top layers. This final report is based on personal inspection and recording of soils in the field between 6th and 24th January 2001, and a limited amount of personal interpretation of field data. Reference is made also to other published material. This final soils report is produced and submitted to the Department of Agriculture, Falkland Islands for 1st May 2001. It draws on all the analytical data available and suggests future possible soil surveys.

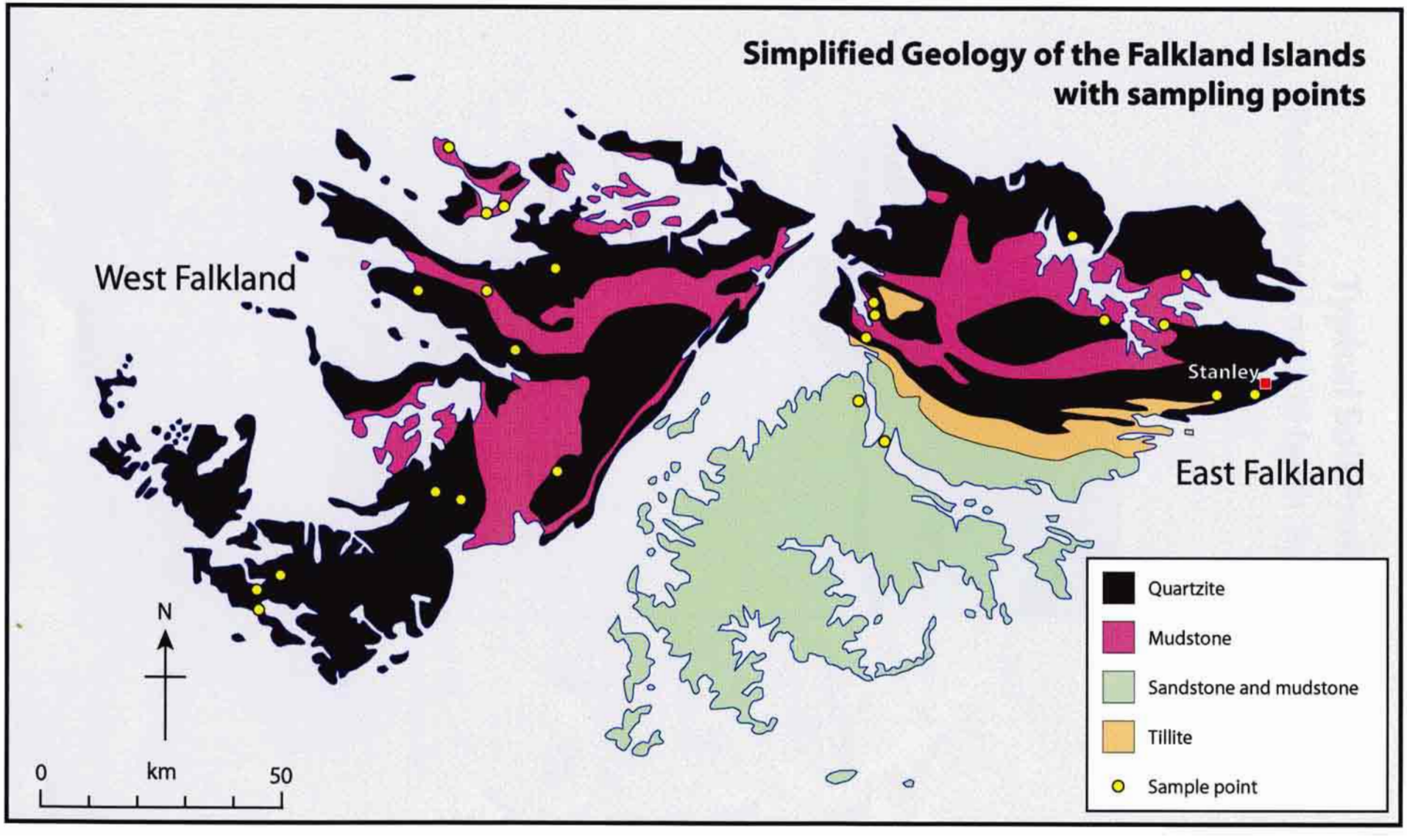
What is the environment in which soil has developed in the Falklands? Climate, past and present, is all-important, especially for the formation of organic soils or peat. Currently annual rainfall (everywhere in the lowlands at less than 700mm) seems too low for peat formation, but the possibility exists for peat to have formed in an earlier, wetter climate. There is evidence of major changes of wind direction during the 'Post-glacial ' period (last 10,000 years) which may have created wetter climates (1. Emma Edwards, pers.comm.) than exist at present. However, the peat in the Falklands is mostly marginal to be of acceptable thickness as peat (see page 3) , and should be regarded as a surface peaty layer. Also, it may have developed on a wet clay-rich subsoil. The present climate of the Falklands is close to semi-arid, and so moisture held by the top layer of peat or the clayey subsoil, can be useful for plant growth.

(2)The soil-forming environment of the Falkland Islands.

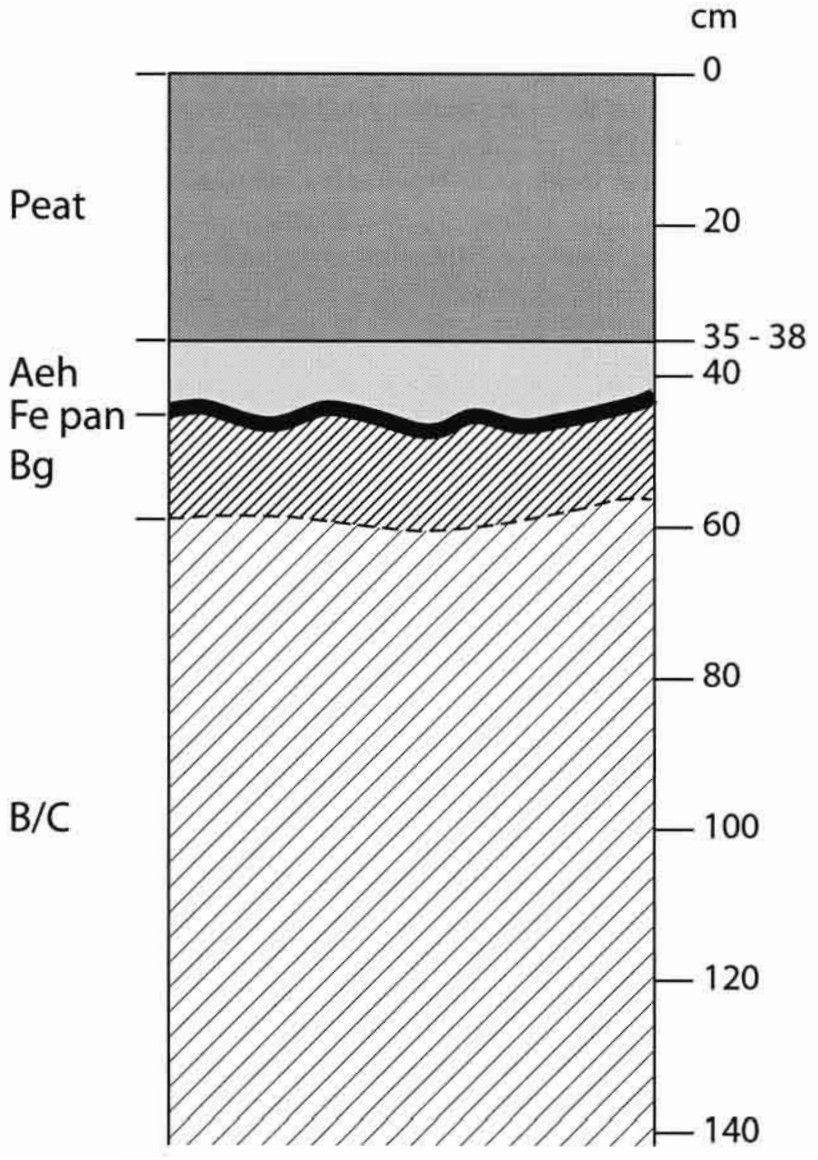
There are five so-called soil-forming factors which are also the main elements of the natural environment. They are climate, geological parent materials, topography, plant and animal organisms. It is the interaction among these elements that produces soil, an interaction that includes both primary processes of weathering and humification, and secondary processes of soil material re-distribution. In all environments, the primary processes are active to some degree, but the nature and progress of secondary processes is highly variable across environments. In the Falklands, the end products of certain secondary processes (e.g leaching and gleying) are clearly visible in the soils, and leaching is associated with humid environments where precipitation exceeds evapo-transpiration annually. Once again (as in the case of peat formation), the mineral soils, in the form of extremely leached podzols, do not appear to be the product of soil moisture balance in the current climate. Both peaty soils and podzols

