RECORD 1986/33

REGOLITH TERRAIN UNITS OF THE HAMILTON 1:1 000 000 SHEET AREA, WESTERN VICTORIA

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SUMMARY

The geology and geomorphology of The Hamilton 1:1 000 000 Sheet area is described. The area includes fifty seven regolith terrain units which are located on the map, and named and described in a standardized form in the Record.

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INTRODUCTION

The definition of regolith

Regolith is a general term for the layer or mantle of fragmental and unconsolidated rock material, whether residual or transported, that nearly everywhere forms the surface of the land and overlies or covers bedrock. It includes rock debris of all kinds including saprolite (weathered rock in place), volcanic ash, glacial drift, alluvium, aeolian deposits, vegetal accumulations, and "soil". "Soil" itself is very difficult to define, as it is used in different senses by agriculturalists and engineers. There is a definition problem with sediments, which may extend to hundreds of metres in a sedimentary basin. Another problem is that some regolith is not unconsolidated but is very hard, as in the case of silcrete and other duricrusts. These problems of definition will not be pursued here: most workers in the field have a pragmatic feel about what is regolith.

The need to study the regolith

The regolith is important for at least three reasons. Firstly it is of intrinsic scientific importance, especially in Australia, where so much of the continent is covered in thick regolith and where much of the later geological history of the continent is recorded. Secondly, some regolith materials are of economic importance, such as bauxite, uraniferous calcrete, nickiferous laterite, opal, or kaolin, and in other places the regolith hosts economically important materials such as diamonds, tin, gold or groundwater. Thirdly, over large areas the regolith is a barrier between mineral explorers and their targets, and they would like to have more understanding of the nuisance to enable them to ask the right questions. The mineral industry, represented by Western Mining, had made strong appeals for regolith research to be undertaken by CSIRO, and later by BMR. BMR initiated a regolith project partly in response to this request from industry.

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Regolith studies

In the past some detailed studies of specific regolith problems have been undertaken by BMR but it was apparent that the national earth science research institute - the BMR - should take a broader view, with a nationwide coverage and a study of fundamental problems. The chosen strategy for regolith research was therefore to study details of the regolith in specially favourable sites (such as deep open pit mines) or where suitable data were available, and to extrapolate regolith mapping by regional regolith terrain studies.

It is also desirable to integrate the large amount of information already available. A data base is required, and this should be related to localities through a map. The first function of a regolith terrain map should therefore be as an adjunct to a data base. Indeed, given present day computer-technology, maps and tabulation of data can be seen as part and parcel of the same data base.

But there is a second reason for wanting regolith terrain maps: there is a large amount of available information on some areas, but other large areas are virtually unknown from a regolith point of view. It was felt necessary to produce a regolith terrain map of the whole continent, so that knowledge could be factually based and not extrapolated from a few well-known areas. Any interpretations of the regolith of the continent as a whole need to be based, so far as possible, on an unbiassed record of the distribution in all parts of the continent. With such an overview, detailed studies can be seen in context. The regolith work aims to follow the classic survey principle of working from the whole to the part. In the words of Dr Johnson "Particulars are not to be examined till the whole has been surveyed". We may not always know what we are mapping, but we hope to take advantage of Lapworth's dictum: "Map it, and it will all come out right."

Regolith mapping

There is no easy way to map regolith. There is not even an easy way to map soils, which are only the surface of the regolith and ignore the wealth of regolith detail at depth.

Soil maps for agricultural purposes can only be made on large scales: about 1:50 000 is the smallest effective scale in most areas. Soil maps of larger areas at smaller scales require abstraction, and the mapping of surrogate units (such as "landscape" units), which have some relationship to the dominant soils.

The regolith is not only concerned with soil, but also with the tens of metres of unconsolidated deposits or weathered rock that may underlie the soil. This varies across the earth's surface at least as much as the surface soil, but also varies in depth, water-holding capacity, geochemical and geophysical variation, and the number of layers that comprise the regolith profile. The only way to map it is by a surrogate map of terrain units.

Regolith terrain units and classification

Regolith terrain units are areas of land which have many details of the terrain and regolith in common, and differ from other areas. The regular sand dunes of the Simpson Desert are an obvious unit. If some detailed knowledge of one dune is available, it can be extrapolated to other dunes with some confidence. Young lava flows make another clear unit. The Channel Country might be another. Not all regolith terrain units are that easy to delineate, and there are technical works on the methodology of producing such maps (Mitchell, 1973; Ollier, 1977; Cooke and Doornkamp, 1974). Such maps often serve as surrogate maps for many other purposes, including miltary travel maps, base maps for highway engineering (e.g. CSIRO Applied Geomechanics), agricultural development, or town planning. They should also be useful for mineral exploration.

But although there are textbooks on the technique of terrain classification, and many examples can be cited, the method is not yet routine. It is itself a research area, and to some extent the maps will vary with the individual researcher, as well as with the level of data available.

Several maps of landscape units of Australia are already in existence. The CSIRO Soils Atlas of Australia is such a map. The continent is mapped at 1:2 000 000, and the units depicted are labelled on the map with alphanumeric codes such at T1. Legend 1 on the map shows that this is "Hard acidic yellow mottled soils: unbleached A_z horizon..." This unit is a subset of "Hard setting loamy soils with mottled yellow clayey subsoils (Dy3)" which is in turn a subset of "III Soils with contrasting (duplex) texture profiles (D)." However, the soil unit number, such as Ta1, can be looked up in Legend 2, in an accompanying booklet, where it is found that the unit is a landscape unit. Our example, Ta1, is simply described as "Mountainous". (This unit is roughly equivalent to Unit 52, Beech on the BMR Hamilton Regolith-Terrain map). Other units are G1, roughly equivalent to Unit 33, Eccles, which is "Friable loamy soils of various kinds" and stone rises ... with dark shallow porous soils ..." and D4, equivalent to Unit 20, Grampian, is "Coherent sandy soils" and "Hilly to mountainous: rock outcrops and shallow grey-brown sandy soils".

The emphasis on surface features made the selection of units for the Soils Atlas different from those that were considered desirable for the BMR regolith maps.

The CSIRO Division of Land Research (later Land Use Research, and Water and Land Research) produced an excellent series of terrain classification maps, but the cover of Australia is incomplete and scattered.

The most complete map of Australian landforms is the map of Jennings and Mabbutt (1986). This is at a scale of only 1:20 000 000, so it cannot convey enough detail for regolith purposes. The individual units are described only very briefly.

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Other examples of Terrain Classification maps include those produced by the Soil Conservation of Victoria, and the Land Conservation of Victoria. In South Australia a ten volume report on Environment Regions of South Australia was produced by CSIRO. In Western Australia the Vegetation Survey (e.g. Beard, 1976), while not itself a terrain classification, has many boundaries that are equivalent to those of regolith terrain. There are many other similar maps. All these sources were utilised in devising the 1:5 000 000 Regolith Terrain Map of Australia (Record 1986/27), but because of their inconsistent keys none of them could be adopted in its entirety.

It was felt that a terrain classification map at a suitable scale would be the best base for a regional description of regolith in Australia. It could also serve as the spatial or geographic basis for a data base of regolith information. Such a data base could include both data which is available today, and that which will become available in the future. There is a lot of information available already on the regolith in Australia, but there is no systematic way of integrating it into a regional scene. In fact there is probably a need for two kinds of maps, both made on the same principles of Terrain Classification. One is for all Australia, so that the data base is nation-wide. There are obvious advantages in covering the whole country, but the units may be too coarse to be useful in a practical way, and so there is a need for another kind of map on a larger scale, so that more detail can be shown. It was thought that 1:1 000 000 might be a useful scale.

