APPENDIX I

SOURCES OF INFORMATION IN LAND TYPE TABLES

Climate

There are relatively few temperature and rainfall recording stations in the study area. Rainfall figures used in the tables have been taken from the rainfall isohyets given in the Land Conservation Council reports for the Alpine and North-east Study Areas (Land Conservation Council 1977, 1984), Rowe (1967) and Figure 2.1 in this report which has been derived from extrapolation of rainfall information using the ESOCLIM software. Consequently they give only the broad range for each land type. Similar data for temperature (isotherms) are not available.

Geology

The age and lithology are given as per the following Geological Survey maps:

1:250 000	Tallangatta Geology Sheet (SJ 55-3)
1:50 000	Cravensville Geology Sheet
1:50 000	Hume Geology Sheet

Physiography

Elevation Range: Taken from the 1:100 000 topographic maps for Rosewood, Holbrook, Tallangatta, Corryong, Bogong and Benambra.

Relative Relief: This was derived from the above topographic maps by determining differences in elevation between streams and the adjacent ridges and hill or mountain crests.

Landform: This was determined from field observations, the 1:100 000 topographic maps listed above and the 1:80 000 aerial photographs. Delineation of mountains, hills and low hills mostly followed McDonald *et al.* (1984) with mountains >300 m, hills between 90 and 300 m and low hills <90 m in elevation.

Slope Range: Slopes have been divided into five classes -

<3%	flat
3 - 10%	gentle
11 - 20%	moderate
21 - 32%	steep
>32%	very steep

The upper and lower values given in the tables for the slope range are the upper and lower values of the slope classes found within the land type or land component. For example, a land type or component with slopes in the gentle to steep classes, would have the slope range 3 - 32%.

Soil

Soil descriptions and data on condition of surface soil, consistency, exposed rock and surface stone, subsoil slaking tendency, and depth to rock are on the basis of profile descriptions made in the field. Use has also been made of data collected by Rowe (1967 and unpublished records) and Imhof *et al*. (1996) where possible. Soils have been classified using ‘A Factual Key for the Recognition of Australian Soils’ (Northcote 1979) and ‘A Handbook of Australian Soils’ (Stace *et al*. 1968). The more recently described soil profiles which were sampled for chemical analyses, have been classified according to the Australian Soil Classification (Isbell 1996).

Descriptions and ranges for the different properties given in the tables are the descriptions and class ranges used in McDonald *et al*. (1984). The descriptions and ranges in McDonald *et al*. (1984) are repeated here for 'condition of surface soil', 'consistence' and 'exposed rock and surface stone' for easy reference.

Condition of surface soil: the options for surface soil condition are given in tabular form below. These conditions are not necessarily mutually exclusive.

Periodic cracking	cracks 6 mm or more wide, 300 mm or more deep and at least one crack per m^2. Cracks may lie below a massive surface.
Self-mulching	highly pedal loose surface mulch forms on drying.
Loose	incoherent mass of individual particles or aggregates. Surface easily disturbed by pressure of forefinger.
Soft	coherent mass of individual particles or aggregates. Surface easily disturbed by pressure of forefinger.
Firm	coherent mass of individual particles or aggregates. Surface disturbed or indented by moderate pressure of forefinger.
Hard setting	compact, hard, apparently apedal condition forms on drying. Surface not disturbed or indented by pressure of forefinger. Surface seal is not necessarily associated with hard setting.
Surface crust	thin surface layer or flake, usually less than 10 mm thick, separates from, and can be lifted off, soil below on drying.
Trampled	soil that has been extensively trampled under dry conditions by hoofed animals.
Poached	soils that has been extensively trampled under wet conditions by hoofed animals.
Recently cultivated	effect of cultivation is obvious.
Saline	surface has visible salt, or salinity is evident from the absence or nature of the vegetation, or from soil consistence. These conditions are characterised by their notable difference from adjacent non-saline areas.

Consistence: consistence refers to the strength of cohesion and adhesion in soil. Strength will vary according to soil water status and hence this is also recorded with soil strength. Strength of soil is the resistance to breaking or deformation. Strength is determined by the force just sufficient to break or deform a 20 mm diameter piece of soil when a compressive shearing force is applied between thumb and forefinger. The 20 mm piece of soil may be a ped, part of a ped, a compound ped or a fragment.

Loose	no force required. Separate particles such as sands.
Very weak	very small force, almost nil.
Moderately weak	small but significant force.
Moderately firm	moderate or firm force.
Very firm	strong force but within power of thumb and forefinger.

Moderately strong	beyond power of thumb and forefinger. Crushes underfoot on hard flat surface with small force.
Very strong	crushes underfoot on hard flat surface with full body weight of average man applied slowly.
Rigid	cannot be crushed underfoot by weight of average man applied slowly.