are associated with cold temperature, humid climate, and soil acidity, so possibly in the Falklands, low soil temperatures, wet mineral subsoil and soil acidity may compensate for lack of rainfall. Evaporation and transpiration losses of water back into the atmosphere have not been measured, but are likely to be quite close to the rainfall figures, especially with strong wind in the Falklands.
The next major factor to explain the macro-variation of soil in the Falklands is geology or rock-type. Evidence on the ground is clear, because the Falkland Islands have not been covered by ice sheets in the last world glaciation, between 14,000 and 25,000 years ago, and which might have obscured, by mixing material, distinctive soil parent materials. Instead, the Falklands lay in a "peri-glacial" environment, around and near ice caps, but not below them. At that time, the Falklands climate was very cold, freezing and thawing the soil by season, and even in shorter cycles. The results were that rock outcrops or "tors" were left intact, slopes were smoothed by the solifluction process and upstanding stones were pushed into stone runs or stone rivers. Middle and upper slopes so affected were the product of "mass movement". The main rock types can be seen clearly in the present landscape, especially so along the roadside cuttings of the new roads. It is well known the Falklands started their geological life on the edge of south-east Africa in what was know as Gondwana. For our interest, the important points are that rock building stopped in the Falklands about 250 million years ago and that the Islands were in their present position about 150 million years ago. That's a long time ago, and crucially means that the Falklands have no rocks from the most recent geological periods, Jurassic, Cretaceous and Tertiary, which usually contain lime-rich rocks. The most familiar example is the area of England, south-east of the line from Bristol to York. The loss to the Falklands of these lime rich rocks is beyond estimation, as a corrective material to reduce acidity in soils.

The mineral soils of the Falklands have developed by chemical and physical changes,(weathering) from underlying rocks. What matters is not that the rocks are old or ancient in geological time, but that they are all acid or very acid, as are the related soils. The main difference among the rocks is between the hard, quartz-rich or silica-rich rocks of the uplands mostly above 500 metres, (Port Stanley and Port Stephens formations), and the soft rocks of siltstone, mudstone and tillite which form most of the lowlands(Fox Bay, Port Philomel, Fitzroy and Lafonia formations). The fine soil material of the latter group contain mainly silt and clay particles, and may have a slightly better mineral nutrient store than the quartzite hard rocks. The soils of the latter have very low soil fertility and are of almost no agriculture potential, except in areas where long periods of "man devised" improvement from livestock around Port Howard and Port Stephens. Measurement of particle size has revealed that most soils have a clay texture class (with more than 43% clay) across all rock types, which may be the starting point of poor subsoil drainage and later peat formation on the surface.


Simplified Geology of the Falkland Islands
with sampling points
West Falkland
East Falkland
Stanley
N
0
km
50
Quartzite
Mudstone
Sandstone and mudstone
Tillite
Sample point

Typical Soil Profile:
Peaty gleyed podzol (with Fe pan variable)



(3)The Soils

The commonly and widely found soil profile type of the Falkland lowlands has 38 cm surface peaty horizon, overlying a thin bleached horizon(5-10cm), an iron pan (incipient or 1-2cm thick consolidated), and all overlying a compact silty clay, poorly drained mineral subsoil. Ideally, such a soil should be deep ploughed to break up the iron pan and mix the upper part of the subsoil with the surface peat. But, the cost and effort would not be justified in the current farming of the Falklands, particularly as the subsoil is not markedly nutrient-rich.
In the UK and Ireland, it has been found that a rise in pH value and a rise in exchangeable cations are found just below the iron pan. The analytical results for Falkland soils indicates the same thing, a rise to pH to 5.42 just below the iron pan(from just below pH 5.0in the samples above), in podzol soils near Fox Bay in the soils of Port Stephens formation. The lower horizons(B) of podzols in the Falklands are usually gleyed (a mottled rust and grey appearance associated with poor drainage), but soil drainage improvement would not be worth the cost or difficulty in the Falklands situation.

The soil profile type discussed above(a peaty podzol with or without an iron pan) is the dominant soil profile on slopes of mass movement(see 4. "Falkland Islands Geological Survey Map of Superficial Geology) on all rock types. The soil profile variation in mineral soils is very small but soil property values may vary. "The Land System Analysis" of King, Lang and Blair Rains(2. 1969 and 1982) also stated that Falkland soils generally were pH 4.1 to 5.0, were deficient in calcium and phosphate but adequate in magnesium and potassium. These findings have been confirmed in this report.

Among organic or peaty soils, there is little true peat of sufficient depth. The map of Superficial Geology shows peat only on the gentle slopes and near-level terrain of the north coast of the East Island. For this, peat must be an organic accumulation, usually quite fibrous over 40cm undrained(USDA definition) or even up to 60cm undrained in some national soil classifications (50cm was used in Northern Ireland's soil survey). Thus, soil in the improved and cultivated lands of the Falklands lowlands is mainly a peaty surface horizon to slightly more than a spade depth, 14in or 35cm,usually found on the better draining slopes. To the farmers here, soil is this shallow peat, and pasture improvement is achieved by ploughing, rotavating, discing and even power-harrowing, as physical measures to improve aeration and mineralisation of the vegetable peat. Burning of vegetation trash must be done with caution, if at all, as improvement of mineral nutrient levels by this method is doubtful. Risk of uncontrollable fire and wind blow of ash are major dangers. The use of lime and phosphate mixes are necessary to raise nutrient levels and to lower acidity(e.g calcified seaweed and rock phosphate).

(4) Soil sampling sites and soil analytical data

At the outset of the 2001 soil survey, it was thought that there might be a soil variation across rock types in the Falklands. Accordingly, an effort was made to sample soils in all the major rock types on both the West and East Islands. A detailed list of sites against geology is included in the appendices, but the general distribution is 11 soil profiles from quartzite rocks, 3 from course feldspar sandstones, and 16 from fine sandstones and mudstones. A distribution map is provided for illustration.

The almost equal 14/16 numbers division of sites between quartzite and mudstones is not reflected in the morphology of soil profiles, seen over long distances along the recently-cut roadside sections. Almost everywhere in the lowlands of the Falklands there is only one soil profile, with minor variations in thickness of horizons. The typical soil profile is illustrated in an attached diagram and the main soil horizons are

(1) A surface organic horizon of fibrous peat 32-38 cm thick,
(2) A Leached and bleached Aeh horizon, variable in strength, usually 6-8 cm thick with some humus staining,
(3) An iron pan (Fe pan), again variable in degree of development from 1.5 cm thick and continuous, to a fragmented and discontinuous form, for a Bg horizon a well-weathered, clay-rich and gleyed middle mineral horizon about 10 cm thick, merging into the underlying soil parent material (C horizon) at about 50-60 cm from the surface.

The two lowest horizons (Bg and C) may contain up to 60% clay by weight, appear to be mottled with rust and grey colours and crack open on the surface when dry (see photogragh and cover).

The author is convinced from widespread field inspection, that all lowland soils in the Falklands are variations of this one soil profile.