Remote sensing imagery and other sources of data

Another source of data for the compilation of a regolith terrain map is remote sensing imagery, whether derived from satellite or aircraft. At present there is a super-abundance of images, but little information on the meaning and reliability of all the information they contain. At the BMR we devised a simple technique for use with imagery. The image is first obtained, together with any data on what the signals are supposed to mean. The major features are checked on the ground, and a rough estimate made of the degree on match between image units and actual regolith units. Then, in hindsight, knowing what the ground truth really is, a better interpretation is made. This too will be imperfect, but better than the first effort, and the degree of fit can again be estimated. It is hoped that repeated quantification of ground-truth will lead to two results - better interpretation of images, and better understanding of the regolith. It must be remembered that most imagery systems are only looking at the top few atoms on the ground or its vegetation cover (less than 40 microns). But there are geophysical image systems that can potentially penetrate to greater depths.

Another very valuable source of information for regolith mapping is the small scale imagery obtained from satellites. LANDSAT is the most well known of these, but BMR has incomplete cover. The major disadvantage, however, is the large number of scenes needed to cover the whole country, and there were insufficient people on the project to work on this scale. Much coarser images are available from US National Oceanographic and Atmospheric Administration (NOAA), TIROS and Nimbus 7 satellites. The sensors on board these two spacecraft are the 5 channel "advanced very high resolution radiometer" (AVHRR), and the 6 channel "coastal zone colour scanner" (CZCS). The ground resolution of these two devices is 1100 and 825 m respectively. Although the CZCS instrument is essentially an oceanographic instrument, 4 of the 6 channels are extremely useful for onshore applications. Images at this small scale are especially helpful in defining major units. Occasionally imagery would reveal totally new features of regolith distribution.

GEOLOGY AND GEOMORPHOLOGY

Descriptive geomorphology

Topographically the area consists of the western end of the West Victorian Uplands bounded by plains to the north, south and west, and with a small area of the South Victorian Uplands to the southeast (Fig. 1).

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The Highland area is generally above 400 m and individual peaks include Mount Buangor in the Central Highlands (990 m) and Mount William in the Grampians (1167 m). The highest point in the Southern Uplands is Mount Sabine in the Otway Range (583 m).

Various local names are used for different parts of the highlands, including the Dundas Tablelands, Merino Tablelands, Grampians, and Central Highlands.

The plains too have many local names. The northern plains are part of the Murray lowlands and include the Wimmera and Riverine plains. Further north where dunes are dominant is the Malee Dunefield. Aeolian features include sand sheets and linear dunes, and lunettes. Two of the dunefields have special names - the Big Desert and the Little Desert. The plains in the west of the area, dominated by beach ridges, form the Millicent Plain. Between the West Victorian Uplands and the South Victoria Uplands lie the West Victorian Plains, which are rather more complex than the others. They are underlain by Tertiary sediment which occasionally outcrops, sometimes with a surface topography controlled by beach ridges. The Tertiary sediments are largely veneered by either basaltic lavas, or alluvial and lacustrine deposits. The major topographic units are shown in Fig. 1, and have been used previously (with minor variations) by Jenkins (1976, p.331), Jennings and Mabbutt (1986), Duncan (1982, p. 3) and Hills (1975).

The present rainfall in the region ranges from over 700 mm on the coastal plain to over 1000 mm in the highlands, but less than 500 mm on the inland plains. This gives rise to several major rivers draining away from the highlands. Only a few major rivers reach the south coast, and there are some areas of internal drainage such as the Lake Corangamite catchment. North of the highlands too, many rivers fail to cross the plains, and die out to the north. The rivers further east have progressively more permanent courses. Past climatic changes are clearly revealed in the conflict between river courses and sand dunes. The northern rivers have all flowed further north in the past, and

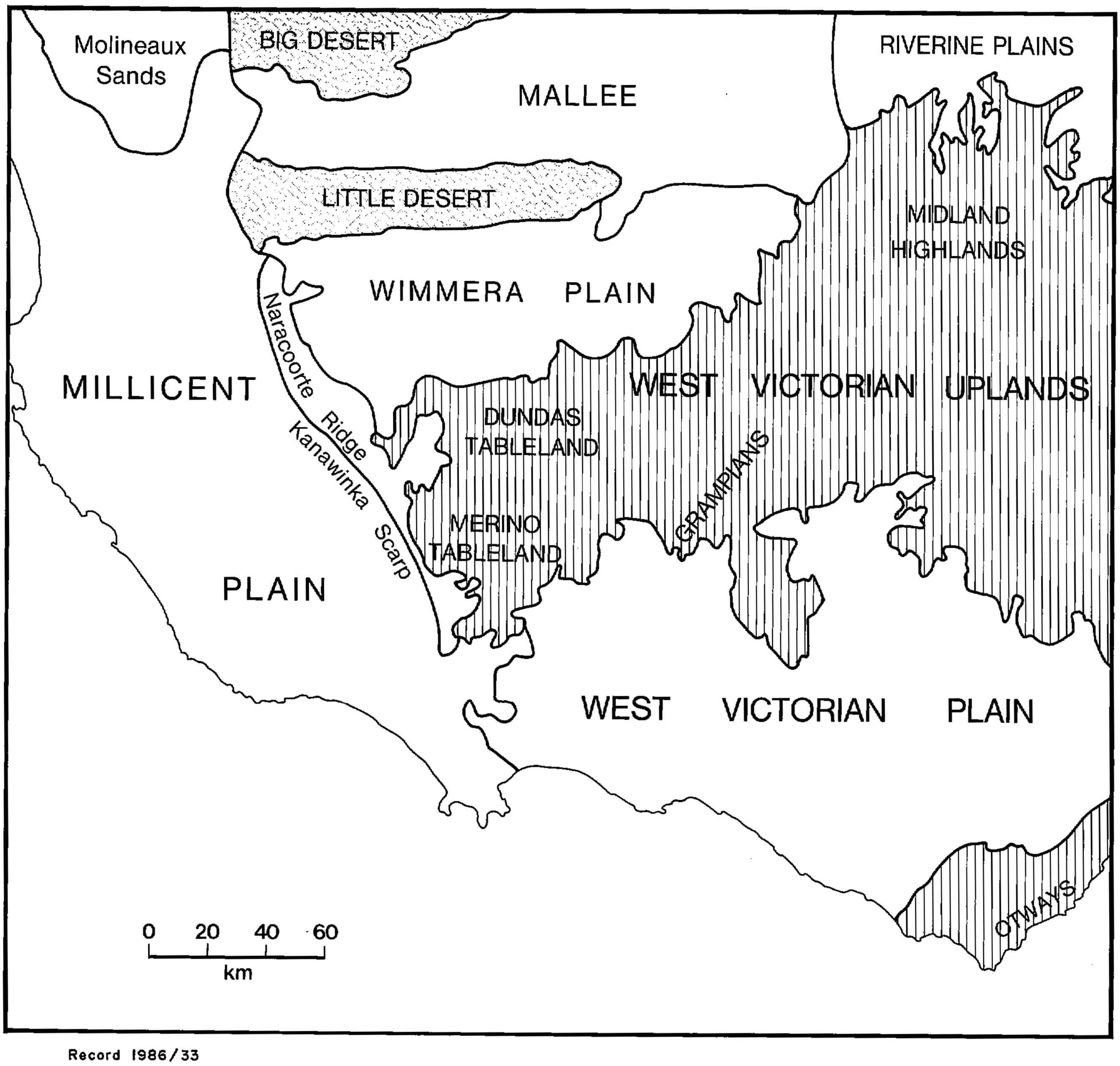
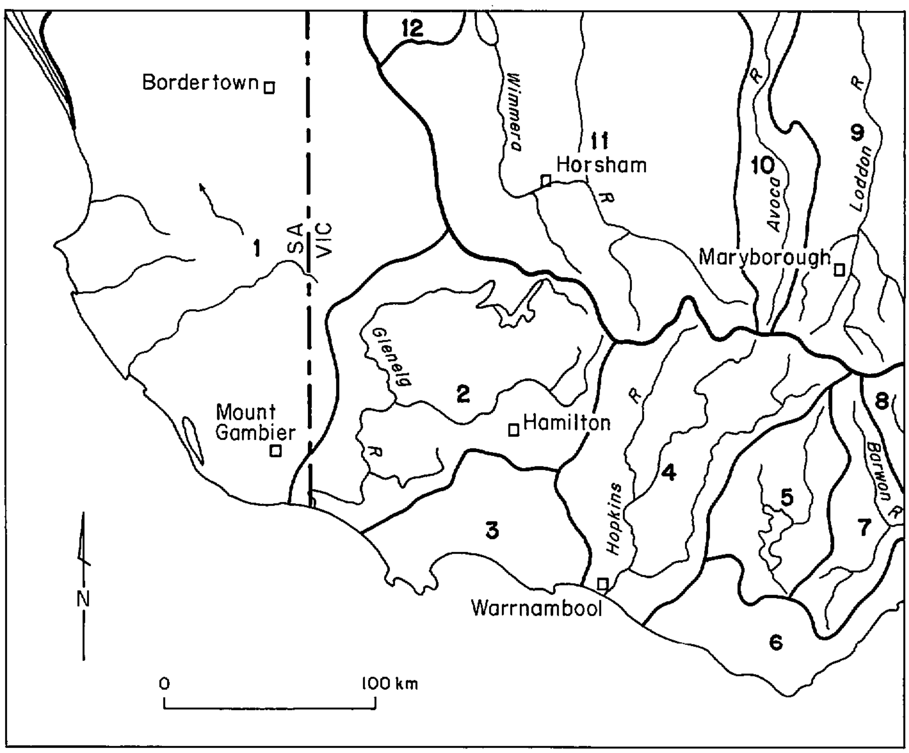