Exposed rock and surface stone: percent ranges are given below.

No surface coarse fragments	0
Very few coarse fragments	<2%
Few coarse fragments	2% - 10%
Coarse fragments common	10% - 20%
Many coarse fragments	20% - 50%
Abundant coarse fragments	50% - 90%
Very abundant coarse fragments	>90%

Slaking tendency: The partial breakdown of soil aggregates in water due to the swelling of clay and the expulsion of air from pore spaces. (Charman and Murphy, 1991)

Depth to rock: Where soil overlies rock, the depth to rock has been given in metres.

Soil Permeability: (No measurements have been made in the field.) Data given are estimates only, based on profile morphology, in particular, on texture, structure and the relationships between horizons. In making these estimates, use was made of "Estimating Saturated Hydraulic Conductivity from Soil Morphology" in McKeague *et al.* (1982), Tables 2 and 3 in Talsma and Hallam (1980), Table 3 in Talsma and Northcote (1982) and unpublished data.

Lack of data on the shrink/swell tendency of subsoils has meant that this factor has not been considered in the estimates of soil permeability; it is most likely to affect the permeability of some of the duplex soils. Due to this and the greater variability within duplex profiles, the estimates for the duplex soils are the most approximate.

Permeability classes are:

High permeability - saturated hydraulic conductivity greater than 360 mm/day

Moderate permeability - saturated hydraulic conductivity in the range 12 - 360 mm/day

Low permeability - saturated hydraulic conductivity less than 12 mm/day

Site Drainage: This refers to the soil water regime at a site. It is determined by:

(i) the rate at which water is able to move through the soil (soil permeability), the depth to an impermeable layer, and the soil water holding capacity;

(ii) topographic factors - in particular slope and landscape position which determine whether a site tends to shed or receive surface water and groundwater flows.

The drainage classes and definitions given below are from McDonald *et al.* (1984).

1	*Very poorly drained*	Water is removed from the soil so slowly that the watertable remains at or near the surface for most of the year. Surface flow, groundwater and subsurface flow are major sources of water, although precipitation may be important where there is a perched watertable and precipitation exceeds evapotranspiration. Soils have a wide range in texture and depth, and often occur in depressed sites. Strong gleying and accumulation of surface organic matter are usually features of most soils.
2	*poorly drained*	Water is removed very slowly in relation to supply. Subsurface and/or groundwater flow, as well as precipitation, may be a significant water source. Seasonal ponding resulting from run-on and insufficient outfall also occurs. A perched watertable may be present. Soils have a wide range in texture and depth; many have horizons that are gleyed, mottled, or possess orange or rusty linings along root channels. All horizons remain wet for periods of several months.
3	*Imperfectly drained*	Water is removed only slowly in relation to supply. Precipitation is the main source if available water storage capacity is high, but subsurface flow and/or groundwater contribute as available water storage capacity decreases. Soils have a wide range in texture and depth. Some horizons may be mottled and/or have orange or rusty linings along root channels, and are wet for periods of several weeks.
4	*Moderately well drained*	Water is removed from the soil somewhat slowly in relation to supply, due to low permeability, shallow watertable, lack of gradient, or some combination of these. Soils are usually medium to fine in texture. Significant additions of water by subsurface flow are necessary in coarse-textured soils. Some horizons may remain wet for as long as one week after water addition.
5	*Well drained*	Water is removed from the soil readily but not rapidly. Excess water flows downward readily into underlying moderately permeable material or laterally as subsurface flow. The soils are often medium in texture. Some horizons may remain wet for several days after water addition.
6	*Rapidly drained*	Water is removed from the soil rapidly in relation to supply. Excess water flows downward rapidly if underlying material is highly permeable. There may be rapid subsurface lateral flow during heavy rainfall provided there is a steep gradient. Soils are usually coarse-textured, or shallow, or both. No horizon is normally wet for more than several hours after water addition.

Native Vegetation

Data on the native vegetation were obtained from field descriptions, from Land Conservation Council reports (1977 and 1984), Rowe (1967) and Adams (1997).

Site Numbering

Sites described during the major phase of field work for this project were numbered sequentially. No soil samples were taken for laboratory analyses during this phase of field work. In March 1998 a field trip was undertaken specifically to obtain soil samples for laboratory analyses from selected land types. The sites from which these soils were obtained have also been numbered sequentially but have the letter 'T' in front of the site number (sites T1 to T15). The laboratory data for these soils are given in Appendix 3. Sites described by Imhof *et al.* (1996) in the Tallangatta Creek Valley have the prefix NE before the number (sites NE19 to NE32).

Where site descriptions are available from similar land types and components, the relevant site numbers have been given in brackets.