Soil texture or particle size composition

Earlier reports on soils of the Falklands (2) concentrated on soil chemistry and assumed that the soils were limited to the surface organic or peaty layer. In this current project, mineral soil samples, taken from 12 of the 30 sites sampled, and from the B/C at about 50-60 cm in depth, revealed a quite amazing particle size composition. In the UK and Ireland, percent clay in the Fine Earth is rarely found over 35%, but in this project, 8 of the 12 sites contained more than 43% clay and 4 of these sites had over 60% clay. These represent CLAY soil texture class, and were found in both quartzite and mudstone soil parent materials. These very clayey soils have no internal soil structure, known as "massive", but do crack open on drying. Extremely high values of percent clay such as these, probably represent millions or tens of millions of years of chemical weathering, across all rock types, thus eliminating geological differences. In theory, this has been possible in the Falklands where the landscape may have been undisturbed for about 150 million years.

pH

In the earlier soil report on the Falklands (2) it was stated that pH values were very acid in the range of 4.1 to 5.0. This survey has confirmed the same range of pH, from about 4.3 to 5.2, with the higher values just over pH 5.0 being found below the Fe pan.

Mean Values :	Surface peat	0-10 cm	pH 4.57
	Lower peat	20-30 cm	pH 4.76
	Aeh	35-42 cm	pH 4.83
	Bg	42-50 cm	pH 5.10
	B/C	below 60 cm	pH 5.18

Exchangeable cations-measured in milliequivelents per 100 grams.

In relation to pH, the chemical properties of immediate interest are base or metallic cations which exchange on the cation exchanging surface of humus and clay, and where their balance against hydrogen ions control the soil pH. Ex.Calcium is normally the dominant base ion. If the very high Ex.Calcium of the Elephant Point wild life site (28.68 me%) is excluded, the mean horizon values for Ex.Calcium, downward from the surface horizon are, 2.96, 0.92, 0.31, 0.39, and 0.36, all classed as low or very low in the Ex.Calcium range.

For Ex.Magnesium, the mean horizon values, downward from the surface horizon are, 9.79 and 2.94 in the surface and lower peat, 1.53, 2.48, and 3.16 in the lower mineral horizons. The peat values are regarded as high for magnesium, and the mineral soil values are moderate. There should be no problem of magnesium deficiency as confirmed in the earlier soil report (2).

For Ex.Potassium (K+), the mean horizon values are 1.31 and 0.55 in the surface peat, values which are considered moderate to high. The mean values for the lower mineral horizons are 0.35, 0.47, and 0.51, which are considered to be low.

It should be noted that these exchangeable cation values in this report are generally slightly higher than the values recorded in the earlier report (2) in which, for example, Ex.Calcium registered nil values in almost all sites. In all soil properties included here, extreme values have been excluded in the calculation of means.

Total P (g/Kg) and Olsen P (mg/l).

The earlier soil report (2) frequently refers to low and extremely low values for total Phosphorus and likewise for soluble, available phosphate. In the current project, the same results have been found. Total P mean values (g/Kg) are all considered low or very low from the surface horizon downward at 0.59, 0.49, 0.25, 0.19 and 0.25. The mean values for Olsen P (mg/l) are again considered to be low, from the surface horizon downward at 10.63, 5.33, 3.58, 1.69, and 1.57. The message is clear, again and again from all reports and recent staff publications (5) Falkland soils are seriously deficient in phosphorus and available phosphate, as well as in calcium or lime.

(6)References

1. Edwards, Emma, geologist, a personal conversation.

2. King, R.B., Lang, D.M. and A. Blair Rains, 1969 and 1982, "Land System Analysis of the Falkland Islands, with notes on soils and grasslands", Land Resources Development Centre, Surbiton, England, pp42.

3. Falkland Islands Geological Survey, 1998, Solid geology, 1:250,000, (East and West Sheets)

4. Falkland Islands Geological Survey, 2000, Superficial Geology, 1:250,000, (East and West Sheets)

5. Publications of the F.I Department of Agriculture Staff such as those of Bob Reid and Aidan Kerr in the Wool Press.

Thanks

Thanks to Bob Reid, Aidan Kerr for arranging this soil project and for making the author's visit to the Falkland Islands so interesting and productive.

Thanks to all the farmers, wives and children, who were generous and congenial hosts.

Thanks also to Gordon Lennie for completion of the chemical analyses carried out at Department of Agriculture, Falkland Islands in Stanley.

Thanks to staff in Soil and Plant Nutrition in DARD Newforge Lane Belfast, for work on the particle size analysis.

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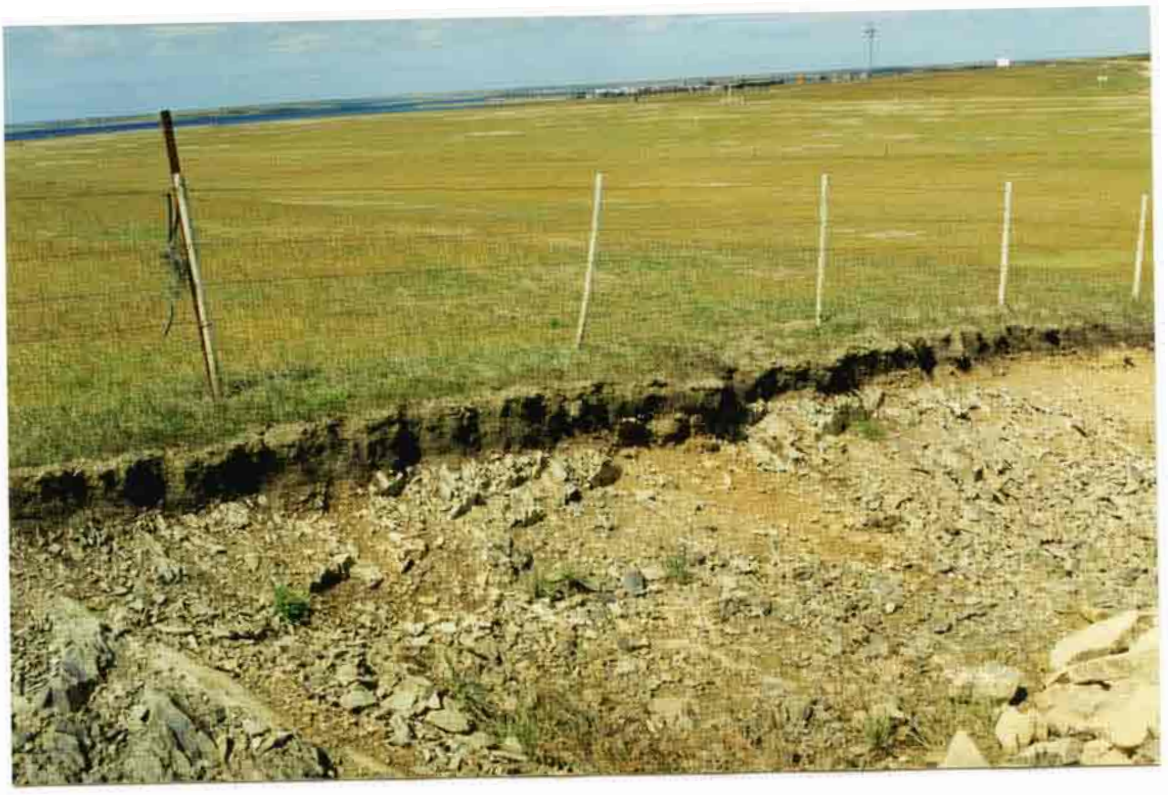
Author's Personal Postscript.

(1) I have thanked those responsible for my soil survey visit to the Falklands, and finally, I wish to thank two people who helped to produce this report, namely Kevin Hamill for the front cover and James Ryan of AMPS Computing in Dublin, who typed and formatted multiple copies of the report.