Figure 1. Major topographic units.

the sand dunes have been more active at different times in the past. In the west small rivers disappear beneath the sand dunes: further east the rivers sometimes maintained their course despite peridic dune activity.

The drainage pattern can be divided into several catchments (Fig. 2). Basically there are simple catchments draining north and south from the Great Divide, and complications arising from local aridity (giving rise to catchments of internal drainage like Corangamite, or disrupted drainage as on the Millicent Plain), and from volcanic activity which diverted and displaced earlier drainage.



1. Millicent Coast
2. Glenelg River
3. Portland Coast
4. Hopkins River
5. Lake Corangamite
6. Otway Coast
7. Barwon River
8. Moorabool River
9. Loddon River
10. Avoca River
11. Wimmera-Avon Rivers
12. Mallee

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Figure 2. Major drainage catchments

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Many lava flows followed river courses, displacing the rivers from their beds. New drainage lines were formed with creation of lateral steams and sometimes twin lateral streams. Downcutting by these steams has often left old valley basalts on ridge tops by the process of inversion of relief (Fig. 3). Some basalts totally disrupted pre-existing drainage, and rivers were diverted into completely new routes. Eruption of a large lava sheet diverted the Wannon (Hills, 1975, p. 234). Lavas spreading out south of the Grampians blocked off the drainage to the east forming a lake that eventually overflowed and cut a new route south of the Grampians. The once-blocked and swampy area gives rise to a distinct land system.

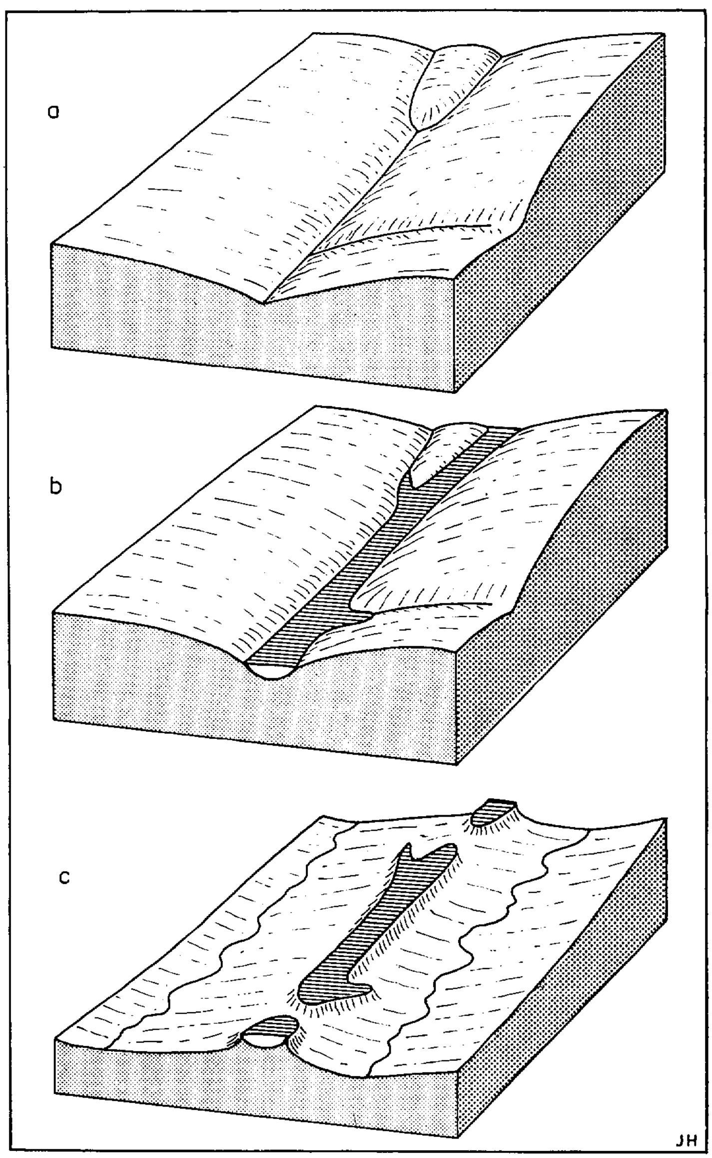

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Figure 3. The process of inversion of relief after a lava flow fills a valley

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Geological history

The lower Palaeozoic rocks, the basement for the region, consist mainly of steeply folded Cambrian metasediments, volcanics, and Cambro-Ordovician shales and sandstone, with extensive Ordovician and Devonian granitic intrusions. These comprise most of the Central Highlands. Steeply dipping Silurian-Devonian sandstones with minor shales and some granite intrusions make up most of the Grampians.

In the Permian the area was a glaciated terrestrial area. Permian sediments, mainly fluvio-glacial, are important in parts of the Dundas Tableland. There was still considerable relief, and the possible presence of an east-west belt of highlands is indicated by decreasing coarseness of the outwash gravels to the north.

When the Permian ice melted, an extensive stable land area continued to exist throughout Triassic and Jurassic times. A widespread planation surface was created, the Trias-Jura palaeoplain (Hill, 1975, p. 339). By the Jurassic an east-west divide, roughly coincident with the present Great Divide, existed in eastern Victoria, and probably extended into the Western Highlands. A rift zone developed to the south of Victoria, as a precursor to the splitting of Australia from Antarctica. The rift was mainly filled by sediment brought in by west-flowing rivers coming from the Tasman Sea palaeodivide.

