ELLENDALE
SOIL REPORT

Reconnaissance Soil Map Series of Tasmania

A Revised Edition
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Department of Primary Industries, Water and Environment
Tasmania
2000

of Divisional Report 5/61 Ellendale
By G.M Dimmock
C.S.I.R.O Division of Soils, Adelaide, 1961

Ellendale Report
and accompanying 1:100 000 Ellendale
Soil Reconnaissance map

DEPARTMENT of PRIMARY INDUSTRIES, WATER and ENVIRONMENT
Tasmania

Natural Heritage Trust
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ACKNOWLEDGEMENTS

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We would like to especially thank Mr G.M. Dimmock for editing the draft map sheet and report.

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PREFACE

The Reconnaissance Series

Over a 27 year period (1940 - 1967), the CSIRO Division of Soils, Adelaide undertook a series of reconnaissance (small scale) soil surveys and some more detailed (large scale) soil surveys of the agricultural land in Tasmania. However, most of these reports are out of print and of limited availability, the terminology is dated and inconsistencies in map units exist across map sheets. In 1997, the Department of Primary Industries, Water and Environment (DPIWE) and the Natural Heritage Trust, put together a project to correlate and reprint the maps and reports and to extend this information and its value as a tool for sustainable land management, to a variety of potential users.

This report is part of the “Reconnaissance Soil Map of Tasmania” series which were published at a scale of 1 inch to 1 mile (1:63 360). The reconnaissance series has been expanded to include the soil maps that were not part of the original “Reconnaissance Soil Map of Tasmania” series but mapped at scales of 1 inch to 1 mile and 1 inch to 2 mile (1:126 000). These maps have been reformatted and reprinted by the DPIWE at a scale of 1:100 000 to be consistent with more recent soil mapping scales (eg South Esk 1:100 000 soil map (southern half), Doyle, 1993), the land capability mapping series and the current Tasmanian Land Tenure map series.

It is not the aim of this project to remap the areas covered by the Reconnaissance series or to change the intensity of mapping, but to correlate, standardise and enhance existing information and provide the public and DPIWE staff with more consistent, reliable and accessible soil resource information.

Correlation of the Ellendale Reconnaissance Soil Map

Defining Map units

In attempting to correlate soils across the Reconnaissance Soil Maps around the State differences in the nature of the map units have caused some problems. Map units on the initial maps investigated (Longford, Quamby and South Esk), essentially depicted broad scale “soil associations”. These associations identified and described a dominant soil and a range of minor soils, which were generally associated with recognisable landscape features. For example the Eastfield Association, dominated by the Eastfield Soil Profile Class (SPC), has a range of minor soils such as the Panshanger SPC and the Bloomfield SPC which are found on rolling to steep dolerite hills.

In other parts of the State, including the Ellendale sheet, the map units of the Reconnaissance Soil Maps have been generally defined on the basis of Great Soil Groups (Stace *et al.*, 1968) and parent material, eg Podzolic Soils on Dolerite. In many instances a dominant or representative soil has been identified and where adequate existing data is available it is possible to define an SPC for that soil. In such cases it is sometimes possible to correlate with SPCs defined elsewhere. However because of insufficient data for the minor soils it is not possible to define and correlate the minor soils around the state. Therefore there is a unit "Podzolics on Dolerite" and another "Eastfield Association" both of which are dominated by the Eastfield SPC but which may have different minor soils. To correlate these two units based on the dominant soil only, would be incorrect and misleading. Instead the original map unit name has been retained. Where a dominant soil has been identified, the map unit has been assigned a number eg Podzolics on Dolerite 1 (Pd1), with the identified dominant soil outlined in the report and on the legend of the map.

In some instances sufficient data exists to determine that a particular polygon or group of polygons have a different dominant soil to others of a similar map unit name. However the data is insufficient to allow the precise definition of that soil. These map units have been assigned a numerical value. (eg Pm1 & Pm2). The distinction between these polygons and polygons where a dominant soil has been defined (eg Pd1), is apparent by the absence of a defined dominant soil in the report and on the legend of the map.

Due to resource constraints only a limited amount of time could be spent investigating these less well defined soils and map units. Hence the term "insufficient data" occurs widely throughout the legend. The correlation of the Reconnaissance Soil Maps has highlighted how little information is available for some of Tasmania's major soils.

The Ellendale Map

The Ellendale Reconnaissance Soil Map adjoins the Brighton map (Spanswick *et al.*, 2000c) on its eastern boundary, the Hobart map (Spanswick *et al.,* 2000d) on its south eastern corner and the Oatlands (Cowie, 1959) on its north eastern corner. For an index map of the 1:100 000 Reconnaissance Soil Surveys of Tasmania, see Appendix 7.

Soil Taxonomic Units
A soil taxonomic unit is a general term for a grouping of soils based on similarities of the soils within the group, and differences compared with other groups. Map units consist of defined areas of contiguous soil taxonomic units. As outlined previously the soil taxonomic units used by Dimmock in this survey are Great Soil Groups (Stace *et al.,* 1968). These have been replaced where possible by Soil Profile Class (SPC) as this will standardise taxonomic units across the Ellendale map and be consistent with taxonomic units used within the more recent South Esk soil map and by other states. A SPC is a group or class of soil profiles within a map unit which have similar morphological characteristics and may have similar chemical properties (Gunn *et al*., 1988). The SPCs were constructed through the use of existing reports, historical soil data in the DPIWE soil database and additional fieldwork. A key to soil horizon designations used within the SPCs is provided in Appendix 1. The lines separating horizons within the SPC diagrams are shown by broken and solid lines. The broken lines show a diffuse or gradual change to the next horizon whereas the solid lines show a clear or abrupt transition. If the horizon transition is unknown a larger broken line is used. Where a lack of profile

information has meant that SPCs cannot be developed, then specific type profiles of the soil, as identified by Dimmock in the original survey, have been used.

Map Edits

Dimmock mapped some of the polygons in the eastern half of the sheet as more than one type of map unit. For example a single map unit may be labelled both "Pd" and "Pd with Bd". This is really a complex unit. However because the occurrence of Pd with Bd is in only a part of the polygon, it is not possible without significant additional fieldwork and aerial photograph interpretation, to split this unit and other units like it. Therefore, we have left these units as are. They are identified on the paper maps and in a notes column attached to the polygon attribute table of the digital maps. This information has also been stored as a separate point coverage; however the coordinates used for the label points are only estimations taken from a visual interpretation of their location on the original published map.

The map units in this survey also include soil complexes. A soil complex consists of two or more dominant soils that occur in an intricate pattern that can not be separated at this scale of mapping without unwarranted effort.

There are two maps for this report in circulation. The map that accompanies this report has polygons coloured according to the different map units identified. The second map, which is intended solely for DPIWE in-house circulation, has map units coloured according to the Australian Soil Classification for the dominant SPC within each unit, no colour is assigned to a map unit if a SPC has not been identified.

Legend

Where possible the dominant soil of each map unit has been classified to soil order using the Australian Soil Classification (Isbell, 1996). Soils have also been classified according to Great Soil Group (Stace *et al.*, 1968).

Edits to the Ellendale Report

The Ellendale report has been reformatted to provide a more consistent structure with other similar reports. The soil terminology used within the Ellendale report has been updated to be consistent with the Australian Soil and Land Survey Field Handbook (McDonald *et al*, 1990), old imperial measurements have been converted to the metric system and sentence structure has been changed where it did not read with clarity. Edits and additional information about the soils within map units have been recorded within the main body of this report. All the changes made to the report are shown in italics.

No changes have been made to Land Use within this report. This information is out of date and is an area that has been identified as requiring further work.

SPC definitions in some map units have been tightened as data available on this map sheet has increased our understanding of some soils. Where these changes have been made to an SPC it has been outlined in the body of the report.

Laboratory Analysed Data

C.S.I.R.O laboratory data is available for some of the dominant soils identified on this map. Readers should be aware that some of the laboratory methods used by C.S.I.R.O in the 1950s and 1960s differ from the methods used in more recent DPIWE laboratory analysis. All CSIRO sites have the character "H" at the beginning of the profile number eg H68. An outline of the different methods used is located in Appendix 2.

Future Work

Correlation of the soils identified on this map with others in southern Tasmania has been extremely difficult due to the lack of existing soil profile data, the complexity of geology and local climate and topography variations. Consequently a number of areas exist where additional work would be valuable.

Alluvial Soils

Though the alluvial soils within the Ellendale map sheet have been split into three sub-units, the variability of the soils within these units has made correlation very difficult. Having said this we have been able to gather enough information to broadly define the dominant soil identified by Dimmock (1961). However more work is needed within this unit as these areas are used for intensive agriculture.

Soils Formed on Triassic Sediments

The occurrence of micaceous and feldspathic sandstones has frequently been observed throughout the correlation of the southern Reconnaissance Soil Maps. However the Ellendale Reconnaissance map is the first to try and differentiate these two lithologies from the siliceous Triassic sediments. Unfortunately very little data is available for the corresponding soils of either of these units, and that which is, is often conflicting. We were able to broadly define the dominant soil within the feldspathic unit but due to a lack of data, and urban development inhibiting field work, no dominant soil was identified for the micaceous sandstone unit. Many of the soils formed on the Triassic sediments are sodic to varying degrees, making them prone to dispersion and, on steeper slopes, erosion. These soils are currently used for grazing, forestry and urban development. More work is required on these soils as their erosion risk has important land use implications.

Soils formed on Permian Sediments

Correlation of the Podzolic Soils on Mudstone on the Ellendale sheet has enabled us to tighten the definition for the Forcett SPC. Due to the data available on this sheet we have determined that there are in fact two main soil types which are related to the underlying geology. Unfortunately due to insufficient data we were unable to define a SPC for the second type of soil. A broad definition for this soil has been given in the body of this report, however more work is needed to further define this soil type.

Land Use

As mentioned previously no edits have been made to the land use section of this report. This is an area where future work would be extremely beneficial.

Accuracy of Maps
Cadaster data on the original Ellendale Reconnaissance Soil Map was supplied by the Department of Lands and Survey, Hobart, in 1942. No relief data was available when the original map was surveyed. The original map used the Transverse Mercator Projection with Co-ordinates displayed in yards. Soil boundaries were delineated by stereoscopic interpretation of aerial photographs. The old paper soil maps were transferred to electronic form in the early 1990s with the Co-ordinate system converted to the Australian Map Grid, however no projection was recorded. Accuracy checks of the Ellendale digital map have revealed a range of spatial errors. Rivers and estuaries have changed position over time. However the major source of spatial error on all the Reconnaissance Soil Maps has been caused by the absence of rectification of the aerial photographs during delineation of line work. Hence, Ground Control Points (GCP) in some areas on the map sheet, eg hilltops, do not match current true ground positions.

We have not had the resources or time to address all the inaccuracies within this map sheet. Users of this data need to be aware that in some areas the boundaries of map units may be out by considerable distances.

Appendices

A series of appendices have been attached providing additional information relevant to this report and the accompanying soil map. Much of this information was either unavailable or not recorded with the original report

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Division of Soils

RECONNAISSANCE SOIL MAP OF TASMANIA

SHEET 74 - ELLENDALE

By
G.M Dimmock

1. INTRODUCTION

This report forms part of the Reconnaissance Soil Map of Tasmania series. The original soil map is at a scale of 1:63 360. The revised version of the map accompanying this report is at a scale of 1:100 000. Discussion is limited to a brief explanation of the map, and further information is left to intended future publications. A list of soil maps available in this series appears at the back of this report. The Ellendale map covers an area of *1140* km^2.

2. PHYSICAL ENVIRONMENT

2.1 Geology & Geomorphology

The dominant features of the landscape are the Mt. Field plateau and the south-easterly trending valley of the Derwent River. Most of the country is hilly or mountainous, the limited areas of flat land being confined to relatively narrow strips along the river valleys. The whole sheet forms part of the extensive Derwent drainage system, the principal tributaries being the Dee, Ouse and Clyde Rivers and Allenvale Rivulet which drain southwards, the Tyenna River draining eastwards, the Plenty River draining to the north-west, and the Repulse, Broad, Styx and Jones Rivers which drain to the north-east. The Mt. Field plateau shows many prominent glacial features including numerous lakes and tarns of which Lake Fenton is the largest. Elevation ranges from about *30m* above sea level in the south eastern corner of the sheet to *1440m* at Mt. Field West.

The oldest rocks in the sheet, occurring in the south western corner, are Precambrian dolomites and Ordovician limestones, conglomerates and quartzites. Permian mudstones outcrop chiefly in the Tyenna valley and the Karanja-Fentonbury area. Sandstones and shales of Triassic age are the most extensive sedimentary rocks in the area. Of these the greater part consists of siliceous sandstones, but micaceous sandstones, siltstones and shales occur around Hamilton and Hollow Tree, and Upper Triassic feldspathic sandstones around Hamilton and

Gretna. Large sills and dyke-like masses of Jurassic dolerite have intruded both the Permian and Triassic sediments, which is the most extensive rock in the sheet.
Small areas of Tertiary lake sediments, mostly clays and sandy clays occur, in one or two localities along the Derwent Valley, the largest between Ouse and Hamilton. Remnants of formerly extensive basalt flows follow the present course of the Derwent River, forming plateaux ranging in altitude from *360m* in the "Lawrenny" area to about *30m* at Plenty. The top and upper slopes of the Mt. Field plateau are mantled with Pleistocene solifluction deposits. River terraces have been formed along all the major streams and in a number of places have been partly covered by deposits of windblown sand. The youngest formations are the river floodplains and alluvial fans.

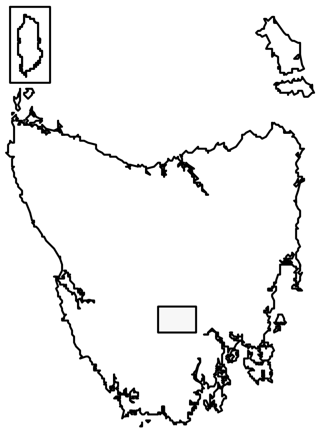


Figure 1 Location of Ellendale Reconnaissance Soil Map

2.2 Climate

Rainfall increases progressively from east to west, annual averages ranging from *450mm* in the Gretna district to *1700mm* at Lake Fenton at an elevation of *1000 m* on the Mt. Field plateau: the highest parts would probably receive more than *1780mm* per annum. At Bushy Park the mean monthly temperature for January - February is *17°C* and for June - July *7° C* and frosts occur on an average of 29 days per year (minimum screen temperatures *0° C* or lower). Snowfalls are common in the higher western part of the sheet during the winter months but, except at the highest elevations, snow does not lie for long periods.

2.3 Land Use

More than half the area is under forest and not used for agricultural purposes. A considerable proportion of the remainder is covered by eucalypt savannah woodland reduced in density in places by some clearing. The native pastures on this semi-cleared country provide rough grazing. The chief agricultural interests are in beef and fat lamb production on improved pastures, with fine-wool growing under the more extensive grazing practices on the native pastures. The Lawrenny irrigation area, utilising a scheme of crude flooding from the Ouse River, provides the basis for an important dairy industry which supplies whole milk to Hobart. Although the areas involved are relatively small, hop growing under irrigation on the fertile

Derwent alluvium is a highly remunerative industry. Small quantities of apples and pears are grown in the south eastern corner of the sheet. Timber milling is still important in some parts, particularly around the flanks of the Mt. Field Plateau and in the Styx valley.

3. THE SOIL LANDSCAPES

3.1 The Soil Map

The soils of the Ellendale sheet are described under the headings of four main physiographic units, namely: -
(1) The plateau top.
(2) The upper mountain slopes.
(3) The lower mountain slopes, and other low hills.
(4) The river terraces, floodplains and alluvial fans.

The soils of (1) and (2) occupy about 30 per cent of the sheet with those of (3) making up most of the remainder. The soils of unit (4) account for only about 7 per cent of the total area.

Soil boundaries are shown on the map in two ways. Full lines indicate those that either have been identified in the field at intervals of *1.5 km* or less, or are evident from the aerial photographs. Broken lines indicate those of which only the approximate location is known from fieldwork and the most likely position interpreted from air photos.

4. SOIL MAP UNITS AND SPCS

4.1 Soils of the Plateau Top.

4.1.1 Liawenee Association (Lw)

YBs and HMP – Yellow-brown soils and High Moor Peats on solifluction deposits: *(75 km^2)*. The plateau top here includes the greater part of the Mt. Field National Park. Elevations range from slightly less than *920m* to *1440m* at Mt Field West. Slopes vary from very steep to very gentle. Apart from exposures of dolerite in situ, all slopes are mantled with solifluction deposits. In places (screes and rock streams) these deposits consist only of loose boulders to depths of *a few metres* but in most cases they have an earthy matrix in which the boulders and rock fragments are embedded. The frequency of such boulders, which may reach *a few metres* across, breaking the surface gives a false impression of the proportion of bare rock to soil cover. Dolerite is the only rock occurring on the plateau top.