(2) In the text, reference was made to an initial proposal of 2 possible groups of soils, the quartzite and mudstone groups. Calculations have shown that the mean values of soil properties showed no statistical difference between these groups, and indeed, the separate mean values are almost identical to the overall means. The very high clay content in the particle soil analyses (made at the end of the whole project) confirms that all soils in the Falklands have been subjected to such a long period of chemical weathering that geological differences within the soils have been reduced to almost nil. It cannot be stated too strongly that Falkland soils are massively deficient in calcium and phosphate and that all soil improvement projects depend on **raising** and **maintaining** the levels of these two elements.

(3) This last requirement may not be possible on every farm and may not even be sensible in the economic context of the Falklands in the 21st century. It is for others to decide.



Upper : Mudstones at Goose Green
Lower : Quartzite near Stanley, both rocky soils but both having 30 – 38 cm of surface peaty horizon.

Two examples of the typical Falklands soil profile, at Goose Green and Brenton Loch. Both sites are on mudstones. (See profile diagram.)

Two examples of the shallow surface peaty horizon, (about 35 – 38 cm) at Saunders Island and near Stanley, on mudstone and quartzite parent materials.

Two examples of drying cracks in high clay mineral horizons. The drying cracks do not show true structural units.

APPENDICES

1.Soil Sampling

2.Soil Textures

3.Raw Chemical Data

11 Geological Formations

			No of Soil sites
Phi	=	Port Philomel mudstones	(2)
FoB	=	Fox Bay mudstones	(11)
BaH	=	Bay of Harbours mudstones	(2)
Blu	=	Bluff Cove mudstones	(1)
SoH	=	South Harbour coarse feldspars	(2)
Fic	=	Fish Creek coarse feldspars	(1)
Sta	=	Port Stanley quartzite	(5)
MoA	=	Mount Alice quartzite	(4)
Alb	=	Albemarle quartzite	(1)
Sph	=	Port Stephens quartzite	(1)
Ftz	=	Fitzroy tillite	(0)

B/C Horizon Soil Textures

Texture Class	Soil site	
Clay **43% - 68% Clay**	20 = Green Hill	(FoB) mudstones
	21 = Port Louis	(FoB) mudstones
	22 = Malo Hills	(Sph) quartzite
	27 = Brenton Loch	(Bah) mudstone
	28 = Sussex House	(Blu) mudstone
	1A = Saunders Island	(FoB) mudstone
	10 = Lakelands	(FoB) mudstone
	17 = Port Stephens – Moonlight	(Alb) quartzite
Clay Loam **34% Clay**	29 = Goose green	(Bah) mudstones
Sandy Clay **30% Clay**	25 = San Carlos	(FoB) mudstones
Sandy Clay Loam **22%-25% Clay**	12 = Lightening Ridge	(SoH) feldspars
	22A = Near Malo Hills	(Sph) quartzite

PARTICLE SIZE ANALYSIS AND TEXTURE CLASS

Soil Site	Coarse Sand%	Medium Sand %	Fine Sand %	Silt %	Clay %	Texture Class
21 B/C	3.58	4.57	8.95	23.38	59.52	Clay
25 B/C	1.16	6.37	49.42	12.97	30.08	Sandy Clay
22 B/C	12.71	9.13	4.37	28.37	45.43	Clay
20 B/C	3.25	15.62	25.81	9.09	46.23	Clay
29 B/C	10.17	13.23	18.40	24.30	33.89	Clay Loam
27 B/C	1.17	6.22	20.51	23.47	48.62	Clay
22A B/C	0.09	13.29	45.64	15.38	25.60	SCL
28 B/C	6.43	5.05	9.66	35.83	43.02	Clay
1A B/C	5.21	16.00	4.69	6.28	67.82	Clay
12 B/C	0.98	14.01	31.31	31.73	21.97	SCL
10 B/C	6.76	6.74	6.34	12.13	68.03	Clay
17 B/C	1.00	4.68	3.76	28.88	61.67	Clay

Falkland Soils – PSA Results

	Horizons -	'O' or 'O' Upr			O Lwr			Aeh			
Site		Sample	pH	pH	Sample	pH	pH	Sample	pH	pH	Site
Number	Name	Depth (cm)	water	CaCl	Depth (cm)	water	CaCl	Depth (cm)	water	CaCl	Number
example		5-10			10-15			none			example
1	Saunders , Ram Hd Rookery		4.22	3.81							1
2	Saunders, Ram Head flats	5-10	4.54	4.03	10-15	4.87	3.92				2
3	Saunders Island, diddle-dee reseed	5-10	4.2	3.91	10-15	4.86	3.85				3
4	Elephant Point, ponds.	5-10	6.31	6.14	10-15	7.11	7.00				4
5	East of Teal River House	5-10	4.55	3.52				20-25	4.68	3.76	5
6	Roy Cove, Bailey Bridge.	15-20	5.00	3.85							6
7	Herbert Stream Terrace	15-30	5.09	4.08	35-40	5.22	4.11				7
8	Hill Cove, Sound Ridge.							12-15	4.64	3.75	8
9	West Lagoons	10-12	4.77	3.81							9
10	Lakelands.	5-10	4.86	3.84	25-30	5.13	3.99				10
11	Leicester Falls.	10-15	4.95	3.89	35-38?	5.09	4.01				11
12	Lightning Ridge.	9-12	5.02	3.84				25-30	5.06	4.04	12
13	Port Stephen, bottom flat.	10-15	4.02	3.62							13
14	P Stephen,New Pdk.	25-30	4.46	3.5							14
15	Port Stephens- New pdk flat.	0-10	4.10	3.52	35-40	4.45	3.52				15
16	Port Stephens, Peat Bog Hill.	5-10	4.54	3.84							16
17	Port Stephens, Moonlight.	10-15	4.63	3.9							17
18											18
19											19
20	Green Hill	5-10	4.58	3.60				12-15	4.59	3.80	20
21	Port Louis.	5-10	4.36	3.66	40-50	4.62	3.81	65-70	4.98	3.96	21
22	Malo Hills.	5-10	4.34		30-35	4.43					22
23	Salvador	5-10	4.46	3.43				55-60	4.77	3.63	23
24	Blue Beach - Hay Field.	5-10	5.03	3.81							24
25	San Carlos, Pony pdk water trench.	5-10	4.94	3.85	20-25	4.76	3.72				25
26	San Carlos, Pony paddock flat.	0-5	4.23	3.56	20-25	4.37					26
27	Brenton Loch	5-10	4.63	3.68	15-20	4.97	3.97				27
28	Sussex House	15-20	5.08	4.09	35-40Aeg	4.97	4.14	50-55?	5.09	4.26	28
29	Goose Green	15-20	4.88	4.08	30-35	5.12	4.08				29
30	Abattoir	10-15	4.31		60-65	4.63	3.59				30
31	Dairy 10 acre	5-10	4.25	3.42	20-25	4.64	3.50				31
32	Dairy 10 acre whitegrass	5-10	4.10	3.48	15-20	4.10					32

Horizons -	B/g			B/C		
	Sample	pH	pH	Sample	pH	pH
Name	Depth (cm)	water	CaCl	Depth (cm)	water	CaCl
	30-40			40-50		
Saunders , Ram Hd Rookery						
Saunders, Ram Head flats						
Saunders Island, diddle-dee reseed						
Elephant Point, ponds.						
East of Teal River House	>35?	5.00	3.88			
Roy Cove, Bailey Bridge.	30-35	4.94	3.89	40-45	5.06	3.87
Herbert Stream Terrace						
Hill Cove, Sound Ridge.	28-30	5.08	3.96	35-40	4.84	3.86
West Lagoons				35-40	5.21	3.88
Lakelands.	35-40	5.3	4.26	40-42	5.23	4.03
Leicester Falls.	40-43	5.21	4.12	60-65	5.41	4.17
Lightning Ridge.				50-55	5.42	4.08
Port Stephen, bottom flat.				35-40	4.82	3.79
P Stephen,New Pdk.	32-35	4.84	3.77	45-50	4.85	3.76
Port Stephens- New pdk flat.						
Port Stephens, Peat Bog Hill.						
Port Stephens, Moonlight.	30-33	4.97	4.06	35-40	5.19	4.07
Green Hill	35-40	4.83	3.81	60-70	4.83	3.82
Port Louis.	70-75	5.51	4.02	C.100	5.41	3.95
Malo Hills.	50-55	4.85	3.86	60-65	5.03	3.83
Salvador	70-75	5.03	3.90	100	5.11	3.88
Blue Beach - Hay Field.	25-30	5.27	3.9			
San Carlos, Pony pdk water trench.	35-40	5.04	3.88	90-95	5.32	3.94
San Carlos, Pony paddock flat.	30-35	5.10	3.88			
Brenton Loch	40-45	5.21	3.94	55-60	5.42	4.02
Sussex House	60-65	5.44	4.20	70-75	5.62	4.13
Goose Green	60-70	5.09	4.03	90-100	5.29	3.91
Abattoir				C.100	5.17	3.92
Dairy 10 acre	40-45	5.06	3.83			
Dairy 10 acre whitegrass	20-25	4.39	3.63			