In the Cretacous widespread tectonism accentuated the divide and deepened basins to the north and south. The palaeoplain started to be dissected. Further lithic sandstones and other sediments,including volcanogenic material, was deposited in areas that are now the Otways and parts of the Dundas Tablelands. The upper Cretaceous rocks are more quartz-rich. To the south-west of Coleraine cross bedded sandstones are widely distributed, with conglomerates. This results from a change from shallow water non-marine deposition in the lower Cretaceous to more quartz-rich terrestrial deposits in the upper Cretaceous.

The Otway Ranges consist of sandstone and siltstone with minor shales. The flanks of the ranges are covered by upper Cretaceous and Tertiary marine and terrestrial sedimentary rocks which form a foothill zone.

Contours on the pre-Tertiary surface suggest that the Murray River was in existence in Eocene times (Macumber, 1978). The Murray Basin slowly filled up through the Tertiary, as did the basin beneath the West Victorian Plains. Some of the highland plateaus have a partial capping of old sedimentary deposits, sometimes reduced to valley fills. Further to the east these have been interpreted as Cretaceous deposits laid down by major meandering rivers on a floodplain (Williams, 1983). Elsewhere they may be early Tertiary. (This is the Hard Hills Unit, 45).

In the Oligo-Miocene an extensive, probably eustatic, marine transgression occurred, and was accompanied by the deposition of limestone, calcarenite and calcareous clay. Miocene deposits include the Gambier Limestone and calcarenites of the Murray Group in South Australia, and rocks of the Duddo Limestone and Heytsbury Group in Victoria, including the Port Campbell Limestone. There was some tectonic uplift during the Miocene, and there was a major retreat of the sea in the late Miocene. The Murray Basin may have experienced general subaerial exposure in the late Miocene (the Mologa Surface of Macumber, 1978).

The Murray Basin was inundated rapidly in the Pliocene, and marine sediments of the Bookpurnong Beds were deposited in the west and generally sandy non-marine sediments of the Calvil Formation were deposited in the east. These were partly reworkedly during the marine transgression to form the Parilla Sand (equivalent to Loxton Sands in South Australia). Subsequent regression is recorded in a series of beach ridges and associated stand plain deposits (Brown, 1985) in the upper Parilla Sand (equivalent to Loxton Sands plus Parilla Sand in South Australia.

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During late Pliocene and early Pleistocene times renewed earth movements resulted in the upwarping of the Dundas Tableland and possibly parts of the Western Highlands. The Otway Ranges also had further uplift, as indicated by uplift of Miocene beach ridges in the neighbouring Scotts Creek Unit.

There are several tectonic domes in the area and nearby. The most obvious one is the Dundas Tableland dome (Fig. 4), described by Hills (1975, p. 84). a more vague dome with radiating palaeovalley of the Hard Hills Unit is centred on Mount Buangor. Just to the east of the Hamilton sheet is the Trentham dome (Joyce, 1975).

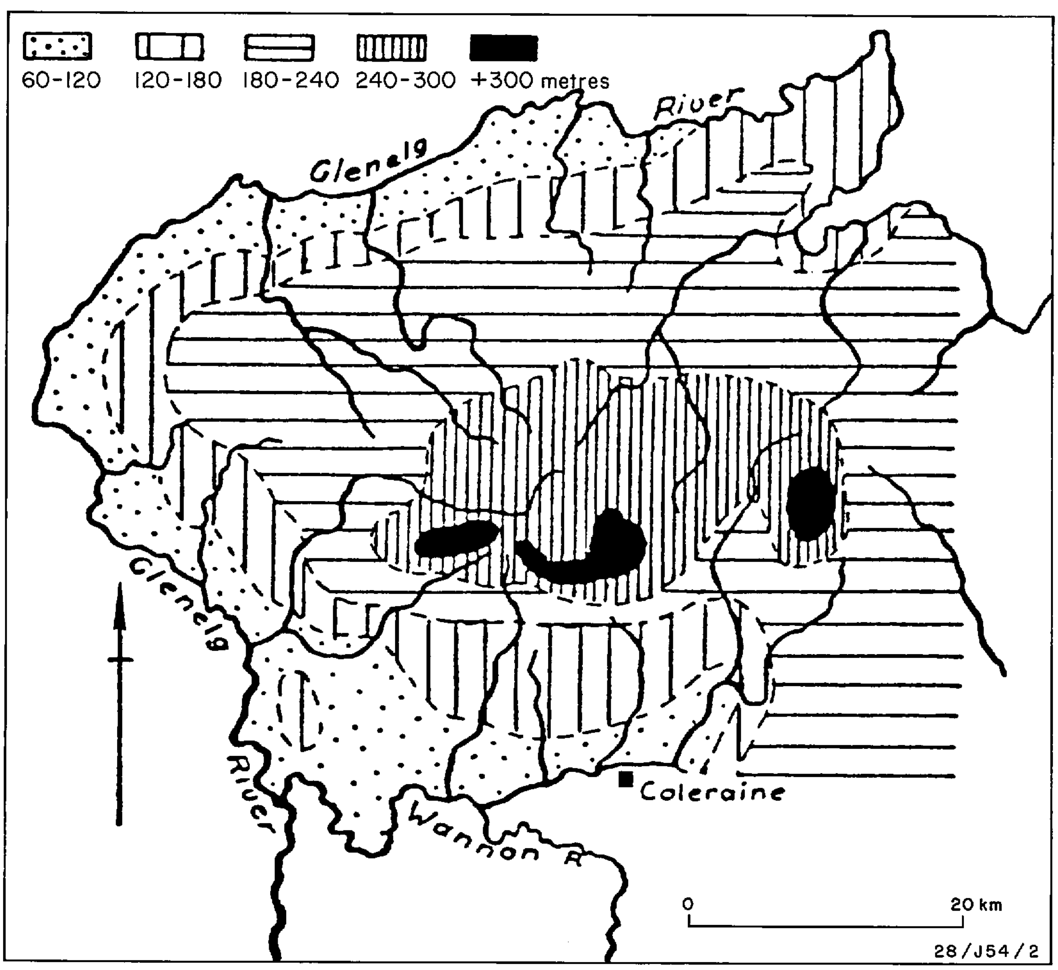

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Figure 4. The domed palaeoplain of the Dundas Tableland, showing radial drainage. (Simplified after Hills, 1975).

The Quaternary is dominated by aeolian deposits, beach ridges, and alluvial deposits.

Many of the aeolian features seem to start from the outermost pre-Quaternary ridge (Naracoorte Ridge). Possibly a wide expanse of sandy sediments of the Pliocene strandplain were exposed at this time, providing the parent material source for aeolian deposits of the Woorinen Formation. This is comparable to the situation in southeast Queensland, but while in Queensland the quartz sand was built into hugh dunes, in the Hamilton area the quartz sand was deposited in broad sand sheets, with dunes of only small to moderate size.

In the Quaternary sea level rose again and a new sequence of beach ridges were constructed in the Millicent Plains area, but with the major difference that these dunes were calcareous rather than quartzose (as in the beach ridges of Pliocene Parilla Sand, or the aeolian deposits on the Woorinen Formation). The calcarenites comprise the Bridgewater Formation.

The Kanawinka Scarp (also known as the Kanawinka Escarpment, the Kanawinka Fault, or the Kanawinka Monocline) formed the coast for a considerable time. This feature is very significant in dating the evolution of the region. On the upthrown, inland side the ridges are entirely of ferruginous quartz sand. A few young siliceous ridges of unknown origin also lie south of the Kanawinka Scarp. On the downthrown, seaward side of the Kanawinka Scarp are the calcareous ridges of the Bridgewater Formation. The calcareous dune ridges span the Brunhes-Matuyama palaeomagnetic boundary (690,000 years) and form a separate unit from the Pliocene quartzose beach ridges. The Quaternary aeolian Woorinen Formation, being quartzose, is largely derived from deflation of the Pliocene ridges and strandplain deposits during the late Pleistocene.