The Yellow-brown soils on solifluction deposits on the plateau top correspond to those on the surrounding upper mountain slopes and are described under that heading. The same range of soils depending on drainage exists but also includes the High Moor Peats (HMP) in the wettest situations such as the floors of shallow valleys and basins. Typical of such situations are Wombat and Windy Moors. The High Moor Peats have profiles similar to those of the yellow-brown soils except for the greater thickness of surface organic matter, which is commonly between *30-40 cm*. The peat is strongly acid and may exceed 50 per cent organic matter in the surface *30 cm*.

Land Use

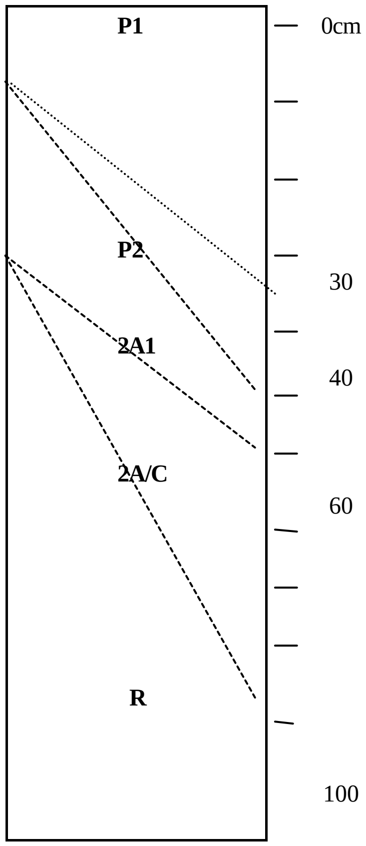
The plateau top is confined largely to the Mt. Field National Park and is used only as a scenic reserve and water catchment. The native vegetation consists of subalpine herbfields and shrubberies with patches of low scrub and stunted eucalypts.

Correlation

The soils of this unit generally correlate with the Liawenee Association (Lw) first described by Spanswick & Zund (1999). No data was available for the High Moor Peats, however these soils are generally similar around the state and correlate at this scale of mapping. Data for the High Moor Peat SPC has been extrapolated from the Hobart Reconnaissance Soil Map, the High Moor Peats are acidic fibric or hemic Organosols. The Yellow-brown soils correlate with Yellow-brown soils mapped on the other southern Reconnaissance map sheets. For a description of the Yellow-brown Soils refer to section 4.2.1.

High Moor Peat Soil Profile Class

Concept	**Shallow, black peat and alpine humus soils underlain by clay or dolerite fragments on bedrock and formed within depressions on the Central Plateau**
Aust. Soil Classification	Acidic Fibric or Hemic Organosols
Great Soil Group	Acid Peat
Principal Profile Form	O
Mapping Units	M3, M1-M3, YBs
Geology	Quaternary marsh and swamp deposits
Landform	Closed depressions or swamps on a plateau
Surface Condition	Self mulching
Permeability	Slowly permeable
Drainage	Very poorly to poorly drained



P1: Black (10YR 2/1,2/2, 5/3); fibric peat; massive structure; abundant live roots; pH 4.5 -5.5; diffuse change to

P2: Black (10YR 2/1,2/2, 5/3) ; hemic or sapric peat; massive structure; common live roots; pH 4.5 - 5.5.

2A1: Black (10YR 2/1,3/1, 5/3); sapric or fibric loam to clay loam; massive structure; pH 5.0 -5.5

2A/C: Occasionally mottled,; black or grey (10YR 3/2, 2.5Y 4/2); 50-90% dolerite gravels; pH 5.5 - 6.0

R: >90% dolerite boulders on bedrock

Morphological Sites: CSIRO H21, H23, H110, H238
Analysed Sites: As for morphological sites
Related soil names: High Moor Peats, Unnamed soils of Miscellaneous Soils Mapping unit, Organic soils on alluvium
Previously described by: Spanswick & Zund (1999b), Spanswick & Kidd (2000b & 2000c), Doyle (1993), Leamy (1961)

4.2 Soils of the Upper Mountain Slopes

4.2.1 Miscellaneous Soils Mapping Unit 1 (M1)

<u>YBs – Yellow-brown soils on solifluction deposits</u>: *(280 km^2)*
The plateau is generally demarcated from the surrounding country by steep slopes or, in a few places along its western edge, by cliffs up to *180m* high. These steep slopes are mantled down to an elevation of about *460m* with solifluction deposits. The deposits are composed chiefly of dolerite detritus but at the lower levels include also some material derived from the Triassic sandstones, Permian mudstones and possibly the Ordovician quartzites and limestones which have been partly or wholly buried during the solifluction process.

The soils occupy practically all the western quarter of the sheet in two areas, separated by the Tyenna valley. A range of soil profiles, depending on drainage, exists. In the wetter, and generally more elevated situations, a shallow peaty surface is developed over an olive coloured fairly compact loam or sandy loam. At a depth of *30-40cm* there is often a hard thin iron pan which forms an effective barrier to roots; below this is an horizon of strong brown friable clay loam or sandy clay loam which may extend to considerable depths. In the better drained situations at lower elevations profiles are generally more friable throughout, the thin iron pan is absent and the peaty surface is replaced by a friable highly organic loam or clay loam directly overlying the strong brown horizon described above. Dolerite fragments and stones are common throughout the profile with a tendency for the largest boulders to be concentrated in the upper *60cm*. Where the fragments have a platy structure they are often roughly aligned parallel to the surface. Textures are fairly uniform within each profile but depending on the rock source for the solifluction material may vary from predominantly fine-textured to predominantly sandy throughout. Grittiness is a feature of many profiles.

Land Use

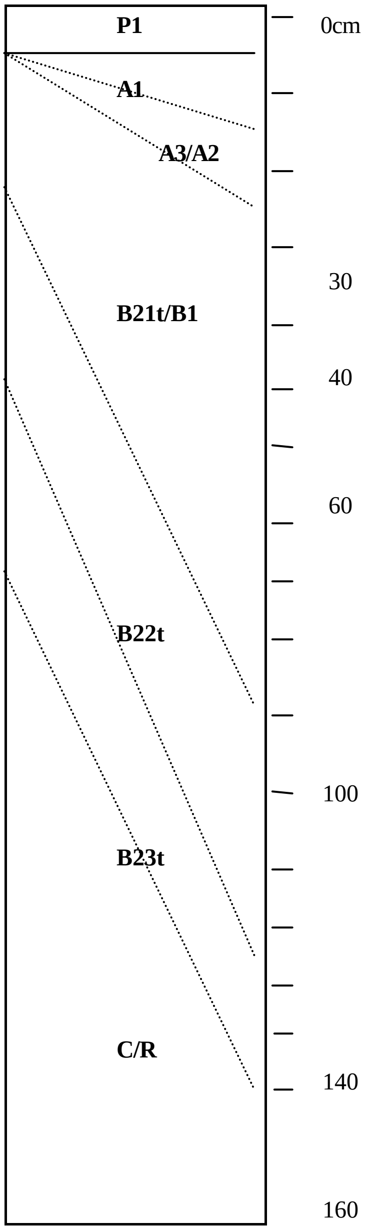
The soils carry a wet sclerophyll forest in which gum-topped stringy-bark *(E. delegatensis)* is often a major component; in some areas, this has been milled extensively. No agricultural development has been carried out because of the steep and stony nature of the country.

Correlation

This unit correlates with the Miscellaneous Soils Mapping Unit 1 first described by Doyle (1993). A broad SPC has been defined for the Yellow Brown Soils, however variation from the SPC can be expected with profiles having thicker peaty topsoils and yellower subsoils in areas of restricted drainage. These soils are generally eutrophic red Ferrosols or brown Dermosols.

Yellow Brown Soils on Solifluction Deposits Soil Profile Class

Concept	**Stony/bouldery soils with gritty sandy loam surface soils and brown, clayey, structured subsoil developed on dolerite solifluction deposits.**
Aust. Soil Classification	Eutrophic Red Ferrosols & Brown Dermosols
Great Soil Group	Red - Yellow Podzolic, Krasnozem soil
Principal Profile Form	Gn
Mapping Units	M1, Lw, M1-Lf, M1-Qu, Ybs1
Geology	Jurassic or Quaternary dolerite solifluction deposits
Landform	Upper slopes, crests and simple slopes of moderate to very steep hillslopes on the Western Tiers and Plateau.
Vegetation	Wet sclerophyll forest - *Eucalyptus delegatensis*
Permeability	Moderate to highly permeable
Drainage	Well drained



P1:	Fibric peat or sapric loam
A1:	Black (5YR 2/1; 7.5YR 2/1, 4/4, 5/6); sandy loam - heavy loam; moderate <2-5mm granular structure; very weak (moist) consistence, 20-50% dolerite gravels and cobbles; pH 5.0-6.0; clear smooth change to
A3/A2:	Black or red (5YR 3/2, 3/3); heavy loam, loamy sand or clay loam; weak to moderate, 2-5mm, granular parting to <2mm granular structure; very weak (moist); consistence; 20-90% dolerite gravels; pH 5.0-6.0; clear wavy change to
B21t/B1:	Brown or red (7.5YR 4/4,4/6, 5/6, 5YR 4/6, 2.5YR 4/6,3/6) clay loam to fine sandy clay; moderate 2-5mm granular or subangular blocky structure; weak (moist) consistence; 50-90% dolerite gravels and cobbles; clay skins common; pH 6.0-6.5; gradual smooth change to
B22t:	Red or brown (5YR 4/4, 4/6, 7.5YR 4/4, 4/6, 5/6); sandy clay loam - heavy clay loam; massive to moderate 5-20mm angular blocky structure; weak (moist) consistence; 2-20% manganiferous soft segregations; 50-90% dolerite gravel on cobbles; common to many clay skins; pH 5.5 - 6.0; gradual smooth change to
B23t:	Red to brown (5YR 4/6, 4/4, 7.5YR 4/4, 4/6, 5/6, 5/8); light clay to heavy clay loam, often with coarse sand; massive to moderate 10-20mm angular blocky parting to 2-10mm angular blocky structure; weak (moist) consistency; <2-50% dolerite gravels and cobbles; clay skins common to many; pH 5.5 - 6.0; diffuse change to
C/R:	Light clay; 50-90% dolerite gravels on bedrock or boulders

Morphological sites: LRRBD L155, L153, L154, H182, H240
Analysed sites: LRRBD L153, L154, H182, H240
Related soil names: Holloway (Ho), Excalibur (Ex), Yellow Brown Soils on Solifluction deposits
Correlation references: Laffan (1995), Leamy (1961), Doyle (1993), Spanswick & Zund (1999b), Spanswick & Kidd (2000b & 2000c)

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**pH water (1:5)**	**EC (d/sm)**	**Total P (mg/kg)**	**Org. Carb. (%)**	**Total N (%)**	**C/N Ratio**	**Ca**	**Mg**	**Na**	**K**
											Cmol(+)/Kg		
Yellow Brown Soils	H240	O	0-1	4.4	0.402	0.039	41.1	0.615	67	22.1	8.5	0.62	1.9
on	H240	A1	1-8	4.8	0.167	0.023	13.5	0.244	55	4.2	2.3	0.35	0.84
Solifluction	H240	B1	8-15	4.9	0.101		5.84	0.113	52				
Deposits	H240	B21	15-23	5.1	0.068		4.2	0.091	46	2.2	1.1	0.32	0.35
471000E	H240	B22	23-33	5.6	0.054		3.19	0.082	39				
5274300N	H240	B23	33-43	5.8	0.048		2.69	0.09	30	2.1	0.95	0.44	0.17
	H240	B24	43-56	5.9	0.048								
	H240	B25	56-76	5.8	0.042								
	H240	B26	79-86	5.7	0.024								
	H240	B27	86-107	5.8	0.021					1.2	0.16	0.27	0.13
	H240	B31	107-127	6.1	0.024								
	H240	B32	127-137	6.2	0.024								
	H240	C1	137-152	6.3	0.027								
	H240	C2	152-165	6.2	0.03								
	H240	C3	165-183	6.4	0.021					7.5	2	1.1	0.49

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**Total Bases**	**CEC**	**BASE SAT (%)**	**ESP (%)**	**Ca/Mg Ratio**	**Gravel (of total) >2000 (um) (%)**	**Sand Coarse >200 (um) (%)**	**Sand Fine <200(um) (%)**	**Silt <20(um) (%)**	**Clay <2 (um) (%)**
Yellow Brown Soils	H240	A1	1-8	33.12		33	0.6	2.60	23	2	8	11	12
on	H240	B1	8-15	7.69		17	0.8	1.83	44	12	31	15	20
Solifluction	H240	B21	15-23										
Deposits	H240	B22	23-33	3.97		15	1.2	2.0	55	15	30	17	27
471000E	H240	B23	33-43										
5274300N	H240	B24	43-56	3.66		11	1.4	2.21	25	20	33	21	20
	H240	B25	56-76										
	H240	B26	79-86										
	H240	B27	86-107	1.76		9	1.4	7.5	47	23	35	17	18
	H240	B31	107-127										
	H240	B32	127-137										

H240	C1	137-152									
H240	C2	152-165									
H240	C3	165-183	11.09	46	4.6	3.75	38	37	30	14	13

Table 1 Analytical data for Yellow Brown Soils on Solifluction Deposits

4.3 Soils of the Lower Mountain Slopes and other Low Hills

4.3.1 Podzolic Soils on Dolerite 1 (Pd1)

Pd - Podzolic soils on dolerite: *(160 km^2)*
These soils are widely distributed throughout the sheet at elevations up to about *610m* wherever the rainfall exceeds approximately *585-635mm* per annum. Slopes vary from gentle to steep and are usually rather stony.

Typical profiles have a grey-brown fine sandy loam to sandy loam surface over a bleached sub-surface frequently containing rounded ironstone gravel. There is a sharp break to the underlying olive-brown or olive-grey dense sticky clay subsoil and below about *90cm* this passes into decomposing dolerite occasionally containing small amounts of free carbonate. Dolerite fragments are common throughout the profile, particularly in the surface horizons. Besides the most common profile described above, the group also includes soils transitional between the podzolic and brown soils on dolerite (see section 4.3.6).

A minor group of podzolic soils formed on coarse-grained dolerite are characterised by the presence of angular decomposing dolerite grit throughout the profile. They occur in two areas: one around the property "Bloomfield" on the eastern edge of the sheet and the other along the "Ellendale - Dunrobin" road. Most of the profiles are similar to the normal podzolic soils apart from the grittiness and a tendency to columnar structure in the clay subsoil, but in association with these, there are some light brown deep gritty soils lacking the clay subsoil.

Krasnozem like soils with markedly silty textures on coarse-grained dolerite were noted in one small area between the Broad and Repulse Rivers; they have been mapped with the podzolic soils.

Land Use

The native vegetation is a sclerophyll forest with a ground cover of grasses, saggs and heaths. Because of the steepness and stoniness of the soils, most have remained uncleared and only rough grazing on the more open areas has been practised. The most promising areas for development appear to be some of the gentler slopes of the gritty podzolic soils and around Ellendale district good pastures have been established on such soils.

Correlation

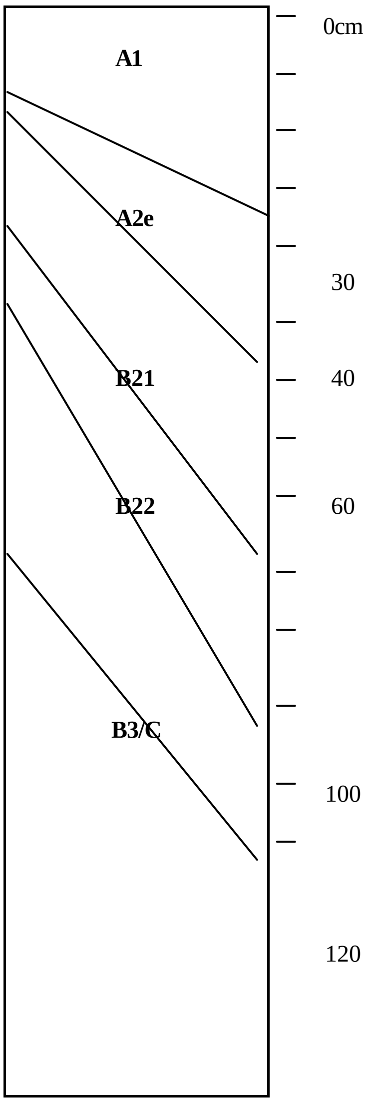
The dominant soil of this unit is the Eastfield SPC. This unit correlates with the Podzolic Soils on Dolerite 1 (Pd1) unit.

Eastfield Soil Profile Class

Concept **Brown, mottled, texture contrast soils with dolerite fragments throughout, loamy topsoils, sandy sub-surface, with ironstone gravels, and clayey subsoils developed on dolerite hills**.

