

2. THE PHYSICAL ENVIRONMENT

The area lies within the central Victorian goldfields and has been subjected to varying land use since settlement. The consequences of this have varied with geology, topography and climate, both past and present, each land component having a characteristic reaction to a particular form of activity. The brief account which follows provides the setting for the specific studies which are presented in detail.

2.1 *Geology and soils*

The bedrock is dominated by Ordovician sandstone, siltstone and slate in comparatively thin, usually graded beds, monotonously repeated. These rocks have been complexly folded, faulted and jointed, the fractures providing actual or potential paths for groundwater movement. Adjacent to granitic intrusions, the sediments have been metamorphosed to hornfels and spotted slate.

The bedrock areas vary from steep and rocky, with deep, narrow valleys, to gently undulating terrain, usually with broader, shallow valleys. The alluvium in the valleys is predominantly fine-grained, but often contains lenses of sand and gravel, although these are rarely continuous for more than a few metres, but are inter-connected through finer, less permeable material or along sedimentational discontinuities. Minor remnants of Tertiary alluvial gravels occur as isolated hill cappings flanking some of the main valleys.

The dominant soils developed on bedrock vary areally with the steepness of the terrain and with the depth and intensity of weathering. In the south (Figure 1, Pilchers Bridge area), the steeper hills and ridges carry thin immature stony red-brown gradational soils, the lower part of the solum rarely being heavier than light clay. In the same general area, but on flatter slopes and divides, the soils usually have better-developed horizons, red-brown duplex profiles being dominant, although deep, red gradational soils are sometimes present, particularly on or near divides (Figures 1-3, Eppalock area).

The soils on the valley alluvium are normally yellow-brown sodic duplex types, but in the north, they tend to be redder in colour. The general increase of redness and the development of heavy clays in all soils towards the north is related not only to drier conditions in the present, but to a climate conducive to deep and intense weathering in the geological past, the artifacts of which are better preserved in the more subdued northern country (Figures 4 and 5).

Associated with the progressive maturity of the soil profiles from south to north is a marked increase in the quantity of soluble salts stored. Under natural conditions, in the north this is about six times that in the immature soils in the south (Jenkin 1979; Jenkin and Irwin 1975). The effect appears in the alluvial soils as well as in those on bedrock.