	Horizons -	'O' or 'O' Upr	Ex.	O Lwr	Ex.	Aeh	Ex.	B/g	Ex.	B/C	Ex.
Site	Site	Sample	me of Ca	Sample	me of Ca	Sample	me of Ca	Sample	me of Ca	Sample	me of Ca
Number	Name	Depth (cm)	in 100g soil	Depth (cm)	in 100g soil	Depth (cm)	in 100g soil	Depth (cm)	in 100g soil	Depth (cm)	in 100g soil
example	Saladero	5-10		10-15		none		30-40		40-50	
1	Saunders , Ram Hd Rookery	5-10	1.434								
2	Saunders, Ram Head flats	5-10	2.141	10-15	2.591						
3	Saunders Island, diddle-dee reseed	5-10	3.650	10-15	0.983						
4	Elephant Point, ponds.	5-10	28.680	10-15	22.61						
5	East of Teal River House	5-10	1.985			20-25	0.202	> 35?	0.244		
6	Roy Cove, Bailey Bridge.	15-20	4.250					30-35	0.05	40-45	0.107
7	Herbert Stream Terrace	15-30	3.834	35-40	0.157						
8	Hill Cove, Sound Ridge.					12-15	0.405	28-30	0.186	35-40	0.413
9	West Lagoons	10-12	0.682					32-35	0.293	35-40	0.368
10	Lakelands.	5-10	1.739	25-30	0.151			35-40	0.0294	40-42	0.14
11	Leicester Falls.	10-15	1.308	35-38?	0.264			40-43	0.1675	60-65	0.146
12	Lightning Ridge.	9-12	0.848			25-30	0.343			50-55	0.889
13	Port Stephen, bottom flat.	10-15	7.394							35-40	0.826
14	P Stephen,New Pdk.	0-5	2.830	25-30	1.332			32-35	0.359	45-50	0.326
15	Port Stephens- New pdk flat.	0-10	5.306	35-40	1.428						
16	Port Stephens, Peat Bog Hill.	5-10	3.518								
17	Port Stephens, Moonlight.	10-15	1.107					30-33	0.325	35-40	0.519
18											
19											
20	Green Hill	5-10	0.224			12-15	0.063	35-40	0.188	60-70	0.133
21	Port Louis.	5-10	0.734	40-50	0.432	65-70	0	70-75	0.239	C.100	0.331
22	Malo Hills.	5-10	1.358	30-35	0.38			50-55	0.207	60-65	0.233
23	Salvador	5-10	4.456			55-60	0.528	70-75	0.019	C.100	0.113
24	Blue Beach - Hay Field.	5-10	2.313					25-30	0.643		
25	San Carlos, Pony pdk water trench.	5-10	3.725	20-25	0.706			35-40	0.727	90-95	0.409
26	San Carlos, Pony paddock flat.	0-5	3.426	20-25	2.794			30-35	0.842		
27	Brenton Loch	5-10	2.699	15-20	0.344			40-45	0.173	55-60	0.261
28	Sussex House	15-20	3.265	35-40Aeg	0.189	50-55?	0.258	60-65	0.439	70-75	1.279
29	Goose Green	15-20	3.665	30-35	0.394			60-70	0.374	90-100	0.542
30	Abattoir	10-15	3.134	60-65	1.434			100	1.768		
31	Dairy 10 acre	5-10	8.763	20-25	0.773			40-45	0.292		
32	Dairy 10 acre whitegrass	5-10	6.767	15-20	1.189			20-25	0.391		
	FERTILIZED										
	me = milli - equivalents										
Ref :	Analysis of Agricultural materials method 16 Cation Exchange Capacity and Exchangeable Cations in Soil										
	ADAS REF BOOK 427										

	Horizons -	'O' or 'O' Upr	Ex.	O Lwr	Ex.	Aeh	Ex.	B/g	Ex.	B/C	Ex.
Site	Site	Sample	me of Mg	Sample	me of Mg	Sample	me of Mg	Sample	me of Mg	Sample	me of Mg
Number	Name	Depth (cm)	in 100g soil	Depth (cm	in 100g soil	Depth (cm)	in 100g soil	Depth (cm)	in 100g soil	Depth (cm)	in 100g soil
example	Saladero	5-10		10-15		none		30-40		40-50	
1	Saunders , Ram Hd Rookery	5-10	7.8								
2	Saunders, Ram Head flats	5-10	15.3	10-15	3.15						
3	Saunders Island, diddle-dee reseed	5-10	12.7	10-15	3.91						
4	Elephant Point, ponds.	5-10	8.7	10-15	0.98						
5	East of Teal River House	5-10	8.8			20-25	1.52	> 35	2.37		
6	Roy Cove, Bailey Bridge.	15-20	5.3					30-35	3.29	40-45	4.28
7	Herbert Stream Terrace	15-30	6.4	35-40	1.55						
8	Hill Cove, Sound Ridge.					12-15	2.69	28-30	1.35	35-40	3.03
9	West Lagoons	10-12	4.6					30-35	3.77	35-40	3.52
10	Lakelands.	5-10	7.3	25-30	0.72			35-40	0.17	40-42	1.66
11	Leicester Falls.	10-15	7.0	35-38?	1.35			40-43	1.11	60-65	1.21
12	Lightning Ridge.	9-12	3.6			25-30	1.10			50-55	3.66
13	Port Stephen, bottom flat.	10-15	17.1								
14	P Stephen,New Pdk.	0-5	7.9	25-30	5.95			32-35	3.08	45-50	3.30
15	Port Stephens- New pdk flat.	0-10	19.6	35-40	6.14						
16	Port Stephens, Peat Bog Hill.	5-10	14.3								
17	Port Stephens, Moonlight.	10-15	8.7					30-33	3.17	35-40	5.37
18											
19											
20	Green Hill	5-10	1.1			12-15	0.52	35-40	0.21	60-70	0.87
21	Port Louis.	5-10	9.3	40-50	1.45	65-70	0.46	70-75	1.77	c.100	2.36
22	Malo Hills.	5-10	4.3	30-35	2.80			50-55	0.80	60-65	1.35
23	Salvador	5-10	14.3			55-60	3.37	70-75	0.51	100	0.76
24	Blue Beach - Hay Field.	5-10	4.3					25-30	3.37		
25	San Carlos, Pony pdk water trench.	5-10	17.9	20-25	4.02			35-40	5.81	90-95	4.20
26	San Carlos, Pony paddock flat.	0-5	8.8	20-25	10.28			30-35	3.70		
27	Brenton Loch	5-10	8.5	15-20	1.43			40-45	2.45		
28	Sussex House	15-20	7.0	35-40 AEG	0.91	50-55?	1.09	60-65	2.62	70-75	6.42
29	Goose Green	15-20	6.1	30-35	1.28			60-70	3.18	90-100	5.49
30	Abattoir	10-15	10.7	60-65	5.69			100	6.92		
31	Dairy 10 acre	5-10	17.8	20-25	3.51			40-45	0.87		
32	Dairy 10 acre whitegrass	5-10	18.3	15-20	5.13			20-25	1.64		
	me = milli - equivalents										
Ref :	Analysis of Agricultural materials	method 16 Cation Exchange Capacity and Exchangeable Cations in Soil									
	ADAS REF BOOK 427										