Aust. Soil Classification Brown or Grey Chromosols and Sodosols
Great Soil Group Grey-Brown Podzolics & Soloths
Principal Profile Form Db, Dd
Mapping Units Ea, Ea-Bo, Ea-Bm, Pd1
Geology Jurassic Dolerite
Landform Moderate to steeply undulating hills

Permeability Slowly permeable
Drainage Imperfectly drained



A1: Grey to black (10YR 2/1, 3/1, 3/2, 4/1, 4/2, 5/2); sandy loam to loam; massive or weak structure, 2-10mm, subangular blocky structure, very weak to weak (moist) consistence, very few, 2-6mm, ferruginous concretions, variable amounts of dolerite stones and boulders; pH 5.5 - 7.0; clear to gradual change to

A2e: Conspicuously bleached (10YR 4/2, 5/1, 5/2, 6/2); fine loamy sand to fine sandy loam; single grain or massive structure; very weak to weak (moist) consistence; common to abundant, <2-6mm, ferruginous concretions, variable amounts of dolerite gravels, stones or boulders; pH 5.5- 7.0; sharp to abrupt change to

B21: Mottled: brown (10YR 3/4, 4/3, 4/4, 4/6, 5/4); medium to heavy clay; massive to weak or moderate, 50-200mm angular blocky, firm to very firm (moist) consistence; few slickensides; clay skins common; cracks present; very few to few, 2-6mm, ferruginous nodules; variable amounts of dolerite fragments, stones or boulders; pH 6.5 - 7.0; abrupt to clear change to

B22: Mottled: brown (2.5Y 4/4, 4/6, 10YR ¾, 4/3, 4/4, 4/6, 5/4, 7.5YR 4/4, 5/6, 4/6, 5YR 3/3); medium to heavy clay; massive to weak or moderate, 50-100mm, angular blocky structure; firm to strong (moist) consistence; very few to few, 2-6mm, ferruginous nodules; variable amounts of dolerite stones and boulders; slickensides and clay skins common; pH 6.5 - 7.5; sharp to clear change to

B3/C: Occasionally mottled; brown (2.5Y 5/4, 5/3, 4/3, 4/4); light to medium clay; strong (moist) consistence; occasionally calcareous soft segregations present; variable amounts of dolerite stones or boulders; slickensides common; pH 7.0-7.5

R: Jurassic dolerite

Morphological sites: CSIRO H86, H78, H24, H163, H125, H237, H128: LRRBD L6, 34, 93, 126; SOILCO 70, 72, 73
Analysed sites: CSIRO H86, H78, H24, H163 H125, H237, H128: LRRBD L12, 43
Related soil names: Eastfield Series, Eastfield Sand, Type I, Eastfield SPC, Podzolic on dolerite, Shawfield Series
Correlation references: Stephens et al (1942), Loveday (1957), Doyle (1993), Spanswick & Zund (1999a &

1999b), Spanswick (2000), Spanswick & Kidd (2000a, 2000b, 2000c)

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**pH water (1:5)**	**EC (d/sm)**	**Total P (mg/kg)**	**Org. Carb. (%)**	**Total N (%)**	**C/N Ratio**	**Ca**	**Mg**	**Na**	**K**
										Cmol(+)/kg			
Eastfield	H128	A1	0-8	5.7		0.009	2.8	0.25	11	8.2	3.5	0.27	0.62
498699E	H128	A2	8-18	6.0		0.005	1.5	0.13	12				
5277726N	H128	B21	20-36	7.2		0.004	0.97	0.055	18	16.6	21.2	2.05	0.27
	H128	B22	36-53	8.1			0.85	0.047	18	22.7	26.1	2.7	0.32
	H128	B23	53-74	8.2				0.03		28.8	29.9	3	0.36
	H128	B24	104-119	8.6				0.01		19.5	31.9	4.3	0.45

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**Total Bases**	**BASE SAT (%)**	**ESP (%)**	**Ca/Mg Ratio**	**Gravel (of total) >2000 (um) (%)**	**Sand Coarse >200 (um) (%)**	**Sand Fine <200 (um) (%)**	**Silt <20 (um) (%)**	**Clay <2 (um) (%)**
Eastfield	H128	A1	0-8	12.59	54	1.2	2.34	3	3	52	24	12
498699E	H128	A2	8-18					43	4	55	24	12
5277726N	H128	B21	20-36	40.12	89	4.6	0.78	4	3	29	9	56
	H128	B22	36-53	51.82		5.2	0.87	7	2	21	7	67
	H128	B23	53-74	62.06		4.8	0.96	1	1	16	4	76
	H128	B24	104-119	56.15		7.7	0.61	23	9	27	19	45

Table 2 Analytical data for Eastfield SPC

4.3.2 Podzolic Soils on Mudstone 1 (Pm1)

Pm - Podzolic soils on mudstone: *(52 km^2)*
Grey soils on Permian siliceous mudstones occur chiefly along the Tyenna Valley between Fitzgerald and National Park, and in the Karanja - Fentonbury area. Slopes are mostly moderate to steep but some are gentle. Rock outcrops are common and the surface is frequently littered with angular mudstone fragments. There are occasional cliffs.

Most of the soils are shallow and contain many angular rock fragments. The surface horizons are grey-brown fine sandy loams or sandy loams and overlie bleached fine sandy sub-surface horizons. These may rest directly on solid rock or there may be an intermediate mottled grey-brown and olive clay subsoil.

Some soils along the Tyenna valley are somewhat deeper than usual. This is due to the shattered nature of the parent material caused by its location in a zone of major geological faulting. Also mapped with this unit are small areas of soils on calcareous mudstones.

Land Use
The podzolic soils on mudstone are generally unattractive for development because of their low natural fertility and shallowness and most areas still remain under the original sclerophyll forest vegetation. The few areas that have been cleared and sown down to pasture do not appear very promising.

Correlation
On the previous southern Reconnaissance soil maps a broad SPC called the Forcett SPC was defined for the dominant soil on the Permian lithologies. The Forcett SPC defined a soil that was typically an acidic texture contrast soil (dystrophic brown or grey Kurosol) with textures in the surface ranging from sandy loams to silty clay loams. This range in surface textures was due to the complex interbedding of fine and coarse grained Permian lithologies. Additional information available from this map sheet has enabled us to tighten the Forcett SPC and identify a second type of soil on the Permian lithologies. The Forcett SPC is associated with the sandier Permian lithologies, textures are typically sandy loams or loamy sands over clay subsoils. On the finer grained Permian lithologies such as siltstone, mudstone and shale, the soils are more gradational with silty clay loam, sandy clay loam or occasionally clay loam surface textures over weakly developed clay subsoils. These soils are grey or brown Kandosols as they lack the abrupt to clear texture contrast of the Forcett SPC. Unfortunately insufficient data was available to define a SPC for the finer textured soils. Though the coarse and fine textured Permian lithologies are interbedded throughout the sheet, the Forcett SPC appears to be the dominant soil within the Podzolic on Mudstone 1 unit .

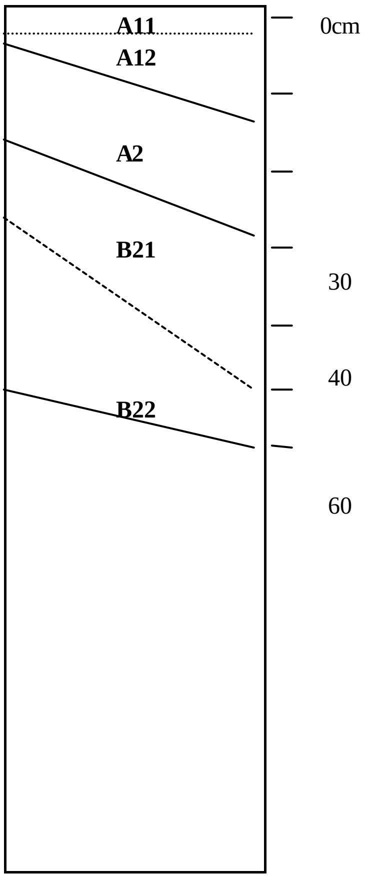
Forcett Soil Profile Class

Concept — **Shallow stony acidic soils, with a brown to grey weakly structured surface over a bleached, hardsetting subsurface over a weak to moderate structured clay subsoil.**

Aust. Soil Classification — Dystropic brown or grey kurosol
Great Soil Group — Grey brown podzolics or soloth
Principal Profile Form — Dy , Db
Mapping Units — Pm1, Pm2
Geology — Permian sandy mudstones interbedded with sandstones

Landform — Colluvial slopes

Vegetation — Dry Sclerophyll forest, *E. amygdalina, E. risdonii, E. tenuiramis, E. viminalis* & in moister situations *E. obliqua*
Surface Conditions — Hard setting and stony
Permeability — Slowly permeable
Drainage — Imperfectly drained



A11: Grey to black (10YR 2/2, 2/1, 3/1, 4/2) moist; fine sandy loam; weak fine 2-5mm granular structure; very weak (dry) consistence; 10-20% angular mudstone gravels; many live roots; pH 4.5 - 5.5; diffuse boundary to

A12: Grey (10YR 3/1, 2/2, 4/2, 4/1) moist; fine sandy loam; weak fine 2-5mm granular structure; very weak (dry) consistence; 10-50% angular mudstone gravels; many live roots; 0.05 dSm-1; pH 4.5 - 5.5; clear boundary change to

A2: May be bleached; grey (10YR 6/1, 6/3, 4/2, 5/1) moist; fine sandy loam; massive structure; firm (dry) consistence; 20-50% angular mudstones gravels; common live roots; 0.05 dSm-1; pH 4.5 - 5.5; abrupt boundary to

B21: Mottled: brown (10YR 5/1,5/2, 2/2, 4/3, 6/4) moist; yellowish brown (10YR 5/8, 5/6, 6/3) mottles; fine sandy medium clay; massive to weak 20-50mm subangular blocky; firm (moist) consistence; 20-90% angular mudstone gravels; few live roots; slightly dispersive; 0.07 dSm-1; pH 4.5 - 5.5; diffuse boundary to

B22: Mottled: brown (10YR 2/2, 5/3, 4/2, 5/8, 5/1, 6/4) moist; yellowish brown (10YR 5/8, 5/6, 6/3, 2.5Y 5/3) mottles; fine sandy medium to heavy clay; massive to moderate 20-50mm subangular blocky; firm (moist) consistence; 20-90% coarse mudstone fragments; few live roots; slightly dispersive; 0.08 dSm-1; pH 4.5 - 5.5

Morphological Sites: CSIRO H154, H221, H199, H226, H225; SOILCO 69
Analysed Sites: CSIRO H154, H199, H221, H225, H226
Related soil names: Podzolics Soils on Mudstone
Previously described by: Loveday (1957), Spanswick (1999), Spanswick & Kidd (2000a, 2000b & 2000c)

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	pH water (1:5)	EC (d/sm)	Total P (mg/kg)	Org. Carb. (%)	Total N (%)	C/N Ratio	Ca	Mg	Na	K
										Cmol(+)/kg			
Forcett	H226	A11	0-2	4.1	0.057	0.011	17.3	0.474	36	4.6	2.1	0.23	0.64
477361E	H226	A12	2-9	4.0	0.054	0.004	4.19	0.123	34	0.95	0.36	0.12	0.3
5273375N	H226	A21	9-11	4.0	0.045		1.91	0.063	30				
	H226	A22	11-18	4.2	0.033		0.98	0.041	24	0.3	0.09	0.07	0.15
	H226	A23	18-30	4.4	0.03								
	H226	B21	30-38	4.8	0.039					0.24	0.75	0.24	0.22
	H226	BC	38-58	5.1	0.027								
	H226	C	53-61	5.0	0.024					0.22	1.7	0.22	0.14

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	Total Bases	BASE SAT (%)	ESP (%)	Ca/Mg Ratio	Gravel (of total) >2000 (um) (%)	Sand Coarse >200 (um) (%)	Sand Fine <200 (um) (%)	Silt <20 (um) (%)	Clay <2 (um) (%)
Forcett	H226	A11	0-2	7.57	15	0.5	2.19	20	6	34	25	12
477361E	H226	A12	2-9	1.73	9	0.6	2.64	26	6	45	32	12
5273375N	H226	A21	9-11									
	H226	A22	11-18	0.61	7	0.8	3.33	28	7	47	33	13
	H226	A23	18-30									
	H226	B21	30-38	1.45	7	1.1	0.32	49	4	33	21	37
	H226	BC	38-58									
	H226	C	53-61	2.28	23	2.2	0.13	0	8	39	30	19

Table 3 Analytical Data for Forcett SPC

4.3.3 Podzolic Soils and Podzols on Siliceous Sandstone 1 (Pss1)

Pss - Podzolic soils and Podzols on Siliceous Sandstone: *(249km^2)*
Siliceous sandstones occupy extensive areas along the western side of the Derwent River, on the eastern flanks of the Mt. Field plateau, and around Hollow Tree and Gretna. Slopes are mostly moderate to steep and rock outcrops are common, sometimes forming prominent cliffs.

Podzolic soils occur in the drier parts of the sheet. They have a dark grey loamy sand to sandy loam surface over a lighter coloured sandy sub-surface. The sub-soil usually consists of variously mottled dark grey-brown, yellowish-brown and olive clay, the darker material occurring mostly as coatings on the outside of structural aggregates.

Podzols are the most widespread soils on sandstone and are found throughout this area wherever sandstone occurs under high rainfall. The profile consists of a grey to dark grey sandy surface overlying a bleached sandy sub-surface. Below about *50cm* there is a dark weakly to moderately cemented sandy organic pan usually only a few *cm* thick. This passes down into either a mottled dark brown and yellowish-brown sand or a mottled olive and yellowish-brown clay subsoil often showing dark organic staining on the surface of the aggregates near the top of the horizon. Both types of subsoil pass into decomposing sandstone below about *75cm*.

Associated with both the podzols and podzolic soils on sandstone are some siliceous sands, usually *1.5m* or more in depth, showing little profile development other than an accumulation of raw organic matter in the surface and an incipient organic B horizon at a depth of about *45cm*. In some but not all situations they could be of colluvial origin. Several small areas of brown soils on micaceous sandstones (see section 3 (d)) have been mapped with this group and they are shown on the map by the symbol "with Bms".

Land Use

Most of the sandstone country in its natural state carries sclerophyll forest vegetation with a ground cover of bracken, saggs and heathy plants. This still remains for the greater part of the area but some of the gentler slopes have been partially cleared and improved pastures established successfully using heavy fertilisation. Some extension of these areas is possible but large-scale development is limited by the ruggedness of the terrain.

Correlation

The Podzolic Soils and Podzols on Siliceous Sandstone has been renamed Podzolic soils and Podzols on Siliceous Sandstone 1 (Pss1). The podzolics and the podzols are co-dominant within this unit. The dominant podzolic soil is a grey-brown or yellow Kurosol; this soil has been defined and is called the Ellendale SPC. The dominant Podzol is a humic semi aquic Podosol, this soils has been defined and is called the Dunrobin SPC. This soil was previously mapped by Hubble 1947 as the Dunrobin sand.

Ellendale Soil Profile Class

Concept *Imperfectly drained texture contrast soils developed on quartz sandstone. Sandy loam surface horizons over lighter coloured, sometimes bleached subsurface horizons over yellowish brown clayey subsoils. Subsoils show organic staining of ped faces.*

Aust. Soil Classification Grey –Brown or yellow Kurosols

Great Soil Group Grey-brown or yellow podzolics

Principal Profile Form Db,Dy

Mapping Units Pss1

Parent Material Triassic quartz sandstone

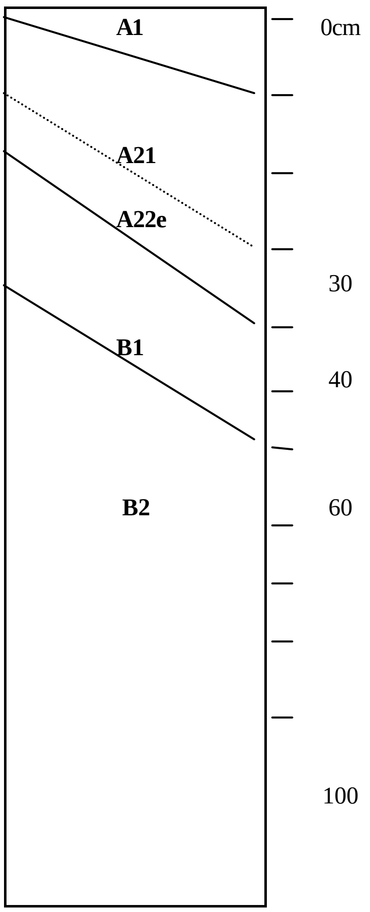
Landform Rolling hills

Vegetation *E. obliqua, E. amygdalina, E. tenuiramis* with understory species *Acacia dealbata, A. melanoxylon* and *Pteridium esculentum*.