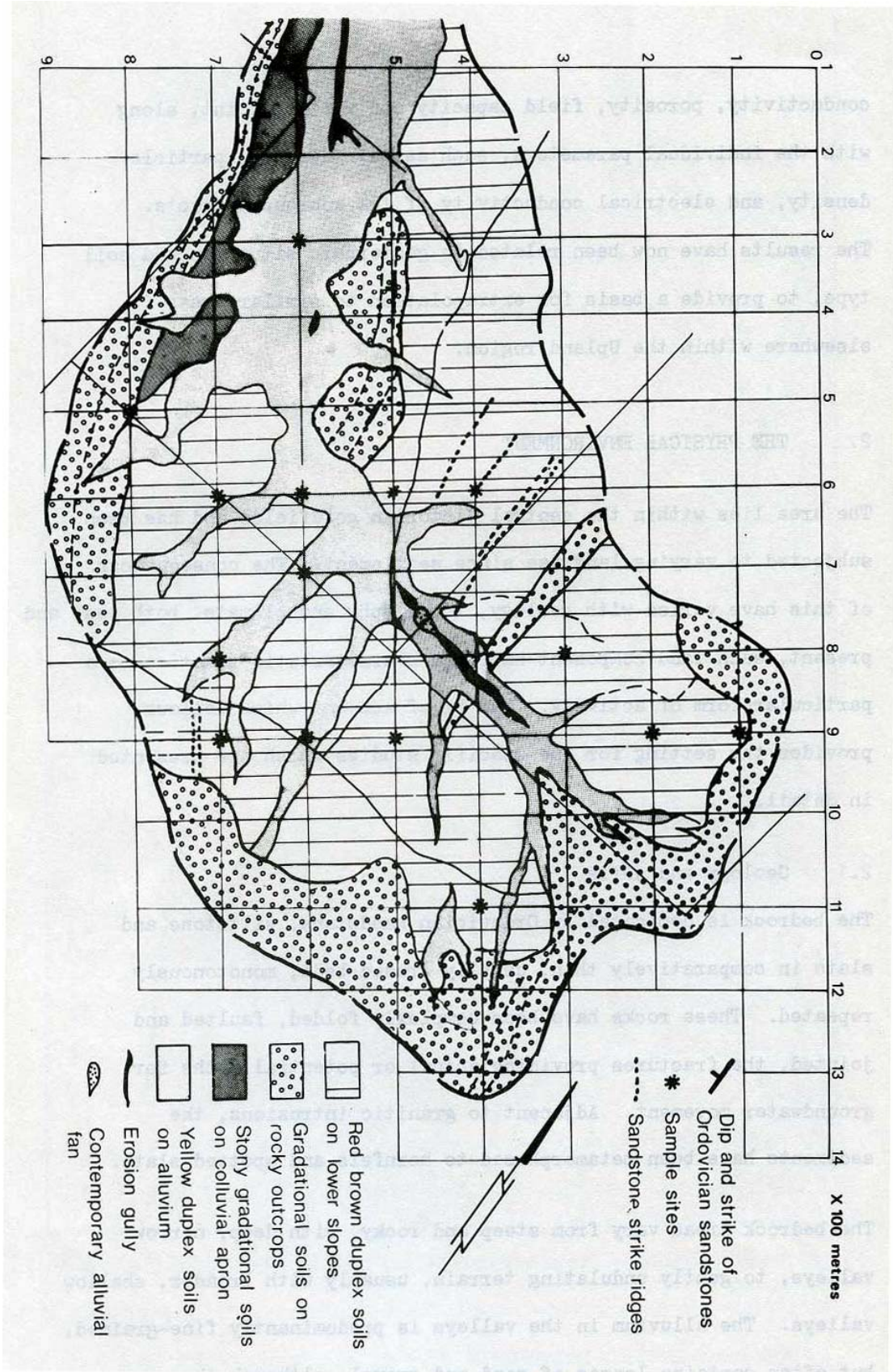


Figure 2(a) – Eppalock cleared catchment (No. 1): Soils and geology

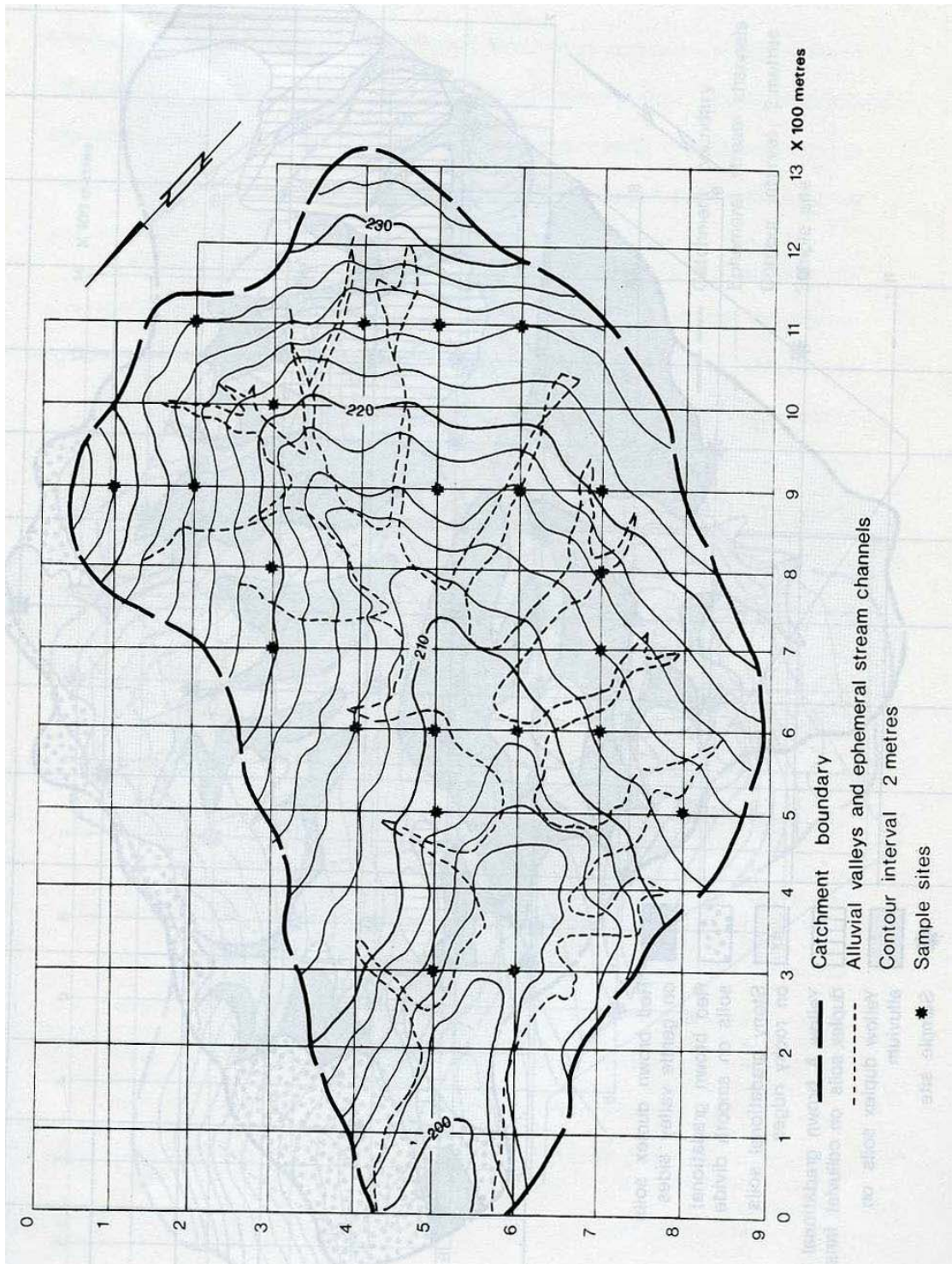


Figure 2(b) – Eppalock cleared catchment (No. 1): Topography and drainage

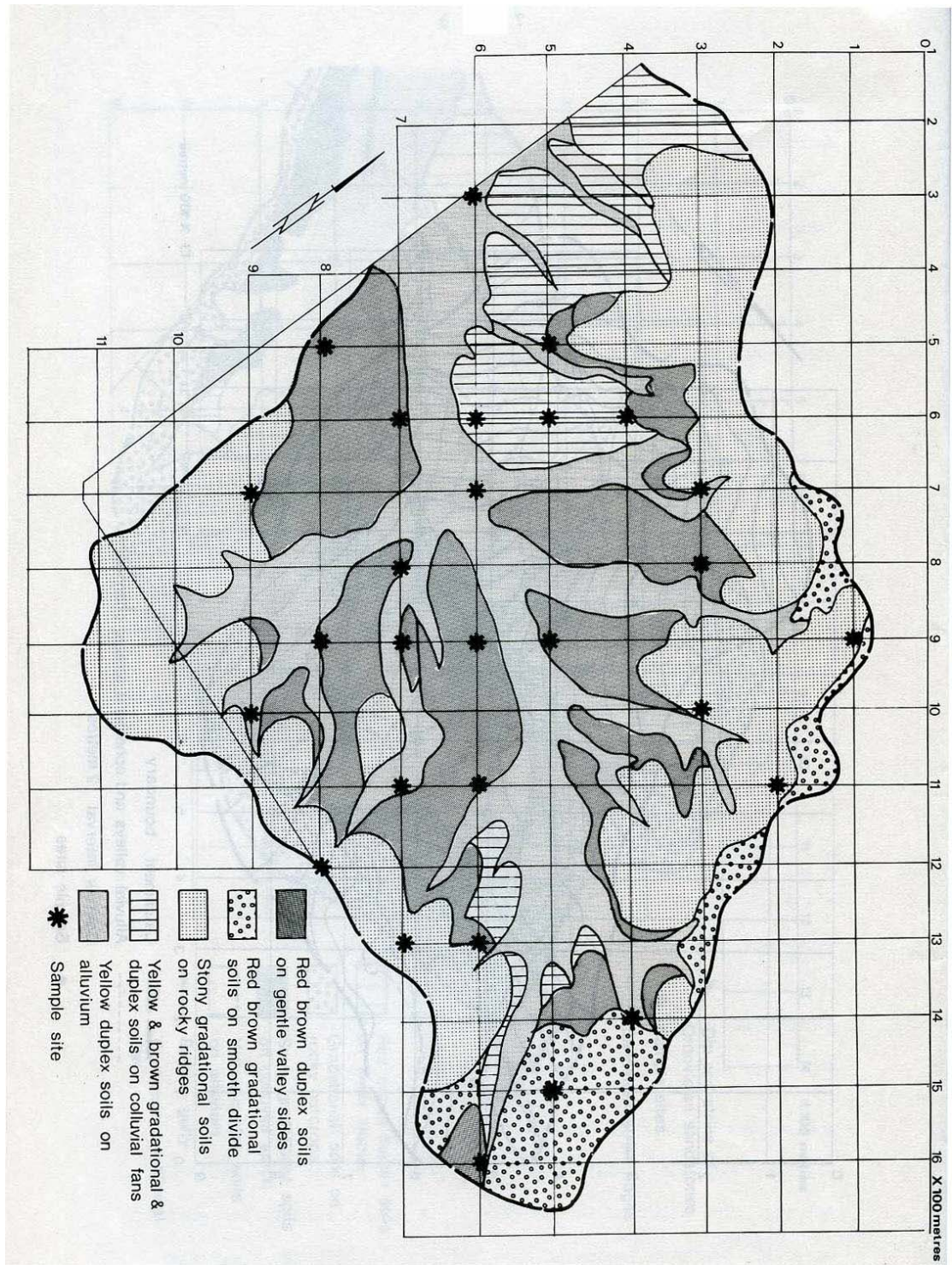


Figure 3(a) – Eppalock forested catchment (No. 2): Soils and geology

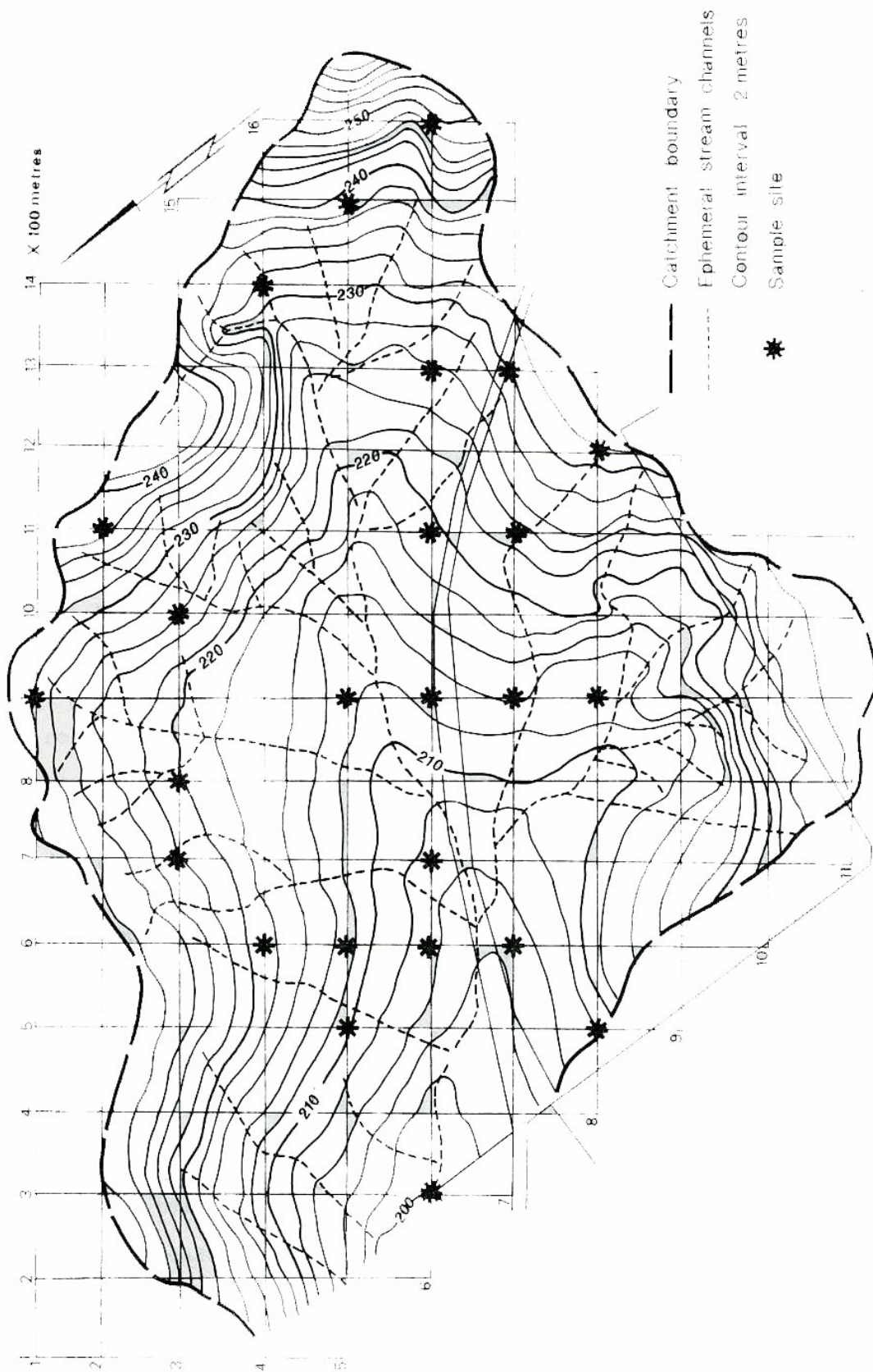


Figure 3(b) – Eppalock forested catchment (No. 2): Topography and drainage

2.2 Climate and vegetation

The annual rainfall decreases from 525 mm in the south to 425 mm in the north, while evaporation increases northwards, with P/E ranging from 0.4 to 0.3.