	Horizons -	'O' or 'O' Upr	Ex.	O Lwr	Ex.	Aeh	Ex.	B/g	Ex.	B/C	Ex.
Site	Site	Sample	me of K	Sample	me of K	Sample	me of K	Sample	me of K	Sample	me of K
Number	Name	Depth (cm)	in 100g soil	Depth (cm)	in 100g soil	Depth (cm)	in 100g soil	Depth (cm)	in 100g soil	Depth (cm)	in 100g soil
example	Saladero	5-10		10-15		none		30-40		40-50	
1	Saunders , Ram Hd Rookery	5-10	1.190								
2	Saunders, Ram Head flats	5-10	1.562	10-15	0.576						
3	Saunders Island, diddle-dee reseed	5-10	1.830	10-15	1.05						
4	Elephant Point, ponds.	5-10	0.115	10-15	0.00						
5	East of Teal River House	5-10	1.139			20-25	0.371	> 35?	0.832		
6	Roy Cove, Bailey Bridge.	15-20	1.587					30-35	0.474	40-45	0.666
7	Herbert Stream Terrace	15-30	0.653	35-40	0.397						
8	Hill Cove, Sound Ridge.					12-15	0.461	28-30	0.23	35-40	0.358
9	West Lagoons	10-12	1.150					32-35	0.602	35-40	0.486
10	Lakelands.	5-10	1.100	25-30	0.340			35-40	1.715	40-42	0.544
11	Leicester Falls.	10-15	1.660	35-38?	0.461			40-43	0.32	60-65	0.346
12	Lightning Ridge.	9-12	0.858			25-30	0.282			50-55	0.250
13	Port Stephen, bottom flat.	10-15	2.520							35-40	0.525
14	P Stephen,New Pdk.	0-5	0.896	25-30	0.320			32-35	0.525	45-50	0.781
15	Port Stephens- New pdk flat.	0-10	1.728	35-40	0.352						
16	Port Stephens, Peat Bog Hill.	5-10	1.536								
17	Port Stephens, Moonlight.	10-15	1.677					30-33	0.512	35-40	0.640
18											
19											
20	Green Hill	5-10	0.115			12-15	0.128	35-40	0.909	60-70	0.461
21	Port Louis.	5-10	1.382	40-50	0.384	65-70	0.256	70-75	0.397	C.100	0.525
22	Malo Hills.	5-10	1.920	30-35	0.678			50-55	0.218	60-65	0.474
23	Salvador	5-10	0.653			55-60	0.371	70-75	0.141	C.100	0.179
24	Blue Beach - Hay Field.	5-10	0.973					25-30	0.614		
25	San Carlos, Pony pdk water trench.	5-10	2.520	20-25	1.178			35-40	1.088	90-95	0.435
26	San Carlos, Pony paddock flat.	0-5	1.190	20-25	0.922			30-35	0.397		
27	Brenton Loch	5-10	1.933	15-20	0.742			40-45	0.23	55-60	0.563
28	Sussex House	15-20	1.626	35-40Aeg	0.346	50-55?	0.538	60-65	0.358	70-75	0.474
29	Goose Green	15-20	1.242	30-35	0.717			60-70	0.768	90-100	0.538
30	Abattoir	10-15	1.344	60-65	0.230			100	0.538		
31	Dairy 10 acre	5-10	1.165	20-25	0.218			40-45	0.179		
32	Dairy 10 acre whitegrass	5-10	1.459	15-20	0.614			20-25	0.422		
	me = milli - equivalents										
Ref :	Analysis of Agricultural materials	method 16 Cation Exchange Capacity and Exchangeable Cations in Soil									
	ADAS REF BOOK 427										

	Horizons -	'O' or 'O' Upr	Total	O Lwr	Total	Aeh	Total	B/g	Total	B/C	Total
Site	Site	Sample	K	Sample	K	Sample	K	Sample	K	Sample	K
Number	Name	Depth (cm)	g/Kg	Depth (cm)	g/Kg	Depth (cm)	g/Kg	Depth (cm)	g/Kg	Depth (cm)	g/Kg
example	Saladero	5-10		10-15		none		30-40		40-50	
1	Saunders , Ram Hd Rookery	5-10	2.40								
2	Saunders, Ram Head flats	5-10	1.22	10-15	1.54						
3	Saunders Island, diddle-dee reseed	5-10	4.02	10-15	3.76						
4	Elephant Point, ponds.	5-10	0.21	10-15	0.14						
5	East of Teal River House	5-10	2.38			20-25	2.20	>35cm ?	11.40		
6	Roy Cove, Bailey Bridge.	15-20	3.98					30-35	4.38	40-45	4.34
7	Herbert Stream Terrace	15-30	3.30	35-40	4.70						
8	Hill Cove, Sound Ridge.					12-15	3.92	28-30	3.08	35-40	3.18
9	West Lagoons	10-12	4.94					30-35	4.62		
10	Lakelands	10-12	4.94	25-30	2.82			35-40	2.08	40-42	6.64
11	Leicester Falls	10-15	3.56	35-38?	2.90			40-43	5.16	60-65	4.14
12	Lightning Ridge	9-12	2.34			25-30	2.88			50-55	2.80
13	Port Stephen, bottom flat.	10-15	2.52							35-40	3.78
14	P Stephen,New Pdk.	25-30	3.30					32-35	6.60	45-50	7.96
15	Port Stephens- New pdk flat.	0-10	1.12	35-40	1.94						
16	Port Stephens, Peat Bog Hill.	5-10	1.70								
17	Port Stephens, Moonlight.	10-15	3.30					30-33	3.70	35-40	4.86
18											
19											
20	Green Hill	5-10	1.40			12-15	1.68	35-40	6.32	60-70	2.02
21	Port Louis.	5-10	1.66	40-50	1.58	65-70	3.70	70-75	3.76	c.100	5.64
22	Malo Hills.	5-10	1.48	30-35	0.82			50-55	3.52	60-65	4.08
23	Salvador	5-10	1.04			55-60	3.68	70-75	2.40	100	2.74
24	Blue Beach - Hay Field.	5-10	2.80					25-30	5.48		
25	San Carlos, Pony pdk water trench.	5-10	3.24	20-25	2.14			35-40	7.72	90-95	4.06
26	San Carlos, Pony paddock flat.	0-5	2.00	20-25	0.92			30-35	3.92		
27	Brenton Loch	5-10	2.92	15-20	2.26			40-45	5.76	55-60	6.16
28	Sussex House	15-20	3.22	35-40 Aeg	2.96	50-55	4.96	60-65	3.00	70-75	3.00
29	Goose Green	15-20	3.34	30-35	2.96			60-70	5.64	90-100	3.64
30	Abattoir	10-15	1.00	60-65	2.02			100	4.00		
31	Dairy 10 acre	5-10	0.78	20-25	1.28			40-45	2.52		
32	Dairy 10 acre whitegrass	5-10	0.88	15-20	1.66			20-25	2.08		
Ref:	Analysis of Agricultural materials	Method 11	Potassium, Nitro-perchloric acid soluble , in soil								
	Reference book 427										