Surface Conditions Soft

Permeability Slowly permeable

Drainage Imperfectly drained



A1: Black (10YR 2/1, 3/1); loamy sand to sand; single grained to weak fine (5-10mm) subangular blocky structure; loose to very weak (dry) consistence; live roots common; pH 4.5-5.5; clear change to

A21: Black to grey (10YR 3/1,3/2, 2.5Y 5/2); loamy sand to sand; weak medium (10-20mm) subangular blocky structure; very weak (dry) consistence; live roots common; pH 4.5-5.5; gradual change to

A22/A22e: May be weakly cemented &/or mottled: grey (10YR 5/2, 6/2, 6/3, 2.5Y 6/2); loamy sand to sand; weak fine (5-10mm) subangular blocky structure; very weak (dry) consistence; live roots common; pH 4.5-6.0; abrupt change to

B1: Mottled: grey to yellow brown (2.5Y 5/1, 10YR 4/6, 7.5YR 5/6); sandy clay loam; weak fine (5-10mm) subangular blocky structure; firm (dry) consistence; few live roots; pH 5.0-5.5; clear change to

B2: Mottled: grey to yellow brown (2.5Y 5/1, 4/6, 10YR 4/6, 5/6, 7.5YR 5/6); medium to heavy clay; weak to moderate coarse (50-100mm) angular blocky or prismatic structure; very firm (dry) consistence; few live roots; slightly dispersive; strong organic staining of ped faces; pH 5.0-5.5

Morphological sites: SOILCO 78; PINK 12109, CSIRO H222
Analysed sites: PINK 12109
Related soil names: Podzolic soils on sandstone
Correlation references: Dimmock (1961)

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	pH water (1:5)	Total N (%)	Gravel (of total) >2000 (um) (%)	Sand Coarse >200 (um) (%)	Sand Fine <200 (um) (%)	Silt <20 (um) (%)	Clay <2 (um) (%)
Ellendale	12109	A1	0-10	5.6	0.066		52	44	1	3
480300E	12109	A21	10-33	5.2	0.019	0.4	49	47	0	4
5286375N	12109	A22	36-43	6.1	0.008	1	46	50	0	4
	12109	B21	48-61	5.5	0.067		15	21	0	64
	12109	B22	61-104	5.5			15	27	2	56
	12109	B3	109-142	5.5						

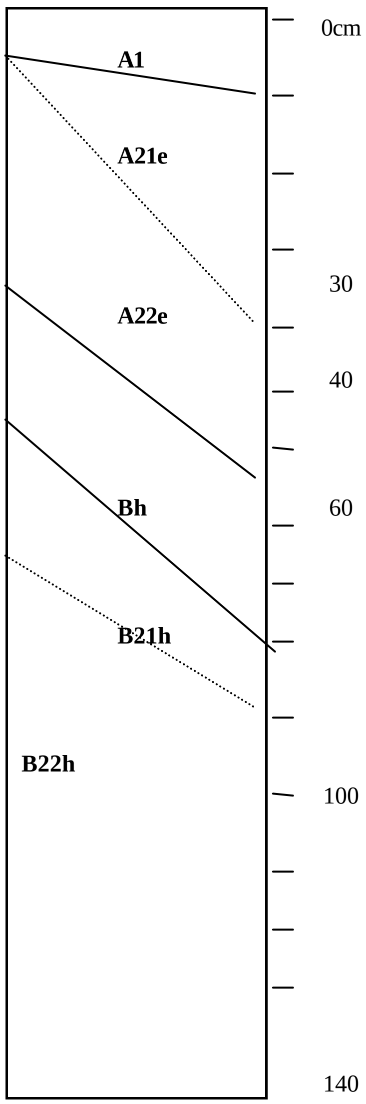
Table 4 Analytical Data for Ellendale SPC

Dunrobin Soil Profile Class

Concept *Uniform to gradational deep sands with tongued organic pans, with only weakly developed structure in the subsoils.*

Aust. Soil Classification Humic Semiaquic Podosol
Great Soil Group Podzol
Principal Profile Form U, G
Mapping Units Pss1
Parent Material Triassic quartz sandstone
Landform Rolling hills

Vegetation
Surface Conditions Loose
Permeability Very slowly permeable
Drainage Rapidly to well drained



A1: Black (10YR 3/1, 2/1); loamy sand to sand; weak fine (2-5mm) subangular blocky structure; very weak (dry) consistence; <2% (6-20mm) sandstone gravels; pH 4.0-4.5; clear boundary change to

A21e: Grey (10YR 4/1, 4/3, 5/1); loamy sand to sand; weak medium (10-20mm) subangular blocky structure; very weak (dry) consistence; 2-10% (6-20mm) sandstone gravels; pH 4.5-5.0; gradual change to

A22e: Grey (10YR 6/2, 7/1, 5/1); loamy sand to sand; weak fine (2-5mm) subangular blocky structure; very weak (dry) consistence; 2-10% (6-20mm) sandstone gravels; pH 5.0-5.5; abrupt change to

Bh: Tongued organic weakly cemented pan; loamy sand to sandy clay loam; abrupt change to

B21h: Sometimes mottled; yellow or red (10YR 2/1, 5/6; 5YR 5/1); loamy sand to sandy clay loam; weak fine (5-10mm) subangular blocky structure; weak (dry) consistence; 2-10% (6-20mm) sandstone gravels; pH 5.0-5.5

B22h: Sometimes mottled; yellow (2.5Y 7/4, 5/3, 10YR 7/1, 3/3, 5/8, 5/4); sand to sandy clay loam; weak fine (5-10mm) subangular blocky structure; weak (dry) consistence; 2-10% (6-20mm) sandstone gravels; pH 5.0-5.5

Morphological Sites: SOILCO 80; PINK 12091, CSIRO H220, H223
Analysed Sites: PINK 12091
Related soil names: Dunrobin sand, Podzols on sandstone

Correlation references: Hubble (1947); Dimmock (1961)

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**pH water (1:5)**	**Total P (mg/kg)**	**Org. Carb. (%)**	**Total N (%)**	**Exch H meq**	**C/N Ratio**	**Ca**	**Mg**	**Na**	**K**
												Cmol(+)/kg	
Dunrobin	12091	1	0-13	4.3	0.013	3.4	0.1	15.52	34				
476500E	12091	2	13-36	4.8									
5288600N	12091	3	36-48	5.3				1.47		0.05	0.08	0.25	0.08
	12091	4	51-56	5.4									
	12091	5	56-61	5.5									
	12091	6	68-107	5.3				12.4		0.01	2.7	0.7	0.5
	12091	7	119-152	5.0									

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**Total Bases**	**BASE SAT (%)**	**ESP (%)**	**Ca/Mg Ratio**	**Gravel (of total) >2000 (um) (%)**	**Sand Coarse >200 (um) (%)**	**Sand Fine <200 (um) (%)**	**Silt <20 (um) (%)**	**Clay <2 (um) (%)**
Dunrobin	12091	1	0-13					No data	34	58	5	3
476500E	12091	2	13-36					No data	34	62	2	2
5288600N	12091	3	36-48	0.46	24	13.0	0.63	No data	36	62	0	2
	12091	4	51-56					No data	31	47	1	21
	12091	5	56-61					No data	30	41	2	27
	12091	6	68-107	3.91	24	4.3	0.00	No data	26	24	5	45
	12091	7	119-152									

Table 5 Analytical data for Dunrobin SPC

4.3.4 Brown Soils on Micaceous Sandstone (Bms)

Bms - Brown Soils on Micaceous Sandstone: *(13km^2)*
Soils formed on micaceous sandy mudstones, shales, siltstones and sandstones of Triassic Age have been grouped as brown soils on micaceous sandstones. They are largely confined to two localities - one near Hamilton and the other near Hollow Tree, but a few areas too small to map separately have been included with other units; they are shown on the map by the symbol "with Bms". Slopes are gentle to moderate and rock outcrops fairly common. A prominent feature in some areas, particularly that near Hamilton, is the severe erosion of both tunnel and sheet types, associated with these soils.

Typical profiles have a dark brown sandy loam to loam surface over a brown compact sandy loam sub-surface. This passes abruptly at about *25cm* to a mottled yellowish-brown and reddish-brown clay subsoil with strongly developed blocky structure. The faces of the aggregates show prominent dark organic staining at the top of the horizon, this feature decreasing with depth. Decomposing micaceous sandstone occurs at a depth of about *60cm*.

Occasional small areas of brown soils on feldspathic sandstone (see section 3(e)) are mapped with this group and are shown by the symbol "with Bfs".

Land Use

Where not eroded, the soils carry a good ground cover of native grasses under open savannah woodland. They are used at present almost entirely for rough grazing but with careful management could be developed to good sown pastures, particularly with over-sowing and aerial top-dressing on the steeper country.

Correlation

No dominant soil has been described for this unit. However a type profile identified by Dimmock (1961) has been added to the report.

CSIRO Soil Surveys (1949-70)

SITE DESCRIPTION

Site Number:	H227	Property Name:		Runoff:	Rapid
Project Code:	CSIRO	Property Owner:		Permeability:	Very slowly permeable
Map Scale:		Nearest Town:	ELLENDALE	Drainage:	Poorly drained
Sheet No:		Describer:	Geoff M. Dimmock	Elevation:	140 m
Map Name:		Date Cored:	13 Sep 1961		
AMG Easting:	487339 E	Rainfall:	510 mm	Soil Class:	UN-NAMED
AMG Northing:	5289594 N	Air Temp (3pm):		Northcote PPF:	Dy3.23
Film No:	13553	Type of Site:		Great Soil Group:	Solodic
Run No:	3	Type of Desc:	Soil pit	Soil Taxonomy:	
Frame No:		Soil Samples:	Yes	Land Capability:	
State:	Tasmania	Soil Photos:		Geological Map:	Bms

Location: 1.2KM NE of Hamilton on property "Uralla".
Aust Classn: Sodic, Eutrophic, Brown, Chromosol; (Confidence level 4)

Landform: Element moderately inclined, mid-slope, hillslope; Pattern hills;
Land Surface: Slope angle 17.6 %; Aspect 000; no effective disturbance except grazing by hoofed animals; Erosion severe, gully erosion; Rock Outcrops <2% bedrock exposed, Sandstone;
Vegetation:
Substrate: sandstone;

HORIZON DESCRIPTIONS

A11 0 10 cm Moist; dark brown (10YR 3/3 moist); sandy loam; weak ex fine (<2mm) granular structure; very weak (moist); many live roots; 6.3 field pH; .03 dSm-1; gradual (50-100mm) boundary;

A12 10 20 cm Moist; dark brown (10YR 3/3 moist); sandy loam; weak ex fine (<2mm) granular structure; very weak (moist); common live roots; 7 field pH; .024 dSm-1; diffuse (>100mm) boundary;

A21 20 25 cm Moist; yellowish brown (10YR 5/4 moist); sandy loam; massive structure; very weak (moist); few (2-10%) gravels (20-60mm) sandstone; few live roots; 7.3 field pH; .03 dSm-1; clear (20-50mm) irregular boundary;

A22 25 30 cm sandy loam; few (2-10%) gravels (20-60mm) sandstone; 7.6 field pH; .173 dSm-1; diffuse (>100mm) boundary;

B21 30 44 cm Moderately moist; dark yellowish brown (10YR 4/4 moist); prominent greyish brown (2.5Y 5/3) primary mottles; very dark greyish brown (10YR 3/2) secondary mottles; heavy clay; strong medium (20-50mm) angular blocky structure; strong (moist); v few (<2%) gravels (20-60mm) sandstone; few live roots; 7.5 field pH; .071 dSm-1; clear (20-50mm) boundary;

B22 44 60 cm Moderately moist; greyish brown (2.5Y 5/3 moist); dark greyish brown (2.5Y 4/2) primary mottles; dark yellowish brown (10YR 4/4) secondary mottles; heavy clay; moderate medium (20-50mm) angular blocky structure; strong (moist); few (2-10%) angular sandstone coarse fragments; few live roots; 8.6 field pH; .232 dSm-1; gradual (50-100mm) boundary;

B23 60 76 cm Moderately moist; yellowish brown (10YR 5/4 moist); greyish brown (2.5Y 5/3) primary mottles; dark greyish brown (10YR 4/2) secondary mottles; sandy medium clay; massive structure; very strong (moist); common (10-20%) angular gravels (6-20mm) sandstone; 9.2 field pH; .271 dSm-1; gradual (50-100mm) boundary;

BC 81 89+ cm Moderately moist; greyish brown (2.5Y 5/3 moist); yellowish red (5YR 4/8) primary mottles; sandy medium clay; massive structure; very strong (moist); abundant (50-90%) angular sandstone coarse fragments; 9.2 field pH; .443 dSm-1; abrupt (5-20mm) irregular boundary;

Profile Note: Un-named brown soils on micaceous sandstone; 81-89cm upper part of w`d sa is highly ferruginous; 30-60cm 10YR32 surface staining; pm mix of micaceous/siliceous sa. Field pH and EC have been copied from Lab data.

General Note: Isbell classification added by R.Tegg.

Figure 2 Type profile for Brown Soils on Micaceous Sandstone

UN-NAMED Solodic Dy3.23 sandstone H227/CSIRO/427 487339E 5289594N ELLENDALE

Sample Layer	Depths Upr cm	Depths Lwr cm	pH 1:5 H2O	PH 1:5 CaCl	EC 1:5 dS/m	Soluble Chloride mg/kg	Exchangeable Cations Ca meq	Mg meq	K meq	Na meq	Exch H meq	Exch Al meq	ECEC Sum meq	CEC Meas meq	TEB Sum meq	Base Sat %	ESP %	Ca/Mg Ratio
A11	0	10	6.3		.03 B	20 A	3.3	1.2	.77	.23 A	4.4 B		9.9		5.5	56	2.3 B	2.75
A11	0	10									2.3 C							
A12	10	20	7.0		.024 B	20 A												
A21	20	25	7.3		.03 B	20 A	1.8	1.7	.41	.57 A	.5 B		4.98		4.48	90	11.4 B	1.06
A22	25	30	7.6		.173 B	310 A												
B21	30	44	7.5		.071 B	120 A	3.7	8.5	1.1	.4 A	3.7 B		17.4		13.7	65	1.9 B	.44
B22	44	60	8.6		.232 B	480 A												
B23	60	76	9.2		.271 B	610 A												
BC	81	89	9.2		.443 B	890 A	2.93	5.4	.59	3.2 A					12.12		26.4 C	.54

Sample Layer	Depths Upr cm	Depths Lwr cm	Loss Ign %	Organic Carbon %	Total N %	C/N Ratio	Avail N mg/kg	Air Dry Moi%	Grav Moi%	Total P %	Avail P mg/kg	Extract P mg/kg	Total K %	Avail K mg/kg	Extract K meq
A11	0	10	4.5	1.71 C	.127 A	13		1.6		.018 A					
A11	0	10													
A12	10	20	2.8	.62 C	.063 A	10		.91		.014 A					
A21	20	25	2.5	.43 C	.009 A	48		1.1							
A22	25	30	3.6					1.2							
B21	30	44	6.3					2.8							
B22	44	60	5.2					2.3							
B23	60	76	3.8					2.1							
BC	81	89	2.6					4							

Sample Layer	Depths Upr cm	Depths Lwr cm	<------Extractable--------> Cu mg/kg	Mn mg/kg	Zn mg/kg	Fe mg/kg	B mg/kg	Free Fe %	Extractable Al %	Extractable Si %	Total Fe %	Total S %	Avail SO4-S mg/kg	CaCO3 %	Dispersion	Particle Size GV %	CS %	FS %	S %	C %
A11	0	10						2.17 A			1.77 C					0	4	63	21	13 B
A11	0	10																		
A12	10	20						2.38 A			1.89 C									
A21	20	25														1	4	65	16	14 B
A22	25	30																		
B21	30	44														0	2	31	16	52 B
B22	44	60																		
B23	60	76																		
BC	81	89														43	4	55	13	27 C

Figure 2 Cont

NB: Methodology is outlined in Appendix 2

4.3.5 Brown Soils on Feldspathic Sandstone 1 (Bfs1)

Bfs - Brown Soils on Feldspathic Sandstone: *(16km^2)*
Soils formed on Triassic feldspathic sandstones occur chiefly in the Hamilton, Langloh and Gretna - Plenty districts. The terrain is gently undulating to rolling and subdued rock outcrops are fairly common.

The dominant soils, those of the Langloh series, have a grey-brown sandy loam to loam surface overlying a lighter-coloured, sometimes bleached, sub-surface of similar texture. The prismatic clay subsoil, which occurs below a depth of about 30cm, is mottled grey, olive and sometimes yellowish-brown and has dark organic staining on the surface of the aggregates. At about *60cm* deep, this passes to strong brown or olive-yellow friable sandy clay, sometimes with free carbonate, overlying decomposing feldspathic sandstone at about *90cm*.

Where rock outcrops are more frequent, the soils are generally shallower and do not have a clay subsoil; the profile consists of a grey-brown loamy sand over reddish-yellow or pale yellow sand, sometimes weakly cemented, resting on weathered feldspathic sandstone at depths of *60cm* or less.

Minor areas of soils having a clay loam surface over a clay subsoil at shallow depth occur on some slopes and drainage ways, and often have a hummocky micro-relief.