The distribution of the natural vegetation varies with the level in the landscape and, consequently, partly with the nature of the soils. In the more humid southern areas, the stony soils dominate the higher parts and support a red box and stringy-bark forest. On the deeper red soils of the gentler slopes and broad divides the forest is often dominated by red ironbark. At this level grey box enters the association, becoming ubiquitous here and at lower levels. In the lower parts of the upland valleys, yellow gum is conspicuous and, in the broader alluvial valleys, river red gum dominates.

Towards the north, grey box dominates the slopes with river red gum on the flats. Mallee vegetation is widespread on stony ironstone soil derived from the formerly extensive lateritic palaeosol between Bendigo and the Riverine plain.



Salinised flats at Kamarooka

23 Land use and deterioration

Land use during early occupation was pastoral and the effect on soils was probably slight. With the discovery of gold in 1851 there was a dramatic increase in population associated initially with limited areas yielding rich alluvial gold. The development of larger mines, mainly quartz in this area, resulted in forests being exploited for mine timbers and fuel. As the alluvial gold ran out, the demand for agricultural land increased, and in the late 1850s and early 1860s, extensive clearing commenced, with its far-reaching effects on land deterioration.

The most obvious forms of deterioration were sheet wash and gully erosion. The more subtle effects, such as nutrient loss associated with leaching, and the rise of saline groundwater, were not appreciated fully until quite recently.

Salinisation associated with rising groundwaters is widespread in the region and, although the underlying cause is the same in all cases, the individual manifestations vary. These are of two kinds, salinisation of water supplies and soil salting.

Soil salting results from the general rise of the saline groundwater body and saturation of the whole profile, or from the emergence of saline springs which affect soils below their points of emergence, both producing deterioration of water supply quality in dams, groundwater wells and streams.