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Aeolian deposits

Aeolian deposits take the form of sand sheets, several kinds of dunes, and aeolian clay.

There are two types of sand dune in the Mallee:

1. East-west linear dunes
2. Parabolic and transverse dunes

The east-west dunes are regularly spaced, and are composed of dark reddish-brown calcareous sand with some clay, known as the Woorinen Formation. They have yielded thermoluminescence dates of about 100 000 years, and within the dunes are several palaeosols, dated approximately at 40-15000 years.

The parabolic or transverse dunes consist of siliceous greyish yellow sand. This is the Lowan Sand in Victoria, equivalent to the Molineaux Sand in South Australia. A large patch of this sand is the Ninety Mile Desert of South Australia, and three lobes extend into Victoria - the Sunset Desert, the Big Desert and the Little Desert, of which the last two occur on the Hamilton sheet.

Lunettes are crescentic dunes formed on the downwind side of lakes. They consists mainly of clay (blown from the lake floors in peletal form), but also of sand and Coxiella shells. They often contain fossil soils, indicating stable periods between phases of lunette growth, and sequences of lunettes may form on successive shores as lakes shrink.

The Widgelli Clay (parna) is a aeolian clay that covers considerable areas of undulating bedrock in the hills marginal to the plans, and extends over the plains themselves. The widespread distribution and uniform physical character of the clay suggests it is fallout from dust-laden winds. It may relate to the Woorinen Formation and the origin of the east-west dunes.

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Alluvial deposits

At present the whole Riverine Plain exhibits a remarkable river system with major streams and anastomosing anabranches and distributaries. These are not the product of deposition by existing streams, but of an older river system with prior streams and ancestral rivers. The Riverine Plain geomorphic system just reaches to the Hamilton sheet.

Prior streams are narrow, sinuous channels only 1-2 m deep, with well-defined sandy levees, West of the Loddon leveed streams are very rare, and there are none west of the Avoca. Ancestral rivers were broad rivers with meanders larger than those of the river of the present day. Their valley floors are about 3 m below the general level of the plains. Present day valleys are confined with valleys having alluvial floors 1.5 to 5 m below the general level of the plain.

Alluvial deposits and processes have not been studied to any great extent in this area. Former coarses of tributaries of the Murray River could possibly be traced, and account for some broad alluvial tracts with only minor steams. Other alluvial features result from aggradation, and the Wimmera River seems to have been deflected several times by its own alluvial deposits.

Stratigraphically the alluvial deposits have been divided into an older Shepparton Formation, and a younger Coonambidgal Formation.

Volcanism

Basaltic volcanism was active in this area from at least Pliocene times, but especially during the Quaternary. The oldest volcanics are very deeply weathered. The Grange Burn basalts provide one dated example, with what has been called a laterite on basalt dated at about 4.5 m.y. Many basalts have intermediate weathering and are classifed as Dunkeld type, and called the Older Newer Basalt. The Mount Rouse basalt for instance has given K-Ar dates of about 300 000 and 400 000 (McDougall and Gill, 1975) and about 1.8 m.y. (Ollier, 1985). The youngest basalts are classified as Eccles type, Younger Newer Basalt. The youngest volcanic activity in the region is at Mount Gambier (6000): Tower Hill is probably 15000, and Mount Eccles about 20 000 years old. In these volcanoes the ash and scoria may be weathered to a metre or so, the lava flows are little altered and preserve primary volcanic features such as lava stalactites.

Deep weathering and "laterite"

Deep weathering profiles are preserved in many of the highlands. Many of the deep weathered profiles, having a ferricrete at the top, have been called "laterites". Recent work in South Australia suggests that ferricretes may result from ferruginisation of surficial materials, distinct from the saprolite beneath (Milnes, Bourman and Northcote, 1985), so although the word "laterite" is sometimes used in this report, following older literature, the term should be treated with caution. Deep weathering profiles are found on bedrock of Palaeozoic, Permian, Cretaceous and Tertiary age.

The Dundas Tableland laterite is found on the tablelands as far as the Kanawinka Fault. In the central part it lies on various Palaeozoic rocks and Lower Cretaceous Otway Group sediments, but to the west the host rocks are flat-lying Tertiary sediments, mainly Dorodong Sandstone. There is a suspicion that the ferricrete may be formed in a ferruginous sandstone lying unconformably over older rocks in some of the central part of the tablelands. Although the host rock may be of Tertiary age, some of the ferricrete may have formed during the Pleistocene.

Geological units in the Hamilton Sheet area

The following are summary descriptions of the major geological units referred to in descriptions of Regolith Terrain units. The major relationships are shown in Table 1.

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Table 1. Hamilton Sheet area. Major geological units affecting regolith, and Victoria-South Australian correlations

	SOUTH AUSTRALIA	VICTORIA	
PLEISTOCENE	MOLINEAUX SAND PADTHAWAY FM. BRIDGEWATER FM.	LOWAN SAND WOORINEN FM. BRIDGEWATER FM. SHEPPARTON FM.	COONAMBIDGAL FM. WIDGELLI CLAY
PLIOCENE	PARILLA SAND LOXTON SANDS DORODONG SAND	PARILLA SAND (formerly Diapur sandstone DORODONG SAND	
MIOCENE OLIGOCENE	GAMBIER LIME-	HEYTSBURG GROUP inc. PORT CAMPBELL LIMESTONE	
CRETACEOUS		OTWAY GROUP	

Otway Group. Cretaceous sediments, mainly mudstone and shale with minor sandstone.

Heytsbury Group. Miocene sediments including the Clifton Formation, the Gellibrand Marl and the Port Campbell Limestone. The Gambier Limestone of South Australia is roughly equivalent to the Port Campbell Limestone of Victoria.

Dorodong Sand. This is fine micaceous sandstone unconformably overlying the Heytsbury Group in a belt northeast of the Kanwinka Fault. It is usually about 6 to 15 m thick, but reaches 30 m in places. It is a marine sand, and has poorly preserved marine fossils. It has beach ridges sub-parallel to the Kanawinka scarp, marking the southernmost of the sandstone ridges. Some include it in the Parilla Sand. It is ferruginised, and is locally the parent

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rock of the Dundas Tableland "laterite" (ferricrete) capping.

Parilla Sand. Well-sorted fine to coarse quartz sand with rare gravel, the Parilla Sand is 40 to 150 m thick, and has a surface expression of sub-parallel ridges up to 50 m high. It is essentially marine, with fossils, and the ridges are beach ridges formed during marine regression. The Parilla Sand is weathered to a depth of up to 15 m, and the sand is cemented by kaolin and limonite.

Woorinen Formation. An aeolian deposit, widespread west of the riverine plain, consisting of dark reddish brown calcareous sandy clay. It consists of several aeolian accretions, each with a degree of soil formation, and has been divided into 5 members. In the south it is mainly a sand sheet, with dunes no more than low mounds, but distinct east-west dunes become increasingly common northwards.

Lowan Sand. This is loose siliceous sand which covers large areas in the form of dune fields, especially in the Big Desert and Little Desert. The form ranges from sandsheets, especially in the Little Desert, to dune chains and closely packed parabolic and longitudinal dunes, from 4 to 20 m high. The Lowan Sand is well sorted, fine to medium, siliceous sand, and is not overlain by other units. The equivalent in South Australia is the Molineaux Sand. This forms a large patch (the Ninety Mile Desert) from which three lobes extend into Victoria making the Sunset Country Desert, the Big Desert and the Little Desert.

