QUAMBY
SOIL REPORT

Reconnaissance Soil Map Series of Tasmania

A Revised Edition

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Department of Primary Industries, Water and Environment
Tasmania
1999

of Divisional Report 9/58 Quamby

By K.D Nicolls
C.S.I.R.O Division of Soils, Adelaide, 1959

Quamby Report

and accompanying 1:100 000 Quamby
Soil Reconnaissance map

DEPARTMENT *of* PRIMARY INDUSTRIES, WATER *and* ENVIRONMENT
Tasmania

Natural Heritage Trust
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PREFACE

Correlation of the Reconnaissance Series

Over a 30 year period (1940 - 1967), the CSIRO Division of Soils, Adelaide, undertook a series of reconnaissance soil surveys and some more detailed 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 miles (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.

Edits to the Quamby Map

The Quamby Reconnaissance soil map (Nicolls,1959) adjoins the Longford map (Nicolls, 1958) on its eastern boundary and the South Esk soil map (Doyle, 1993) on its south east corner; for an index map of the 1:100 000 Reconnaissance soil surveys of Tasmania refer to Appendix 8. The area covered by the eastern half of the Quamby map falls within the Launceston Tertiary Basin (Tamar Graben); most of the map west of Cluan Tier and Westbury lies within the "Western Ranges" physiographic region (ABS, 1988). Due to their greater agricultural potential, the soils of the Launceston basin have been mapped at a much higher intensity than the soils of the Western ranges. The map units within the eastern half of the Quamby sheet are soil associations, ie an association of two or more soil types occurring in a characteristic pattern (Gunn *et al.*, 1988), whereas the map units in the south west are defined primarily on landform and parent material.

As the 1:100 000 South Esk soil map (southern half), (Doyle, 1993), has only recently been published and is in circulation, it has been our aim to correlate the Quamby map and the adjoining Longford map as much as possible to the South Esk soil map.

Due to resource constraints only a limited amount of time could be spent investigating map unit boundaries and soils of the less well defined soil associations. Map unit boundaries were changed along the Quamby and Longford map to produce, where possible, a seamless map and increase consistency across the two map sheets; these changes are outlined in Appendix 4. Map unit boundary changes have been done using aerial photos and field work and have been recorded in the Appendix of this report and in the Spatial Information System (SIS).

Nicolls (1959) mapped some of the polygons in the southern half of the sheet as more than one type of map unit. For example a single map unit may be labelled both “Brumby” and “Brumby with Panshanger”. This is really a complex unit. However, because the occurrence of Brumby with Panshanger is in only a third of the polygon, it is not possible without significant additional field work and aerial photograph interpretation to split this unit and other units like it. Therefore, we have left these units as is. They are identified on the paper maps and in a notes column attached to the polygon attribute table. 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. 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 as a DPIWE in-house publication, has map units coloured according to the Australian Soil Classification for the dominant SPC within each unit and no colour is assigned to a map unit if a SPC has not been identified. As this approach can lead to soil of different agricultural potential having a similar map colour, the second map is not suitable for general use.

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 Quamby Report

The Quamby report has been reformatted to provide more consistent structure across all reports. The soil terminology used within the Quamby 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. All the changes made to the report are shown in italics.

The map unit names used by the original surveyor have been preserved and underlined in the report, with the correlated map unit name and code appearing above. Map unit names have been changed were possible to be consistent with naming conventions outlined by Gunn *et al.* (1988). For a description of map units refer to Gunn *et al.*, p 33.

Soil Taxonomic Units
The soil taxonomic units used by Nicolls in this survey are soil series and great soil groups. These have been replaced by Soil Profile Class (SPC) as this will standardise taxonomic units across the Quamby 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 soils data in the DPIWE soil database (Talbot *et al.*, 1998) and additional field work. A key to soil horizon designations used within the SPCs is provided in Appendix 2. The lines separating horizons within the SPC reports are shown by broken and filled lines. The broken lines show a diffuse or gradual change to the next horizon whereas the filled lines show a clear or abrupt transition.

Laboratory Data

Analytical data is available for some of the soils within the Quamby map. Graley (1961) published analytical information for the soils of the Longford map. This information may be used where soils of the Quamby map correlate with soils of the Longford map. Some analytical data also resides within the DPIWE soil database. However most of the methodology used by Graley (1961) and for the analysed data in the soil database, is now out of date or unknown and these results are not necessarily comparable with modern day analytical data and have therefore not been included in this report. More recent soil analysis was undertaken during the South Esk survey. Where the South Esk SPCs correlate with the SPCs of the Quamby map, the analytical data for that SPC has been added to this report. A rating table of chemical values for the analytical data is provided in Appendix 1.

Soil Associations

Outlined below are the map units within the Quamby report which have been edited or identified as lacking the data needed to produce SPCs.

Alluvial Soils - The alluvial soils of the Quamby soil map generally correlate with the alluvial soils of the Longford (Nicolls, 1958) and South Esk (Doyle, 1993) soil maps. However some differences do occur and these have been outlined below.

> *A1 Association* - These soils have formed on basaltic alluvium and have been separated out of the A3 association (Canola or Kinburn association) using limited field work and aerial photo interpretation. This map unit has been renamed Hagley Association (Hg). The Hagley units occur in 2 areas, at Exton and near Westbury.
>
> *A2 Association* -The A2 within the eastern half of the Quamby map correlates with the Brumby Association of the Longford and South Esk soil maps and has been renamed accordingly. In the western half of the map, the A2 soil association forms a complex of alluvial soils and has been renamed Miscellaneous Soils 4. This unit includes soils belonging to the Brumby, Panshanger, Tara and Canola SPCs. Considerable additional work will be needed to separate these different soils.
>
> *A3 Association* - In the eastern half of the map sheet Nicolls mapped both the Kinburn and Canola soils as A3 Association. Where the A3 map unit drains areas of the Cressy soils in the eastern half of the map it has been renamed Kinburn Association. The A3 unit on the Whitemore and Liffey Rivers has been renamed Canola Association. The A3 map units associated with the Meander River and north east of Red Hills on the northern map boundary have also been renamed Canola. The A3 Association in the western half of the sheet, except for one polygon on the Lobster Rivulet, does not fit within either the Canola or Kinburn Associations. Nicolls described the soils in this area as “generally resembling the Canola but browner and less organic”. Field work in this area revealed that these soils are quite different to the Canola soils found in

eastern parts of the area. The soils within this area have been renamed Miscellaneous soils unit 4 (M4) and Miscellaneous soils unit 5 (M5); these two units are described below.

Miscellaneous Soils Unit 4 - This unit forms one polygon in the Dairy Plains area on the western boundary of the map and is a complex of many alluvial soils. The soils in this unit were formed from alluvial deposits from the Meander River, Western Creek and Dairy Rivulet, as well as alluvium from the surrounding Western ranges. Very little is known about this area and further work is necessary to define the major soil types.

Miscellaneous Soils Unit 5 - This unit exists in one location west of “Lemana Junction” along the Western highway. The soils of this area were formed from a different alluvial system to the Miscellaneous soils unit 4 and the Canola Association and they have therefore been put into a separate unit. No field work has been done within this unit and further work is needed to define the major soils.

Eastfield - Archer Complex - This map unit occurs in the west of the Quamby map and is not well understood. We suspect that this unit contains moraine deposits, but an investigation of this is beyond the scope of this project.

Future Work

The eastern half of the Quamby map has been mapped intensively and quite a lot of information is available for this region. However the soils within the western half of the sheet are poorly understood and documented. The soils in the north west are used quite extensively for agriculture. However they are currently poorly defined, and therefore there is a need for further work in this area particularly within the alluvial units Miscellaneous soils unit 4 and, to a lesser extent owing to its relatively small size, Miscellaneous soils unit 5. Further work is also needed in the Miscellaneous soils unit 2, this unit covers an area of approximately 174 square kilometres in the north west of the Quamby sheet. The complexity of the geology combined with a lack of data and time meant we were not able to define all the soil types within this unit and their relationship to each other.

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 by Nicolls, (1959).

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Division of Soils

RECONNAISSANCE SOIL MAP OF TASMANIA

SHEET 46 - QUAMBY

by

K.D. Nicolls

1. INTRODUCTION

This report is the eighth of a series under the general title "Reconnaissance Soil Map of Tasmania". *Each of these reports has been mapped at a scale of 1:63 360.* The survey area lies between latitudes 41 30'S and 41 45'S and longitude 146 30'E and 147 00'E**.** Discussion is limited to a brief explanation of the map, and further information is left to intended future publication.

A list of soil maps available in this series appears at the back of this report, *(Appendix 8). The Quamby map sheet covers 1155 square kilometres. There are two detailed surveys within the Quamby map sheet, Hubble (1944) and Stephens et al. (1942), (see Appendices 5 and 6).*

2. PHYSICAL ENVIRONMENT

The escarpment of the Great Western Tiers dominates the landscape in this area. It divides the Central Plateau to the south from the Launceston Tertiary Basin and associated country of low relief to the north. The top of the escarpment is a sharp line at elevations between *1100m and 1400m*. Thus the Quamby sheet includes a small portion of the Central Plateau at high elevation, extensive flat to gently undulating country of *140 - 340m* elevation, and the slopes of the Tiers between. The escarpment varies in width from *3 to 18km*. Its wider parts include the slopes of a) Quamby Bluff, a former portion of the Plateau isolated by erosion and retreat of the scarp, and b) Cluan Tier, a less elevated block. The Meander River and its tributaries drain seven eighths of the area.

2.1 Geology & Geomorphology

As in Tasmania generally, the geological structure of the area largely determines the pattern of soils, because of the strong influence of rock type upon soil formation. The escarpment is the result of the extensive block faulting which disrupted the surface of Tasmania during the lower to middle Tertiary Period *(see Appendix 3).*
The rocks older than the faulting are:

a) an ancient group of metamorphic rocks of the Precambrian, Cambrian and Ordovician Systems
b) the Permian System of mudstones (siltstones) sandstones and tillite
c) the Triassic System of sandstones and shales
d) the Jurassic System of dolerite, intrusive into a), b), and c).

The order of age is reflected in the location of the Triassic rocks mainly high on the slopes of the Tiers, the Permian on the lower slopes, and the metamorphics in a spur running off the slopes of the Tiers at Golden Valley and continuing north westwards as the Gog Range. The intrusive character of the dolerite, and the subsequent faulting, are reflected in the occurrence of the dolerite at high elevation as a capping to the Triassic sediments on the central Plateau and on Cluan Tier; as a long ridge trending north west through Bracknell; and as isolated hills elsewhere in the sheet. The accumulation of a great depth of sediments at the foot of the Tiers after the faulting produced the plains of the Launceston Tertiary Basin. Basalt flows over these sediments from the north west occupy the narrow trough between ridges of older rocks near Deloraine. In the Launceston Basin and adjoining country of low relief, the slow cutting of rivers through bars of hard rock is responsible for the development of a succession of river terraces and erosion surfaces in the basin sediments and other relatively soft rocks between. These surfaces control the pattern of soils in their locality. *The higher erosion surfaces have been deeply weathered*. The plateau top and the upper slopes of the Tiers, and occasionally the lower slopes, are mantled with solifluction deposits resulting from periglacial conditions during the Pleistocene Epoch *(see Appendix 3).* Characteristic soils develop on such deposits.

2.2 Climate

Rainfall varies greatly with physiographic factors. There are no records for this part of the Central Plateau and the upper slopes of the Tiers, but average annual rainfall there is probably about *1600mm*. At Golden Valley, halfway up the slopes, it is *990mm*. The rain shadow of the Tiers accounts for a relatively low precipitation in the north eastern corner of the sheet, where a figure of *711mm* is recorded at Carrick. The north western corner receives about *1020mm*.

Snow lies periodically in winter at the higher elevations, and severe night frosts are experienced in the Launceston Basin and especially around the floor of the escarpments. At Deloraine mean monthly temperature for February is $15\,^{\circ}C$ and for June - July $5\,^{\circ}C$, and on an average of 68 days per year minimum screen temperature reached $0\,^{\circ}C$ or lower. Westbury is slightly warmer.

2.3 Land Use

Land use also varies greatly. Much of the Launceston Basin country in the north eastern corner of the sheet, and the basaltic soils of the north and north west were settled early and have a long history of cropping with more recent intensive development of sown pastures. *A large percent of the lower slopes of the Tiers have been cleared but production there is generally much lower. Most of the partially cleared land is used for rough bush grazing.* Timber logging is still an important activity in several parts of the escarpments, mainly now at the higher elevations. The plateau top is a water catchment, *and is part of the Tasmanian World*

Heritage Area and now used for nature conservation and recreation. The towns of Deloraine and Westbury, including their environs, had populations of 2133 and 1214 respectively at the 1954 census.

3. SOIL LANDSACPES

3.1 The Soil Map

The Quamby sheet has been surveyed at three levels of intensity of mapping. Its eastern quarter, the gently undulating and intensively used country of Tertiary and Quaternary sediments, has been mapped as soil associations, like the Longford sheet adjoining it. Some of this portion has been surveyed in detail *(see Appendices 5&6).* The remaining three quarters of the sheet, a high proportion of which is less accessible, has been mapped on a broader scale with a combination of dominant Great Soil Group and soil parent material as the mapping unit. For uniformity within this map sheet, the soil associations of the eastern quarter are treated in the same way as the broader units, while for conformity with the Longford sheet the identity of most of them is preserved.

The soils are described under the headings of four main physiographic divisions. These are:
1) The plateau top.
2) The upper slopes of the Tiers escarpments.
3) The lower slopes of the Tiers escarpments, and other low hills.
4) The basin sediments, river terraces, and recent alluvium.

The soils of (3) occupy approximately half the sheet; those of (2) and (4) approximately one quarter each. Only *34 sq. km* of (1) falls within the Quamby sheet. The division between upper and lower slopes of the Tiers is not clear-cut; the solifluction mantle characteristic of the upper slopes extends in some places to the foot of the escarpment.

Soil boundaries are shown on the map in two ways. Full lines indicate those which either have been identified in the field at intervals of *two kilometres* or less, or are evident from the aerial photographs. Broken lines indicate those of which only the approximate location is known from field work 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

Ybs and HMP - Yellow-brown soils on solifluction deposits, and high moor peats *(13 sq. km)*
Only the northern fringe of the plateau top extends into the Quamby sheet but the soils there are representative of most of it. In this portion, elevations range from about *1100m to 1300m* at Dry's Bluff. Slopes vary from very steep to very gentle. Apart from the exposures of dolerite in situ, all slopes are mantled with solifluction deposits. *In places talus slopes and rock streams have deposits of only loose boulders, to below 1.5m in depth, but mostly they have an earthy matrix in which the rock fragments and boulders are embedded*. The frequency of such boulders (occasionally more than *3m* across) breaking the surface gives a false impression of the proportions of bare rock to soil cover. Within the Quamby sheet, no other rock than dolerite outcrops on the plateau top.

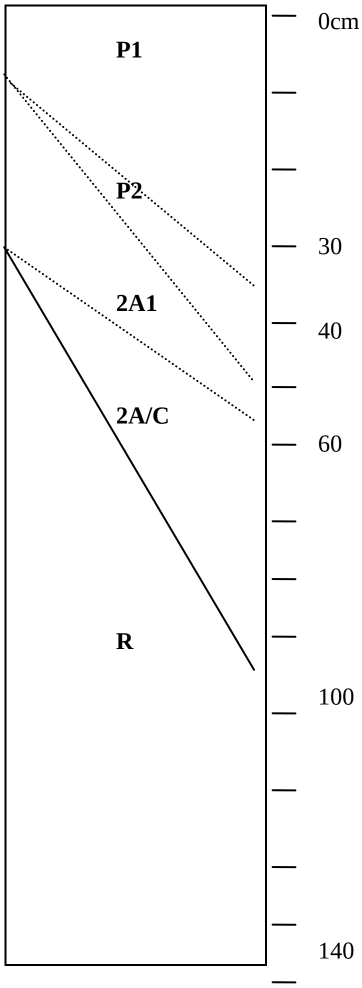
The soils of the solifluction deposits *(Miscellaneous Soils Mapping Unit 1)* on the plateau top correspond to those of the escarpments where dolerite is the sole or main contributor to the debris. These are described below. On the plateau top, the same range depending upon drainage exists, but extends under wet conditions to include the high moor peats *(Miscellaneous Soils Mapping Unit 3) Doyle, 1993.* These are similar profiles, except for their greater accumulation of organic matter at the surface. They are found in the marshy areas, usually the floors of shallow valleys and basins and are almost continuously waterlogged. The depth of peat is commonly *35 - 50cm*, rarely more than *80cm*. These peats are strongly acid, with the organic component usually exceeding 50% in the surface *30cm*. In places they appear to have been partially burned.

Land Use

The plateau top is a water catchment for hydro-electric purposes, and *a nature conservation reserve for the Tasmanian World Heritage Area.* Trees are sparse and stunted. Stoniness of the soils, low winter temperatures *and World Heritage status preclude it from further development.*

High Moor Peat Soil Profile Class

Name	**High Moor Peats SPC (M3**)
Concept	**Shallow, black peat and alpine humus soils underlaid 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
Geology	Quaternary marsh and swamp deposits
Landform	Closed depressions or swamps on a plateau
Drainage	Very poorly to poorly drained



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

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

2A1: Black (10YR 2/1,3/1); 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: Nicolls (1959), Doyle (1993), Leamy (1961)

4.2 Soils of the Upper Slopes of the Tiers Escarpment

The edge of the plateau top is sharply defined, in many places by dolerite cliffs *a couple of hundred metres high* and elsewhere by steep slopes.