	Horizons -	'O' or 'O' Upr	Total		Total	O Lwr	Total		Total	Aeh	Total	
Site	Site	Sample	N		N	Sample	N		N	Sample	N	
Number	Name	Depth (cm)	g/Kg		g/Kg	Depth (cm)	g/Kg		g/Kg	Depth (cm)	g/Kg	
example	Saladero	5-10	a	b	average	10-15	a	b	average	none	a	b
1	Saunders , Ram Hd Rookery	5-10	12.8	12.3	12.5							
2	Saunders, Ram Head flats	5-10	25.3	26.9	26.1		31.0	30.4	30.7			
3	Saunders Island, diddle-dee reseed	5-10	20.1	20.0	20.0		0.7	0.6	0.6			
4	Elephant Point, ponds.	5-10	15.5	17.6	16.5		4.6	9.8	7.2			
5	East of Teal River House	5-10	13.5	13.4	13.4					20-25	5.7	5.4
6	Roy Cove, Bailey Bridge.	15-20	5.7	6.3	6.0							
7	Herbert Stream Terrace	15-30		10.5	10.5	35-40	0.2	0.3	0.3			
8	Hill Cove, Sound Ridge.									12-15	3.3	2.9
9	West Lagoons	10-12	4.0	3.3	3.7							
10	Lakelands.	5-10	8.4	8.4	8.4	25-30	3.6	4.1	3.8			
11	Leicester Falls.	10-15	10.8	10.1	10.5	35-38	5.8	5.2	5.5			
12	Lightning Ridge.	9-12	9.0	9.8	9.4					25-30	2.7	2.4
13	Port Stephen, bottom flat.	10-15	19.7	19.6	19.7							
14	P Stephen,New Pdk.	0-5	13.6	13.3	13.5	25-30	7.2	7.5	7.3			
15	Port Stephens- New pdk flat.	0-10	15.8	15.6	15.7	35-40	15.3	15.0	15.2			
16	Port Stephens, Peat Bog Hill.	5-10	39.1	37.5	38.3							
17	Port Stephens, Moonlight.	10-15	7.3	7.6	7.4							
18												
19												
20	Green Hill	5-10	8.8	10.8	9.8					12-15	3.5	3.3
21	Port Louis.	5-10	32.3	34.5	33.4	40-50	29.1	28.8	29.0	65-70	1.5	2.2
22	Malo Hills.	5-10	23.5	22.4	22.9	30-35	0.2	1.2	0.7			
23	Salvador	5-10	46.4	44.3	45.3							
24	Blue Beach - Hay Field.	5-10	18.1	18.5	18.3	35-40 aeg	2.4	2.5	2.4			
25	San Carlos, Pony pdk water trench.	5-10	24.8	24.9	24.8	20-25	20.7	22.5	21.6			
26	San Carlos, Pony paddock flat.	0-5	40.0	37.8	38.9	20-25	35.6	28.3	32.0			
27	Brenton Loch	5-10	20.8	21.9	21.4	15-20	2.0	1.5	1.8			
28	Sussex House	15-20	16.7	15.0	15.9					50-55	2.3	1.4
29	Goose Green	15-20	17.8	16.2	17.0	30-35	2.3	2.0	2.1			
30	Abattoir	10-15	42.5	45.3	43.9	60-65	20.6	20.9	20.7			
31	Dairy 10 acre	5-10	39.8	34.7	37.3	20-25	25.8	21.9	23.8			
32	Dairy 10 acre whitegrass	5-10				15-20	29.1	18.7				
Ref:	Analysis of Agricultural materials	Method 49	Nitrogen in soil									
	Reference book 427											

	Horizons -	Total	B/g	Total		Total	B/C	Total		Total
Site	Site	N	Sample	N		N	Sample	N		N
Number	Name	g/Kg	Depth (cm)	g/Kg		g/Kg	Depth (cm)	g/Kg		g/Kg
example	Saladero	average	30-40	a	b	average	40-50	a	b	
1	Saunders , Ram Hd Rookery									
2	Saunders, Ram Head flats									
3	Saunders Island, diddle-dee reseed									
4	Elephant Point, ponds.									
5	East of Teal River House	5.6	> 35cm	0.2	0.4	0.3				
6	Roy Cove, Bailey Bridge.		30-35	0.9	1.2	1.0	40-45	0.8	1.0	0.9
7	Herbert Stream Terrace									
8	Hill Cove, Sound Ridge.	3.1	28-30	0.2	0.3	0.3	35-40	0.6	0.7	0.6
9	West Lagoons		30-35	1.4	0.1	0.7	35-40	1.1	0.8	1.0
10	Lakelands.		35-40	0.0	0.0	0.0	40-42	1.1	0.9	1.0
11	Leicester Falls.		40-43	1.2	0.9	1.0	60-65	0.8	0.8	0.8
12	Lightning Ridge.	2.5					50-53	0.4	0.3	0.3
13	Port Stephen, bottom flat.						35-40	2.6	2.0	2.3
14	P Stephen,New Pdk.		32-35	1.4	1.2	1.3	45-50	1.0	0.9	1.0
15	Port Stephens- New pdk flat.									
16	Port Stephens, Peat Bog Hill.									
17	Port Stephens, Moonlight.		30-33	0.9	1.3	1.1	35-40	1.3	1.7	1.5
18										
19										
20	Green Hill	3.4	35-40	1.8	1.2	1.5	60-70	2.3	1.4	1.9
21	Port Louis.	1.9	70-75	0.7	1.7	1.2	c.100	1.2	1.2	1.2
22	Malo Hills.		50-55	2.6	4.5	3.5	60-65	1.9	0.7	1.3
23	Salvador		70-75	3.3	1.4	2.3	100	1.8	1.2	1.5
24	Blue Beach - Hay Field.		25-30	0.0	0.0	0.0				
25	San Carlos, Pony pdk water trench.		35-40	0.9	2.9	1.9	90-95	1.4	1.4	1.4
26	San Carlos, Pony paddock flat.		30-35	2.3	3.7	3.0				
27	Brenton Loch		40-45	0.0	0.0	0.0	55-60	0.9	0.1	0.5
28	Sussex House	1.9					70-78	2.7	2.1	2.4
29	Goose Green		60-70	1.9	2.1	2.0	90-100	1.7	1.8	1.7
30	Abattoir		c.100	4.8	2.7	3.7				
31	Dairy 10 acre		40-45	3.1	1.2	2.1				
32	Dairy 10 acre whitegrass		20-25	1.6	2.7	2.1				
Ref:	**Analysis of Agricultural materials**									
	Reference book 427									

	Horizons -	'O' or 'O' Upr			Olsen	O Lwr			Olsen	Aeh		
Site	Site	Sample			P	Sample			P	Sample		
Number	Name	Depth (cm)			mg/l	Depth (cm)			mg/l	Depth (cm)		
example	Saladero	5-10	a	b	average	10-15	a	b	average	none	a	b
1	Saunders , Ram Hd Rookery	5-10	207.5	193.8	200.7							
2	Saunders, Ram Head flats	5-10	16.0	17.5	16.8	10-15	10.0	10.0	10.0			
3	Saunders Island, diddle-dee reseed	5-10	17.5	14.3	15.9	10-15	5.2	5.4	5.3			
4	Elephant Point, ponds.	5-10	15.0	15.8	15.4	10-15	5.5	5.5	5.5			
5	East of Teal River House	5-10	7.8	7.8	7.8					20-25	6.5	6
6	Roy Cove, Bailey Bridge.	15-20	5.0	5.0	5.0							
7	Herbert Stream Terrace	15-30	7.8	7.5	7.6	35-40	2.0	3.0	2.5			
8	Hill Cove, Sound Ridge.									12-15	3	3
9	West Lagoons	10-12	4.8	5.0	4.9							
10	Lakelands.	5-10	7.0	7.0	7.0	25-30	5.0	5.0	5.0			
11	Leicester Falls.	10-15	9.5	9.5	9.5	35-38?	4.0	4.0	4.0			
12	Lightning Ridge.	9-12	7.4	7.4	7.4					25-30	2.6	2.6
13	Port Stephen, bottom flat.	10-15	39.5	39.5	39.5							
14	P Stephen,New Pdk..	0-5	7.8	7.0	7.4	25-30	3.5	4.0	3.8			
15	Port Stephens- New pdk flat.	0-10	11.5	11.5	11.5	35-40	7.8	7.7	7.7			
16	Port Stephens, Peat Bog Hill.	5-10	7.5	7.8	7.6							
17	Port Stephens, Moonlight.	10-15	5.8	5.6	5.7							
18												
19												
20	Green Hill	5-10	3.5	3.5	3.5					12-15	5	5
21	Port Louis.	5-10	5.0	5.5	5.3	40-50	5.0	4.5	4.8	65-70	2.6	2.6
22	Malo Hills.	5-10	8.3	8.3	8.3	30-35	4.8	4.3	4.5			
23	Salvador	5-10	9.0	9.0	9.0					55-60	15.2	14.5
24	Blue Beach - Hay Field.	5-10	6.0	6.0	6.0							
25	San Carlos, Pony pdk water trench.	5-10	10.5	10.5	10.5	20-25	4.8	4.8	4.8			
26	San Carlos, Pony paddock flat.	0-5	20.5	20.0	20.3	20-25	17.0	17.0	17.0			
27	Brenton Loch	5-10	7.0	7.0	7.0	15-20	4.3	4.8	4.5			
28	Sussex House	15-20	8.0	7.5	7.8	35-40 AEG	0.4	0.4	0.4	50-55	1.8	1.6
29	Goose Green	15-20	5.8	5.8	5.8	30-35	2.5	2.5	2.5			
30	Abattoir	10-15	17.0	17.0	17.0	60-65	5.5	3.5	4.5			
31	Dairy 10 acre	5-10	10.0	10.0	10.0	20-25	2.0	2.0	2.0			
32	Dairy 10 acre whitegrass	5-10	15.5	15.5	15.5	15-20	6.6	6.4	6.5			
Ref :	Analysis of Agricultural materials	Method 59	Phosphorus, extractable in S extractable in soil									
	ADAS Reference book 427											