Land Use

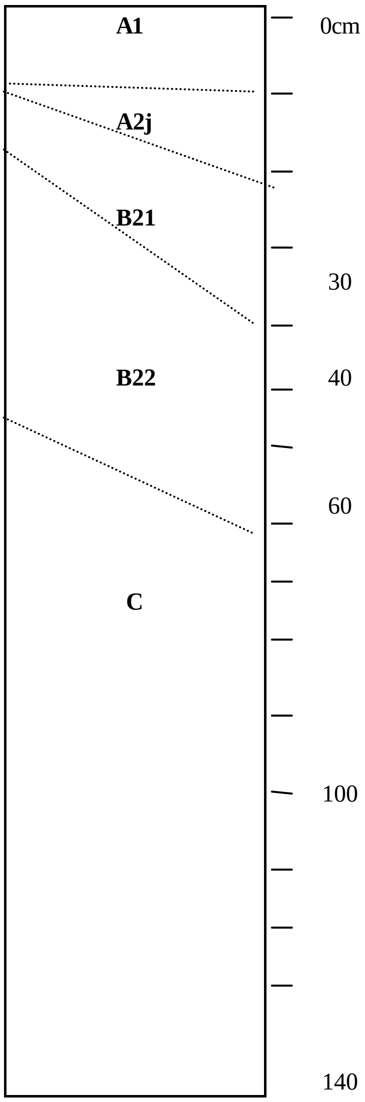
Most of the soils are arable and nearly all have been cleared, at least partially, of their original savannah woodland vegetation. About half are under improved pasture or green fodder crops at present. The remainder is used for rough grazing of the native pastures but a fair proportion of this should be capable of similar development.

Correlation

The unit Brown Soils on Feldspathic Sandstone has been renamed Brown Soils on Feldspathic Sandstone 1. A broad SPC has been defined for the dominant soil which has been called the Langloh SPC. Dimmock (1961) described the dominant soil as having a light coloured sometimes bleached subsurface horizon (A2). Available data and limited field work has shown that there is a range of soils within this unit that includes brown texture contrast soils without an A2. The feldspathic sandstone on this sheet is often found below the dolerite hills which surround it, hence dolerite colluvium may be influencing the formation of the soils within this unit and giving rise to the brown soils. More work is needed in this unit to determine the properties and extent of this soil type.

Langloh Soil Profile Class

Concept	**Imperfectly drained texture contrast soils formed on feldspathic sandstone.**
Aust. Soil	Brown Chromosols
Classification	Grey brown podzolics
Great Soil Group	Db, Dy
Principal Profile Form	Bfs1
Mapping Units	Feldpathic sandstone
Parent Material	Rolling hills
Landform	
	Eucalypt savannah woodland
Vegetation	Loose
Surface Conditions	Slowly to moderately permeable
Permeability	Imperfectly drained
Drainage	



A1: Black or grey (7.5YR 3/1; 10YR 4/1); fine sandy loam to fine loamy sand; weak fine (5-10mm) granular to subangular blocky structure; very weak (dry) consistence; rough faced peds; common fine macropores; dSm-1 0.05; pH 5.5-6.0; clear boundary change to

A2j: Sometimes absent; occasionally sporadically bleached; grey (10YR 4/1, 4/2, 6/3, 5/4); loamy sand to fine sandy loam; weak medium (10-20mm) subangular blocky structure; weak (dry) consistence; rough faced peds; common fine macropores; dSm-1 0.05; pH 6.0-7.0; clear boundary to

B21: Mottled; brown to yellow (10YR 4/2, 5/6, 4/4, 5/4, 6/2, 5/2; 7.5YR 5/6); light to medium clay; moderate medium (10-20mm) angular blocky; firm (dry) consistence; smooth faced peds; few fine macropores; organic staining on ped faces; dSm-1 0.1; pH 6.0-7.5; gradual boundary change to

B22: Mottled; brown to yellow (2.5YR 5/4, 5/2, 4/4, 6/8; 7.5YR 5/8, 5/6, 3/1; 5Y 3/2); medium to heavy clay may be sandy; moderate medium-coarse prismatic or angular blocky structure; firm (dry) consistence; smooth faced peds; no macropores; organic staining on ped faces; dSm-1 0.1-0.5; pH 7.5 –8.5

Morphological sites: SOILCO 68; CARDS C0712, C0711; PINK 12049
Analysed sites: PINK 12049
Related soil names: Langloh series

Correlation references: Hubble (1947), Dimmock (1961)

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	pH water (1:5)	Org. Carb. (%)	Total N (%)	C/N Ratio	Ca	Mg	Na	K
									Cmol(+)/kg		
Langloh SPC	PINK 12049	1	0-15	5.8	2.43	0.231	11	7.1	2.1	0.14	0.93
484075E		2	18-28	6.5				6.7	3.3	0.21	0.32
5289825N		3	28-38	7.2	0.41	0.045	9	5.2	4.3	0.63	0.14
		4	38-66	8.1	0.66	0.075	9	10.2	13.3	4	0.35
		5	66-89	8.9							
		6	89-109	9.3							
		7	109-135	9.3							
		8	140-163	9.2							

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	Total Bases	BASE SAT (%)	ESP (%)	Ca/Mg Ratio	Gravel (of total) >2000 (um) (%)	Sand Coarse >200 (um) (%)	Sand Fine <200 (um) (%)	Silt <20 (um) (%)	Clay <2 (um) (%)
Langloh SPC	PINK 12049	1	0-15	10.27	54	0.7	3.38		40	27	17	16
484075E		2	18-28	10.53	76	1.5	2.03		45	31	12	12
5289825N		3	28-38	10.27	81	5.0	1.21		32	32	19	17
		4	38-66	27.85	92	13.2	0.77		17	25	12	46
		5	66-89						18	30	12	40
		6	89-109						22	31	10	37
		7	109-135						13	27	13	47
		8	140-163									

Table 6 Analytical data for Langloh SPC

4.3.6 Brown Soils on Dolerite 1 (Bd1)

Bd - Brown soils on Dolerite: *(114 km^2)*
Shallow brown soils on dolerite are widespread on the northeastern side of the Derwent River with limited occurrences elsewhere, chiefly in the Glenora - Plenty district. They reach a maximum altitude of about *460m* in those areas having a rainfall of less than about *585-635mm* per annum and occupy moderate to steep slopes on rough stony hills. Rock outcrops are very common.

The characteristic soils are those of the Kimbolton series. They have a reddish-brown clay loam to loam surface overlying a dusky red or red clay subsoil, which may directly overlie dolerite rock, or there may be an intermediate horizon of yellowish-brown mealy decomposing dolerite. Free carbonate is occasionally present in the mealy horizon or along cracks in the solid rock. Stones are common on the surface and throughout the profile.

Some deeper less stony soils of restricted occurrence have formed from colluvial material on the lower slopes of some dolerite hills; they have a brown clay loam to light clay surface over a dark strongly structured clay subsoil with free carbonate below *45cm*. Mapped also with this unit are soils transitional to the podzolic soils on dolerite.

Land Use

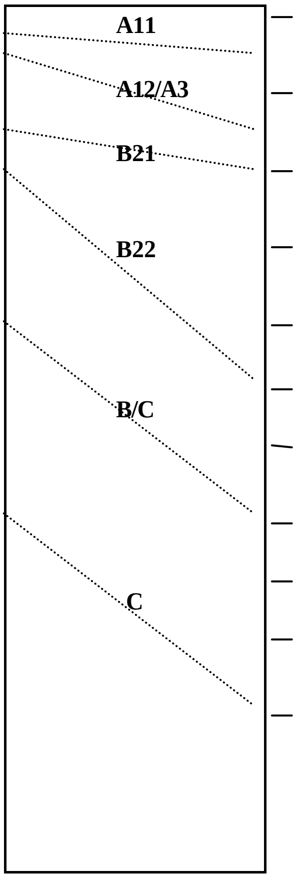
Apart from areas of deeper lower slope soils, most of the unit is non-arable or is used only for rough grazing. The land still carries the original eucalypt savannah woodland vegetation with a ground cover of native grasses. Aerial topdressing and surface seeding could probably improve some areas, but the shallowness of the soils makes them very prone to drought during the summer.

Correlation

The dominant soil of this unit correlates with the Tea Tree SPC previously defined on the Brighton and Hobart Reconnaissance Soil maps. The Brown Soils on Dolerite unit has been renamed Brown Soils on Dolerite 1. The Brown soils on dolerite in the previous southern Reconnaissance reports were recorded as having either angular blocky or prismatic structure. Additional data for these soils obtained through the correlation of the Ellendale sheet suggests that the primary structure in the B horizon of the Tea Tree SPC is angular blocky, therefore the Tea Tree SPC has been changed in this report to reflect this.

Tea Tree Soil Profile Class

Concept	**Shallow moderately structured gradational to weakly duplex red brown soils formed on dolerite.**
Aust. Soil Classification	Eutrophic red or brown Dermosols or Ferrosols
Great Soil Group	Non calcic Brown soils
Principal Profile Form	G or D
Mapping Units	Bd1,
Geology	Jurassic Dolerite
Landform	Moderate to steep slopes
Surface Conditions	Many coarse fragments
Permeability	Moderate permeability
Drainage	Moderately well drained



0cm	**A11:**	Black to red (7.5YR 3/2, 5YR 2/3, 2/2, 2/1); loam to clay loam; weak-moderate granular structure; weak (moist) consistence; 2-10% dolerite stones; pH 6.0 - 6.5;
	A12/A3:	Brown to red (7.5YR 3/2, 5YR 2/2, 3/3); clay loam; weak to moderate granular structure; weak (moist) consistence; 10-20% dolerite stones; pH 6.0 - 7.0; gradual boundary change to
30	**B21:**	Red (5YR 3/3, 4/5, 3/4, 2.5YR 2/3); medium to heavy clay; weak to moderate fine to medium (10-50mm) angular blocky, sometimes moderate granular structure; moderate (moist) consistence; 2-20% dolerite gravels; pH 6.5 - 7.5; diffuse boundary to;
40		
	B22:	Sometimes mottled: red (5YR 3/3, 2.5YR 2/4, 2/3); heavy clay; moderate to strong (20-50mm) angular blocky structure, moderate to strong (moist) consistence; 10-20% dolerite gravels; clay skins often present, pH 7.0 - 8.0; diffuse boundary to
60		
	B/C:	Mottled: red (5YR 3/3, 4/2, 5/8, 4/6; 2.5YR 3/6, 10YR 5/6, 7.5 YR 5/8); heavy clay; massive to weak (20-50mm) angular blocky; moderate (moist) consistence; 10-50% dolerite gravels; calcareous segregations are sometimes present; pH 7.5 - 8.0; diffuse boundary to
100	**C:**	Mottled: red to brown (5YR 3/3, 10YR 5/6, 10YR 5/8, 10YR 8/1); massive structure; pH 8.0

Morphological sites: CSIRO H245, H114, H167, H160; PINK 12022; CARDS C0251, C0252, C0253
Analysed sites: CSIRO H245, H114, H167, H160; PINK 12022
Related soil names: Brown Soils on Dolerite, Kimbolton Series
Correlation references: Spanswick & Kidd (2000b & 2000c)

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	pH water (1:5)	EC (d/sm)	Total P (mg/kg)	Avail P (mg/kg)	Avail K (mg/kg)	Org. Carb. (%)	Total N (%)	C/N Ratio	Ca	Mg	Na	K
												Cmol(+)/kg			
Tea Tree	H160	A1	0-4	6.7	0.065	0.03			3.7	0.276	13	17.5	10.9	0.41	1.5
484951E	H160	AB	4-10	7.0	0.065	0.023			3.8	0.259	15	22.8	18.2	0.93	1.2
5289123N	H160	B21	10-25	7.7	0.077				1.9	0.163	12				
	H160	B22	28-38	8.3	0.113				1.5	0.134	11	28.3	36.2	3	0.81
	H160	B23	38-51	8.7	0.235	0.016			1.2	0.11	11	29.7	36.2	3.2	0.69
	H160	BC	53-64	8.9	0.381				0.64	0.059	11				
	H160	C1	64-71	8.9	0.438										
	H160	C2	71-84	8.9	0.488										
	H160	C3	84-107	8.9	0.399	0.003				0.014		30.7	45.3	5.4	0.23

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	Total Bases	CEC	BASE SAT (%)	ESP (%)	Ca/Mg Ratio	Gravel (of total) >2000 (um) (%)	Sand Coarse >200 (um) (%)	Sand Fine <200 (um) (%)	Silt <20 (um) (%)	Clay <2 (um) (%)
Tea Tree	H160	A1	0-4	30.31		78	1.1	1.61	6	17	30	17	28
484951E	H160	AB	4-10	43.13		84	1.8	1.25	13	15	22	10	45
5289123N	H160	B21	10-25										
	H160	B22	28-38	68.31		96	4.2	0.78	3	7	14	2	78
	H160	B23	38-51	69.79			4.6	0.82	8	11	13	4	72
	H160	BC	53-64						5	10	19	1	62
	H160	C1	64-71										
	H160	C2	71-84										
	H160	C3	84-107	81.63			6.6	0.68		11	15	20	49

Table 7 Analytical Data for Tea Tree SPC

4.3.7 Black and Brown Soils on Basalt 1 (Blb1)

<u>Blb and Bb - Black and Brown soils on Basalt</u>: *(62 km^2)*
These soils are found on remnants of basalt plateaux, which originated as valley flows following a former course of the Derwent River. They range in altitude from about *365m* north of Hamilton to less than *30m* at Plenty. The plateaux have flattish to gently undulating tops with moderately to steeply sloping sides, subject to landslip in some areas. Rock outcrops are common.

Dark fine-textured soils of the Ellengowan series are dominant on the plateau tops, with the shallow brown Chiltern series on freer draining sites such as the plateau edges and low stony knolls. The Ellengowan soils have a dark grey granular clay loam surface overlying a black granular clay which at about *50cm* grades into a dark yellowish-brown friable clay, sometimes with free carbonate. This passes down into decomposing basalt at about *75cm*. Stones are common throughout the profile and on the surface. The Chiltern series has a brown very friable loam to clay loam surface over a dark reddish-brown stony clay subsoil which passes into decomposing basalt at *45cm* or less.

Associated with the Ellengowan series on the plateau tops are some deep-cracking black clay soils with strongly developed hummocky micro-relief; they are of minor extent. Other minor soils include brown skeletal soils on basalt and soils on mixed parent materials around the plateau edges.

Land Use
The natural vegetation was a rather open savannah woodland with native grasses, but most of the trees have now been cleared. The black soils can support high quality sown pastures but many areas are still used for rough grazing on the native vegetation. The shallower and stonier brown soils dry out strongly in summer and are used only for rough grazing.

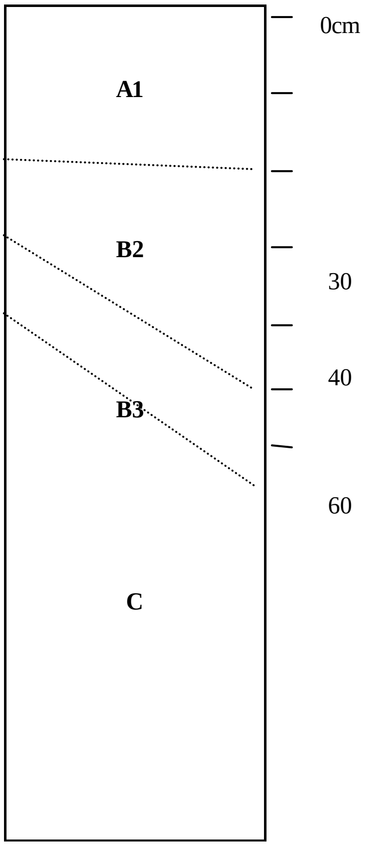
Correlation
The Black and Brown soils on Basalt have been mapped as three different units, Black Soils on Basalt 1 (Blb1), Brown Soils on Basalt 1 (Bb1) and Black and Brown Soils on Basalt (Blb1-Bb1). The dominant black soil, the Ellongowan series, is a black Dermosol and correlates with the Sorell SPC. The Sorell SPC is dominant in the Blb1 unit and co-dominant in the Blb1-Bb1 unit. The Brown soils on Basalt have been mapped for the first time on the Ellendale map sheet. The dominant soil is the Chiltern series. The Chiltern soils are brown to red-brown with fine sandy clay loam to fine sandy loam surface textures over clay subsoils. The lighter texture of these soils and their topographic position in the landscape, means they have improved drainage. These soils are very similar to the fine sandy variant of the Stoneleigh SPC (red-brown soils on basalt) on the Sorell Reconnaissance Soil map. Unfortunately not enough data is available for the Stoneleigh SPC or the Chiltern series to enable reliable correlation, more work is required in these two units as these soils may in fact correlate. The Brown Soils on Basalt on the Ellendale sheet have been defined as the Chiltern SPC, it is dominant in two small polygons of Bb1 in the north west and north east of the sheet, and is co-dominant in the Blb1-Bb1 unit.