Bridgewater Formation. A term applied to limestone ridges throughout the Mount Gambier plains. These beach ridges range from sea level to 64 m at the Kanawinka Scarp. They generally have calcrete and thin soils.

Shepparton Formation. This includes all the older alluvium, and its upper surface is said to be the top of the Riverine Plain. It is divided into members on the basis of geomorphic forms and soils (Lawrence, 1976, p. 278), and ranges in composition from clay to gravel.

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Widgelli Clay. A widespread clay unit from 1 to 3 m thick. It is calcareous and is thought to be wind-blown clay, possibly winnowed from the Woorinen Formation.

Coonambidgal Formation. This groups together all the deposits of existing streams and their recent ancestors, and includes flood plains, meander scrolls and terraces.

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REGOLITH TERRAIN UNITS

1.	UNIT NAME	Coorong
2.	ID	01
3.	STYLE	Depositional
4.	FORM	Coast dune and lagoon
5.	SOIL	Uc1.11 Yellow grey calcareous sands. Uc6.11 Red sandy soils.
6.	DESCRIPTION	Coastal plain with lagoons, active dunes and blow outs.
7.	REGOLITH	Calcareous loose sand, calcarenite. Black clay in the drained lagoons.
8.	GEOLOGY	Unconsolidated sediments. Recent beach sand and lagoon clay.
9.	BOUNDARIES	Sea on one side. Dune and swale system inland.
10.	ELEVATION	0-30 m
11.	RELIEF	30 m
12.	LNDFMS-MINOR	Lagoon shores, blowouts
13.	MAPS	See refs and Rogers, 1980
14.	REFS	Laut et al., 1977; Tyler et al., 1983, 15-24; 39-48; Blackburn et al., 1965; Cook et al., 1977.
15.	INITIALS/DATE	C.O. 6/86

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1.	UNIT NAME	Woakwine
2.	ID	02
3.	STYLE	Depositional
4.	FORM	Plain with dunes
5.	SOIL	Uc2.1 yellow siliceous sands. Uc6.13 red sandy soil. Ug5.17 black cracking clay.
6.	DESCRIPTION	Plain with swamps, calcarenite, and dunes, parallel to the coast.
7.	REGOLITH	Calcarenite and calcareous loose sand. Black clay with many cobbles in swales.
8.	GEOLOGY	Pleistocene estuarine sediments with shell beds (Glanville Fm of S.A.). Calcarenite and unconsolidated Quaternary deposits.
9.	BOUNDARIES	Lagoons of Coorong to the west and Lucindale plain to east.
10.	ELEVATION	0-30 m
11.	RELIEF	15 m
12.	LNDFMS-MINOR	-
13.	MAPS	Rogers, 1980
14.	REFS	Laut et al., 1977, 13-31; Tyler et al., 1983, 15-24, 39-48; Blackburn et al., 1965; Cook et al., 1977.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Lucindale
2.	ID	03
3.	STYLE	Depositional
4.	FORM	Plain with low ridges
5.	SOIL	Uc6.13 red sandy soil. Dy5.43 sandy mottled yellow duplex.
6.	DESCRIPTION	Low parallel ridges separated by narrow swales with occasional swamps. Small east west unconsolidated dunes.
7.	REGOLITH	Weathered calcarenite and surficial swamp and dune deposits.
8.	GEOLOGY	Pleistocene calcarenite ridges (=Bridgewater Fm), and swales (Padthaway Fm)of lagoonal fine dolomite and clay.
9.	BOUNDARIES	Bounded by similar units but with more swales.
10.	ELEVATION	30 m
11.	RELIEF	10 m
12.	LNDFMS-MINOR	Dunes. Small granite outcrops
13.	MAPS	Rogers, 1980; Laut et al., 1977.
14.	REFS	Laut et al., 1977, 68-77.
15.	INITIALS/DATE	C.O. 6/86

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1.	UNIT NAME	Naen
2.	ID	04
3.	STYLE	Depositional
4.	FORM	Plains with dunes
5.	SOIL	Dy5.43 sandy mottled yellow duplex. U2.21 bleached sands.
6.	DESCRIPTION	Plain with sand sheet and discontinuous ESE dunes in quartz sand.
7.	REGOLITH	Thin sand cover over weathered calcarenite, with interdune swamps.
8.	GEOLOGY	Recent quartz Molineaux Sand over weathered calcarenite.
9.	BOUNDARIES	Ridge and swale units without Molineaux Sand
10.	ELEVATION	30 m
11.	RELIEF	5 m
12.	LNDFMS-MINOR	Swamps
13.	MAPS	Rogers, 1980
14.	REFS	Laut et al., 1977 Province 2
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Moyhall
2.	ID	05
3.	STYLE	Depositional
4.	FORM	Interdunal plain
5.	SOIL	Ug5.11 black cracking clay
6.	DESCRIPTION	Plain of clay or marl. Lunette lakes.
7.	REGOLITH	Clay or marl.
8.	GEOLOGY	Interdune clay. Pleistocene Padthaway Fm lagoonal fine dolomite and clay.
9.	BOUNDARIES	Units with calcareous ridges.
10.	ELEVATION	40 m
11.	RELIEF	6 m
12.	LNDFMS-MINOR	Lunettes, lunette lakes, swamps,small iregular dunes, small outcrops L. Palaeozoic granite.
13.	MAPS	Rogers, 1980
14.	REFS	Laut et al.,1979, 68-71, 86-89.
15.	INITIALS/DATE	C.O. 6/86

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1.	UNIT NAME	Naracoorte Range
2.	ID	06
3.	STYLE	Depositional
4.	FORM	Calcarenite ridges
5.	SOIL	Uc6.13 red sandy soil. Uc2.21 bleached sands.
6.	DESCRIPTION	Largest single ridge, and most inland calcarenite dune ridges, overlain by sand sheets or dunes of mobile sand. Some swamps in swales.
7.	REGOLITH	Mobile sand over weathered calcarenite.
8.	GEOLOGY	Pleistocene Bridgewater Fm (lower member) calcarenite. Stranded coastal dune and beach deposits. Possibly the border between Quaternary and older beach ridges.
9.	BOUNDARIES	Mainly swampy plains, or sand dune units
10.	ELEVATION	70 m
11.	RELIEF	10 m (max. 40 m)
12.	LNDFMS-MINOR	Swamp. Minor granite outcrop (to which ancient dunes were tied).
13.	MAPS	Rogers, 1980
14.	REFS	Laut et al., 1977, 96-99; Tyler et al., 1983, 15-24, 39-48; Blackburn et al., 1965; Cook et al., 1977.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Woorinen
2.	ID	07
3.	STYLE	Depositional
4.	FORM	Plain
5.	SOIL	Dy5.43 sandy mottled yellow duplex. Ug5.2 Grey and brown cracking clay.
6.	DESCRIPTION	Undulating plain and subdued EW dunes.
7.	REGOLITH	Clay, alluvium.
8.	GEOLOGY	Pliocene Parilla Sand Fm in west (S.A.), progressively overlain to east by clay-rich Pleistocene Woorinen Fm (EW dunes) in Victoria; includes palaeosols with carbonate, modern alluvium.
9.	BOUNDARIES	EW dune units, and alluvial plains.
10.	ELEVATION	90 m
11.	RELIEF	10 m
12.	LNDFMS-MINOR	Valley sides, swamp, lakes and lunettes. Parilla Sand ridges.
13.	MAPS	
14.	REFS	LCC, 1985
15.	INITIALS/DATE	C.O. 6/86