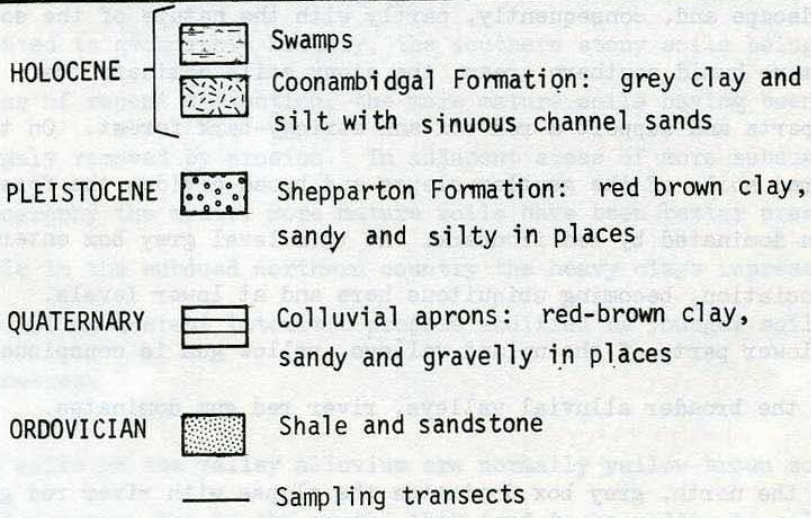
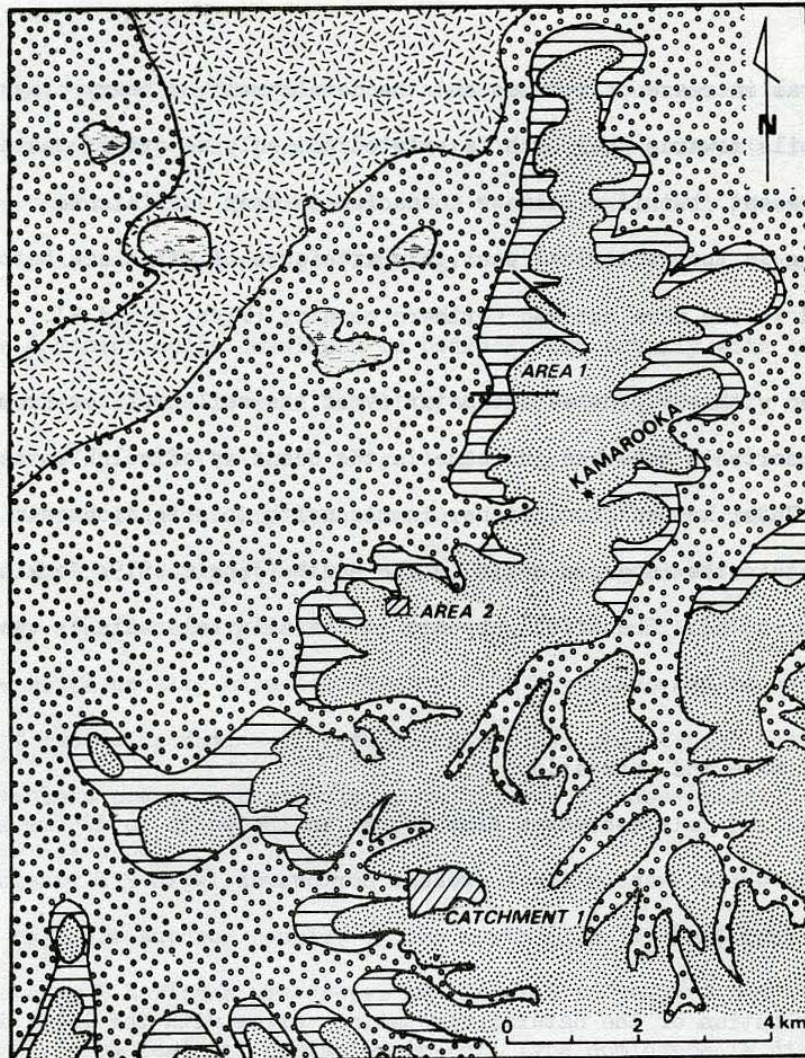