Sorell Soil Profile Class

Concept **Shallow black friable clays on the upper slopes of basaltic hills**

Aust. Soil Classification Melanic-Vertic Black Dermosol or Black Vertosol
Great Soil Group Prairie Soil or Black Earth
Principal Profile Form Gn, Ug
Mapping Units Blb1 & Blb2
Geology Tertiary Basalt
Landform Upper part of gentle undulating low hills or hills

Vegetation Mostly cleared or savannah woodland
Permeability Very slowly to slowly permeable
Drainage Moderate to imperfectly drained



A1: Black (10YR 2/1, 2/2, 3/1; 7.5YR 3/1), light clay to clay loam, weak subangular blocky structure breaking to fairly friable moderate fine granular structure, strong to firm (moist) consistence; 2-10% coarse gravels; many <2mm live roots; pH 5.8 - 7.0; gradual change to

B2: Black (10YR 2/1, 3/1, 3/2, 4/2); medium to heavy clay; angular blocky to weak coarse prismatic structure; very firm to strong consistence (moist); occasionally very few ferruginous concretions; 2-20% coarse gravels; common <2mm live roots; coarse (10-20mm) cracks; pH 6.0 - 7.0; gradual change to

B3: Black or brown (2.5Y 3/2, 3/3, 5Y 3/1, 3/2, 10YR 3/2); medium to heavy clay; massive structure; very firm (moist) consistence; occassional few 6-20mm ferruginous concretions; 2-20% medium gravels; pH 7.0 to 7.5; gradual change to

C: Decomposing basalt marl; decomposing basalt stones occasionally coated in a calcareous skin; and/or basalt stone

Sandy Phase
A1: Fine sandy clay loam to sandy clay loam texture

Morphological sites: CSIRO H69, H77, H82, H234, H215; CRGKH C219; LCDERW 25, 1029, 1030; SOILCO 66, 65, 67
Analysed sites: CSIRO H69, H77, H82, H234, H215
Related soil names: Sorell clay, Ellengowan series
Correlation references: Hubble *et al* (1946); Loveday (1957), Holtz (1987), Spanswick (1999), Spanswick & Kidd (2000a, 2000b & 2000c)

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**pH water (1:5)**	**EC (d/sm)**	**Total P (mg/kg)**	**Org. Carb. (%)**	**Total N (%)**	**C/N Ratio**	**Ca**	**Mg**	**Na**	**K**
												Cmol(+)/kg	
Sorell	H215	1	0-8	6.5	0.071	0.036	5.27	0.405	13	42.1	15.2	1	0.84
492034E	H215	2	8-19	6.6	0.08	0.028	3.98	0.285	14	28.8	19.8	1.3	0.55
5275405N	H215	3	19-35+	7.1	0.077	0.021	2.94	0.198	15	32	25.3	1.9	0.22

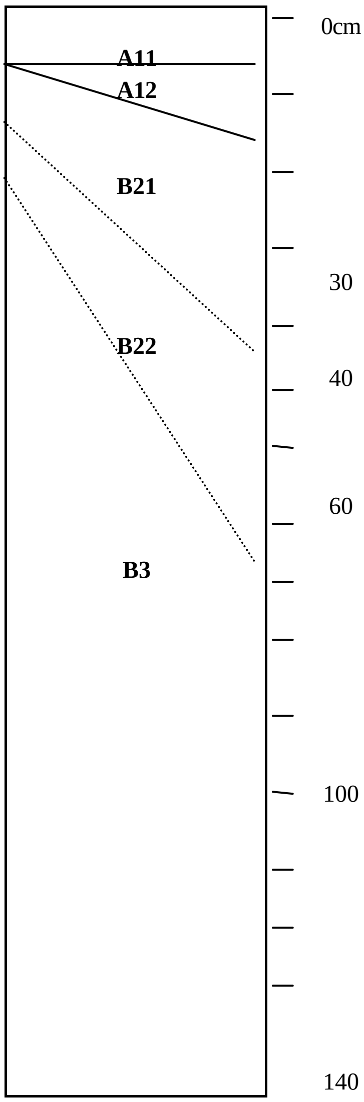
Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**Total Bases**	**CEC**	**BASE SAT (%)**	**ESP (%)**	**Ca/Mg Ratio**	**Gravel (of total) >2000 (um) (%)**	**Sand Coarse >200 (um) (%)**	**Sand Fine <200 (um) (%)**	**Silt <20 (um) (%)**	**Clay <2 (um) (%)**
Sorell	H215	1	0-8	41.14	N/A	74	1.8	1.59	0	4	29	16	41
492034E	H215	2	8-19	50.45	N/A	82	2.1	1.45	0	3	25	16	49
5275405N	H215	3	19-35+	59.42	N/A	87	2.8	1.26	0	7	21	14	54

Table 8 Analytical Data for Sorell SPC

Chiltern Soil Profile Class

Concept Brown stony soils with clay loam surfaces over clay subsoils developed on the slopes of basalt plateaux.
Aust. Soil Classification Brown Chromosol
Great Soil Group Gc, Gn
Principal Profile Form Bb1, Blb-Bb
Mapping Units Tertiary vesicular basalt
Parent Material Steep to moderate slopes of plateaux
Landform

Vegetation Stony, rock outcrop common
Surface Conditions Moderate permeability
Permeability Well drained
Drainage



A11: Black to dark brown (10YR 3/1, 7.5YR 3/2); fine sandy clay loam to loam; strong to moderate very fine (2-5mm) granular structure; very firm (dry) consistence; rough faced peds; fine <5mm cracks; few fine macropores; 20-50% coarse angular gravels; many live roots; 0.1 dSm-1; pH 6.0-7.0; abrupt change to

A12: Black to dark brown (7.5YR 3/2); loam to sandy clay loam; strong extremely fine (<2mm) granular structure to weak fine (5-10mm) subangular blocky structure; very firm (dry) consistence; rough faced peds; fine <5mm cracks; few fine macropores; 20-50% coarse angular gravels; many live roots; 0.3 dSm-1; pH 6.0 –7.5; clear change to

B21: Dark brown (10YR 3/3); light medium clay to fine sandy light medium clay; strong to moderate medium to coarse medium (10-50mm) angular blocky structure; very firm dry consistence; smooth faced peds; medium 5-10mm cracks; common very fine macropores; 20-50% coarse angular gravels; live roots common; 0.5 dSm-1; pH 7.0 –8.0; gradual change to

B22: Brown to reddish brown (10YR ¾ ,2/2, 5YR 3/5); heavy clay to fine sandy light medium clay; strong to moderate medium to coarse medium (10-50mm) angular blocky structure; smooth faced peds; medium 5-10mm cracks; common very fine macropores; 20-50% coarse angular gravels; few roots common; 0.5 dSm-1; pH 7.5 – 8.5; gradual change to

B3: Brown sometimes with yellow brown mottles; heavy to fine sandy light clay; weak medium (10-20mm) subangular blocky structure; rough faced peds; 20-50% coarse angular gravels; pH 8.0 – 9.5

Morphological Sites: SOILCO 64; CSIRO H157
Analysed Sites: CSIRO H157
Related soil names: Brown Soils on Basalt
Correlation references: Hubble (1947); Dimmock (1961)

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**pH water (1:5)**	**EC (d/sm)**	**Total P (mg/kg)**	**Org. Carb. (%)**	**Total N (%)**	**C/N Ratio**	**Ca**	**Mg**	**Na**	**K**
										Cmol(+)/kg			
Chiltern	H157	A11	0-4	5.8	0.152	0.081	10.8	1.05	10	23.4	6.8	0.28	3.6
474079E	H157	A12	4-10	5.5	0.104	0.057	6.8	0.63	11				
5298278N	H157	B21	13-25	6.4	0.051	0.03	2.5	0.185	14	25.2	24.2	0.66	1.6
	H157	B22	25-41	6.6	0.048								
	H157	B/C	41-51	6.9	0.039	0.029		0.186		22.8	25.2	0.87	0.81

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**Total Bases**	**BASE SAT (%)**	**ESP (%)**	**Ca/Mg Ratio**	**Gravel (of total) >2000 (um) (%)**	**Sand Coarse >200 (um) (%)**	**Sand Fine <200 (um) (%)**	**Silt <20 (um) (%)**	**Clay <2 (um) (%)**
Chiltern	H157	A11	0-4	34.08	53	0.4	3.44	0	1	23	24	29
474079E	H157	A12	4-10									
5298278N	H157	B21	13-25	51.66	79	1.0	1.04	6	2	20	7	71
	H157	B22	25-41									
	H157	B/C	41-51	49.68	82	1.4	0.90	0	4	24	6	67

Table 9 Analytical Data for Chiltern SPC

4.3.8 Lateritic Soils on Lake Sediments (L)

L - Lateritic soils on lake sediments: *(8 km^2)*
Soils formed on lateritized Tertiary lacustrine clays and sands have been mapped in three areas, the largest along the Lyell Highway between Hamilton and Ouse. The landscape is strongly rolling, made up of numerous ridges with short moderate slopes alternating with narrow drainage lines. Outcrops of laterite are common.

The dominant soils are those of the Kokeree series formed on the clayey sediments. The grey-brown or light grey-brown loam to clay loam surface is *10-15cm* thick and overlies a mottled light grey, reddish-brown and strong brown clay subsoil. Marked dark grey-brown organic staining is present on the surfaces of aggregates near the top of the clay horizon. The dark staining disappears with depth and the clay becomes predominantly light grey with some yellow mottling. Ironstone gravel, occasionally in large masses may occur throughout the profile but mainly in the top *60cm*.

The surface usually has a hummocky micro-relief. On the sandy sediments, the soils have a grey-brown sandy loam surface over a light coloured sandy sub-surface containing abundant pisolitic ironstone gravel. The subsoil clay, which occurs at a depth of about 30cm, is grey mottled with strong brown and red, sometimes with dark organic staining in the upper part of the horizon. Colours become lighter with depth. Small amounts of ironstone gravel may be distributed throughout the clay.

Associated with the sediments in some places, particularly along their western margin, are deep windblown sands having weakly developed soil profiles with light coloured sub-surface horizons and sometimes incipient sandy organic B horizons.

Land Use

The native vegetation was eucalypt savannah woodland with patches of heath and bracken on the sandier soils. Some of the trees have been cleared and improved pastures established where slopes are not too steep or stony. A fair proportion of the country, however, is non-arable, but should respond to aerial top-dressing and over-sowing.

Correlation

No dominant soil has been defined for this unit. This unit maintains its original name and code.

4.3.9 Miscellaneous Soils on Ordovician and Precambrian Rocks (M7)

M - Miscellaneous soils on Ordovician and Precambrian rocks *(28 km^2)*
A variety of soils occupying rough terrain in the southwestern corner of the sheet have been grouped together for mapping purposes. The soils include shallow Terra Rossas on Ordovician limestones, and podzols and skeletal soils on Ordovician quartzites and conglomerates.
Dolomites tentatively considered to be of Precambrian age outcrop in the extreme corner of the sheet, but through difficulty of access the soils on them were not inspected.

Land Use

The area is heavily forested and forms part of Australian Newsprint Mills Ltd. Concession Area. Considerable quantities of timber have been cut from the district.

Correlation

No dominant soil has been defined for this unit. To be consistent with other map sheets and Gunn et al (1998) this unit, though no dominant soil has been identified, has been renamed Miscellaneous soils on Ordovician and Precambrian rocks 7 (M7).

4.4 Soils of the River Terraces, Floodplains and Alluvial Fans

Three Sub-units have been separated and are shown on the map by the symbols *Bp, Ro* and *Dw,* representing respectively the soils of the higher terraces, the lower terraces with associated sand dunes, and the flood plains and alluvial fans.

4.4.1 Bushy Park Association (Bp)

<u>A1 - Soils of the higher terraces</u> *(13km^2)*
This group of terraces ranges in height from about *70m* to some *120m* or more above present stream level. The main occurrences flank the Derwent River around Bushy Park and for several *kilometres* to the north. There are also small isolated remnants of very old terraces at elevations of *180-245m* to the northeast of Hamilton, although their relationship to present day streams is obscure.

The soils are rather variable and commonly contain large amounts of waterworn siliceous gravel and stone, both on the surface and throughout the surface horizons. In some areas the soils have sandy surface horizons and lateritic clay subsoils, with lumps of laterite on the surface. The sub-unit also includes shallow brown clay loams on Tertiary conglomerate.

Correlation

The soils of this unit have formed on Tertiary sediments and as pointed out by Dimmock (1961) are highly variable. Available data and limited field work suggest that a lateritic podzolic, similar to the Brickendon SPC, is the dominant soil within this unit. The surface horizons are typically sandy with large amounts of quartz; below this is a medium to heavy mottled clay; ferruginous nodules are also sometimes present on the surface and throughout the profile. In the Australian Soil Classifiaction this soils is a bleached-sodic dystrophic brown Chromosol. However this soil has not been correlated with the Brickendon SPC as more data about the age of the terraces in the Derwent Valley is required. The dominant soil of this unit has been called the Bushy Park SPC.

Bushy Park Soil Profile Class

Concept **Deeply weathered brown texture contrast soils with sandy topsoils containing water worn quartz gravels and ferruginous nodules overlying clayey subsoils on the highest terraces of the Derwent valley.**

Aust. Soil Classification Bleached-Sodic Dystrophic Brown Chromosol

Great Soil Group Lateritic podzolic

Principal Profile Form Db, Dy

Mapping Units Bp

Parent Material Tertiary sediments of the Derwent river valley

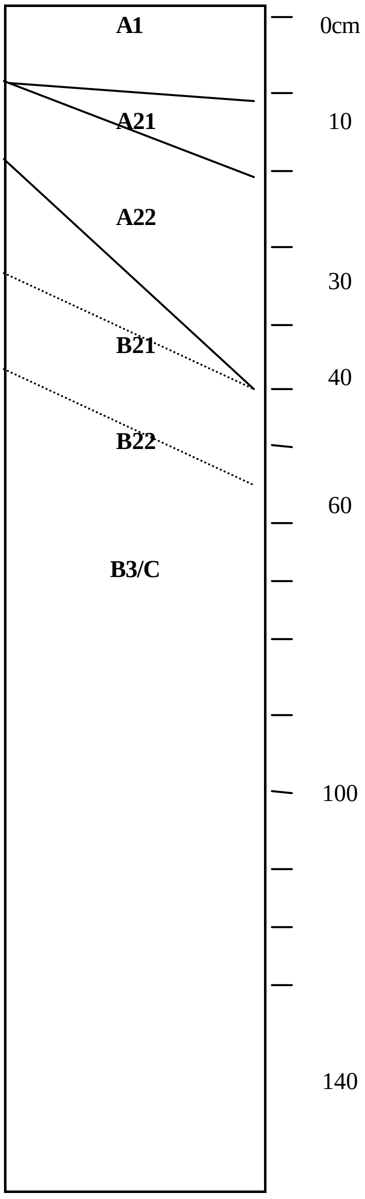
Landform Highest terrace in Derwent valley

Vegetation *Eucalyptus ovata, E. amygdalina, E viminalis, Acacia dealbata, Bursaria, Lomandra, Poa, Danthonia, Themeda, Banksia species and Casuarina species*

Surface Conditions Waterworn quartz gravels common, ferruginous nodules are sometimes present

Permeability Slow to moderate

Drainage Imperfect



A1: Black or grey (10YR 4/1, 5/1, 5YR 2.5/2); loamy sand to sandy loam; weak very fine (2-5mm) granular structure; weak (dry) consistence; rough faced peds; common 1-2mm macropores; many (20-50%) rounded quartz gravels (6-20mm); few fine (2-6mm) ferruginous nodules; live roots common; pH 4.5-5.5; clear boundary change to

A21: Grey (10YR 6/1, 5YR 4/2); sand to loamy sand; weak fine (5-10mm) subangular blocky to massive; weak (dry) consistence; sandy fabric to rough faced peds; common fine (1-2mm) macropores; many (20-50%) rounded (6-20mm) quartz gravels; common fine (2-6mm) ferruginous nodules; live roots common; pH 4.5-5.5; gradual boundary change to

A22e: Sometimes bleached; grey to red (7.5YR 6/3, 10YR 7/2,7/3, 5YR 4/6); sand to loamy sand; weak fine (5-10mm) subangular blocky to massive; loose to very weak (dry consistence); sandy fabric to rough faced peds; common fine (1-2mm) macropores; many (20-50%) rounded (6-20mm) quartz gravels; common fine (2-6mm) ferruginous nodules; live roots common; pH 5.0-6.0; clear wavy boundary change to

B21: Mottled; brown (7.5YR 5/6, 10YR 4/4) red (2.5YR 3/8, 4/6); medium to heavy clay; moderate medium-coarse (20-50mm) angular blocky structure; very firm to rigid (dry) consistence; smooth faced peds; fine (<5mm) cracks; none to few fine (2-6mm) ferruginous nodules; very few (<2%) gravels (20-60mm) same as substrate material; few live roots; pH 5.0-6.0; gradual change to