Below most cliffs are extensive talus slopes with large boulder fields and little soil to support vegetation. Other slopes are mantled with solifluction deposits having boulders and rock fragments embedded in an earthy matrix. The fragments and boulders are of all sizes up to an occasional *3m* across and are irregularly distributed in the profile except for a general concentration in the surface *60cm*, and for a tendency for platy fragments to be oriented parallel to the slope. The solifluction mantle extends varying distances down the slopes, depending upon their steepness and their configuration. Where the escarpment is steepest, the solifluction mantle reaches to its foot. It tends to be shed by spurs, particularly at the lower levels, and to tongue down valleys. The character of the deposits depends largely upon their rock source. At the higher levels, dolerite is the main or only contributor; below the dolerite, Triassic sediments, mainly sandstone, add to the dolerite debris from above, and at lower levels there may be some contribution from Permian mudstones etc. Where valleys running obliquely across the escarpment head off the solifluction debris from above, the isolated spurs if high enough are mantled with debris of local origin, mainly from sandstone. In mapping, a distinction has been made between the soils on debris containing dolerite, *(Miscellaneous Soils Mapping Unit 1)* and those not containing dolerite, (*Liffey Association)*. The *Miscellaneous Soils Mapping Unit 1* constitute the mapping unit with the largest area in the Quamby sheet while the *Liffey soils* are of comparatively small extent.

4.2.1 Un-named Miscellaneous Soils Mapping Unit (M1)

Ybs - Yellow-brown soils on deposits derived wholly or partly from dolerite solifluction deposits. *(238 sq. km).*

The texture of these soils varies widely with the relative contributions of dolerite and other rocks to the matrix, and with the degree of physical comminution of these rocks. Thus where dolerite alone is the source, textures vary from gritty sand loam to clay, whilst where sandstone is the main source, sandy textures result. However within any one profile, texture tends to remain fairly uniform with depth. The soils vary also with drainage. Where poorly drained, the surface is a shallow peat and the mineral soil below is coloured yellow-grey, sometimes with grey mottling. Thin iron pans, common on such soils elsewhere, have not been observed in this area. Where well drained, the soils of the *Miscellaneous Soils Mapping Unit* usually have a bright yellow-brown colour, and surface accumulations of organic matter, though still moderately high, are less. These well drained profiles are generally open and friable, and may be *1.5m* deep. Some, in which dolerite is the main parent rock are strongly reddish coloured, and merge with the krasnozems on dolerite (*Archer SPC, Ar*). *At their lower margins the solifluction deposits are often a thin deposit of mostly dolerite stones*. In such places podzolic soils characteristic of the underlying rocks may be included with the solifluction soils on the map.

Land Use

The steep slopes and stony profiles make these soils generally unsuitable for agriculture development, although the land is exploited for its forest resource.

4.2.2 Liffey Association (Lf)

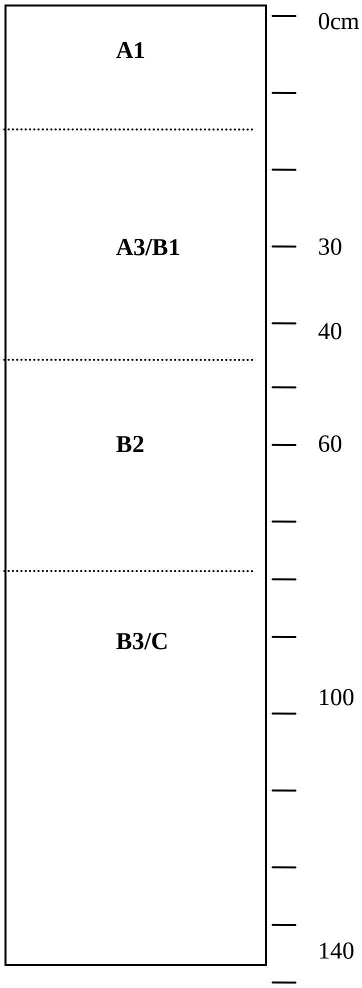
<u>YBss - On deposits derived wholly or mainly from sandstone without dolerite</u>. *(12 sq. km.)* These soils have a dark brownish grey sandy loam or loamy sand surface, over a greyish brown or yellowish brown sandy loam or sandy clay loam with many angular sandstone fragments of all sizes. Large boulders of sandstone may lie on the surface or be embedded in the profile. These profiles are mostly friable throughout, freely drained, *and greater than 1.5m in depth.*

Land Use

Land use is the same as for *Miscellaneous Soils Mapping Unit 1*. Because of difficulties of access to the steep slopes, and of stoniness, very little has been cleared, and some has reverted to bracken. These soils below about the *910m* level are heavily forested, largely with gum-topped stringy bark, *Eucalyptus delegatensis*, and still carry substantial timber reserves and plantations.

Liffey Soil Profile Class

Name	**Liffey SPC (Lf)**
Concept	**Brown sandy soils with poor structure and sandstone boulders throughout developed wholly or partly from sandstone solifluction deposits of the Western Tiers.**
Aust. Soil Classification	Yellow Kandosol
Great Soil Group	Yellow Earth
Principal Profile Form	Gn2.8
Mapping Units	Lf
Geology	Triassic sandstone solifluction deposits
Landform	Steeply undulating slopes of mountains (Western Tiers)
Vegetation	Wet sclerophyll forest, dominated by *Eucalyptus delegatensis*
Surface conditions	50-90% sandstone boulders
Permeability	Highly permeable
Drainage	Moderately well drained



A1: Black (10YR 3/2); loamy sand to sandy loam; massive structure,; very weak (moist) consistence; pH 5.5 - 6.0; gradual change to

A3/B1: Brown (10YR 4/3,4/4); sandy clay loam to clay loam fine sandy; massive structure; very weak (moist) consistence; pH 5.5 - 6.0; gradual change to

B2: Yellow or grey (2.5Y 6/4, 6/3, 6/2, 5/2 , 10YR 5/2, 5/3, 5/4, 6/4); sandy clay loam to sandy clay; massive structure; very weak (moist) consistence; 10-90% sandstone fragments of all sizes; pH 5.0 - 5.5; gradual boundary change to

B3/C: Yellow (5Y 7/3, 7/4, 2.5Y 7/4, 7/6, 10YR 7/4); clay loam sandy to sandy clay loam; massive or weak structure; very weak (moist) consistence; 10-100% sandstone fragments of all sizes, occasionally mudstone fragments

Morphological Sites: SOILCO 17
Analysed Sites: No sites available
Related soil names: Yellow brown soils on sandstone solifluction deposits (Ybss)
Previously described by: Nicolls (1959)

4.3 Soils of the Lower Slopes of the Tiers Escarpment, and other low Hills.

4.3.1 Quamby Association (Qu)

YPm - Yellow podzolic soils on mudstones. *(132 sq. km)*
The Permian rocks are exposed as nearly horizontal strata around the lower half of the Tiers escarpments, ie at elevations between *210m* and *610-760m*. Near the middle of this range are the sandstones of the Liffey group which yield some of the sandy soils mapped as Blessington *(Bl).* Above and below the *Blessington soils* are the yellow podzolic soils on mudstone (siltstone) and tilite, *(Quamby soils).* These soils therefore tend to run in two parallel belts, with a belt of sandy *Blessington* soils between. At the foot of the lower belt are the soils of the basin floor.

The dominant soils show a trend in soil profile development from west to east. In the west, profiles are not so strongly differentiated, and bleached sub-surface horizons are not well developed. There, a dark brownish grey loam or clay loam surface overlies a yellowish or brownish fine sandy loam or fine sandy clay loam sub-surface, and at about *30cm* a yellowish brown clay, *often very open and friable and containing many soft mudstone fragments*. In the east, on the same parent rocks, a grey sandy loam or silt loam surface overlies a strongly developed, sometimes cemented, bleached light grey fine sand to fine sandy loam sub-surface, and around *40cm* a yellowish brown clay or fine sandy clay sometimes mottled with grey.

In both areas, the clay may continue to *greater then 1.5m* in depth, and in both, quartz pebbles (erratics) may be scattered on the surface and through the profile.

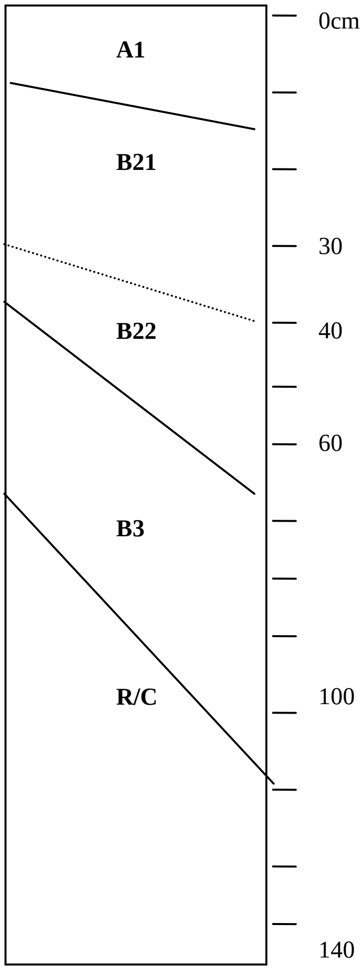
Minor soils include sandy profiles on thin bands of sandstone, and some highly organic soils in wet locations. Some soils at the higher elevations are formed on layered accumulations of fragmented detritus of appreciable depth and free internal drainage.

Land Use

Much of the *Quamby soils are* still forested and supply timber for milling. However, in marked contrast to soils on similar parent rocks in southern Tasmania, these soils have been sought after for agricultural use and many clearings follow them on steep slopes and to high elevations. Many of these early ventures have become neglected and there appears scope for considerable reclamation if limitations of access can be overcome.

Quamby Soil Profile Class

Name	**Quamby SPC (Qu)**
Concept	**Shallow, acid gradational soils with black loamy structured surface soils over brown or grey structured silty clay loams developed on Permian mudstone.**
Aust. Soil Classification	Grey or Brown Dermosols or Kurosols
Great Soil Group	Grey Earths
Principal Profile Form	Gn
Mapping Units	Qu, Qu-Bl
Geology	Permian mudstone (siltstones) and tillite
Landform	Simple moderate to steep rolling hillslopes on mountains of the Great Western Tiers
Vegetation	Wet sclerophyll - *Eucalyptus delegatensis*
Permeability	Very slow to slow permeability
Drainage	Imperfectly to moderately well drained



A1: Black (7.5YR 3/2, 10YR 3/2), loam silty loam, moderate 2-10mm subangular blocky structured; very weak (moist) consistence; 2-10% mudstone or other gravels; pH 5.0-5.5; clear or abrupt change to

B21: Mottled; brown or grey (7.5YR 5/4 - 10YR 6/2); silty clay loam; moderate 10-20mm prismatic or angular blocky structure; weak (moist) consistence; clay skins common; 2-20% mudstone pebbles or other gravels; soil aggregates dispersive (class 2-3); pH 5.0-5.5, gradual to smooth change to

B22: Mottled; brown or grey (7.5YR 5/4 - 10YR 5/2); silty clay loam to silty light clay; moderate 5-20mm angular blocky structure; weak (moist) consistence; clay skins common 2-20% mudstone pebbles or other gravels; soil aggregates dispersive (class 2-3); pH 5.0-5.5; clear to abrupt change to

B3: Brown or grey (10YR 4/3 - 2.5Y 6/2); silty clay loam; massive structure; 20 - 50% mudstone fragments or other pebbles; pH 5.0-5.5; clear or gradual change to

R/C: Weathered mudstone, siltstone or tillite

Morphological Sites: LRRBD L143, 158; LCKEN 160
Analysed Sites: CSIRO H177, 178, 179; LRRBD L156
Related soil names: Yellow podzolics on mudstone (Ypm), Qu SPC
Previously described by: Nicolls (1958), Doyle, (1993)

Soil Profile Class "Property" Grid Reference (AMG)	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	Total Bases	CEC	BASE SAT (%)	ESP (%)	Ca/Mg Ratio
												(milli-equivalents / 100 grams of soil)								
Quamby	SP 186	A1	0 - 8	5.5	0.06	165	5	418	6.50	0.260	25	5.68	2.71	0.20	0.72	9.31	20	45	1.0	2.10
"Connorville"	SP 186	B21	8 - 30	5.1	0.02	109	3	135	2.10	0.090	23	0.77	1.15	0.25	0.48	2.65	10	26	2.4	0.67
506575E	SP 186	B22	30 - 45	5.1	0.03	140	3	115	1.00	0.070	14	0.26	0.80	0.18	0.39	1.63	7	22	2.5	0.33
5360575N	SP 186	B/C	45 - 68	5.1	0.03	168	3	135	1.00	0.080	13	0.30	1.52	0.28	0.38	2.48	8	31	3.5	0.20

Soil Profile Class "Property" Grid Reference (AMG)	Profile Number	Horizon	Sample Depth (cm)	Gravel (of total) >2000 (μm) (%)	Sand Coarse >250 (μm) (%)	Sand Fine <250 (μm) (%)	Silt (%)	Clay (%)
Quamby	SP 186	A1	0 - 8	51	5	45	33	17
"Connorville"	SP 186	B21	8 - 30	26	5	27	40	28
506575E	SP 186	B22	30 - 45	37	9	27	37	28
5360575N	SP 186	B/C	45 - 68	0	11	27	33	29

Table 1 Analytical data for Quamby, taken from Doyle (1993)

4.3.2 Blessington Soil Association (Bl)

<u>Pss - Podzolic soils on Permian and Triassic sandstone</u>. *(23 sq. km).*
There are several sandstones in the Quamby area. Apart from the soils of the solifluction deposits, to which the Triassic sandstones may contribute in part *(Miscellaneous Soils Mapping Unit 1)* or wholly *(Liffey soils),* soils derived from sandstones are best considered as falling within three separate groups for mapping purposes. These are:

- i) narrow discontinuous belts of soils derived from thin bands of sandstones associated with the Permian mudstones *(Quamby soils);*
- ii) soils on the Caroline Creek sandstone, associated with the metamorphic rocks *(Miscellaneous Soils Mapping Unit 2);*
- iii) soils more or less in situ on the Triassic sandstones and on the Liffey group (Permian) sandstone, *(Blessington soils).*

The *Blessington soils* are group (iii). They are frequently associated with benches above cliffs formed by these sandstones around the slopes of the Tiers. Because the sandstones are nearly horizontally bedded, these cliffs and benches follow the contours.

The dominant soils have a grey to dark grey, loamy sand or sandy loam surface, over a light grey (bleached) sub-surface, over clay or sandy clay at about *50cm.* The clay may be firm to plastic, or occasionally friable, yellow-brown or mottled with grey, and may continue in depth to *120cm* or more. These soils correspond to those of the Blessington Association in the adjoining Longford sheet.

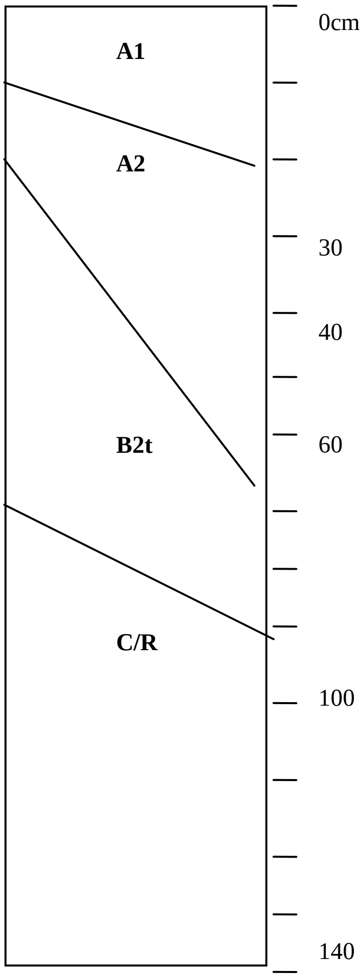
Other soils include deeper sandy profiles, with texture not finer than sandy clay loam to *110cm* depth, and dark coloured, poorly drained soils in some seepage areas on the benches. The latter may have surface textures of loam or clay loam, and bluish (gleyed) colours in the subsoil.

Land Use

Some areas of these sandstone soils still carry forest regrowth after early milling. Most have been partially or completely cleared, and some carry sown pastures but appreciable further development appears possible.