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1.	UNIT NAME	Big Desert
2.	ID	08
3.	STYLE	Depositional
4.	FORM	Dune field with large irregular dunes, sometimes parabolic.
5.	SOIL	Dy.5.43 sandy mottled duplex. Uc2.2 bleached sands. Podsols.
6.	DESCRIPTION	Undulating plain on calcrete with a cover of aeolian sandsheet and E-W parabolic dunes. Shallow depressions with gilgai.
7.	REGOLITH	Calcrete on Upper Tertiary sediments, mobile sand.
8.	GEOLOGY	Quaternary to Recent quartz sand (Lowan Sand, equivalent to Molineaux Sand of S.A.), over Pliocene Parilla Sand.
9.	BOUNDARIES	Plains with regular parallel dunes (clay rich).
10.	ELEVATION	110 m
11.	RELIEF	20 m
12.	LNDFMS-MINOR	Parabolic dunes, blowouts.
13.	MAPS	Bowler and Magee, 1978.
14.	REFS	Rowan and Downes, 1963.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Little Desert
2.	ID	09
3.	STYLE	Depositional
4.	FORM	Plain with irregular dunes, often parabolic.
5.	SOIL	Dy5.3 sandy mottled yellow duplex; Uc2.2 bleached sands.
6.	DESCRIPTION	Undulating plain on Tertiary sand overlain by E-W parabolic dunes and sand sheets.
7.	REGOLITH	Modern sand (Lowan Fm, equivalent to Molineaux Fm) over Pliocene Parilla Sand with some ferruginous capping.
8.	GEOLOGY	Pleistocene and Recent quartz sand (Lowan Sand) over Pliocene Parilla Sand in east and limestone in west.
9.	BOUNDARIES	Naracoorte Range to west. Alluvial plains and regular parallel dunes to north. Alluvial and lacustrine plain to south
10.	ELEVATION	100 m
11.	RELIEF	10 m
12.	LNDFMS-MINOR	Sinkholes on limestone in west; swamps.
13.	MAPS	
14.	REFS	LCC, 1985; Laut et al., 1977, 106-109; Blackburn, Bond and Clark, 1967.
15.	INITIALS/DATE	C.O. 6/86.

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1.	UNIT NAME	Goroke
2.	ID	10
3.	STYLE	Depositional
4.	FORM	Plain
5.	SOIL	Dy3.8 mottled yellow duplex; Ug5.2 grey cracking clays. Dr2.1 red duplex on aeolian units.
6.	DESCRIPTION	Plain on Tertiary sand with local ferricrete. Sinkholes in west, and lunettes around swamps and lakes to east. Lakes tend to be in NNW-trending swales.
7.	REGOLITH	Weathered Tertiary sand with local ferricrete. Minor limestone.
8.	GEOLOGY	Quaternary sand and alluvium over Pliocene Parilla Sand, sometimes calcareous at depth in west.
9.	BOUNDARIES	Naracoorte Range, Little Desert. Alluvium to east.
10.	ELEVATION	85 m
11.	RELIEF	5 m
12.	LNDFMS-MINOR	N-S beach ridges (subdued), sinkholes, lunettes, EW sand dunes.
13.	MAPS	
14.	REFS	LCC, 1985; Laut et al., 1977, 106-109; Blackburn, Bond and Clark, 1967.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Gambier
2.	ID	11
3.	STYLE	Depositional
4.	FORM	Plain with swamps on limestone.
5.	SOIL	Brown solodic; Brown duplex; Gley.
6.	DESCRIPTION	Plain with irregular surface and extensive swamps. Some aeolian cover.
7.	REGOLITH	Veneer of Pleistocene deposits. Terra rossa.
8.	GEOLOGY	Gambier Limestone (Oligocene-Miocene), marine.
9.	BOUNDARIES	On west Naracoorte Range, on east Goroke plains. Also included is SW Victoria not covered by volcanic units.
10.	ELEVATION	100 m
11.	RELIEF	10 m
12.	LNDFMS-MINOR	Sinkholes; dunes.
13.	MAPS	Rogers, 1980; LCC, 1972; Gibbons and Downes, 1964 (SW Vict)
14.	REFS	
15.	INITIALS/DATE	C.O. 6/86

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1.	UNIT NAME	Follett
2.	ID	12
3.	STYLE	Depositional
4.	FORM	Plain
5.	SOIL	Bleached sand Uc2.2, Podsol, Solodic.
6.	DESCRIPTION	Gently undulating calcarenite plain with large patch of sheet sand over swamps. Pale to white sand dunes and sheets of inland and coastal plain. Minor swamps.
7.	REGOLITH	Loose quartz sand.
8.	GEOLOGY	Sand (equivalent to Molineaux Sand) over Bridgewater Limestone in north, and over coastal plain in part.
9.	BOUNDARIES	Large swale to NW, to S Strathdownie swampy plains, t E Kanawinka escarpment.
10.	ELEVATION	70 m
11.	RELIEF	15 m
12.	LNDFMS-MINOR	Parallel dunes
13.	MAPS	Gibbons and Downes, 1964; Rogers, 1980.
14.	REFS	Laut et al., 1977, 100-103.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Strathdownie
2.	ID	13
3.	STYLE	Depositional
4.	FORM	Plain
5.	SOIL	Yellow Solodic Dy5.4; Gley in swamp; on dunes red sandy Uc6.1.
6.	DESCRIPTION	Low lying swampy coastal plain of clay.
7.	REGOLITH	Pleistocene and Recent clays.
8.	GEOLOGY	Pleistocene and Recent clays (Padthaway Fm. - lagoonal fine dolomite and clay); minor marl and peat.
9.	BOUNDARIES	Surrounded by somewhat higher sandier ground.
10.	ELEVATION	70 m
11.	RELIEF	10 m
12.	LNDFMS-MINOR	Few sandy rises, lunettes, aeolianite calcareous dunes.
13.	MAPS	Rogers, 1980
14.	REFS	Gibbons and Downes, 1964; Laut et al., 1977, 90-91; LCC, 1972, 90.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Schank
2.	ID	14
3.	STYLE	Volcanic depositional
4.	FORM	Ash plain, scoria and tuff cones.
5.	SOIL	Um6.12 brown friable loams
6.	DESCRIPTION	Plain covered with volcanic ash. Tuff and scoria cones.
7.	REGOLITH	Weathered volcanic ash over Tertiary limestone; windblown sand cover in NW.
8.	GEOLOGY	Quaternary to Recent volcanic ash over Oligocene-Miocene Gambier Limestone and calcareous ridges (upper Bridgewater Fm).
9.	BOUNDARIES	Approximate limit of volcanic ash.
10.	ELEVATION	45 m
11.	RELIEF	10 m (max 150 m)
12.	LNDFMS-MINOR	Volcanic craters, lakes.
13.	MAPS	Rogers, 1980
14.	REFS	Tyler et al., 1983, 5-14; Laut et al., 1977, 60-61.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Nelson
2.	ID	15
3.	STYLE	Depositional
4.	FORM	Plains with few ridges
5.	SOIL	Uc6.13 Stony red sandy soils, Rendzinas, Podzols.
6.	DESCRIPTION	Broad stony limestone plains with isolated calcarenite ridges.
7.	REGOLITH	Terra rossa, insoluble residue over limestone, non-calcareous.
8.	GEOLOGY	Oligocene-Miocene Gambier Limestone and Pleistocene (upper Bridgewater Fm.) calcarenite ridges.
9.	BOUNDARIES	Sea or Coorong unit on coastal side, more ridges or swamps on units inland.
10.	ELEVATION	15 m
11.	RELIEF	5 m
12.	LNDFMS-MINOR	Sinkholes
13.	MAPS	Rogers, 1980
14.	REFS	Laut et al., 1977, 42-43; Gibbons and Downes, 1964
15.	INITIALS/DATE	C.O. 6/86