B22: Mottled; brown (7.5YR 5/6, 10YR 4/4) red (2.5YR 3/8, 4/6); medium to heavy clay; moderate medium-coarse (20-50mm) prismatic structure; very firm to rigid (dry) consistence; smooth faced peds; fine (<5mm) cracks; none to few fine (2-6mm) ferruginous nodules; very few (<2%) gravels (20-60mm) same as substrate material; few live roots; dSm-1 0.1; pH 5.0-6.0; gradual change to

B3/C	Brown (10YR 5/6), red and grey mottles (2.5YR 3/8, 10YR 6/1); coarse sandy light medium clay; massive; pH 5.5-6.0

Morphological Sites: CSIRO field obs 38, 46, 41, 35; CSIRO H239; SOILCO 76
Analysed Sites: CSIRO H239
Related soil names: A1
Correlation References: Dimmock (1961)

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**pH water (1:5)**	**EC (d/sm)**	**Total P (mg/kg)**	**Org. Carb. (%)**	**Total N (%)**	**C/N Ratio**	**Ca**	**Mg**	**Na**	**K**
											Cmol(+)/kg		
Bushy Park	H239	1	0-9	5.1	0.063	0.015	3.6	0.21	17	2.4	0.6	0.24	0.31
490558E	H239	2	9-18	5.5	0.033	0.002	0.89	0.052	17				
5270934N	H239	3	18-25	5.5	0.03		0.71	0.039	18				
	H239	4	25-33	5.7	0.024		0.52	0.03	17	0.26	0.16	0.12	0.16
	H239	5	33-37	5.8	0.036								
	H239	6	37-41	5.9	0.068								
	H239	7	41-48	5.7	0.071		0.89	0.045	20	0.5	0.89	0.63	0.89
	H239	8	48-63	5.2	0.086								
	H239	9	63-79	4.8	0.11								
	H239	10	79-91	4.5	0.152		0.26	0.014	19	0.66	0.32	0.24	0.32

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**Total Bases**	**BASE SAT (%)**	**ESP (%)**	**Ca/Mg Ratio**	**Gravel (of total) >2000 (um) (%)**	**Sand Coarse >200 (um) (%)**	**Sand Fine <200 (um) (%)**	**Silt <20 (um) (%)**	**Clay <2 (um) (%)**
Bushy Park	H239	1	0-9	3.55	26	1.7	4.0	33	44	39	7	5
490558E	H239	2	9-18									
5270934N	H239	3	18-25									
	H239	4	25-33	0.7	22	3.8	1.63	37	45	38	7	8
	H239	5	33-37									
	H239	6	37-41									
	H239	7	41-48	2.91	34	7.4	0.56	14	3	5	3	86
	H239	8	48-63									
	H239	9	63-79									
	H239	10	79-91	1.54	9	1.4	2.06	16	6	6	1	84

Table 10 Analytical Data for Bushy Park SPC

4.4.2 Rotherwood Association (Ro)

<u>A2 - Soils of the lower terraces:</u> *(36km^2)*

A second group of terraces ranging from *20-35m* above the present river level is well developed along the Derwent in the southeastern corner of the sheet and between Ouse and Hamilton. Small terraces probably of similar age but at lower elevations above the river level, occur along the Styx River. On the *30-35m* terraces of the group, the soils show predominantly strongly differentiated profiles. The most common consists of a grey sandy loam surface over a bleached sandy sub-surface, which overlies at about 25cm a prismatic, or columnar, structured clay subsoil often with a very wavy upper boundary. Near the top of the clay horizon the aggregates are dark-stained on the outside by organic matter, the staining gradually decreasing with depth. Inside the aggregates and below the stained zone the clay is mottled olive and yellowish-brown, sometimes becoming sandy with depth and sometimes overlying waterworn gravels.

The soils on the *20m* terraces have profiles similar to those above except that the surface horizons are thinner, especially the bleached sub-surface which may be represented only by a thin coating on top of the clay aggregates.

Superimposed on the terraces in several places along the eastern side of the Derwent are deposits of windblown sand. The deposits occupy low rises and are particularly well developed around Macquarie Plains and at Lawrenny. The usual soil profile on them has a brown sand to sandy loam surface overlying a reddish-brown to red sandy clay loam which passes to a brownish-yellow sand at about *60cm*, resting at various depths below this on older buried profiles.

A minor group of brown loamy soils is found in complex association with the windblown sands and the lateritic soils on Lake Sediments near "Lawrenny". Profiles are similar to the windblown sands except for a finer textured surface and a brown blocky clay sub-soil. The soils of two rock-bar basins in the northeast of the rectangle have also been mapped with the sub-unit.

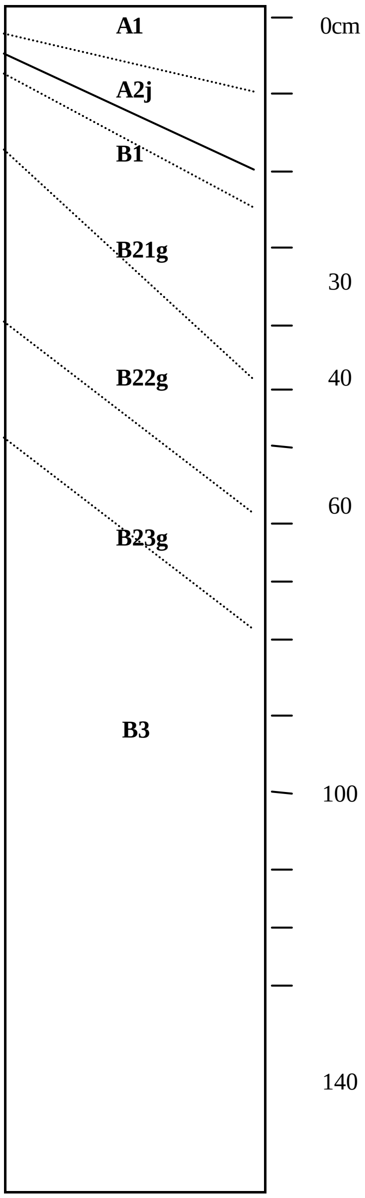
Correlation

This unit has been renamed Rotherwood Association. The dominant soil of this unit has been defined and has been called the Rotherwood SPC. The Rotherwood SPC is a grey or brown Hydrosol and has been broadly defined to encompass the soils on both levels of the second terrace.

Rotherwood Soil Profile Class

Concept *Grey or brown texture contrast soils with sandy loam surfaces over mottled clay subsoils. Subsoils periodically saturated. Ferruginous gravels often present throughout profile. Developed on lowest terrace of Derwent river vallley.*

Aust. Soil Classification
Great Soil Group Chromosolic salic Hydrosol??
Principal Profile Form
Mapping Units Db, Dg or Dy
Parent Material Ro
Landform Tertiary sediments
Lowest terrace of the Derwent River
Vegetation
Surface Conditions
Permeability Firm
Drainage Slowly permeable
Imperfectly drained



A1: Black (10YR 3/2, 3/3, 7.5YR 2/2), sandy loam to fine sandy loam; weak very fine (2-5mm) subangular blocky to moderate medium (20-50mm) platy structure; firm (dry) consistence; rough ped fabric; 0.3 dSm-1; pH 5.5 – 6.0; gradual change to

A2j: Grey (7.5YR 4/2, 3/2, 5/2), dry (7.5YR 7/1, 7/2); sandy loam to fine sandy loam; weak fine (5-10mm) subangular blocky to moderate medium (20-50mm) platy structure; firm (dry) consistence; rough ped fabric; 0-0.1 dSm-1; pH 5.5-6.0; abrupt to clear boundary change to

B1: Mottled: brown or grey, sometimes red (10YR 5/4, 4/4, 7.5YR 4/4, 10YR 4/2, 4/8, 5/2, 5YR 6/8), light medium to medium clay, moderate medium to fine (5-50mm) angular blocky structure; firm (dry) consistence; smooth ped fabric; coarse (6-20mm) ferruginous nodules often present; 0-0.1 dSm-1; pH 5.5-6.5; gradual change to

B21g: Mottled: brown, grey or red (10YR 5/1, 4/2, 4/8, 5/4, 5YR 6/8, 4/8), light medium to heavy clay; moderate coarse (50-100mm) prismatic parting to moderate medium to fine (5-50mm) angular blocky structure; firm (dry) consistence; smooth ped fabric; coarse (6-20mm) ferruginous nodules often present; 0-0.1 dSm-1; pH 6.5-7.0; gradual change to

B22g: Mottled: brown or red (10YR 4/4, 5/4, 5/3, 5/8, 5YR 4/8); light medium to heavy clay; moderate coarse (50-100mm) prismatic parting to moderate medium to fine (5-50mm) angular blocky structure; firm (dry) consistence; smooth ped fabric; coarse (6-20mm) ferruginous nodules often present; 0-0.1 dSm-1; pH 6.5-7.5; gradual change to

B23g: Mottled: grey, olive brown or red (5Y 6/1,5/1,5/2, 5/3, 2Y 5/2, 10YR 4/4; 2.5YR 4/6, 5/6, 5/4, 5YR 5/8, 5Y); light to heavy clay; moderate to strong fine to medium (5-50mm) angular blocky structure; coarse (6-20mm) ferruginous nodules often present; 0 – 0.3 dSm-1; pH 7.0-8.0; gradual to diffuse change to

B3: Mottled: olive brown or red (2.5Y 5/4, 5/6, 3/0; 7.5YR 5/8, 5YR 5/8, 5Y 6/1, 2.5Y); sandy clay, silty clay to light clay; massive; 0-0.4 dSm-1; pH 7.0-8.5

Morphological sites: PINK 12006; CARDS C0412, C0414; SOILCO 75
Analysed sites: PINK 12006
Related soil names: Rotherwood sandy loam
Correlation references: Hubble (1947), Dimmock (1961)

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**pH water (1:5)**	**EC (d/sm)**	**Total P (mg/kg)**	**Org. Carb. (%)**	**Total N (%)**	**C/N Ratio**	**Ca**	**Mg**	**Na**	**K**
												Cmol(+)/kg	
Rotherwood	12006	1	0-14	6.3		0.042	2.14	0.177	12	6.9	2.1	0.13	0.54
479400E	12006	2	17-25	7.0									
5291775N	12006	3	29-68	7.1									
	12006	4	71-94	7.4									
	12006	5	99-132	7.4									

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**Total Bases**	**BASE SAT (%)**	**ESP (%)**	**Ca/Mg Ratio**	**Sand Coarse >200 (um) (%)**	**Sand Fine <200 (um) (%)**	**Silt <20 (um) (%)**	**Clay <2 (um) (%)**
Rotherwood	12006	1	0-14	9.67	64	0.9	3.29	21	48	15	16
479400E	12006	2	17-25					20	51	15	14
5291775N	12006	3	29-68					3	38	34	25
	12006	4	71-94					5	47	14	34
	12006	5	99-132					35	61	2	2

Table 11 Analytical data for Rotherwood SPC

4.4.3 Derwent Association (Dw)

<u>A3 - Soils of the floodplains and alluvial fans</u>: *(34 km^2)*.
The soils of this group are characterised by a lack of marked differentiation of the profile into horizons. They are mostly medium to fine-textured throughout.

The largest areas of both floodplains and alluvial fans are along the Derwent River, especially at "Lawrenny" and Bushy Park. The soils of the floodplains fall into two broad classes depending on the size of the streams concerned. Along the larger rivers at elevations of about *3m* above normal stream level, soils of the Derwent series are dominant; these have typically dark brown deep friable profiles with excellent structure. Textures are clay loams at the surface changing gradually to a light or medium clay at *30-45cm*. In some instances there may be interstratified sandy deposits and older buried profiles. Waterworn gravel may occur below about *2m*. Along the smaller streams the soils are mostly black granular clays, which crack deeply when dry, and which may contain free carbonate in the subsoil. Similar black granular clays, sometimes stony, are the dominant soils of the alluvial fans and constitute the Lawrenny series; they reach their maximum development around "Lawrenny".

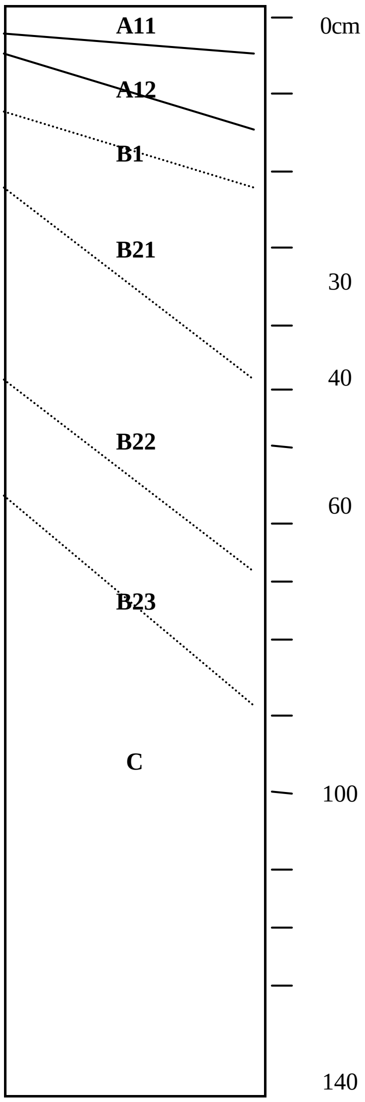
The A3 soils are all more or less intensively developed; in particular, the deep friable Derwent alluvium is well suited to irrigation and is used widely for hop-growing and dairying on irrigated pastures despite the liability to flooding. The A2 soils are mostly under improved pastures of which a small proportion is irrigated. Use of the A1 soils is often limited by stoniness to rough grazing but a few areas have been developed to sown pastures.

Correlation

This unit has been renamed the Derwent Association (Dw). The soils of this unit have formed on Quaternary alluvial sediments. The dominant soil on the Derwent floodplains is a black to dark brown moderately structured, self-mulching soil with a clay loam surface over a cracking clay subsoil. In the Australian Soil Classification the dominant soil, renamed Derwent SPC, is a black Dermosol. On the smaller rivers, creeks and tributaries of the Derwent, the Lawrenny series dominantes. The Lawrenny series is darker then the Derwent SPC and cracks throughout the profile with cracks often evident on the surface during drier periods (black Vertosol). No SPC has been defined for the Lawrenny series. Soils similar to the Lawrenny series (black Vertosols) were also observed on the outer limits of the Derwent floodplain.Derwent Soil Profile Class

Derwent Soil Profile Class

Concept	**Black to dark brown self-mulching soils with clay loam surfaces over cracking clay subsoils**
Aust. Soil Classification	Black Dermosols
Great Soil Group	Prairie Soils
Principal Profile Form	Gn
Mapping Units	A3
Parent Material	Alluvium from the Derwent River
Landform	Floodplains
Vegetation	
Surface Conditions	Self-mulching
Permeability	Moderately permeable
Drainage	Moderately well drained



A11: Black (10YR 2/2 moist & dry); clay loam to fine sandy clay loam; extra fine (<2mm) granular structure; moderate (dry) consistence; many (1-2mm) live roots; 0.185 dSm-1; pH 6.0-7.0; clear boundary change to

A12: Black (10YR 2/2, 3/1); clay loam to fine sandy clay loam; fine (2-5mm) angular blocky structure; moderate (dry) consistence; many (1-2mm) live roots; pH 6.0-7.0; clear boundary change to

B1: Black (7.5YR 2/2, 2.5Y 3/1); heavy clay loam; medium (10-20mm) angular blocky structure; moderate (dry) consistence; many (1-2mm) live roots; pH 6.0-7.0; gradual boundary change to

B21: Black (7.5YR 2/2, 2.5Y 3/2); light clay to medium clay often with fine sand; moderate to strong medium coarse (20-50mm) prismatic structure; firm (dry) consistence; smooth faced peds; few live roots; fine <5mm cracks; pH 6.0-7.0; gradual boundary change to

B22: Mottled: black (7.5YR 3/3, 7.5YR 2/2); light medium to medium clay often with fine sand; moderate to strong medium coarse (20-50mm) prismatic structure; very firm (dry) consistence; smooth faced peds; few (2-10%) fine gravel (2-6mm); few fine (1-2mm) macropores; fine <5mm cracks; pH 6.5-7.5; gradual boundary change to

B23: Mottled: black or grey (7.5YR 2/2, 10YR 2/2, 3/2); light medium to medium clay often with fine sand; moderate medium (10-20mm) angular blocky structure; moderate (dry) consistence; smooth faced peds; fine <5mm cracks; pH 7.0-7.5; gradual boundary change to

B/C: Sandy clay loam; massive

Note: Carbonate is sometimes present in the lower horizons

Morphological Sites: PINK 12031, 11947; CSIRO H214; SOILCO 74, 77
Analysed Sites: PINK 12031, 11947; CSIRO H214
Related soil names: Derwent clay loam

Correlation References: Hubble (1947), Dimmock (1961)