Blessington Soil Profile Class

Name	**Blessington SPC (Bl)**
Concept	**Brown sandy texture contrast soils with sandy surfaces and sandy clay or loamy subsoils developed on Permian and Triassic sandstones. Accumulation of sand on surface common.**
Aust. Soil Classification	Brown Sodosols
Great Soil Group	Yellow podzolic or Solodic soil
Principal Profile Form	Dy
Mapping Units	Bl, Bl-Ca, Bl-Ps
Geology	Permian and Triassic siliceous sandstones
Landform	Moderate to steeply undulating footslopes of scarps and hills
Drainage	Imperfectly drained



A1: Black (10YR 3/2); loamy sand to sandy loam; weak 5-20mm blocky structure parting to single grain structure; loose to very weak (moist and dry) consistence; 2-10% sandstone or quartz gravels; pH 5.5; clear to gradual smooth change to

A2: Grey (7.5YR 4/1, 4/2, 10YR 4/1, 4/2); sand to sandy loam; massive or single grained structure; very weak (moist or dry) consistence; 2-10% sandstone or quartz gravels; pH 5.5; E.C 0.2 dS/m; abrupt wavy change to

B2t: Mottled; brown (7.5YR ¾, 4/4, 5/8 10YR 5/4, 5/6, 5/8); sandy clay loam to sandy heavy clays; strong 50-100mm prismatic or columnar structure; firm to very firm (moist and dry) consistence; many clay coatings; pH 6.5 - 7.0; EC 0.4 dS/m (slightly saline); clear change to

C/R: Weathered sandstone

Morphological Sites: LRRBD L109, 146, 152; WTRBG 8M, 11P
Analysed Sites: No sites available
Related soil names: Unnamed dominant soil, Podzolic soils on sandstone, Blessington SPC
Previously described by: Nicolls (1958), Leamy (1961), Doyle, (1993)

4.3.3 Eastfield Association (Ea)

Pd - Podzolic soils on dolerite (Eastfield Association) *(80 sq. km)*
As elsewhere in Tasmania, dolerite outcrops are controlled by fault structures, very often with a north-west trend. A prominent example in the Quamby sheet is the low ridge of dolerite about *32km* long and *5km* wide, following the Tiers Fault through Bracknell. At the higher elevations on the Tiers, dolerite contributes largely to the solifluction mantle, *soils of the Miscellaneous Soils Mapping Unit 1*. Below elevations of about *460m*, it yields two groups of soils roughly divided by the Meander River, the krasnozems *on dolerite, Archer Association (Ar)* to the north and west of the river, and the podzolic soils, *Eastfield Association (Ea)* to the south and east. Soils with incipient podzolic features only have been included with the *Eastfield Association*. This group corresponds to the Eastfield Association of the adjoining Longford sheet.

Soils of the Eastfield series, and similar profiles, are dominant. In the *Eastfield SPC*, a grey-brown loam or fine sandy loam surface overlies a light grey fine sand to sandy loam sub-surface, often with much fine rounded ironstone gravel (buckshot). Below about *30cm* is mottled yellow-brown, grey-brown and yellow-grey firm to plastic clay. The clay may rest sharply on little-weathered dolerite boulders at any depth, or there may be a transitional zone of decomposing rock, usually below *60cm*. Clay penetrates down weathering planes between boulders. Dolerite fragments and stones of all sizes are common throughout the profile.

Particularly south of Bracknell, brown soils, *(Bloomfield SPC),* common elsewhere in the State, are intermixed with podzolic soils. They have a greyish brown fine sandy loam to loam surface, over-lying at about *20cm* a brown to red-brown firm to friable clay. This may rest sharply on rock, or pass to a transitional zone of clay and weathering rock below about *50 cm*. These brown soils are often very stony. All grades between the *Eastfield SPC* and the brown soils are to be found.

Where dolerite has been exposed by erosion of basin sediments, or where it has been thinly buried by the basin sediments or by windblown sand, various soils of mixed parentage occur. Where dolerite outcrops at the level of the Woodstock surface, small extents of soils resembling the Woodstock *(Wk)* or the lateritic krasnozems *(ArLp)* may be mapped with *Eastfield*.

Land Use

In this area these soils have been developed little for agricultural use. Firewood and some millable timber are still taken from them. About half the area has been partially cleared and provides rough grazing, while isolated paddocks carry sown pasture. There appears scope for considerable further development, though rock outcrop and loose stone, and in some places steep slopes, are limiting factors.

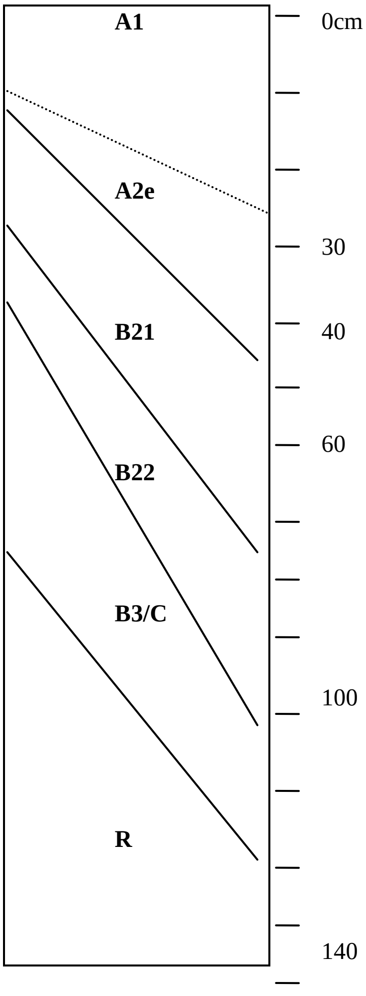
Eastfield Soil Profile Class

Name — **Eastfield SPC (Ea)**

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

Aust. Soil Classification — Brown Chromosols and Brown Sodosols
Great Soil Group — Grey-Brown Podzolics
Principal Profile Form — Db, Dd
Mapping Units — Ea, Ea-Ar, Ea-Ps, Ea-Wk
Geology — Jurassic Dolerite
Landform — Moderate to steeply undulating hills

Permeability — Slowly permeable
Drainage — Imperfectly drained



A1: Black (10YR 2/1, 3/1, 3/2); 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, 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 leached (10YR 4/2, 5/1, 5/2, 6/2 (moist)); fine sand to fine sandy loam or silty 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 6.0 - 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; moderate, 50-200mm angular blocky or columnar structure, 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 or red (2.5Y 4/4, 4/6, 10YR ¾, 4/3, 4/4, 4/6, 5/4, 7.5YR 4/4, 4/6, 5YR 3/3); heavy clay; 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: LRRBD L6, 34, 93, 126
Analysed Sites: CSIRO H24, H163; LRRBD L12, 43
Related soil names: Eastfield Series, Eastfield Sand, Type I, Eastfield SPC
Previously described by: Nicolls (1958), Doyle, (1993), Stephens *et al.* (1942)

Soil Profile Class "Property" Grid Reference (AMG)	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	Total Bases	CEC	BASE SAT (%)	ESP (%)	Ca/Mg Ratio
												(milli-equivalents / 100 grams of soil)								
Eastfield	SP 12	A1	0 - 8	5.4	0.14	166	15	348	2.00	0.194	10	3.19	1.53	0.33	0.88	5.9	10	61	3.4	2.08
"Kelvin Grove"	SP 12	A2	8 - 18	6.4	0.04	115	2	193	0.80	0.096	8	2.69	1.78	0.48	0.40	5.4	9	57	5.1	1.51
540600E	SP 12	B21tg	18 - 60	8.1	0.11	70	0	491	0.70	0.093	8	9.64	18.65	4.57	1.38	34.2	42	82	11.0	0.52
5376300N	SP 12	B22t	60 - 70	8.9	0.15	122	0	441	0.70	0.075	9	10.09	20.63	5.91	1.25	37.9	44	86	13.4	0.49
	SP 12	Ctk	70 - 80	9.3	0.45	132	0	324	0.40	0.039	10	17.15	17.25	5.36	0.85	40.7	34	119	15.7	0.99
Eastfield	SP 43	A1	0 - 16	5.8	0.08	386	7	62	4.10	0.310	13	11.21	4.08	0.21	0.18	15.7	20	77	1.0	2.75
"Leverington"	SP 43	A2	16 - 23	6.3	0.03	143	0	44	1.30	0.123	11	7.15	3.90	0.16	0.14	11.4	16	71	1.0	1.83
520800E	SP 43	B21t	23 - 47	6.8	0.04	124	0	123	0.70	0.100	7	15.04	15.16	0.53	0.40	31.1	38	81	1.4	0.99
5375300N	SP 43	B22t	47 - 65	7.4	0.04	109	0	123	0.60	0.070	9	14.17	15.53	0.78	0.38	30.9	41	76	1.9	0.91
	SP 43	B3	65 - 80	8.2	0.05	79	0	142	0.10	0.020	5	15.37	16.69	1.23	0.36	33.7	42	81	2.9	0.92

Soil Profile Class "Property" Grid Reference (AMG)	Profile Number	Horizon	Sample Depth (cm)	Gravel (of total) >2000 (µm) (%)	Sand Coarse >250 (µm) (%)	Sand Fine <250 (µm) (%)	Silt (%)	Clay (%)	Clay Mineralogy Smectite	Kaolinite	Illite
									(Approximate weight %)		
Eastfield	SP 12	A1	0 - 8	0	14	50	18	18		80	20
"Kelvin Grove"	SP 12	A2	8 - 18	0	18	48	16	18	25	65	10
540600E	SP 12	B21t	18 - 60	0	4	17	11	68	80	20	
5376300N	SP 12	B22t	60 - 70	6	13	17	12	59	85	15	
	SP 12	B3	70 - 80	4	28	16	9	47			
Eastfield	SP 43	A1	0 - 16	0	4	54	29	14			
"Leverington"	SP 43	A2	16 - 23	0	6	52	26	17			
520800E	SP 43	B21t	23 - 47	0	2	30	13	56			
5375300N	SP 43	B22t	47 - 65	1	2	27	15	56			
	SP 43	B3	65 - 80	1	2	41	10	47			

Table 2 Analytical data for Eastfield, taken from Doyle (1993)

4.3.4 Miscellaneous Soils 2 (M2)

RYP - Red and Yellow Podzolic Soils and Podzols on various metamorphic rocks.
(174 sq. km)
A south easterly continuation of the Gog Range runs from the north western corner of the Quamby sheet to merge with the slopes of the Tiers at Golden Valley. *Several rock types are represented in this sharply defined ridge but all are older than Permian and the rocks are extensively folded*. Slopes are mostly gentle to moderate, but steep and rugged ridges are associated with the Precambrian quartzite. The Meander River and other streams cut across these ridges and are confined in gorges. The soils vary considerably with the character of the underlying rock, but form a natural group for mapping purposes.

The red and yellow podzolic soils are co-dominant. Their relationships with the various parent rocks have not been fully established but the red podzolics appear to be particularly associated with the Owen conglomerate. In the red podzolic soils a dark grey to greyish brown sandy loam surface overlies a reddish brown to red-brown sandy loam, sandy clay loam or sometimes friable clay. In road cuttings of moderate depth these soils may easily be mistaken for the basaltic krasnozems, (*Deloraine soils, Dl)*, but they differ in texture and in structure. Angular siliceous gravel and stones are scattered through the profile.

In the yellow podzolic soils, a grey to grey-brown fine sandy loam surface overlies a lighter coloured fine sandy loam sub-surface and at *about 30cm* depth a friable yellow-brown light clay or sandy clay. This clay may continue to *110cm* or sometimes lies sharply on partially weathered rock at shallower depths. Angular siliceous gravel and stone occur on the surface and through the profile. There are some gritty yellow podzolic soils associated with coarse textured granite-like rocks.

In some places on the Precambrian quartzites there are podzols with a dark grey fine sandy surface and a light grey sandy sub-surface with much angular quartzite over a very irregular iron-organic pan.

Land Use

Little agricultural use has been made of these soils. Firewood and some timber is still taken from them and the steeper country is unlikely to be much further developed in the foreseeable future. Extension of the small existing clearings on the gentle to moderate slopes depend upon economic factors.

4.3.5 Deloraine Association (Dl)

Kb - Krasnozems and other soils on basalt. *(93 sq. km).*
In this sheet, basalt is confined to the lowlands, its elevation seldom exceeding *340m*. It occurs chiefly in the north western quarter, with the major area centred around Deloraine. The basalt landscape is one of low rolling hills, with slopes gentle to moderate. Of the three groups of basaltic soils (*Deloraine (Dl), Deloraine Lateritic variant (DlLv), and Hagley (Hg)), Deloraine covers the largest area.*

The dominant soils are krasnozems, which are deep freely draining, reddish coloured, slightly to moderately acid, friable clays with the apparent texture of clay loam or even loam at the surface. An average profile has a brown to reddish-brown friable clay loam surface, overlying at about *26cm* a reddish brown to red-brown friable clay with increasing quantities of highly weathered basalt below about *77cm*. Boulders of basalt are common on the surface and throughout the profile but the depth to continuous unweathered rock may be a *few metres.*

The krasnozems approach their climatic limit between Exton and Westbury, and eastward of that area krasnozem profiles occur intermixed with shallower brown and dark coloured soils on basalt, particularly on lower slopes. Around Hagley and Whitemore the basalt itself is thin and dissected, and separation of the basaltic soils from the *Cressy soils (Cs)* in mapping is difficult. Included with the basaltic soils in this part of the sheet are some containing "foreign" materials such as quartz gravels, derived from formerly-overlying river terraces. The basalt ridge between Needles and Chudleigh has slump formations around its sides, with dark coloured, poorly drained soils on the slump benches.

Land Use

Almost all of the basalt area has been cleared and most is intensively farmed. Much of it, formerly heavily cropped, now carries sown pasture.

4.3.6 Deloraine Association Lateritic Variant (DlLv)

<u>LKb - Lateritic krasnozems on basalt.</u> *(10sq. km*)
An ancient, almost flat erosion surface, once continuous from the vicinity of Deloraine eastward to merge with areas of the Woodstock soils *(Wk),* is now represented by two areas of very gently undulating country north west and south east of Deloraine, and by other isolated hilltops, at the highest levels reached by the basalt. Massive laterite, in tabular form *90 - 120cm* thick and occasionally several metres across, outcrops sporadically, while angular pieces of semi-soft laterite, *2.5 - 25cm* across, are scattered throughout the soils.

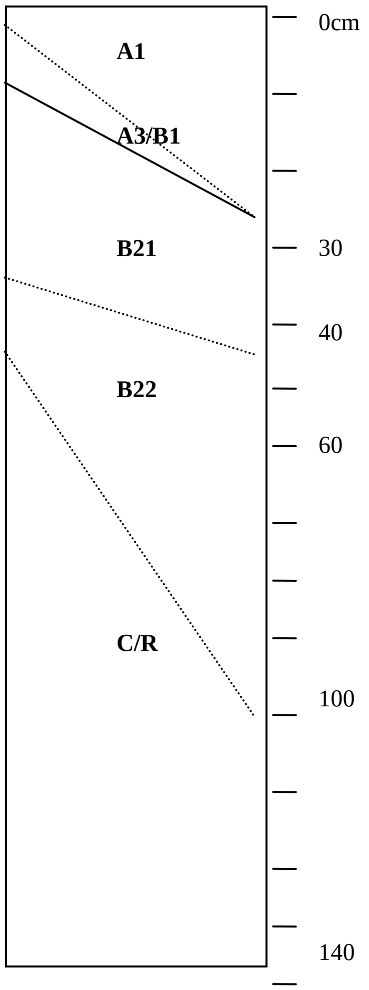
The soils vary little throughout the areas mapped. They generally resemble the *Deloraine* krasnozems on basalt typical of the surrounding, more dissected country, but tend to be more loamy, more friable, and more strongly reddish coloured. The occurrence within them of high proportions of the lateritic gravel and stones distinguishes them from the normal krasnozems. Basalt floaters are relatively uncommon.

Land use

Same as that of the *Dl*.

Deloraine Soil Profile Class

Name	**Deloraine SPC (Dl)**
Concept	**Red friable clayey soil developed on Tertiary basalt**
Aust. Soil Classification	Red Ferrosol
Great Soil Group	Krasnozems
Principal Profile Form	Gn3.11
Mapping Units	Dl, DlLv
Geology	Tertiary Basalt
Landform	Upper to mid slope of gently to moderately undulating hillslopes of low hills. Mostly cleared
Permeability	Highly permeable
Drainage	well drained



A1: Black or red (2.5YR 3/2, 5YR 3/3, ¾, 7.5YR 3/2); loam to clay loam; strong <2mm granular structure; moderately weak (dry) consistence; very few 2-6mm ferruginous nodules; 0-20% basalt gravels; pH 5.5 - 6.5; gradual to diffuse change to

A3/B1: Black or red (2.5 YR 3/2, 5YR 3/3); light to heavy clay; moderate to strong <2mm granular structure; moderately weak to firm (dry) consistence; none to very few, <2-6mm, ferruginous nodules; 0-20% basaltic gravels; pH 5.5 - 6.5; clear change to

B21: Red (2.5 YR 3/4, 3/6, 5YR 3/4); clay loam to light clay; moderate to strong <2mm granular structure; very few to few, <2mm-6mm, ferruginous nodules; 0-50% basaltic gravels; diffuse change to

B22: Red (2.5 YR 3/6, 4/6, 5YR 3/4) ; medium to heavy clay; strong to weak, <2mm granular structure; firm (dry) consistence; none to very few,<2mm, ferruginous nodules; 0-10% basaltic gravel; diffuse change to

C/R: Weathered basalt

Morphological Sites: SOILCO 24; Cards 869, 883, 974
Analysed Sites: CSIRO H91, H197
Related soil names: Krasnozems on basalt (Kb); Lateritic Krasnozems on basalt (LKb)
Previously described by: Nicolls (1959)

4.3.7 Archer Association (Ar)

Kd - Krasnozems on dolerite. *(23 sq. km)*
The two main occurrences of these soils are north east of Deloraine and south east of Meander. Slopes are generally moderate to steep, and rock outcrop is fairly common.

The dominant soils closely resemble the krasnozems on basalt, *Deloraine SPC*, but are more stony and usually shallower. Associated with them in some places are small areas of podzolic soils, *Eastfield, and transitional soils between the Archer and Eastfield soils*. On Warner's Sugar Loaf where solifluction deposits derived from dolerite mantle the higher slopes, the soils at their lower periphery are often reddish and friable, and difficult to distinguish from the surrounding residual krasnozems. The possible extent of solifluction material on Archer's Sugar Loaf is also difficult to define.

