APPENDIX III – Methods and explanation of land system descriptions

It is important to realise that land system boundaries do not necessarily indicate a sharp change in the land, but may separate areas that differ in certain specific criteria. The simplest and most precise boundary is one that marks a sharp physiographic break – for example, where an alluvial fan landscape meets steep hill-slopes. Changes in rock type may be significant for definition of land systems and may be clear enough to be used as a precise boundary.

Commonly, however, changes in important land characteristics are gradual, and an arbitrary choice must be made for the placement of a boundary. For example, the gradual change in rainfall across a region may be great enough to justify subdividing the area. It is often convenient to use change in vegetation characteristics as an indicator of where the change is significant for plant growth. The land system boundary that separates such areas obviously indicates a zone of change. Similarly, gradual changes in the presence and/or proportion of landforms within the broader landscape may occur which, at the land system scale of mapping, would be considered as separate map units. Placement of map unit boundaries in this case depends on the mapper's skill and the significance placed on the differences. Again, such a boundary represents a zone of change and the map units each contain a range of the defining characteristic, although a narrower range than would otherwise have been the case.

Data presented in the land system tables have been derived in the following ways:

Climate

Rainfall: Annual average and rage were estimated by constructing isohyets for stations within and adjacent to the catchment, based on published data of the Bureau of Meteorology, other records and extrapolation on the basis of these data modified by presumed topographic effects.

Temperature: Annual average and range were estimated on Bureau of Meteorology data for stations within and adjacent to the catchment.

Geology

Details on the age and lithology were obtained from the 1:250 000 geological maps Melbourne SJ 55-5 and Bendigo SJ 55-1 (Department of Minerals and Energy) together with inspection in the field.

Physiography

Landscape: Determined from values of relief and modal terrain slope, taken from the Australian Soil and Land Survey Handbook (McDonald *et al* 1984).

Elevation range: Derived from 1:100 000 topographic map of the area.

Relative relief: Derived from 1:100 000 topographic maps by taking the average difference in elevation between the ridges and major depressions at numerous locations within the land system.

Slope gradient: The typical slope and the range in slope were determined from measurements taken in the field.

Site drainage: A field observation on how quickly water removes itself via surface flow from the site.

Native vegetation

A full explanation of the methods and references used is given in the introduction of the Vegetation chapter (Chapter 5).

Soils

Parent material: Determined by field observation with prior reference to 1:250 000 geological maps of the area (Department of Minerals and Energy).

Description: Soil profiles were described in general terms compatible with Northcote's (1979) categories based on textural change with depth. A generalised Munsell name was used to describe the dominant colour of the B horizon in its moist state. Additional terms were used for many soils:

Shallow – less than 0.5 m to rock impenetrable to auger.
Stony – the A horizon contains more than 10% stone.
Calcareous – carbonates detectable with 0.1 M HCl (Northcote 1979)
Sodic – sodium more than 5% of exchangeable metal cations
Coarsely structured – B horizon with blocky peds more than 2 cm in diameter

Classification: The Northcote (1979) classification was used, however in Table 7 all soils have been given the appropriate classifications according to Stace et al (1968) and Soil Survey Staff (1975).

Surface texture: Northcote's (1979) texture grades and symbols were used.

Depth of solum: The depth to the bottom of the B horizon. In addition to augering, depth was estimated from road and other soil exposures and by geomorphic evidence.

Nutrient status: The A_1 horizons and the B horizons from 30 to 60 cm list in Appendix I were rates for the sum of exchangeable calcium, magnesium and potassium as a guide to the availability of nutrients in general. The ratings appear to be consistent with fertiliser requirements for agriculture.

	Ca + Mg + K Milliequivalents per 100 g
Very low	0 – 3.9
Low	4 – 7.9
Moderate	8 – 17.9
High	>18

Available soil water capacity: The broad relation between texture and available soil water capacity was used to rate topsoils and subsoils together with depth functions for modal soils from each land component. Using values from Soil Taxonomy (Soil Survey Staff 1975) and converting USDA textures to equivalent Australian Soil textures, the relations shown in the table below were formed.

Soil texture	Available water capacity cm water/cm depth of sol	Rating
Sand	0.06	Low (<0.1)
Loamy sand	0.08	
Clayey sand		Moderate (0.1-0.15)
Sandy loam	0.13	
Loam		
Sandy clay		
Silty clay	0.14	
Clay		
Silty loam, silt	0.15	
Silty clay loam		High (>0.15)
Clay loam	0.16	
Sandy clay loam		