	Horizons -	Olsen	B/g			Olsen	B/C			Olsen
Site	Site	P	Sample			P	Sample			P
Number	Name	mg/l	Depth (cm)			mg/l	Depth (cm)			mg/l
example	Saladero	average	30-40	a	b	average	40-50	a	b	average
1	Saunders , Ram Hd Rookery									
2	Saunders, Ram Head flats									
3	Saunders Island, diddle-dee reseed									
4	Elephant Point, ponds.									
5	East of Teal River House	6.3								
6	Roy Cove, Bailey Bridge.		30-35	1.6	1.6	1.6	40-45	0.2	0.2	0.2
7	Herbert Stream Terrace									
8	Hill Cove, Sound Ridge.	3.0	28-30	0.6	0.6	0.6	35-40	0.5	0.5	0.5
9	West Lagoons		30-35	3.5	3	3.3	35-40	0.6	0.6	0.6
10	Lakelands.		35-40	0.8	0.8	0.8	40-42	1	1	1.0
11	Leicester Falls.		40-43	0.5	0.5	0.5	60-65	1.5	1.5	1.5
12	Lightning Ridge.	2.6					50-55	8.2	8.4	8.3
13	Port Stephen, bottom flat.						35-40	4.26	4	4.1
14	P Stephen,New Pdk..		32-35	1	1	1.0	45-50	0.5	0.5	0.5
15	Port Stephens- New pdk flat.									
16	Port Stephens, Peat Bog Hill.									
17	Port Stephens, Moonlight.		30-33	2	1	1.5	35-40	2.5	2.5	2.5
18										
19										
20	Green Hill	5.0	35-40	0	0	0.0	60-70	0	0	0.0
21	Port Louis.	2.6	70-75	0	0	0.0	c.100	2	1.6	1.8
22	Malo Hills.		50-55	4.2	4.6	4.4	60-65	1.6	1.6	1.6
23	Salvador	14.9	70-75	0.2	0.2	0.2	100	0.6	0.6	0.6
24	Blue Beach - Hay Field.		25-30	1.8	2	1.9				
25	San Carlos, Pony pdk water trench.		35-40	1.6	1.6	1.6	90-95	1.2	1.2	1.2
26	San Carlos, Pony paddock flat.		30-35	2.3	2.1	2.2				
27	Brenton Loch		40-45	2	1.6	1.8	55-60	0	0	0.0
28	Sussex House	1.7	60-65	1	0.6	0.8	70-75	4.4	3.8	4.1
29	Goose Green		60-70	0.2	0.2	0.2	90-100	0	0.2	0.1
30	Abattoir		b/g 100	0.8	0.8	0.8				
31	Dairy 10 acre		40-45	2	1.8	1.9				
32	Dairy 10 acre whitegrass		20-25	4.4	4.4	4.4				
Ref :	Analysis of Agricultural materials									
	ADAS Reference book 427									

	Horizons -	'O' or 'O' Upr	Total	O Lwr	Total	Aeh	Total	B/g	Total	B/C	Total
Site	Site	Sample	P	Sample	P	Sample	P	Sample	P	Sample	P
Number	Name	Depth (cm)	g/Kg	Depth (cm)	g/Kg	Depth (cm)	g/Kg	Depth (cm)	g/Kg	Depth (cm)	g/Kg
example	Saladero	5-10		10-15		none		30-40		40-50	
1	Saunders , Ram Hd Rookery	5-10	2.590								
2	Saunders, Ram Head flats	5-10	1.280		2.090						
3	Saunders Island, diddle-dee reseed	5-10	0.624		0.480						
4	Elephant Point, ponds.	5-10	0.400		0.176						
5	East of Teal River House	5-10	0.580			20-25	0.232	35?	0.176		
6	Roy Cove, Bailey Bridge.	15-20	0.472					30-35	0.080	40-45	0.040
7	Herbert Stream Terrace	15-30	0.860	35-40	0.296						
8	Hill Cove, Sound Ridge.					12-15	0.227	28-30	0.192	35-40	0.040
9	West Lagoons	10-12	0.256					30-35	0.168	35-40	0.120
10	Lakelands.	5-10	0.430	25-30	0.428			35-40	0.136	40-42	0.340
11	Leicester Falls.	10-15	0.800	35-38?	0.450			40-43	0.133	60-65	0.187
12	Lightning Ridge.	9-12	0.512			25-30	0.184			50-55	0.152
13	Port Stephen, bottom flat.	10-15	0.968							35-40	0.128
14	P Stephen,New Pdk.	25-30	0.520					32-35	1.140	45-50	0.900
15	Port Stephens- New pdk flat.	0-10	0.544	35-40	1.030						
16	Port Stephens, Peat Bog Hill.	5-10	0.950								
17	Port Stephens, Moonlight.	10-15	0.800					30-33	0.980	35-40	0.780
18											
19											
20	Green Hill	5-10	0.224			12-15	0.112	35-40	0.328	60-70	0.256
21	Port Louis.	5-10	0.460	40-50	0.660	65-70	0.168	70-75	0.072	C.100	0.524
22	Malo Hills.	5-10	0.120	30-35	0.656			50-55	0.136	60-65	0.120
23	Salvador	5-10	0.644			55-60	0.152	70-75	0.464	100	0.424
24	Blue Beach - Hay Field.	5-10	0.584					25-30	0.120		
25	San Carlos, Pony pdk water trench.	5-10	0.496	20-25	0.312			35-40	0.096	90-95	0.128
26	San Carlos, Pony paddock flat.	0-5	0.710	20-25	0.712			30-35	0.016		
27	Brenton Loch	5-10	0.564	15-20	0.392			40-45	0.168	55-60	0.248
28	Sussex House	15-20	1.080	35-40 Aeh	0.224	50-55	0.608	60-65	0.216	70-75	0.256
29	Goose Green	15-20	0.416	30-35	0.296			60-70	0.064	90-100	0.192
30	Abattoir	10-15	0.800	60-65	1.040			100	0.048		
31	Dairy 10 acre	5-10	0.576	20-25	0.480			40-45	0.120		
32	Dairy 10 acre whitegrass	5-10	0.400	15-20	0.296			20-25	0.064		
Ref:	Analysis of Agricultural materials	Method 11.	Phosphorus , nitro-perchloric acid , soluble, in soil								
	Reference book 427										