Land Use

Only small areas of these soils have been cleared, which is suprising in view of their resemblance, where not too stony, to the intensively farmed krasnozems on basalt. *The remaining trees provide firewood and fence posts, and some areas still carry millable timber.*

4.3.8 Archer Association Lateritic Variant (ArLv)

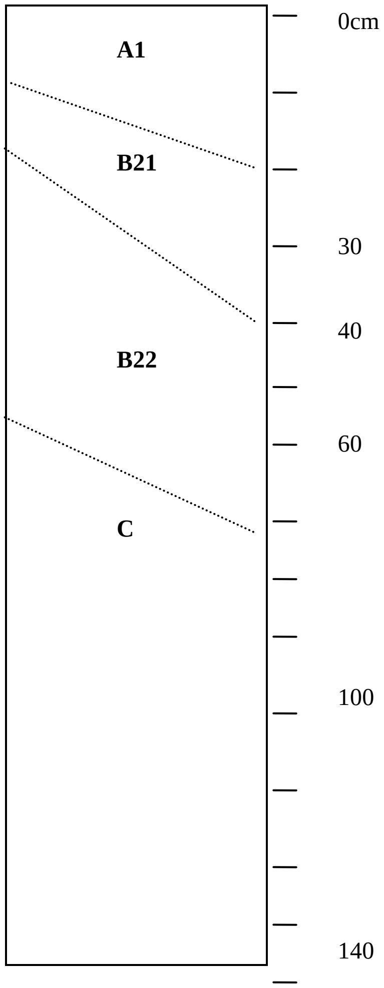
LKd - Lateritic krasnozems on dolerite. *(12 ha)*
Only one small patch *(about 12ha)* of these soils, near Bracknell, is shown on the map but others of similar extent may be included with areas of podzolic soils on dolerite *Eastfield Association (Ea) at* approximately the same elevation *(182m*), and with areas of *Woodstock Dolerite Variant (WkDv)* where dolerite outcrops amongst them. The soils resemble their basaltic counter-part *Deloraine Lateritic Variant (DlLv)*. Associated with them may be soils with a sandy surface over the red-brown friable clay. On the adjoining Longford map sheet *(Nicolls 1958)* these soils are indicated with a red stipple as lateritic soils of the Eastfield Association.

Land Use

Same as Archer Association

Archer Soil Profile Class

Name	**Archer SPC (Ar)**
Concept	**Stony shallow, red or brown friable clayey soil developed on dolerite**
Aust. Soil Classification	Red or Brown Ferrosols
Great Soil Group	Krasnozem
Principal Profile Form	Gn3.12, Gn3.21
Mapping Units	Ar, ArLv
Geology	Jurassic dolerite
Landform	Moderate to steep hillslopes of hills and mountains
Vegetation	Dry sclerophyll forest
Permeability	Highly permeable
Drainage	Well drained



A1: Red or brown (5YR 3/3, 10YR 3/6); clay loam to light medium clay; strong <2mm - 5mm granular or subangular blocky structure; moderately firm (dry) consistence, very few to common 2-6mm manganiferous nodules; 50-90% dolerite fragments or pebbles; pH 5.5 - 7.5; gradual to diffuse change to

B21: Red or brown (5YR 3/3, 10YR 4/4); light to light medium clay; strong, 2mm-5mm granular or subangular blocky structure; moderately firm (dry) consistence; very few to common, 2-6mm manganiferous nodules, 20-50% dolerite fragments of variable size; pH 6.0 - 7.0; gradual to diffuse change to

B22: Red or brown (5YR 4/6, 10YR 4/6); medium clay; strong 2-5mm subangular or polyhedral structure; firm (dry) consistence; very few to common, 2-6mm, manganiferous nodules or soft veins; 10-20% dolerite fragments of variable size; pH 6.0 - 7.0; clear to diffuse change to

C: Weathered dolerite

Morphological Sites: SOILCO 21, 25
Analysed Sites: None available
Related soil names: Holloway (Ho), Archer Lateritic Krasnozems (ArLv)
Previously described by: Laffan *et al.* (1995), Nicolls (1959)

4.4 Soils of the Basin Sediments and River Terraces

4.4.1 Woodstock Association (Wk)

LPw - Lateritic Podzolic Soils of the Woodstock Association. *(38 sq. km)*
The Woodstock soils are characteristic of very gently undulating country at the highest levels *(170 - 200m)* reached by the basin sediments (either their original surface, or an ancient erosion surface cut in these sediments). They are very old and of low fertility.

The dominant soils are of the *Woodstock SPC,* in which a grey-brown loamy sand to sandy loam surface, sometimes with ironstone gravel, overlies at about *13cm* a light brown or sometimes light grey, sub-surface horizon of loose sand to sandy loam containing varying but usually large amounts of ironstone gravel of about *1cm in diameter*. At about *45cm* is a sharp change to a brightly coloured, mottled yellow-brown, red - brown and grey clay, friable over a wide range of moisture content, which continues in depth to *greater than 1.5m.* Occasionally massive boulders of concretionary laterite lie on the surface.

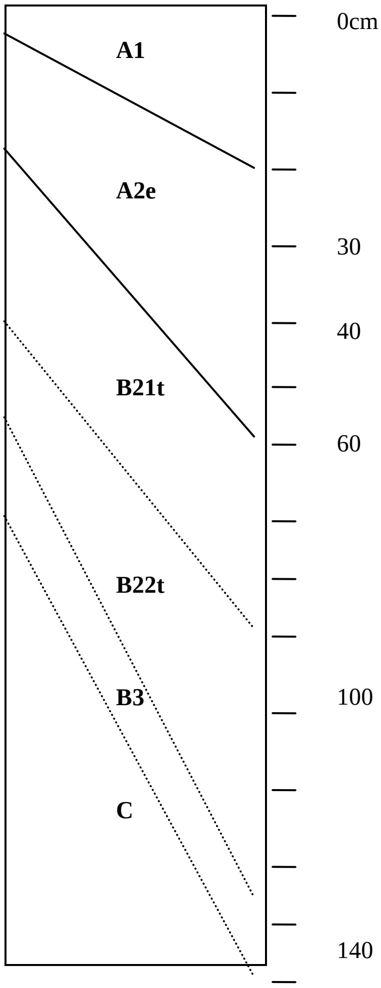
In drainage ways and small lagoons are miscellaneous heavier soils with duller coloured clays. Eroded slopes have soils of the Cressy Association *(Cs).* Where dolerite outcrops amongst the Woodstock soils at the same level, lateritic soils are formed on it also. These may resemble the Woodstock series but with a bright red-brown clay, or may be lateritic krasnozems *(ArLv).*

Land Use

Within the Quamby sheet only small areas of the Woodstock soils have been cleared and most still carry a forest mainly of black peppermint (*Eucalyptus amygdalina)* which provides firewood and fence posts and some bush grazing. Some pastures have been established successfully on Woodstock soils and this should eventually be possible on the remainder. The gravelly sub-surface horizons of the Woodstock soils are a valuable source of road-surfacing materials.

Woodstock Soil Profile Class

Name	**Woodstock SPC (Wk)**
Concept	**Deeply weathered, texture contrast soils with sandy surfaces rich in ironstone, structured brown clay subsoils developed on peneplain of the tertiary Launceston basin.**
Aust. Soil Classification	Brown Kurosols or Brown Sodosols
Great Soil Group	Lateritic podzolics
Principal Profile Form	Dy, Dr
Mapping Units	Wk, Wk-Ps
Geology	Laterised tertiary lake sediments
Landform	Flat to gently undulating dissected peneplain
Vegetation	Dry sclerophyll forest dominated by *Eucalyptus amygdalina* and *E. viminalis, Banksia marginata* and A*cacia dealbata*
Surface Condition	Occasional petroferric boulders and shale (laterite)
Permeability	Moderately permeable
Drainage	Imperfectly drained



A1: Black or grey (10YR 3/1, 3/2 , 5/2, 7.5YR 3/2); loam sand to sandy loam; single grained or weak <2 - 5mm subangular blocky structure; loose or weak (moist) consistence; few to common 2-6mm ferruginous nodules; pH 5.5-6.0; clear to diffuse smooth change to

A2e: Conspicuously bleached grey (10YR 4/2, 4/3. 5/2, 5/3,6/2); loamy sand to sandy loam; single grained, massive or weak <2mm subangular blocky structure; loose to weak (moist) consistence; common to abundant 2-20mm ferruginous nodules, occasional quartz pebbles present; pH 5.5-6.0; sharp to abrupt wavy change to

B21t: Mottled; brown (10YR 4/6,5/4,5/6,5/8, 7.5YR 4/6,5/6, 5YR 4/6,5/6,5/9); medium to heavy clay; moderate 5-10mm angular blocky breaking to 2-5mm angular blocky structure; firm to very firm (moist) consistence; common distinct clay skins; few to common 2-20mm ferruginous nodules; pH 6.0-6.5; gradual or diffuse change to

B22t: Mottled; brown (2.5Y 5/6, 10YR 4/6,5/6,5/8, 7.5YR 4/6,5/6); medium to heavy clay; weak 2-10mm angular blocky structure; firm to very firm (moist) consistence; common distinct clay skins; few to common 2-6mm ferruginous nodules; pH 5.5-6.0; gradual to diffuse change to

B3: Mottled; brown (10YR 4/6, 5/6,5/8, 7.5YR 5/6, 5/8); light to heavy clay; firm (moist) consistence; few to common 2-6mm ferruginous nodules; pH 5.0-5.7; gradual change to

C: Weathered lateritic clays.

Morphological Sites: CARDS CO400, LRRBD L100, 125, 132, 148, 17, 22, 3, 37, 4, 50, 73
Analysed Sites: CSIRO H34, H20, H19, H16; LRRBD L147
Related soil names: Woodstock sand, Woodstock series
Previously described by: Stephens *et al.* (1942), Nicolls (1958, 1959), Doyle (1993)

Soil Profile Class "Property" Grid Reference (AMG)	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	Total Bases	CEC	BASE SAT (%)	ESP (%)	Ca/Mg Ratio
												(milli-equivalents / 100 grams of soil)								
Woodstock	SP 166	A1	0 - 20	5.5	0.04	57	2	14	1.50	0.094	16	2.24	1.22	0.40	0.25	4.1	5	87	8.5	1.84
"Cleveland Hwy"	SP 166	A21	20 - 33	6.8	0.02	16	2	14	0.12	0.014	9	0.17	0.50	0.29	0.29	1.2	2	56	13.0	0.33
572000E	SP 166	A22	33 - 51	6.8	0.02	23	1	14	0.00	0.013	0	0.13	0.60	0.33	0.28	1.3	2	64	15.8	0.22
5333200N	SP 166	B21t	51 - 95	6.1	0.15	65	1	64	0.00	0.031	0	0.83	19.38	3.75	0.53	24.5	45	55	8.4	0.04
	SP 166	B22t	95 - 110	6.8	0.19	63	1	79	0.00	0.020	0	0.75	17.33	4.23	0.57	23.0	39	59	10.8	0.04
Woodstock	H 19	A1	0 - 4	6.4		70			2.10	0.176	12	2.70	1.00	0.10	0.22	4.0	16	25	0.6	2.70
CSIRO	H 19	A21	4 - 10	5.6		40			0.90	0.075	12	1.60	0.21	0.10	0.15	2.1	8	26	1.3	7.62
Somerset	H 19	A22	10 - 28	5.7		10			0.30	0.032	9									
530456E	H 19	A23	28 - 36	6.2																
5370494N	H 19	B21	36 - 56	6.3								0.74	7.20	1.70	0.22	9.9	22	45	7.8	0.10
	H 19	B22	56 - 86	6.4																
	H 19	B23	114 - 127	5.4								1.10	7.80	2.90	0.09	11.9	23	51	12.6	0.14

Soil Profile Class "Property" Grid Reference (AMG)	Profile Number	Horizon	Sample Depth (cm)	Gravel (of total) >2000 (μm) (%)	Sand Coarse >250 (μm) (%)	Sand Fine <250 (μm) (%)	Silt (%)	Clay (%)	Clay Mineralogy (Approximate weight %): Smectite	Kaolinite	Illite	Goethite
Woodstock	SP 166	A1	0 - 20	0	7	83	6	4		100		
CSIRO	SP 166	A21	20 - 33	3	6	83	7	4		85	15	
Somerset	SP 166	A22	33 - 20	16	7	82	6	4		90	5	5
530456E	SP 166	B21t	51 - 33	0	1	10	3	86	5	80		15
5370494N	SP 166	B22t	95 - 110	0	2	13	3	81	5	80		15
Woodstock	H 19	A1	0 - 4	22	11	60	17	9				
"Cleveland Hwy"	H 19	A21	4 - 10	38	9	65	16	8				
572000E	H 19	A22	10 - 28									
5333200N	H 19	A23	28 - 36									
	H 19	B21	36 - 56		1	9	1	86		65-80		20-30
	H 19	B22	56 - 86									
	H 19	B23	114 - 127	22	6	15	8	72				

Table 3 Analytical data for Woodstock, taken from Doyle (1993)

4.4.2 Cressy Association (Cs)

<u>LPc - Lateritic Podzolic Soils of the Cressy Association.</u> *(62 sq.km)*
The Cressy soils are characteristic of gently sloping country resulting from a moderate degree of erosion of either the Woodstock or the Brickendon surfaces, and consequently at somewhat lower levels *(150 - 200m)* than these surfaces. At depth the Cressy soils closely resemble the Woodstock and the Brickendon, but in contrast to the sandy A horizons of these older soils, the Cressy soils have a surface texture of loam to clay loam.

The dominant soils are of the *Cressy SPC*, with a dark grey-brown to brown, loam to clay loam surface, overlying at about *15cm* depth a reddish brown to grey-brown rather friable clay passing below to a brightly coloured, variously mottled yellow-brown, brown, grey and red clay friable over a wide moisture range. Platy or rounded ironstone gravel occurs throughout the profile and may be scattered over the surface.

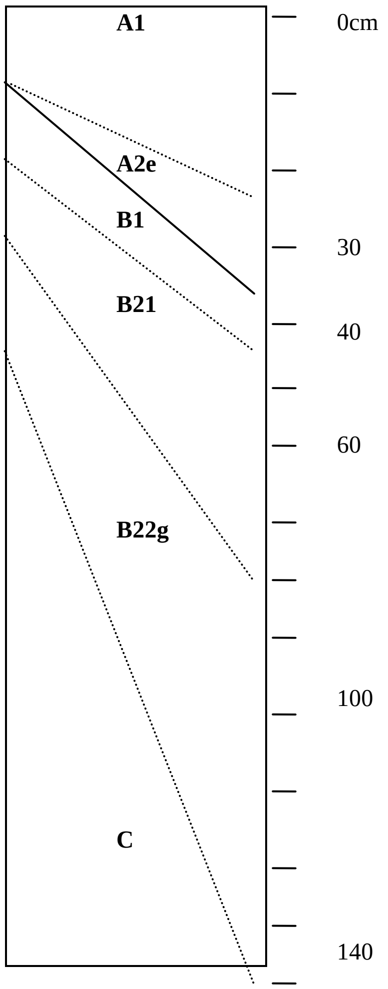
In small depressions and drainage ways through this association, the Cressy soils grade continuously into the Kinburn soils described below. Around Westbury, Hagley and Whitemore the Cressy soils merge with the *Deloraine soils* across ill-defined boundaries. Very occasionally in the Quamby sheet, through more commonly further east, the Cressy soils may have light coloured (bleached) sandy sub-surface horizons. Where the Cressy soils have been derived by erosion of a former Brickendon terrace, they are often scattered with waterworn quartz pebbles.

Land Use

The Cressy soils have been extensively exploited and most have undergone prolonged cultivation. Correction of the molybdenum deficiency characteristic of these soils has enabled the establishment of sown pastures, and fat lamb raising has largely replaced their former cultivation. Potassium deficiency is common.