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	pH water (1:5)	EC (d/sm)	Total P (mg/kg)	Org. Carb. (%)	Total N (%)	C/N Ratio	Ca	Mg	Na	K
Derwent	H214	A11	0-2	6.2	0.185	0.069	8.08	0.536	15	25.2	8.6	0.69	0.72
478891E	H214	A12	2-10	6.2	0.065	0.064	6.5	0.466	14	26.2	7.3	0.28	0.17
5292962N	H214	A13	10-30	6.4	0.036	0.045	3.61	0.249	14	25.2	5.6	0.24	0.09
	H214	A14	30-41	7.0	0.03		1.75	0.12	15	22.2	5.9	0.26	0.04
	H214	B21	43-52	7.0	0.021		1.1	0.083	13				
	H214	B22	56-74	7.0	0.024					15.8	5.1	0.16	0.03
	H214	B23	74-81	7.0	0.03								
	H214	B24	81-104	7.1	0.027					24.8	11.6	0.22	0.06
	H214	B25	104-129	7.3	0.027								
	H214	C	190-198+	7.6	0.024								

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	Total Bases	BASE SAT (%)	ESP (%)	Ca/Mg Ratio	Gravel (of total) >2000 (um) (%)	Sand Coarse >200 (um) (%)	Sand Fine <200 (um) (%)	Silt <20 (um) (%)	Clay <2 (um) (%)
Derwent	H214	A11	0-2	35.21	69	1.3	2.93	0	1	43	18	22
478891E	H214	A12	2-10	33.95	67	0.6	3.59	0	11	41	16	22
5292962N	H214	A13	10-30	31.13	71	0.5	4.50	0	1	44	26	23
	H214	A14	30-41	28.4	83	0.8	3.76	0	3	47	21	27
	H214	B21	43-52									
	H214	B22	56-74	21.09	84	0.6	3.10	0	11	51	11	25
	H214	B23	74-81									
	H214	B24	81-104	36.68	84	0.5	2.14	0	1	36	24	36
	H214	B25	104-129									
	H214	C	190-198+									

Table 12 Analytical Data for Derwent SPC

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	pH water (1:5)	Total P (mg/kg)	Org. Carb. (%)	Total N (%)	C/N Ratio	Ca	Mg	Na	K
Derwent	12031	A1	0-13	6.9	0.138	5.4	0.385	14	20.3	6.9	0.28	0.15
477700E	12031	B1	13-22	7.0					20.5	7.1	0.2	0.12
5291850N	12031	B21	25-53	7.2								
	12031	B22	53-79	7.4					14.1	6.8	0.22	0.08
	12031	B3	79-127	7.7								
	12031	C	127-157	7.5								
Derwent	11947	A1	0-15	6.1	0.036	4.09	0.357	11	14.1	6.9	0.3	0.35
477100E	11947	B1	15-23	6.6	0.204	2.04	0.167	12				
5293625N	11947	B21	25-51	6.9	0.144	1.19	0.102	12	15.6	12.6	0.37	0.15
	11947	B22	51-66	7.1	0.145	1.45	0.087	17				
	11947	B23	71-94	7.1	0.121				15	14	0.41	0.14
	11947	B31	94-124	7.1	0.647	0.647	0.061	11				
	11947	B32	130-152+	7.3								

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	Total Bases	BASE SAT (%)	ESP (%)	Ca/Mg Ratio	Gravel (of total) >2000 (um) (%)	Sand Coarse >200 (um) (%)	Sand Fine <200 (um) (%)	Silt (%) <20 (um)	Clay (%) <2 (um)
Derwent	12031	A1	0-13	27.63	68	0.7	2.94		10	48	20	22
477700E	12031	B1	13-22	27.92	79	0.6	2.89		9	52	18	21
5291850N	12031	B21	25-53						10	55	14	21
	12031	B22	53-79	21.2	88	0.9	2.07		16	52	14	18
	12031	B3	79-127						23	49	13	15
	12031	C	127-157						30	43	12	15
Derwent	11947	A1	0-15	21.65	62	0.9	2.04		5	41	24	23
477100E	11947	B1	15-23						6	43	21	25
5293625N	11947	B21	25-51	28.72	83	1.1	1.24		8	42	15	32
	11947	B22	51-66						5	41	19	32
	11947	B23	71-94	29.55	85	1.2	1.07		2	33	25	38

11947	B31	94-124		3	39	20	36
11947	B32	130-152+					

Table 13 Analytical Data for Derwent SPC

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APPENDIX 1

LIST OF KEY SOIL HORIZON DESIGNATIONS USED IN SPCS

Horizons (some of which may be subdivided eg, A11 and A12)

A1 Topsoil, zone of maximum biological activity, usually dark in colour.

A2 Grey, generally sandy, sometimes bleached, eluvial horizon (less clay, organic matter and sesquioxides than horizons above and below).

A3 Transitional horizon between A and B horizon and more similar to A than B horizon.

B1 Transitional horizon between A and B horizon and more similar to B than A horizon.

B2 Main subsoil horizon, either:-

1) illuvial clay, humus or sesquioxide accumulations or

2) maximum pedological development such as structure or colour.

B3 Transitional horizon between B2 and C horizon and having significant amount of clay to still be classed as part of the solum.

BC As above.

C Weathered parent material and partially weathered rock from which the soil has formed.

D Buried horizon which is unlike the pedological organisation of the overlying horizons.

R Bedrock.

P1 Primarily undecomposed organic matter (peat).

P2 Primarily decomposed organic matter (peat).

Horizon Suffixes Used

e conspicuously bleached horizon, for example A2e.

g Gleyed horizon caused by very poor drainage.

h accumulation of humified, well decomposed organic matter.

j sporadically bleached horizon, for example, A2j.

k accumulation of carbonate.

t accumulation of silicate clay (illuviation).

w weakly developed B horizon, ie, colour or structured B horizon, little or no illuviation.

For full horizon definitions refer to McDonald *et al.* (1990). This figure has been modified from Doyle (1993), p 118.

APPENDIX 2

ANALYTICAL METHODS FOR CSIRO SITES

The following analytical methodology, taken from Graley (1961), is assumed to be similar for the sites analysed by CSIRO Division of Soils on this map.

The methods of analyses used were essentially those of Piper (1947) but with the following modifications:

pH was determined using a glass electrode and the system described by Raupach (1954).

Phosphorus is reported as “total” P dissolved by four hours boiling with concentrated hydrochloric acid. It was determined by a colorimetric method using butanol to extract the ammonium phosphomolybdate prior to its reduction with stannous chloride to the blue complex.

“Free” ferric oxide was determined using a modification by Haldane (1956) of Jeffries’ method.

Particle size distribution was determined on a number of samples by the International pipette method, method B in type profile, and on others by the rapid plummet balance method, method C in type profile, (Marshall, 1956) after dispersion of the soil using “calgon” (Hutton, 1955). Use of the pipette method is indicated in the tabulated data by quoting the results of the silt and clay fractions to one decimal place and of the plummet method to the nearest whole number. Coarse and fine sands are quoted to the nearest whole number for both methods.

Organic Carbon was determined using the Walkley and Black method.

Exchangeable metal cations were extracted by leaching with normal ammonium chloride and the leachate examined by titration with E.D.T.A for calcium and magnesium (Bond and Tucker, 1954 and Hutton, 1954) and by the “Eel” flame photometer for potassium and sodium (Stace and Hutton, 1958).

Exchangeable hydrogen has been determined by both the paranitro phenol (to pH 7.0) and meta-nitrophenol (to pH 8.4) methods of Piper (1942) but the total exchangeable cations recorded are the sum of the metal ions and exchangeable hydrogen to pH 8.4.

Values are reported for fractionation of the coarse and fine sands from certain samples. These were determined by sieving through five inch sieves with hand shaking for twenty minutes.

Analytical methods for DPIWE sites

Soil pH and electrical conductivity were measured in a 1:5 soil:water ratio.

Clay mineralogy was determined by the Tasmanian Department of Mineral Resources using

X-ray diffraction.

Exchangeable Aluminium and Acidity was measured using method 15G1 described by Rayment and Higginson (1992).

Organic Carbon was measured using the Walkley and Black method described in Rayment and Higginson (1992).

Available phosphorus was measured using method 9B2 described by Rayment and Higginson (1992) based on Murphy and Riley (1962).

Air-dry moisture content has been expressed as a percentage based on method 2A1 described by Rayment and Higginson (1992).

Total nitrogen was measured using an auto analyser following method 7A2 in Rayment and Higginson (1992).

Copper, Zinc, Manganese and Iron were measured using method 12A1 described in Rayment and Higginson (1992).

Exchangeable Calcium, Magnesium, Sodium and Potassium were measured by ammonium chloride at pH 7.0 using method 15B3 in Rayment and Higginson (1992).

APPENDIX 3

RATING TABLE FOR ANALYTICAL PROPERTIES

General analytical properties

	Very low	Low	Medium	High	Very High
Organic Carbon (%)	<1	1-2	2-4	4-8	>8
Total Nitrogen (%)	<0.1	0.1-0.2	0.2-0.4	>0.4	
Total Phosphorus (mg/kg)	<100	100-200	200-500	500-1000	>1000
CEC (meq/100g soil)	<6	6-12	12-25	25-50	>50
Base Saturation (%)	<20	20-40	40-60	>60	

Note: Organic matter content can be estimated by multiplying organic carbon contents by 1.724.

Colwell Extractable Phosphorus and Potassium

Light soils (sandy loams)	Low	Medium	High
P (mg/kg)	<10	10-35	>35
K (mg/kg)	<100	100-200	>200
Heavy soils (clays)	Low	Medium	High
P (mg/kg)	<30	30-80	>80
K(mg/kg)	<150	150-300	>300

Salinity

	None	Slight	Moderate	High	Very High
(dSm-1)	<0.2	0.2-0.7	0.7-1.2	1.2-3.0	>3.0

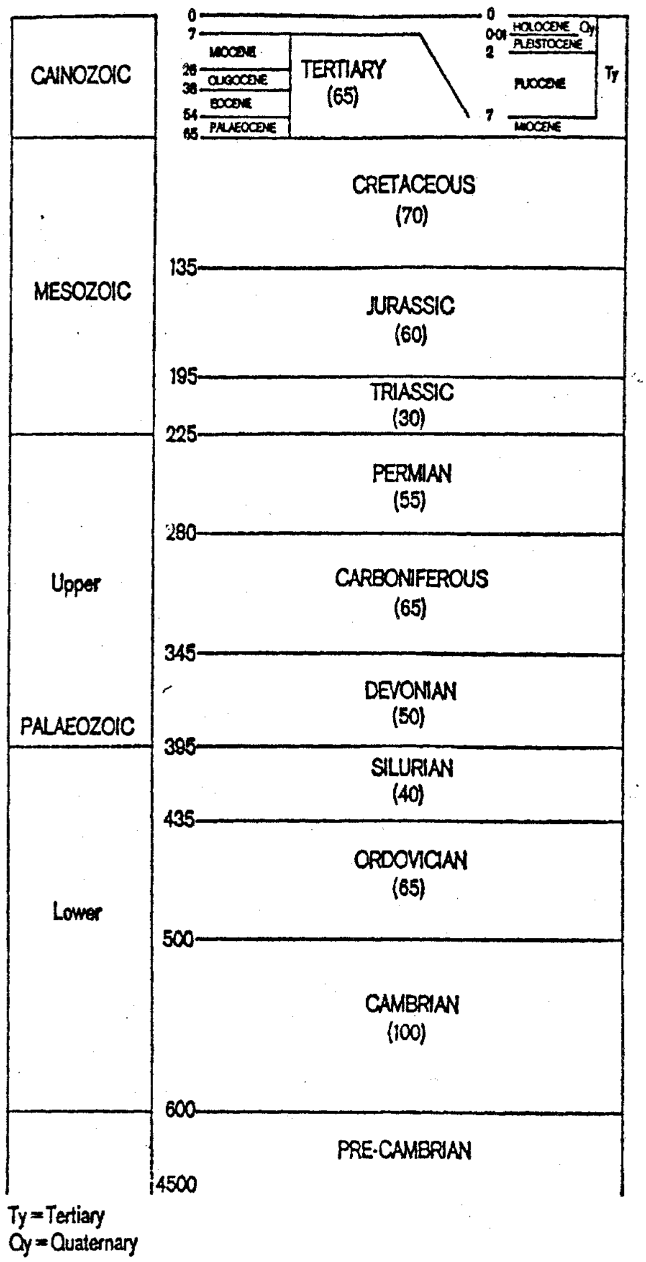
Soil Acidity

	Slightly	Moderately	Strongly	Extremely
pH range	6.5-6.0	5.9-5.3	5.2-4.5	<4.5

This table has been taken from Doyle (1993) p115

APPENDIX 4

GEOLOGICAL TIMELINE



Taken from Brooks J.R.V., and Whitten D.G.A., (1972) Dictionary of Geology . Published by Penguin, England.

APPENDIX 5

ADDITIONAL RELEVANT INFORMATION

Detailed Maps

Hubble (1947) Unpublished, Soil map of Lawrenny and Part Dunrobin Estate: Part Counties Cumberland and Buckingham.

Lawrenny and Part Dunrobin Estates.

APPENDIX 6

LIST OF REPORTS IN THE RECONNAISSANCE 1:100 000 SOIL MAP SERIES

Cowie, J.D. (1959), Reconnaissance soil map of Tasmania. Sheet 68, **Oatlands**. Div. Rep. Div Soils CSIRO Aust. 4/59**;** Scale 1:63 360

Doyle, R.B. (1993), Soils of the **South Esk** Sheet Tasmania (southern half) Reconnaissance Soil Map. DPIF Soil Survey Series of Tasmania No 1.
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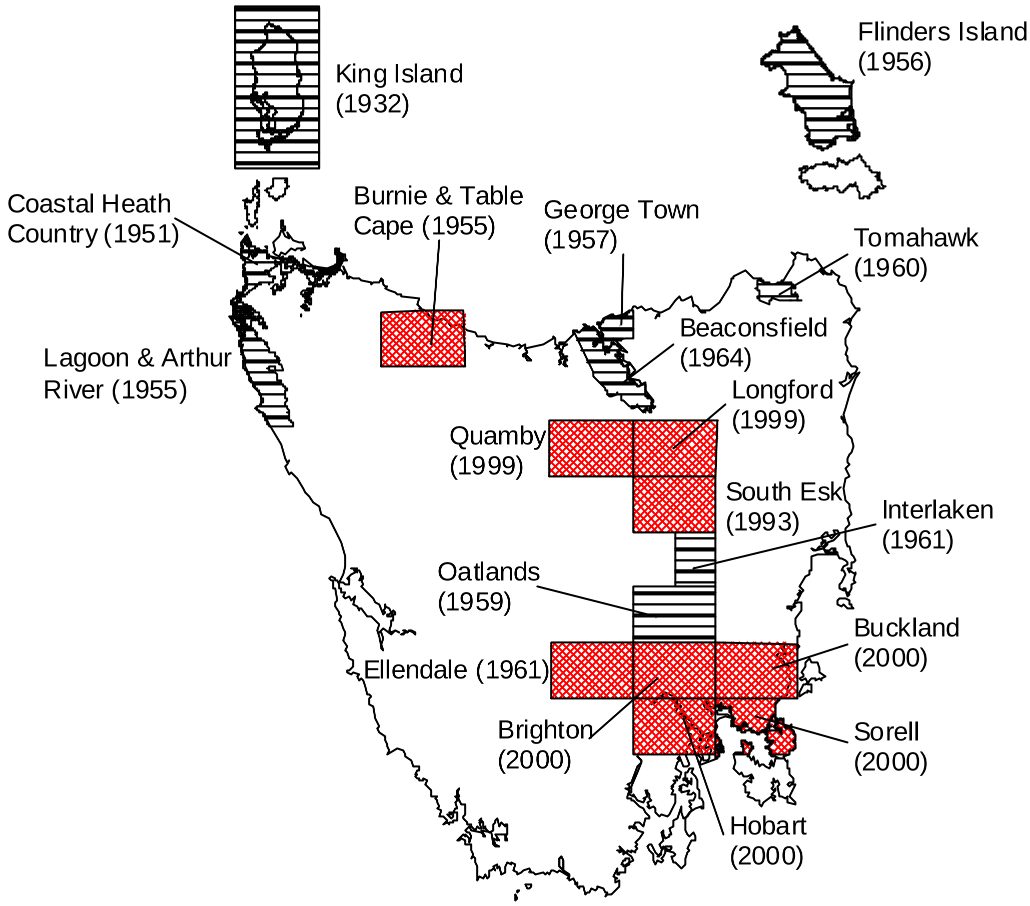
Spanswick S.B and Kidd D.B (2000) Revised **Ellendale** Reconnaissance Soil Map of Tasmania. Department of Primary Industry Water and Environment, Tasmania. Scale 1:100 000

Stephens, C.G. and Hosking, J.S. (1932), A soil survey of **King Island**. Bull. No 70 CSIRO Aust**;** Scale 1:126 720.

APPENDIX 7

INDEX MAP OF THE 1:100 000 RECONNAISSANCE SOIL SURVEYS OF TASMANIA

(Maps now available shown iby cross hatching)



DEPARTMENT of PRIMARY INDUSTRIES, WATER and ENVIRONMENT

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