Figure 4 – Geological map of Kamarooka showing the study area

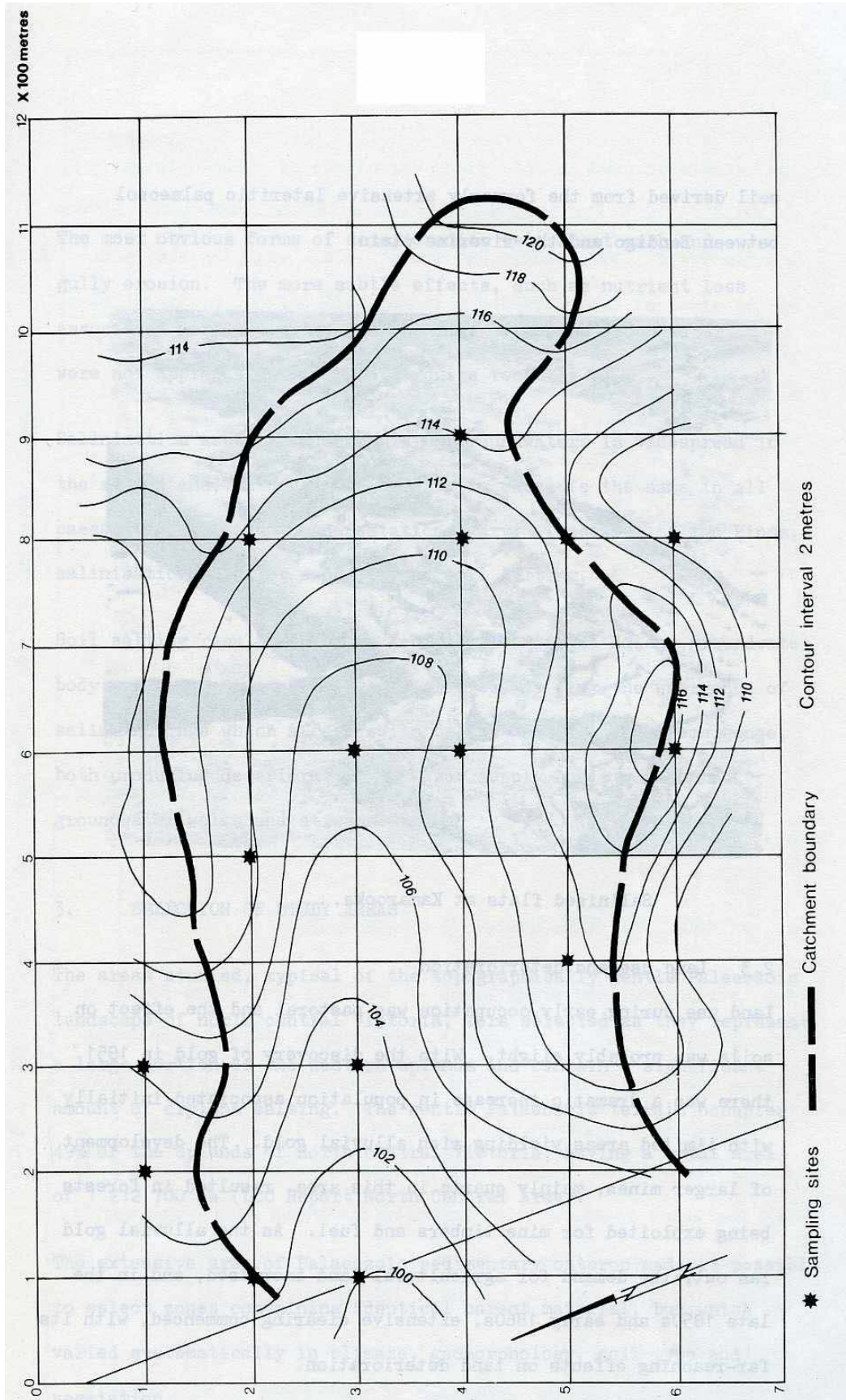


Figure 5 – Kamarooka forested catchment (No. 1): Topography