Cressy Soil Profile Class

Name	**Cressy SPC (Cs)**
Concept	**Structured brown clay loam surface soils overlying clayey subsoils containing shale fragments on gently undulating slopes between the Woodstock and Brickendon surfaces of the Launceston basin**
Aust. Soil Classification	Brown Dermosols
Great Soil Group	Lateritic podzolic soil
Principal Profile Form	Dy3, Dr3, Db2, Gn3
Mapping Units	Cs
Geology	Lateritic tertiary lake sediments of the Launceston basin
Landform	Eroded gently to moderately undulating hillslopes formed by the dissection of a peneplain
Vegetation	Savannah woodland dominated by *Eucalyptus pauciflora* and *E. ovata*
Surface Conditions	Occasional shale lateritic boulders, ironstone pebbles common
Permeability	Moderately permeable
Drainage	Imperfect to moderately well drained



A1: Black (10YR 2/1,3/1,3/2, 7.5YR 2/2,3/2, 5YR 2/2,3/1,3/2); clay loam to light clay; weak <2-5mm granular structure; moderately weak (moist) consistence; common 6-20mm ferruginous nodules; pH 5.5-6.0; clear to diffuse change to

A2e: Occasionally absent, occasionally mottled; conspicuously or sporadically bleached (10YR 4/2,5/2,5/3, 7.5YR 4/2); clay loam to medium clay; massive or weak to moderate 5-10mm granular or sub-angular blocky structure; moderate weak (moist) consistence; many 6-20mm ferruginous nodules; occasionally quartz pebbles or gravels; pH 5.0 - 6.2; abrupt or clear change to

B1: Mottled; brown, red or grey (7.5 YR 4/4,5/4, 5YR 4/4,3/4, 2.5YR 3/6, 10YR 4/3,4/4,5/3); medium to heavy clay; massive, weak or moderate 5-10mm blocky structure; moderately weak to firm (moist) consistence; common or many 6-20mm ferruginous nodules; pH 5.5-6.5; diffuse change to

B21: Mottled; brown or red (10YR 4/4,5/4 7.5YR 4/4, 5/4, 5/6, 5YR ¾,4/4,4/6, 2.5YR 3/6,4/6); medium to heavy clay; moderate 5-10mm angular blocky structure; moderately firm (moist) consistence; common 6-20mm ferruginous nodules; pH 5.5-6.5; diffuse change to

B22g: Mottled; gleyed or grey (5Y 4/1,5/1, N 6/0,7/0); heavy clay; moderate 5-50mm angular blocky structure; very firm (moist) consistence; common 6-20mm ferruginous nodules; pH 4.5-6.0;

C: Weathered shale (laterite

Morphological Sites:
Analysed Sites: CSIRO H7, 194, 196, 242, 243, 244, 260
Related soil names: Cressy series, Cressy shaley clay loam
Previously described by: Kershaw (1975), Nicolls (1958), Stephens *et al.* (1942)

4.4.3 Brickendon Association (Bk)

LPb - Lateritic Podzolic Soils of the Brickendon Association *(44sq. km)*
The Brickendon soils are characterised by the presence, in addition to ironstone gravels, of varying but usually large amounts of quartz gravels. The quartz pebbles are mostly waterworn and *1 - 5cm* in diameter, and concentrated in the upper *60cm* of the profile. These soils belong to the highest river terrace and in this sheet are found at elevations mainly between *150 - 210m.* Apart from the presence of the quartz gravels, the Brickendon soils closely resemble the Woodstock, merging with the latter when the quartz gravels are rare.

The dominant soils are of the *Brickendon SPC*, having a grey sandy surface over a light grey sand with varying amounts of quartz and ironstone gravels and a mottled yellow-brown, red-brown and grey friable clay subsoil at about *50cm* depth. This clay tends to be less brightly coloured than the Woodstock but is often of identical appearance. The *Brickendon SPC* is characteristic of the nearly flat benches, but may extend down the slopes.

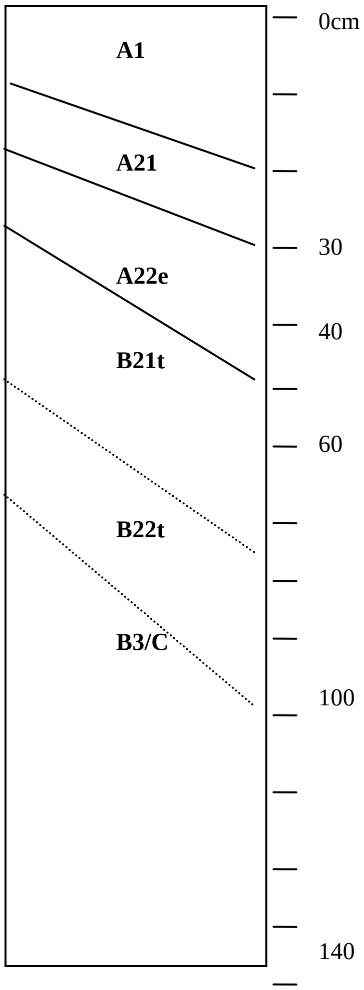
Cressy soils may be found on eroded slopes, mainly around the fringes of the association. Near Bracknell, where the Brickendon terrace crosses a low dolerite ridge, dolerite outcrops are common amongst the Brickendon soils and contribute to soil formation.

Land Use

Much of the Brickendon Association within the Quamby sheet has been developed to varying extents with sown pastures and some is cultivated. Some remaining woodland near Bracknell provides firewood, fence posts, and sparse grazing. At Westbury the gravelly sub-surface horizons of the Brickendon soils are quarried for road making.

Brickendon Soil Profile Class

Name	**Brickendon SPC (Bk)**
Concept	**Deeply weathered brown textured contrast soils with a sandy topsoil containing water worn quartz gravels overlying a clayey subsoil, found between the Brumby and Woodstock surfaces of the Launceston Basin.**
Aust. Soil Classification	Brown Chromosols or Kurosols
Great Soil Group	Latteritic Podzolic
Principal Profile Form	Db, Dy
Mapping Units	Bk
Geology	Aeolian sands and tertiary lake sediment of the Launceston Basin
Landform	Highest relic tertiary river terrace
Vegetation	Mostly cleared
Permeability	Quartz pebbles common. Slow to moderate
Drainage	Imperfectly drained



A1: Black to grey (7.5YR 3/2, 10YR3/1, 3/2, 4/1); sandy loam to fine sandy loam; single grained to weak, 5-10mm subangular blocky structure, very weak to weak (moist) consistence, 10 - 20%, water worn quartz pebbles, few 2-6mm ferruginous nodules; pH 5.5 - 6.2; clear change to

A21: Mottled; grey to brown (10YR 5/2, 5/1, 7YR 5/2, 6/2); sandy loam to fine sandy loam; single grained to massive structure; very weak (moist) consistence; 20-50%, water worn quartz pebbles, common 2-6mm ferruginous nodules; pH 6.0 - 6.5; clear change to

A22e: Conspicously bleached, mottled grey to yellow (10YR 6/2, 6/1, 6/4, 7.5YR 5/2, 6/2); sandy loam to fine sandy loam; massive structure; loose to very weak (moist) consistence; 20 -50% water worn quartz pebbles, common 2-6mm ferruginous nodules; pH 6.0 - 6.5; abrupt change to

B21t: Mottled; grey to brown (2.5Y 5/4, 4/4, 5/2, 6/2, 6/6, 10YR 5/4, 5/8); medium clay; moderate, 5-10mm angular blocky structure; firm (moist) consistence; 10-20% water worn quartz pebbles; very few 2-6mm ferruginous nodules; pH 5.5 - 6.5; diffuse change to

B22t: Mottled; yellow to brown some red mottling (2.5Y 5/2, 5/6, 6/4); heavy clay; moderate 5-10mm angular blocky structure; firm (moist) consistence; <2% water worn quartz pebbles, very few 2-6mm ferruginous nodules; pH 6.5 - 7.5; gradual change to

B3/C: Heavy sediments; massive

Morphological Sites: LRRBD L62, CSIRO H78, H17, H203
Analysed Sites: LRRBD L59, L62, L82; CSIRO H17, H155, H198, H203, H219, H239, H2412
Related soil names: Brickendon series, Brickendon sand, Brickendon soils, Brickendon SPC
Previously described by: Doyle (1993), Nicolls (1958 & 1959), Kershaw (1975), Stephens *et al.*, (1942), Hubble (1947)

Soil Profile Class "Property" Grid Reference (AMG)	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	Total Bases	CEC	BASE SAT (%)	ESP (%)	Ca/Mg Ratio
												(milli-equivalents / 100 grams of soil)								
Brickendon	SP 59	A1	0 - 13	5.7	0.06	478	58	85	4.50	0.287	16	4.01	1.23	0.20	0.27	5.7	9	65	2.3	3.27
"Formosa"	SP 59	A2	13 - 30	5.9	0.03	148	13	79	1.40	0.098	14	1.83	0.64	0.15	0.22	2.8	4	63	3.4	2.85
507200E	SP 59	B21tg	30 - 52	6.1	0.05	163	0	68	1.20	0.085	14	5.01	8.26	0.72	0.25	14.3	30	48	2.4	0.61
5377600N	SP 59	B22t	52 - 78	6.0	0.06	161	0	56	1.20	0.085	14	3.38	10.15	1.06	0.22	14.8	27	55	3.9	0.33
	SP 59	B23t	78 - 93	5.7	0.08	98	0	32	0.60	0.042	14	1.70	8.08	3.43	0.22	13.4	30	45	11.4	0.21
Brickendon	SP 62	A1	0 - 13	5.1	0.06	362	58	103	4.30	0.278	15	2.84	0.73	0.17	0.35	4.1	7	59	2.5	3.88
"Formosa"	SP 62	A21	13 - 30	5.6	0.02	418	4	32	0.60	0.036	17	0.50	0.24	0.17	0.16	1.1	2	45	7.2	2.09
507000E	SP 62	A22	30 - 42	6.2	0.03	109	0	38	0.60	0.031	19	1.69	1.09	0.79	0.19	3.8	6	68	14.3	1.54
5376650N	SP 62	B21t	42 - 85	5.3	0.08	150	0	21	0.80	0.031	26	1.45	4.82	0.74	0.20	7.2	29	25	2.6	0.30
	SP 62	B22t	85 - 95	5.0	0.09	154	0	21	0.40	0.025	16	0.42	3.82	0.72	0.22	5.2	24	22	3.0	0.11

Soil Profile Class "Property" Grid Reference (AMG)	Profile Number	Horizon	Sample Depth (cm)	Gravel (of total) >2000 (µm) (%)	Sand Coarse >250 (µm) (%)	Sand Fine <250 (µm) (%)	Silt (%)	Clay (%)	Clay Mineralogy: Kaolinite	Illite	Goethite	Lepidocrocite
									(Approximate weight %)			
Brickendon	SP 59	A1	0 - 13	19	23	49	13	15				
"Formosa"	SP 59	A2	13 - 30	78	57	26	10	8	85		5	
507200E	SP 59	B21tg	30 - 52	0	2	6	1	91	75		15	5
5377600N	SP 59	B22t	52 - 78	0	1	3	0	97	85		10	2
	SP 59	B23t	78 - 93	0	2	12	3	84	90		5	
Brickendon	SP 62	A1	0 - 13	27	27	50	12	11				
"Formosa"	SP 62	A21	13 - 30	52	35	42	13	10				
507000E	SP 62	A22	30 - 42	0	26	30	17	27	65	5	20	5
5376650N	SP 62	B21t	42 - 85	0	9	6	10	75	85		10	2
	SP 62	B22t	85 - 95	0	14	11	13	62	80		15	

Table 4 Analytical data for Brickendon, taken from Doyle (1993)

4.5 Recent Alluvial Soils

Alluvial Soils *(184 sq. km).* The term "alluvial soils" as used here is to be understood in the sense of soils formed on river and creek alluvium, and not necessarily showing little differentiation of the profile. (The Brickendon soils *(Bk)* are also "alluvial" in this sense). *The alluvial group has been divided into 4 sub-groups, Hagley (Hg), Brumby (Br) and Glen (Gl) associations and the recent alluvial soils including Canola (Ca) and Kinburn (Kb) associations*. These subgroups have not been fully separated from each other in mapping. The *Hagley (Hg)* soils may be as much as *30m* above water level in the nearest stream, the others are mostly less than *9m* above local stream level. Together, the alluvial soils constitute the second largest mapping unit in this sheet.

4.5.1 Hagley Association (Hg)

A_1 - Soils of high terraces (other than Brickendon).

The terrace on which these soils are found corresponds in elevation to the Brickendon terrace but it is largely cut in materials other than the basin sediments (mostly basalt). In several places on this terrace, chiefly north of Hagley, the *Hagley Association* soils are dark coloured clays and clay loams like the recent alluvial soils. Some of these have semi-hard masses of cemented black ironstone concretions. Elsewhere, chiefly north of the Meander River in the north eastern corner of the sheet, such soils alternate with podzolic profiles having a grey sandy surface overlying at *30 - 45cm* a predominantly yellow grey clay, with deeper sands, and with shallow brown loams around outcrops of basalt or dolerite.

4.5.2 Brumby Association (Br)

A_2 - Soils of lower terraces.

These soils are more clearly defined. The main terrace is about *3m* above present flood plains and has meadow podzolic soils corresponding to the Brumby Association in the adjoining Longford sheet. Soils of the *Brumby SPC* are dominant, and have, grey or brownish grey sandy loam or loam surface, a lighter coloured subsurface of fine sand, fine sandy loam, or loam, and at about *40cm* depth a dark grey-brown to dark yellow-grey tough or plastic clay, passing below to a yellower, mottled, more friable clay or sandy clay. Fine rounded ironstone or quartz gravel may occur through the profile usually concentrated in the subsurface horizon. In several places, on remnants of another terrace somewhat above the main Brumby level, are soils like the *Brumby SPC* but with brighter coloured clays. Strips of *Canola (Ca)* soils along small water courses are mapped with the Brumby Association. Around Meander and Montana are some yellowish brown sandy soils which may represent windblown deposits, *(Panshanger (Ps).*

Brumby Soil Profile Class

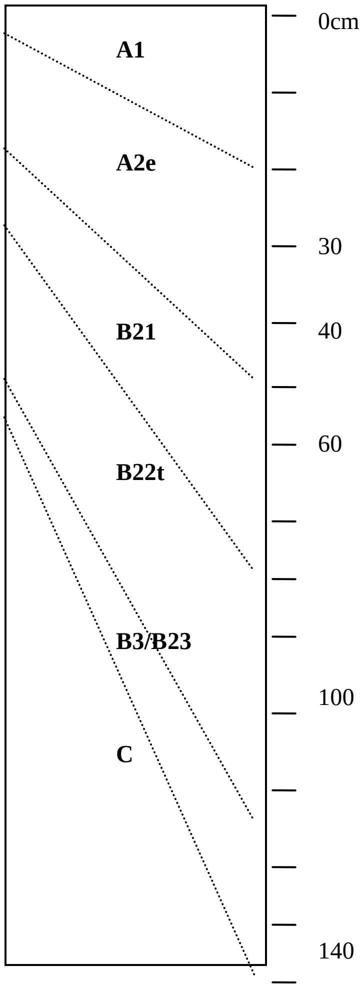
Name — **Brumby SPC (Br)**

Concept — **Sodic, grey or brown texture contrast soils with shallow rooting depth, developed on the lowest river terraces sediments**

Aust. Soil Classification — Brown Sodosols or Chromosols
Great Soil Group — Solodized Solonetz, Solodic
Principal Profile Form — Dy, Db
Mapping Units — Br, Br-Ca, Br-Ps, Br-Ta
Geology — Quaternary Alluvium
Landform — Flat to gently undulating river terraces

Permeability — Slowly permeable
Drainage — Poorly drained

Land Capability — Class 4 or 5



A1: Black or grey (10YR 3/1, 3/2, 4/2, 7.5YR 3/2, 4/2); sandy loam to loam; weak to moderate, 5-20mm sub-angular blocky structure; very weak to weak (moist) consistence; pH 5.5 - 6.0; abrupt to clear change to

A2e: Occasionally mottled, bleached, grey (10YR 5/2, 6/2, 6/3, 6/4); loamy sand to loam fine sand; massive weak 5-20mm angular blocky structure; very weak to weak (moist) consistence; few <2mm ferruginous nodules; pH 5.5 - 6.5; abrupt to clear change to

B21: Mottled; brown to grey (2.5Y, 5/4, 4/2, 5/3, 4/3, 10YR 4/3); medium clay; moderate 100-200mm, prismatic structure parting to moderate 20-50mm angular blocky structure; firm (moist); consistence; very few <2mm mangniferous nodules; pH 6.0 - 7.0; gradual to diffuse change to

B22t: Mottled; brown (2.5Y 5/3, 5/4, 4/3, 4/2); medium to heavy clay; massive to moderate 20-50mm angular blocky structure; very firm (moist) consistence; very few <2mm manginferrous nodules present in some profiles; pH 6.0 - 8.0; EC 0.2 dS/m; gradual to diffuse change to

B3/B23: Mottled; brown (7.5YR 5/8, 2.5Y 5/4, 5/3); sandy medium clay to heavy clay; massive to weak 20-50mm angular blocky structure; pH 7.0 - 8.0, EC 0.5 dS/m; gradual change to

C: Massive clay to sandy clay; pH 8.0; EC 0.2 dS/m

Morphological Sites: SOILCO 21, 25
Analysed Sites: None available
Related soil names: Holloway (Ho), Archer Lateritic Krasnozems (ArLv)
Previously described by: Laffan *et al.*, (1995), Nicolls (1959)

Soil Profile Class "Property" Grid Reference (AMG)	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	Total Bases	CEC	BASE SAT (%)	ESP (%)	Ca/Mg Ratio
												(milli-equivalents / 100 grams of soil)								
Brumby	SP 39	A1	0 - 20	5.1	0.19	223	20	60	3.30	0.296	11	4.86	2.64	0.39	0.29	8.2	12	70	3.3	1.84
"Leverington"	SP 39	A2	20 - 26	5.9	0.05	83	8	33	0.70	0.069	10	1.95	2.80	0.46	0.20	5.4	8	69	5.9	0.70
521400E	SP 39	B21tg	26 - 32	6.3	0.13	68	1	95	1.10	0.117	9	5.72	14.90	1.76	0.46	22.8	26	88	6.7	0.38
5374100N	SP 39	B22tg	32 - 53	7.3	0.18	71	0	123	1.00	0.111	9	8.49	24.34	3.10	0.60	36.5	36	102	8.7	0.35
	SP 39	B23tg	53 - 82	8.6	0.54	62	0	130	0.30	0.045	7	8.45	31.02	6.13	0.66	46.7	37	127	16.6	0.27
	SP 39	B24t	82 - 165	8.9	0.66	38	0	74	0.20	0.016	13	6.53	21.74	6.19	0.43	35.5	30	119	20.8	0.30
Brumby	SP 63	A1	0 - 18	5.7	0.04	239	9	44	1.80	0.161	11	3.60	1.27	0.27	0.27	5.4	7	78	3.8	2.82
"Formosa"	SP 63	A2	18 - 25	6.5	0.02	71	0	21	0.40	0.036	11	1.45	0.71	0.19	0.21	2.6	4	73	5.4	2.04
507700E	SP 63	B21t	25 - 60	7.3	0.08	125	0	91	0.80	0.079	10	8.72	11.85	1.34	0.41	22.5	35	65	3.9	0.74
5376700N	SP 63	B22t	60 - 70	8.1	0.30	95	0	85	0.60	0.036	17	10.76	16.51	3.43	0.46	27.7	36	77	9.5	0.65
Brumby	SP 66	A1	0 - 20	5.0	0.17	328	35	104	2.30	0.140	16	1.73	0.44	0.11	0.34	2.6	6	44	1.9	3.88
"Cressy Station"	SP 66	A2	20 - 32	6.0	0.07	152	9	55	0.60	0.060	10	1.10	0.28	0.07	0.16	1.6	3	63	2.7	3.89
506300E	SP 66	B21tg	32 - 50	6.2	0.07	270	4	109	0.60	0.090	7	9.83	11.53	1.23	0.61	23.2	20	119	6.3	0.85
5379200N	SP 66	B22tg	50 - 80	6.5	0.06	196	2	88	1.50	0.070	21	6.38	11.26	1.58	0.42	19.6	19	105	8.5	0.57
	SP 66	Cg	90 - 95	7.9	0.12	92	0	98	0.80	0.050	16	7.21	14.96	3.88	0.41	26.5	19	142	20.9	0.48
Brumby	SP 89	A1	0 - 10	5.3	0.13	179	8	107	1.50	0.161	9	2.69	0.81	0.28	0.29	4.1	8	51	3.5	3.33
"Connorville"	SP 89	A2	10 - 36	6.8	0.03	139	3	43	0.12	0.031	4	2.96	1.63	0.39	0.20	5.2	8	61	4.6	1.82
507700E	SP 89	B21tg	36 - 50	8.2	0.09	86	3	64	0.12	0.049	2	4.25	13.54	3.17	0.26	21.2	30	72	10.7	0.31
5371400N	SP 89	B22t	50 - 70	8.9	0.16	64	2	71	0.00	0.028	0	5.69	20.25	6.03	0.37	32.4	36	91	16.9	0.28
	SP 89	B3g	70 - 90	9.6	0.40	52	6	71	0.00	0.014	0	5.23	18.22	7.35	0.34	31.2	24	128	30.1	0.29
Brumby	SP 113	A1	0 - 15	5.6	0.06	302	90	143	2.75	0.228	12	6.04	4.15	0.39	0.24	10.8	13	83	3.0	1.45
"Fosterville"	SP 113	A2	15 - 31	6.3	0.06	156	46	64	1.00	0.077	13	4.77	7.82	0.87	0.24	13.7	15	89	5.7	0.61
536100E	SP 113	B21tg	31 - 45	7.2	0.13	114	12	179	0.75	0.085	9	7.96	25.93	3.04	0.58	37.7	37	102	8.2	0.31
5354800N	SP 113	B22t	45 - 75	8.2	0.27	90	6	179	0.25	0.028	9	5.98	28.06	4.36	0.55	39.4	36	110	12.2	0.21
	SP 113	B3k	75 - 95	9.4	0.66	48	3	164	0.00	0.013	0	13.71	30.20	7.62	0.46	52.0	37	141	20.7	0.45

Table 5 Analytical data for Brumby, taken from Doyle (1993)

Soil Profile Class "Property" Grid Reference (AMG)	Profile Number	Horizon	Sample Depth (cm)	Gravel (of total) >2000 (µm) (%)	Sand Coarse >250 (µm) (%)	Sand Fine <250 (µm) (%)	Silt (%)	Clay (%)	Clay Mineralogy (Approximate weight %) Smectite	Kaolinite	Illite	Goethite
Brumby	SP 39	A1	0 - 20	14	5	60	18	17				
"Leverington"	SP 39	A2	20 - 26	13	9	55	18	18				
521400E	SP 39	B21tg	26 - 32	11	4	27	12	58				
5374100N	SP 39	B22tg	32 - 53	11	3	20	9	67				
	SP 39	B23tg	53 - 82	7	2	17	8	73				
	SP 39	B24t	82 - 165	8	6	44	8	42				
Brumby	SP 63	A1	0 - 18	2	6	55	22	17	15	85		
"Formosa"	SP 63	A2	18 - 25	2	8	53	26	12	5	90	5	
507700E	SP 63	B21t	25 - 60	0	3	21	9	67	20	75		5
5376700N	SP 63	B22t	60 - 70	0	2	19	13	66	35	55		10
Brumby	SP 66	A1	0 - 20	2	6	72	6	17				
"Cressy Station"	SP 66	A2	20 - 32	10	13	64	15	8				
506300E	SP 66	B21tg	32 - 50	2	6	34	6	55				
5379200N	SP 66	B22tg	50 - 80	0	5	40	5	49				
	SP 66	Cg	80 - 95	0	5	46	9	41				
Brumby	SP 89	A1	0 - 10	50	6	41	39	14				
"Connorville"	SP 89	A2	10 - 36	27	21	32	33	14				
507700E	SP 89	B21tg	36 - 50	2	5	16	22	57				
5371400N	SP 89	B22t	50 - 70	1	1	14	41	44				
	SP 89	B3g	70 - 90	0	1	28	11	59				
Brumby	SP 113	A1	0 - 15	0	3	52	23	23				
"Fosterville"	SP 113	A2	15 - 31	0	3	46	23	28	75	25		
536100E	SP 113	B21tg	31 - 45	0	1	24	14	61	75	25		
5354800N	SP 113	B22t	45 - 75	0	2	29	12	57	70	30		
	SP 113	B3k	75 - 95	0	1	28	14	56	80	20		

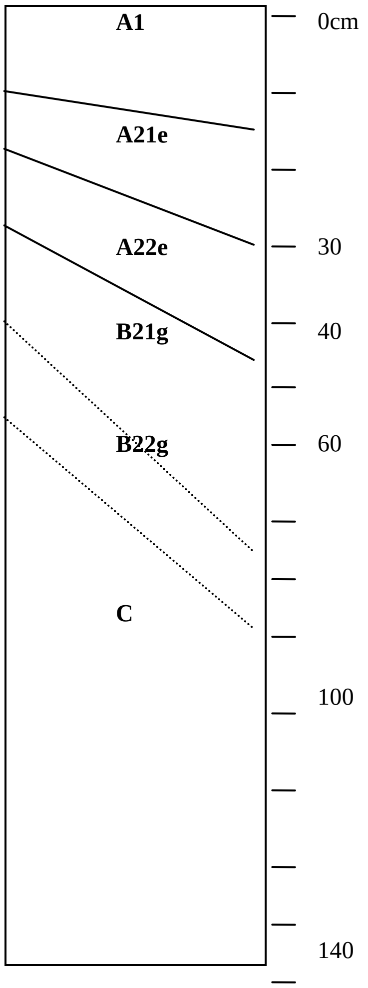
Table 5 (Continued)

4.5.3 Glen Association (Gl)

A_4 - Soils of stony alluvial fans.
In the western half of the sheet these are brown or yellowish brown loams, almost undifferentiated except for accumulation of organic matter in the surface horizon. Stones mostly of dolerite, often account for a large proportion of the total soil volume. Such soils often grade imperceptibly into the solifluction soils *(M1).* At Blackwood Creek on an ancient alluvial fan, stony lateritic profiles are interspersed with yellow podzolic soils on outcrops of mudstone *(Quamby).* Surrounding this fan is a part of the Brumby terrace with soils resembling the *Brumby SPC* but containing much dolerite stone (Nile Association of the Longford sheet).

Glen Soil Profile Class

Name	**Glen SPC (Gl)**
Concept	**Grey loamy soils with dolerite gravel over structured or massive clayey subsoils formed on dolerite fans adjacent to the Western Tiers escarpment.**
Aust. Soil Classification	Redoxic Hydrosol
Great Soil Group	Yellow or gleyed podzolic soils
Principal Profile Form	Dy, Db
Mapping Units	Gl, Gl-Ca, Gl-Ps, Gl-Qu
Geology	Dolerite gravel and detritus fan deposits
Landform	Gently undulating to rolling fan surfaces on the foot slopes of mountains
Surface Condition	Very few to common dolerite stones
Permeability	Slow
Drainage	Poor
Land Capability	Class 5 or 4



A1: Black (10YR 3/2); loam; moderate 5-10mm sub-angular blocky parting to 2-5mm sub-angular blocky structure; weak (moist) consistency; some ferruginous nodules present; 10-20% dolerite stones; pH 5.5 ; clear change to

A21e: Conspicously bleached, mottled; grey (2.5Y 6/2); fine sandy loam; massive structure; weak (moist) consistency; dolerite gravel and cobbles; pH 5.5 6.0; clear change to

A22e: Conspicuously bleached, mottled; grey (2.5Y 6/2); sandy clay loam; massive structure; weak (moist) consistence; some <2mm ferruginous nodules present;10-20% dolerite gravel and cobbles; pH 5.5 -6.0; abrupt wavy change to

B21g: Mottled; brown (10YR 5/6 - 10YR 4/5); heavy clay; moderate 50-100mm angular blocky parting to 20-50mm angular blocky structure; very firm (moist) consistence; distinct clay coatings common; 2-20% dolerite cobbles and stones ; pH 5.5 -6.0; gradual boundary change to

B22g: Mottled; brown (10YR 5/6); heavy clay; massive parting to weak 10-20mm angular blocky structure; very firm (moist) consistence; distinct clay coatings; 2-10% dolerite stones; pH 6.0; gradual smooth change to

B23g/B3g: Brown (10YR 5/5); medium clay; massive structure; very firm (moist) consistence; distinct clay coatings common; 2-10% manganiferous soft segregations; 2-20% dolerite stones; pH 6.0 - 6.5

Morphological Sites: LRRBD L116, 118, 119, 157, 159
Analysed Sites: No sites available
Related soil names: Unnamed dominant soil, Glen SPC
Previously described by: Nicolls (1959), Doyle (1993)

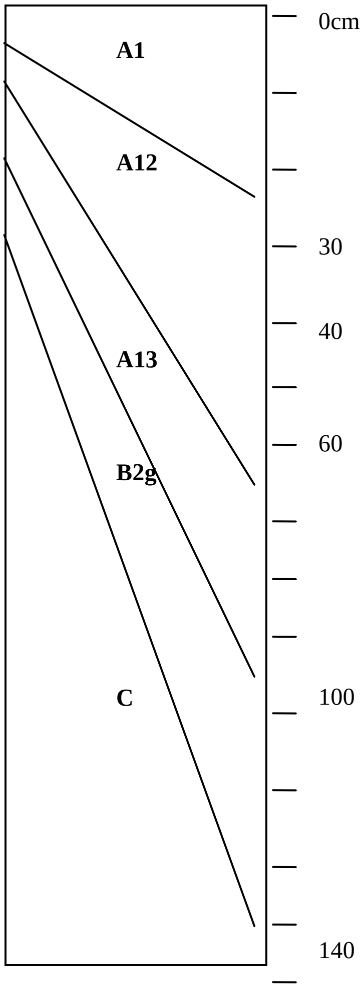
4.5.4 Canola Association (Ca)

A_3 - Soils of flood plains and other young alluvium (except A4).

These correspond generally to the Canola Association of the Longford sheet, with the addition of some browner soils on basaltic and other alluvium in the western half of the sheet, *(Hagley Association).* They are hydromorphic soils, on present river flood plains, the floors of small valleys, and some alluvial fans. The Canola Association consists of dark coloured organic clay loams and clays. The *Canola SPC,* dominant on the flood plains of the Liffey River and the Whitemore Creek, has a dark grey to dark grey-brown highly organic clay loam or clay surface with rusty colouring along root channels reflecting poor drainage. This passes at about *20cm* depth to a dark brownish grey or black clay, with rusty coloured mottlings. Below about *60cm* is less organic clay with yellowish mottlings continuing for a *metre or two*. The *Canola SPC* is acid throughout the profile. Similar black clays fringe areas of basalt south east of Chudleigh, south west of Westbury, and west of Whitemore. In the western part of the sheet, on the floors of small valleys and basins, are some soils generally resembling the Canola but browner and less organic.

Canola Soil Profile Class

Name	**Canola SPC (Ca)**
Concept	**Uniform, black, cracking clay with subsoils associated with active flood plains, stream valleys and drainage depressions on alluvial fans**.
Aust. Soil Classification	Black Vertosol
Great Soil Group	Black earth, Wiesenboden or Chernozem
Principal Profile Form	Ug5, Ug6, Gn
Mapping Units	Ca, Ca-Gl, Ca-Hg, Ca-Ps, Ca-Ta
Geology	Quaternary alluvial deposits
Landform	Lower terrace flats, swamps and drainage depressions on active alluvial plains of large rivers.
Vegetation	Mostly cleared
Permeability	Very slowly permeable
Drainage	Very poor to imperfectly drained



A1: Black (10YR 2/1, 3/1, 3/2 7.5YR 2/1, 3/2); clay loam to light clay; moderate <2mm, granular or subangular blocky structure; firm (moist) consistence; pH 5.5 - 6.5; clear or abrupt change to

A12: Black (10YR 2/1,3/1, 7.5YR 2/1); light to heavy clay; moderate, 5-20mm, blocky structure; firm (moist) consistence; occasionally slickensides present, occasionally water worn gravel present; pH 6.0-7.0; clear to gradual change to

A13: Black (10YR 2/1, 3/1, 3/2, 2.5Y 2/1); light to heavy clay; weak to moderate, 5-50mm, blocky structure occasional manganiferous &/or calcareous nodules; occasional dolerite gravels; slickensides present; pH 6.0-8.0; abrupt to clear change to

B2, B2g: Mottled grey or gleyed (10YR 4/1, 2.5Y 4/2, 5Y 4/1,6/1, N 3/0, N 4/0); light medium to heavy clay; moderate to strong, 5-50mm, angular blocky or lenticular structure; firm (moist) consistence; common to many manganiferous or calcareous soft segregations; slickensides common; pH 5.5-8.0; gradual to diffuse change to

C: Sandy unconsolidated mineral material

Morphological Sites: CARDS 186-200, 207-209, 397, 435, 721, 1036, 1065-67, 1101, 1102, 1245, 146: CSIRO H26, H156
Analysed Sites: LRRBD L7, L103, L104, L112, L115; CSIRO H26, H156
Related soil names: Canola clay loam, Canola series, Canola SPC
Previously described by: Nicolls (1958 & 1959), Doyle (1993)

Soil Profile Class "Property" Grid Reference (AMG)	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	Total Bases	CEC	BASE SAT (%)	ESP (%)	Ca/Mg Ratio
												(milli-equivalents / 100 grams of soil)								
Canola	SP 11	A11	0 - 14	7.4	0.39	524	17	179	8.80	0.725	12	18.59	28.13	4.69	0.52	52.1	52	99	9.0	0.66
"Kelvin Grove"	SP 11	A12(a)	14 - 40	8.7	0.81	230	1	203	2.50	0.207	12	14.27	32.43	9.09	0.55	57.1	63	90	14.3	0.44
540400E	SP 11	A12(b)	40 - 65	9.0	0.87	152	0	168	1.80	0.118	15	16.64	31.98	9.39	0.49	59.4	55	108	17.1	0.52
5377700N	SP 11	A13k	65 - 80	8.9	0.78	123	0	156	0.80	0.066	12	18.46	31.16	6.29	0.51	56.9	47	120	13.3	0.59
	SP 11	A14g	80 - 120	8.7	0.42	164	0	162	0.60	0.048	13	14.14	26.46	3.56	0.59	45.1	42	106	8.4	0.53
	SP 11	C	120 - 130	8.9	0.10	146	0	132	0.20	0.025	8	5.71	10.38	1.31	0.34	17.7	19	93	6.9	0.55
Canola	SP 103	A11	0 - 26	6.3	0.05	175	7	37	2.40	0.174	14	7.82	3.40	0.44	0.16	11.8	18	66	2.5	2.30
"St Johnstone"	SP 103	A12	26 - 36	6.8	0.04	185	2	24	0.40	0.037	11	4.75	3.33	0.47	0.13	8.7	13	68	3.7	1.43
529800E	SP 103	A13g	36 - 53	7.5	0.06	96	2	70	0.50	0.077	6	10.26	11.36	0.89	0.31	22.8	33	70	2.7	0.90
5361300N	SP 103	Cw	53 - 95	8.5	0.08	52	2	50	0.20	0.002	100	5.67	6.07	0.72	0.20	12.7	17	76	4.3	0.93
Canola	SP 104	A11	0 - 13	6.0	0.06	314	17	50	3.40	0.281	12	9.04	4.69	0.47	0.19	14.4	24	61	2.0	1.93
"St Johnstone"	SP 104	A12	13 - 35	6.5	0.05	224	4	34	0.90	0.095	9	6.27	4.15	0.53	0.16	11.1	18	60	2.9	1.51
529400E	SP 104	A31	35 - 50	7.0	0.05	146	2	72	0.50	0.073	7	10.40	9.65	0.70	0.26	21.0	31	68	2.3	1.08
5361500N	SP 104	A32	50 - 55	7.5	0.06	132	0	66	0.20	0.040	5	10.29	10.28	0.97	0.29	21.8	30	73	3.2	1.00
Canola	SP 112	A11	0 - 6	5.9	0.18	265	26	257	7.30	0.569	13	15.00	7.22	0.32	0.53	23.1	32	73	1.0	2.08
"Fosterville"	SP 112	A12	6 - 28	6.4	0.11	102	5	130	2.80	0.242	12	16.09	11.01	0.43	0.33	27.9	37	76	1.2	1.46
535400E	SP 112	A13	28 - 45	6.9	0.09	72	0	88	1.40	0.147	10	18.21	15.05	0.65	0.31	34.2	39	88	1.7	1.21
5354600N	SP 112	A3	45 - 65	7.8	0.08	62	0	74	1.30	0.106	12	22.47	19.27	0.97	0.30	43.0	46	93	2.1	1.17
Canola	SP 115	A11	0 - 10	6.1	0.15	282	23	98	4.30	0.349	12	10.38	7.01	0.93	0.29	18.6	26	73	3.6	1.48
"Fosterville"	SP 115	A12	10 - 27	6.6	0.07	181	8	34	1.90	0.195	10	7.67	6.09	0.88	0.18	14.8	21	70	4.2	1.26
536500E	SP 115	A13g	27 - 46	7.6	0.23	79	2	60	0.90	0.118	8	10.08	16.12	3.39	0.30	30.1	37	82	9.2	0.63
5355200N	SP 115	B2g	46 - 75	7.9	1.12	53	0	53	0.46	0.030	15	7.67	14.12	4.75	0.25	28.1	27	103	17.4	0.54
	SP 115	Cwg	75 - 95	8.7	1.13	52	0	47	0.06	0.007	9	10.62	11.38	4.53	0.20	27.9	22	128	20.8	0.93

Table 6 Analytical data for Canola, taken from Doyle (1993)

Soil Profile Class "Property" Grid Reference (AMG)	Profile Number	Horizon	Sample Depth (cm)	Gravel (of total) >2000 (µm) (%)	Sand Coarse >250 (µm) (%)	Sand Fine <250 (µm) (%)	Silt (%)	Clay (%)	Clay Mineralogy (Approximate weight %) Smectite	Kaolinite
Canola	SP 11	A11	0 - 14	0	6	27	21	46	70	30
"Kelvin Grove"	SP 11	A12(a)	14 - 40	0	5	9	11	75	80	20
540400E	SP 11	A12(b)	40 - 65	0	6	10	10	74		
5377700N	SP 11	A13k	65 - 80	11	5	17	13	64	80	20
	SP 11	A14g	80 - 120	0	3	26	15	55	85	15
	SP 11	C	120 - 130	0	10	51	15	24		
Canola	SP 103	A11	0 - 26	0	16	47	14	23		
"St Johnstone"	SP 103	A12	26 - 36	20	35	36	9	21		
529800E	SP 103	A13g	36 - 53	0	19	27	3	52		
5361300N	SP 103	Cw	53 - 95	0	15	55	0	29		
Canola	SP 104	A11	0 - 13	0	29	30	11	30		
"St Johnstone"	SP 104	A12	13 - 35	12	48	25	8	20		
529400E	SP 104	A31	35 - 50	2	34	22	5	39		
5361500N	SP 104	A32	50 - 55	19	30	24	7	39		
Canola	SP 112	A11	0 - 6	2	10	38	21	30		
"Fosterville"	SP 112	A12	6 - 28	11	11	23	17	48	65	35
535400E	SP 112	A13	28 - 45	2	10	19	11	60	70	30
5354600N	SP 112	A3	45 - 65	4	9	15	11	64	70	30
Canola	SP 115	A11	0 - 10	0	4	56	21	19		
"Fosterville"	SP 115	A12	10 - 27	0	5	55	20	20		
536500E	SP 115	A13g	27 - 46	0	2	35	12	51		
5355200N	SP 115	B2g	46 - 75	0	2	45	12	41		
	SP 115	Cwg	75 - 95	2	2	58	13	27		

Table 6 (Continued)

4.5.5 Kinburn Association (Kb)

A_3 - Soils of flood plains and other young alluvium (except A4).

The Kinburn soils are hydromorphic soils that occupy the floors of shallow valleys between areas of the Cressy Association (Cs). In the Kinburn series, a dark grey rather friable clay loam or clay overlies at about *30cm* a yellow-grey or dark yellow-grey, sometimes mottled, plastic clay continuing to several feet. Ironstone gravel, sometimes platy but mostly rounded, black and rather soft or brittle, occurs throughout the profile, sometimes concentrated into large masses.

Land Use of the Recent Alluvial Soils

Most of the area of the Hagley and Brumby Associations and much of the Canola and Kinburn Association finds more or less intensive agricultural use with sown pastures. *Some area have previously been heavily cropped*. Along the larger streams the use of *Canola Association (Ca)* soils is limited by relatively frequent flooding. Some of the *Glen Association (Gl)* soils carry sown pastures, others have been developed to varying degrees, and the remainder are still in woodland or regrowth forest. Agricultural use of some soils is limited by excessive stoniness.

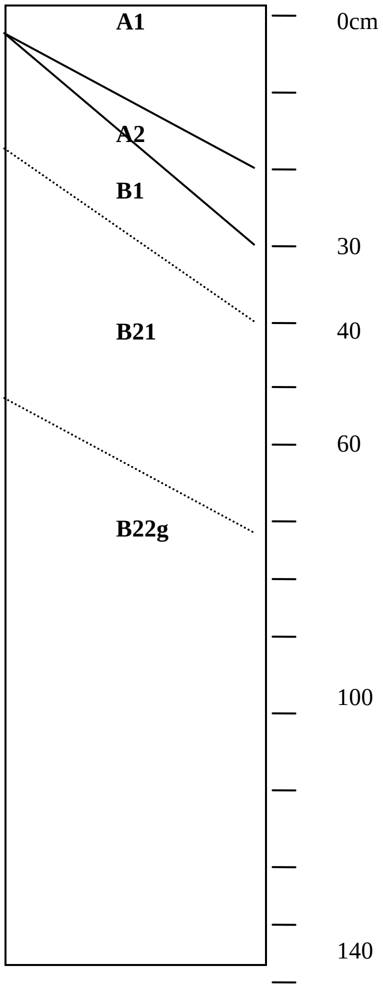
Kinburn Soil Profile Class

Name **Kinburn SPC (Kb)**

Concept **Poorly drained, structured clayey soil with grey subsoils and ferruginous nodules throughout the profile, developed on locally derived colluvium from the surrounding cressy surfaces of the Launceston Basin.**

Aust. Soil Classification Grey vertisol or Redoxic Hydrosol
Great Soil Group
Principal Profile Form Ug 5, Ug 6, Gn 3, Gn 4
Mapping Units Kb
Geology Colluvial sediments derived from adjacent remnants of the Launceston tertiary basin
Landform Flat to very gently inclined small valley flats of a dissected peneplain
Vegetation Savannah woodland dominated by *Eucalyptus pauciflora* and *E. ovata*

Permeability Very slow
Drainage Very poor



A1: Black (10YR 3/1,3/2,4/1, 5YR 2/2); light to medium clay; moderately weak (moist) consistency; common 6-20mm ferruginous nodules; pH 5.5-6.0; E.C 0.1ds/m; clear to diffuse change to

A2: Occasionally present, occasionally bleached; light medium to medium clay; massive or moderate 5-10mm sub-angular blocky structure; moderately firm (moist) consistence; many 6-20mm ferruginous nodules; pH 6.0-7.0; E.C 0.1 dS/m; clear to diffuse change to

B1: Occasionally mottled, grey or brown (10YR 4/1,5/2,5/3,5/4 7.5YR 4/4); medium to heavy clay; massive to moderate 5-10mm blocky structure; moderately firm (moist) consistence; many 6-20mm ferruginous nodules ; pH 6.0 - 6.5; gradual to diffuse change to

B21: Mottled ,grey or brown (10YR 5/2,5/3,5/4, 2.5Y 5/2, 5Y 4/1); medium to heavy clay, moderate 5-10mm angular blocky; moderately firm (moist) consistence; common to many 6-20mm ferruginous nodules; pH 5.3-6.7; 0.1-0.5 dS/m; diffuse change to

B22g: Mottled, gleyed or grey (2.5Y 4/2, 5/2, 5Y 4/1, 5/1); heavy clay; moderate 5-10mm angular blocky structure; moderately firm (moist) consistence; common to many 6-20mm ferruginous nodules or soft segregation ; pH 4.5 - 5.0; EC 0.05 - 0.1 dS/m; occasionally a ferricrete pan may be present;

Morphological Sites:
Analysed Sites:
Related soil names: kinburn gravelly clay, Kinburn series, Kinburn SPC
Previously described by: Stephens *et al* (1942), Nicolls (1958 & 1959)

4.6 Soils of Aeolian Deposits

4.6.1 Panshanger Association (Ps)

P-Windblown sands of the Panshanger Association *(3 sq. km).*
Deposits of sand, moved in the past by prevailing westerly winds have accumulated to the east of some valleys and lagoon, but to a much less extent in the Quamby sheet than in the adjoining Longford sheet. Here the deposits are small and scattered, with the single exception of a patch of about *182ha* near Westbury. The depth of the deposits varies from over *1 metre* to a thin skin around their margins.

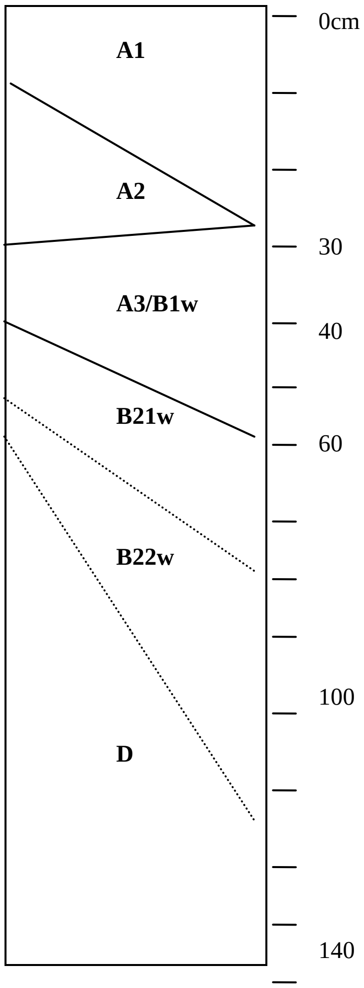
In this area most of these sands are grey though some are brownish. Texture at the surface is usually loamy sand, and below about *50cm* may be sandy or clayey sand. Sometimes at depth there are softish lumps of iron-cemented “ortstein”. Where the deposits are thin, shallow buried soils of the underlying formations may be mapped with them. Where they have blown over dolerite, outcrops and “floaters” of the rock are frequent.

Land Use

The largest occurrence of the windblown sands in the Quamby sheet is mainly uncleared and the others are too small for selective agricultural use. Over-cultivation may lead to renewed drifting.

Panshanger Soil Profile Class

Name	**Panshanger SPC (Ps)**
Concept	**Deep windblown brown sands overlying clays and bedrock on all surfaces of the Launceston Tertiary Basin.**
Aust. Soil Classification	Brown Tenosol
Great Soil Group	Siliceous sand
Principal Profile Form	Uc
Mapping Units	Ps, Ps-Bo, Ps-Ca, Ps-Mq, Ps-Wk
Geology	Quaternary Aeolian Sand
Landform	Gently undulating dunes and lunettes on fringes of lagoons, river terraces, and plains
Vegetation	Dry sclerophyll woodland
Permeability	Highly permeable
Drainage	Rapidly drained
Land Capability	Class 4 or 5



A1: Black (10YR 3/1,3/2, 7.5 3/2, 5YR 3/2); sand to fine sandy loam; single grained to massive or weak 5-50mm subangular blocky structure, very weak (moist) consistence; pH 5.5 - 6.5; Clear to gradual change to

A2: Occasionally present A2; grey (10YR 5/2,5/1); sand to loamy sand; single grained structure; loose (dry) consistency; field pH 6.5.

A3/B1w: Brown or red (5YR 4/4, 4/6, 7.5YR 5/4,6/4); sand to sandy clay loam; massive to subangular blocky structure; very weak (moist) consistence; pH 6.0 - 6.8; clear to gradual change to

B21w: Brown (7.5YR 4/4,5/6) sand to loamy sand; single grained to massive structure; loose to very weak (moist) consistence; pH 5.5 - 6.5; diffuse change to

B22w: Brown (10YR 5/6, 6/4); sand to clayey sand; single grained to massive structure; few, 2-6mm, ferruginous segregation; pH 6.0-7.0; diffuse change to

D: Occasionally mottled yellow or grey (10YR 7/4, 4/6, 6/1); sand to loamy sand, some clay horizons; single grained or massive; loose (dry) consistence, some clay horizons with firm consistence; pH 6.5

Morphological Sites:
Analysed Sites: LRRBD L42, L54, L88, L102; CSIRO H12, H18
Related soil names: Panshanger series, Unnamed dominant soil, Wilmore sandy loam, Panshanger sand, Panshanger SPC
Previously described by: Nicolls (1958 & 1959), Doyle (1993), Kershaw (1975), Hubble (1947)

Soil Profile Class "Property" Grid Reference (AMG)	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	Total Bases	CEC	BASE SAT (%)	ESP (%)	Ca/Mg Ratio
												(milli-equivalents / 100 grams of soil)								
Panshanger	SP 42	A1	0 - 8	5.2	0.05	125	13	115	2.40	0.180	13	2.44	0.75	0.06	0.14	3.4	5	71	1.2	3.26
"Leverington"	SP 42	A21	8 - 40	5.2	0.02	31	3	24	0.00	0.020	0	0.22	0.06	0.02	0.04	0.3	2	16	1.1	3.91
521700E	SP 42	A22	40 - 66	6.0	0.02	29	1	11	0.00	0.000		0.31	0.16	0.03	0.05	0.6	2	28	1.6	1.93
5375900N	SP 42	B21sm	66 - 80	6.1	0.08	39	0	76	0.10	0.010	10	0.87	4.25	0.62	0.18	5.9	8	75	7.8	0.21
	SP 42	B22t	80 - 115	5.7	0.19	50	0	57	0.10	0.010	10	1.44	13.06	2.04	0.18	16.7	22	77	9.4	0.11
	SP 42	BC	115 - 135	6.0	0.05	23	0	26	0.00	0.000		0.43	4.26	0.75	0.08	5.5	7	76	10.3	0.10
	SP 42	C	135 - 150	6.4	0.06	27	0	13	0.00	0.000		0.30	2.89	0.56	0.06	3.8	5	82	12.1	0.10
Panshanger	SP 54	A1	0 - 22	6.4	0.04	184	0	297	1.30	0.130	10	2.66	0.68	0.08	0.74	4.2	6	64	1.2	3.93
"Mt Joy"	SP 54	A3	22 - 48	6.6	0.04	107	0	216	0.30	0.060	5	6.11	4.53	0.19	0.47	11.3	16	71	1.2	1.35
515800E	SP 54	B21w	48 - 78	8.0	0.04	75	0	87	0.10	0.010	10	4.70	5.29	0.31	0.23	10.5	13	78	2.3	0.89
5377300N	SP 54	B22w	78 - 125	8.1	0.06	59	0	80	0.10	0.020	5	5.43	6.50	0.83	0.25	13.0	17	77	4.9	0.84
	SP 54	B23w	125 - 145																	
Panshanger	SP 88	A1	0 - 12	5.8	0.03	60	17	87	0.60	0.047	13	1.08	0.36	0.26	0.19	1.9	3	69	9.3	2.99
"Connorville"	SP 88	C1	12 - 55	5.7	0.02	30	15	73	0.20	0.000		0.58	0.20	0.27	0.17	1.2	1	85	18.7	2.89
511900E	SP 88	C2	55 - 75	5.5	0.02	15	6	40	0.10	0.000		0.35	0.18	0.28	0.11	0.9	1	76	23.1	1.97
5369400N	SP 88	C3wg	75 - 95	4.9	0.05	28	0	37	0.10	0.000		0.65	1.52	0.32	0.14	2.6	20	13	1.6	0.43
Panshanger	SP 102	A1	0 - 14	5.5	0.06	204	7	489	1.40	0.134	10	3.66	1.51	0.14	1.55	6.9	14	43	3.0	2.42
"St Johnstone"	SP 102	A3	14 - 30	6.5	0.06	211	6	472	0.60	0.055	11	5.01	2.10	0.42	0.75	8.3	14	61	3.1	2.39
530000E	SP 102	B21w	30 - 75	7.3	0.07	171	6	274	0.40	0.033	12	6.27	3.60	0.39	0.49	10.8	15	71	2.6	1.74
5361400N	SP 102	B22wg	75 - 95	8.4	0.06	96	2	102	0.10	0.000		5.28	4.12	0.51	0.24	10.2	13	78	3.9	1.28
Panshanger	H 18	A11	0 - 5	6.0		60			0.80	0.07	11	2.00	0.39	0.05	0.08	2.5	5	48	1.0	5.13
CSIRO	H 18	A12	5 - 13	5.4					0.30	0.04	8	0.70	0.20	0.05	0.05	1.0	2	48	2.5	3.50
"Valley Field"	H 18	B21w	13 - 43	5.5					0.10	0.01	8									
526303E	H 18	B22w	43 - 71	5.7																
5370511N	H 18	B23w	71 - 109	6.0																
	H 18	B3	119 - 140	6.1																
	H 18	C1	173 - 185	5.6		20						0.42	8.40	2.30	0.17	9.0	22	41	10.5	0.05
	H 18	C2	292 - 305	5.6								5.27	2.40	0.44	0.89	8.6				

Table 7 Analytical data for Panshanger, taken from Doyle (1993)

Table 7 (Continued)

Soil Profile Class "Property" Grid Reference (AMG)	Profile Number	Horizon	Sample Depth (cm)	Gravel (of total) >2000 (μm) (%)	Sand Coarse >250 (μm) (%)	Sand Fine <250 (μm) (%)	Silt (%)	Clay (%)	Clay Mineralogy (Approximate weight %) Smectite	Kaolinite	Illite	Goethite
Panshanger	SP 42	A1	0 - 8	0	9	85	6	1				
"Leverington"	SP 42	A21	8 - 40	0	11	87	2	1				
521700E	SP 42	A22	40 - 66	0	8	77	14	1				
5375900N	SP 42	B21sm	66 - 80	0	9	72	5	14				
	SP 42	B2[illegible]	80 - 115	0	8	46	4	43				
	SP 42	BC	115 - 135	0	11	75	1	13				
	SP 42	C	135 - 150	0	14	73	12	1				
Panshanger	SP 54	A1	0 - 22	0	14	75	4	7	15	80	5	
"Mt Joy"	SP 54	A3	22 - 48	0	11	62	3	25	45	50		5
515800E	SP 54	B21w	48 - 78	0	12	68	3	17	65	30		5
5377300N	SP 54	B22w	78 - 125	0	19	55	3	22	60	35		5
	SP 54	B23w	125 - 145									
Panshanger	SP 88	A1	0 - 12	1	36	50	7	7				
"Connorville"	SP 88	C1	12 - 55	0	33	55	6	6				
511900E	SP 88	C2	55 - 75	0	34	47	9	10				
5369400N	SP 88	C3wg	75 - 95	3	17	24	6	53				
Panshanger	SP 102	A1	0 - 0	0	20	69	4	7				
"St Johnstone"	SP 102	A3	14 - 14	0	22	58	3	17				
530000E	SP 102	B21w	30 - 30	0	17	58	3	22				
5361400N	SP 102	B22wg	75 - 95	0	23	55	4	18				
Panshanger	H 18	A11	0 - 5	0	32	63	4	5				
CSIRO	H 18	A12	5 - 13	0	24	73	1	2				
"Valley Field"	H 18	B21w	13 - 43									
526303E	H 18	B22w	43 - 71									
5370511N	H 18	B23w	71 - 109									
	H 18	B3	119 - 140	0	17	77	3	2				
	H 18	C1	173 - 185	0	14	44	3	39				
	H 18	C2	292 - 305									

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Tarbuck E.J & Lutgens F.K. (1984), The earth an Introduction to Physical geology. Third edition Merrill Publishing Company. Columbus, Ohio.

APPENDICES

Appendix 1

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 2

List of Key Soil Horizon Designations Used in SPC's

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 solumn.

BC As above.

C Weathered parent material and partialy 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.

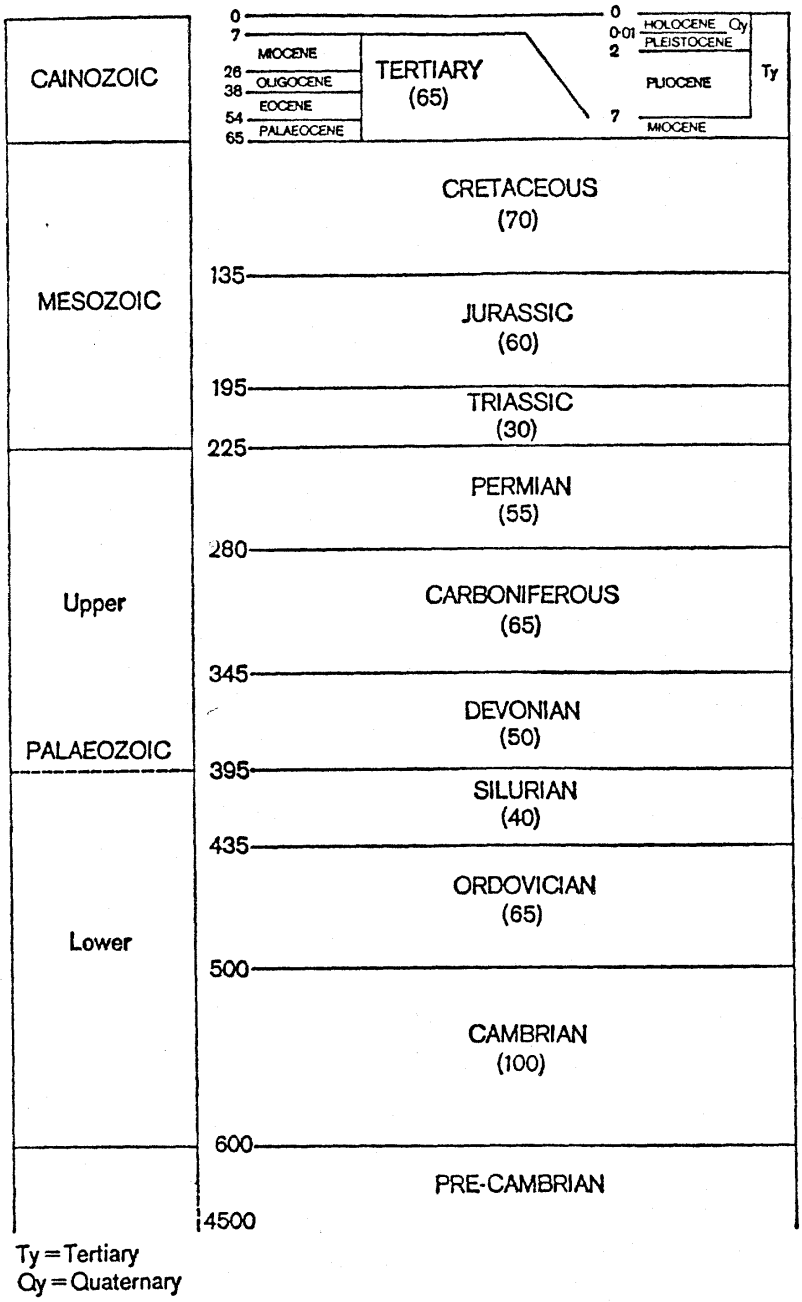
t accumulation of silicate clay (illuviation).

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

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

Appendix 3. Geological Timeline

1



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

Appendix 4

Polygon Line Changes to Soil Map

- Polygon 522 (M1-Qu) has been added to the map, Nicolls mapped this area as a complex within a soil association without any boundaries.

- Polygons 419 & 435 are a split along the river of an original polygon, Nicolls mapped Polygon 435 on the Eastern side of the Meander River as a complex and Ploygon 419 on the western side of the Meander river as a Soil Association/ Soil landscape map unit

- Polygons 97 & 77 (Hg) Originally called A1 have been added to the map seperating them form the Polygon 28 (Ca) which they were originally mapped with.

- Polygons 108, 20 & 87 (Hg), (Ca), &(Hg) outside the town of Westbury were originally part of the one polygon, line work was added to separate these areas highlighted by Nicolls on his original map.

- Polygon 16 & 18 (Kb) (Br-Ca) were originally the one polygon, line work was added along Brook creek to split the polygon.

- Polygons 213 & 224 (Cs) have had line work added along the boundary with the Longford Sheet. The line work occurs on the Longford sheet.

- Polygons 151 & 189 (Ps) have had line work added along the boundary with the Longford Sheet. The line work occurs on the Longford sheet.

- Polygon 218 (Ca) has had line work added along the boundary with the Longford Sheet. The line work occurs on the Longford sheet.

- Polygon 61 (Br) has been added to the Quamby sheet to improve edge matching.

- Line work changes have been made to polygon 7 (Ca) on the Quamby sheet, these changes extend onto the Longford sheet into polygon 62 (Ca).

Appendix 5.

Additional Relevant Literature

Detailed Maps and Reports:

Hubble (1944), “Portion of Launceston basin Westmoorland” (There is no report for this map but the map may be used in conjunction with the Stephens et. al. (1942) report.

Stephens, C.G., Baldwin, J.G. and Hosking, J.S. (1942), The Soils of the Parishes of Longford, Cressy and Lawrence, County Westmorland, Tasmania, CSIR Bulletin 150. Scale 1: 63 365.

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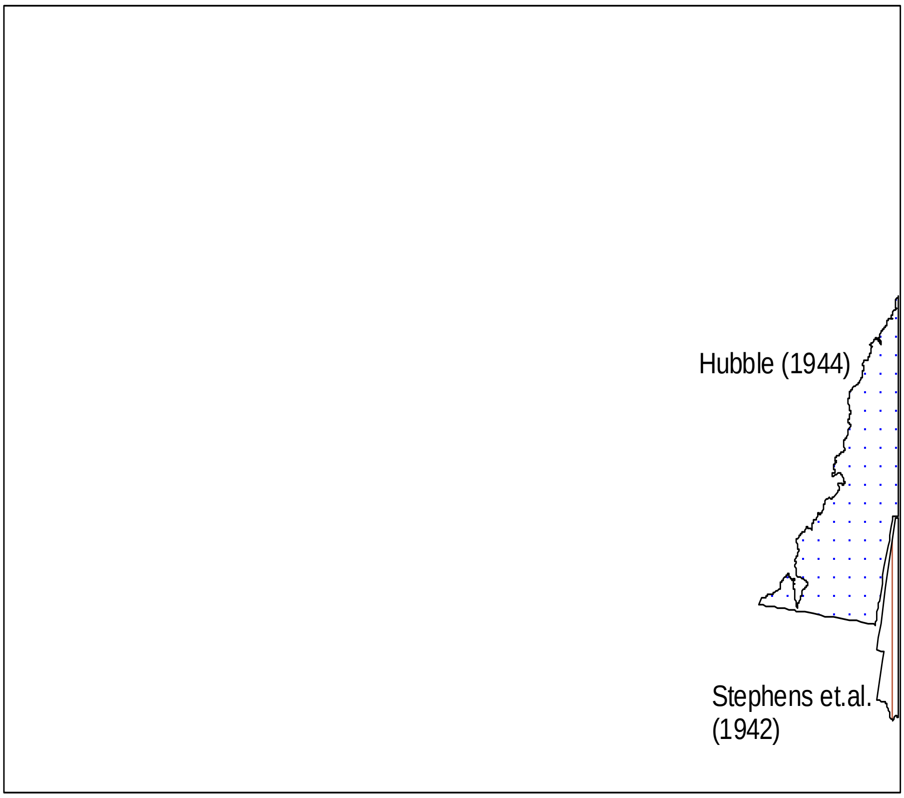
Wells, A.T. (1957), Geology of the Deloraine-Golden Valley Area, Tasmania. Records of the Queen Victoria Museum, Launceston. New Series, No. 8.

Tasmanian Department of mines-Hobart (1970), Geological survey of Tasmania, Quamby 360. Zone 7 Sheet No. 46.

Appendix 6.

Index Map Showing Detailed Surveys occurring on the Quamby Soil Reconnaissance Map



Quamby Soil Reconnaissance Map

Appendix 7.

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.
Scale 1:100 000

Dimmock, G.M. (1956), Reconnaissance soil map of Tasmania **Flinders Island**. Div. Rep. Div. Soils CSIRO Aust. 8/56**;** Scale 1: 63 360

Dimmock, G.M. (1957), Reconnaissance soil map of Tasmania. Sheet 75, **Brighton**. Div. Rep. Div. Soils CSIRO Aust. 2/57**;** Scale 1: 63 360

Dimmock, G.M. (1960), Soil reconnaissance of the area between the **Tomahawk and Ringarooma Rivers**, N.E Tasmania. Tech memo. Div. Soils CSIRO Aust. 7/60**;** Scale 1:63 360

Dimmock, G.M. (1961), Reconnaissance soil map of Tasmania. Sheet 74, **Ellendale**. Div. Rep. Div. Soils CSIRO Aust. 5/61**;** Scale 1:63 360

Dimmock, G.M. (1964), **Beaconsfield** Soil Survey. CSIRO (unpublished)**;**
Scale 1: 100 000

Hubble, G.D. (1951), Reconnaissance survey of the **Coastal Heath Country, N.W** Tasmania. Div. Rep. Div. Soils CSIRO Aust. 10/5 **;** Scale 1:126 720

Leamy, M.L. (1961), Reconnaissance soil map of Tasmania, Sheet 61. **Interlaken**. Div. Rep. Div. Soils CSIRO Aust. 6/61**;** Scale 1:63 360

Loveday, J. and Dimmock, G.M. (1958), Reconnaissance soil map of Tasmania. Sheet 76, **Buckland**. Div. Rep. Div. Soils CSIRO Aust. 13/57**;** Scale 1: 63 360

Loveday, J. (1955), Reconnaissance soil map of Tasmania, sheets 22 and 28 - **Table cape and Burnie**. Div. Rep. Div. Soils CSIRO Aust. 14/55**;** Scale 1:126 720

Loveday, J. (1955), Reconnaissance soil map of Tasmania. Sheet 83, **Sorell**. Div rep Div Soils CSIRO Aust 10/55**;** Scale 1:63 360

Loveday, J.. (1955), Reconnaissance soil map of Tasmania. Sheet 82, **Hobar**t. Div rep Soils CSIRO Aust. 13/55**;** Scale 1:63 360

Nicolls, K.D. (1955), Soils, geomorphology and climate of an area between the **Lagoon and Arthur River**, West Coast of Tasmania Div. Rep. Div. Soils CSIRO Aust. 7/55**;** Scale 1:126 720

Nicolls, K.D. (1957), Reconnaissance of the soils around **Georgetown**, Tasmania. Tech. Memo Div Soils CSIRO Aust 3/57**;** Scale 1: 126 720

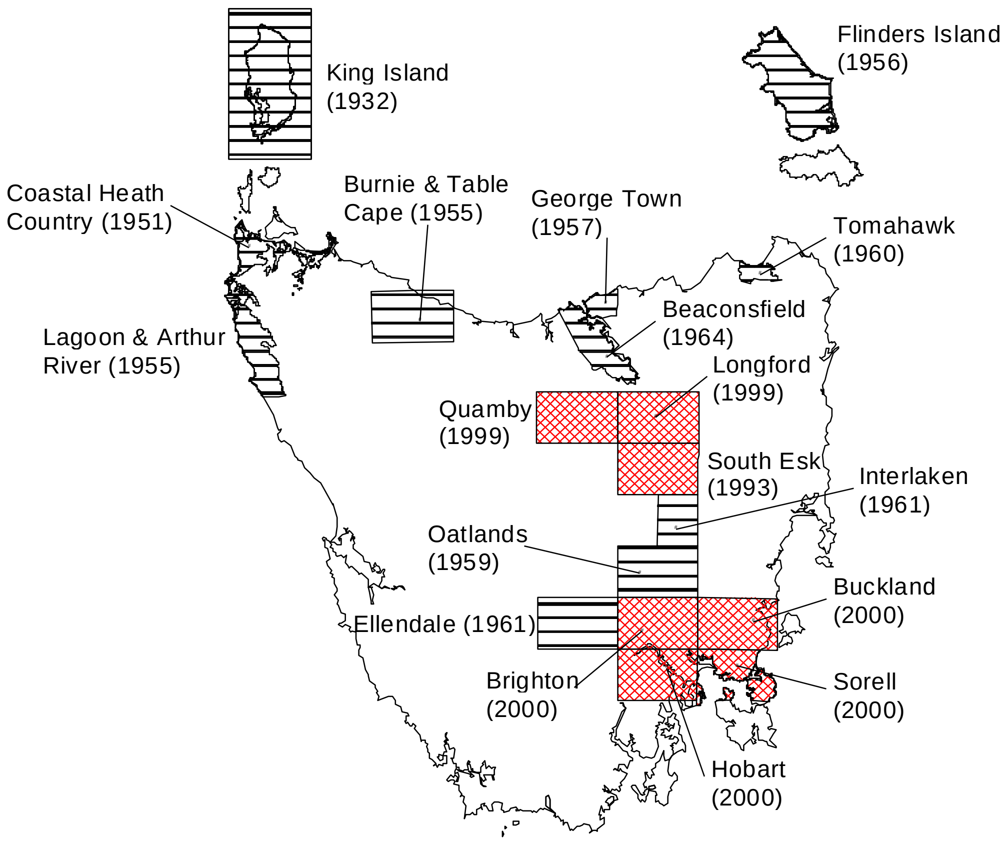
Nicolls, K.D. (1958), Reconnaissance soil map of Tasmania. Sheet 47, **Longford**. Div. Rep. Div Soils CSIRO Aust. 14/57**;** Scale 1: 63 360

Nicolls, K.D. (1959), Reconnaissance soil map of Tasmania. Sheet 46, **Quamby**. CSIRO Div. Report No. 9/58**;** Scale 1: 63 360.

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

Appendix 8

Index Map of the 1:100 000 Reconnaissance Soil Surveys of Tasmania



Correlated maps depicted by hatching.