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1.	UNIT NAME	Jeparit
2.	ID	16
3.	STYLE	Depositional
4.	FORM	Alluvial plain
5.	SOIL	Grey and brown clay, Ug5.2.
6.	DESCRIPTION	Alluvial plain of the Wimmera River between Little Desert and Lake Hindmarsh; characterised by chains of lakes and gypsum flats.
7.	REGOLITH	Alluvium, evaporites.
8.	GEOLOGY	Pleistocene to Recent alluvium (Coonambidgal Fm.), gypsum (Yamba Fm.), lunettes.
9.	BOUNDARIES	Bounded by EW dune plain.
10.	ELEVATION	90 m
11.	RELIEF	5 m
12.	LNDFMS-MINOR	Lunettes.
13.	MAPS	
14.	REFS	LCC, 1985.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Mitre
2.	ID	17
3.	STYLE	Depositional
4.	FORM	Chain of lakes, gypsum flats and lunettes.
5.	SOIL	Grey and brown clay, Ug5.2.
6.	DESCRIPTION	Chain of lakes between two broad alluvial plains, S of Little Desert and between Goroke and Horsham units; bigger lakes than Jeparit unit.
7.	REGOLITH	Alluvium, clay, gypsum.
8.	GEOLOGY	Alluvium (Shepparton Fm. in part).
9.	BOUNDARIES	Broad plains (Goroke and Horsham) on each side.
10.	ELEVATION	150 m
11.	RELIEF	10 m
12.	LNDFMS-MINOR	Minor channel features, lunettes, swamps, no through drainage.
13.	MAPS	
14.	REFS	LCC, 1985
15.	INITIALS/DATE	C.O. 6/86

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1.	UNIT NAME	Murton
2.	ID	18
3.	STYLE	Depositional
4.	FORM	Ridged marine plain; dunes and sandsheets.
5.	SOIL	Grey and brown clay, Ug5.2.
6.	DESCRIPTION	Dunes and sandsheets, in part dissected, underlain by Parilla Sand.
7.	REGOLITH	Thin cover of dark clay over sand.
8.	GEOLOGY	Pliocene Parilla Sand.
9.	BOUNDARIES	Irregular as this overlies many units, and has dune form in part.
10.	ELEVATION	160 m (higher up main valleys).
11.	RELIEF	10 m
12.	LNDFMS-MINOR	
13.	MAPS	
14.	REFS	LCC, 1985
15.	INITIALS/DATE	EBJ C.O. 6/86

1.	UNIT NAME	Horsham
2.	ID	19
3.	STYLE	Depositional
4.	FORM	Plain
5.	SOIL	Calcareous sodic duplex on cleared plain; grey cracking clay, Ug5.2, in lower situations.
6.	DESCRIPTION	Clay plain with closely spaced northerly drainage; almost flat alluvial plain of Wimmera River.
7.	REGOLITH	Alluvial and lacustrine clay; dune sand.
8.	GEOLOGY	Pleistocene and Recent clay (Shepparton Fm.)
9.	BOUNDARIES	Dundas Tablelands and Grampians to S, alluvial units to E and W, and Murton sand to N.
10.	ELEVATION	160 m
11.	RELIEF	5 m
12.	LNDFMS-MINOR	Minor channel features, Lowan Sand EW dunes, lakes, lunettes, swamps.
13.	MAPS	
14.	REFS	LCC, 1985; LCC, 1979.
15.	INITIALS/DATE	C.O. 11/85

1.	UNIT NAME	Darracourt
2.	ID	19a
3.	STYLE	Erosional
4.	FORM	Undulating plain.
5.	SOIL	Brown Splonetz Dy4 with sandy A horizon (Darracourt Series), gilgaied clays.
6.	DESCRIPTION	Undulating plain, mapped as entirely depositional plain except by Sibley. Parallel streams. Possibly a subset of Unit 19, Horsham.
7.	REGOLITH	Deeply weathered basement rock.
8.	GEOLOGY	Palaeozoic rocks, possibly shales, and possibly Grampians Group.
9.	BOUNDARIES	Surrounding flat plains and sand sheets.
10.	ELEVATION	160 m
11.	RELIEF	10 m
12.	LNDFMS-MINOR	Lowlands with gilgai.
13.	MAPS	Sibley, 1967.
14.	REFS	Sibley, 1967, 47, 158.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Grampian
2.	ID	20
3.	STYLE	Erosional
4.	FORM	Mountainous ridges
5.	SOIL	Skeletal, sandy; shallow stony podzol.
6.	DESCRIPTION	Strike ridges and hills on sandstone
7.	REGOLITH	Sandstone debris
8.	GEOLOGY	Carboniferous Grampians Group sandstone.
9.	BOUNDARIES	Alluvial units, Hamilton basaltic lava plains.
10.	ELEVATION	Maximum of 1167 m, much of unit up to 1000 m.
11.	RELIEF	500 m
12.	LNDFMS-MINOR	Valleys, alluvial fans, synclinal basin, strike valleys in shales; Mount Arapiles and Mitre Rock are isolated outlying hills; Ordovician rock included in Black Range.
13.	MAPS	
14.	REFS	LCC, 1979; Sibley, 1967.
15.	INITIALS/DATE	C.O. 6/86

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1.	UNIT NAME	Moora
2.	ID	21
3.	STYLE	Depositional
4.	FORM	Allvial fans, sand plain.
5.	SOIL	Podzols, leached sand, yellow Sodic duplex.
6.	DESCRIPTION	Gently sloping alluvial and colluvial fans around the Grampian hills.
7.	REGOLITH	Boulders and sand
8.	GEOLOGY	Sandstone and shale beneath fanglomerate.
9.	BOUNDARIES	This unit borders all Grampian Group sandstone outcrops.
10.	ELEVATION	500 m
11.	RELIEF	30 m
12.	LNDFMS-MINOR	Fans, gulleys.
13.	MAPS	
14.	REFS	Sibley, 1967; LCC, 1979.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Dorodong
2.	ID	22
3.	STYLE	Erosional/depositional
4.	FORM	Fringing plain or ridge.
5.	SOIL	Laterite; mottled duplex; yellow solodics.
6.	DESCRIPTION	Fringing plain or gentle ridge north of Dundas Tableland.
7.	REGOLITH	Weathered ferruginous sands; some laterite profiles.
8.	GEOLOGY	Pliocene Dorodong Sand Fm.; ferruginous sandstone (in part equivalent to Parilla Sand).
9.	BOUNDARIES	Edge of Dundas tableland to south, and clay plains to N.
10.	ELEVATION	160 m
11.	RELIEF	20 m
12.	LNDFMS-MINOR	Minor valleys and gullies
13.	MAPS	
14.	REFS	LCC, 1979; Sibley, 1967.
15.	INITIALS/DATE	C.O. 6/86

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1.	UNIT NAME	Dundas
2.	ID	23
3.	STYLE	Complex
4.	FORM	Plateau
5.	SOIL	Ferricrete (laterite); mottled duplex soil with ironstone; yellow sodic duplex in valleys; black cracking clays in south.
6.	DESCRIPTION	Lateritised plateau, somewhat dissected.
7.	REGOLITH	Lateritic weathering profile.
8.	GEOLOGY	Thin Tertiary cover over Ordovician granodiorite; minor Permian sediments; Palaeozoic schists and gneiss.
9.	BOUNDARIES	Dorodong lowlands to N. Other laterite plateaus neighbouring. Grampians and Rocklands hills to E.
10.	ELEVATION	300 m
11.	RELIEF	100 m
12.	LNDFMS-MINOR	Valleys (radiating pattern), landslides.
13.	MAPS	
14.	REFS	LCC, 1979; Gibbons and Downes, 1964.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Casterton
2.	ID	24
3.	STYLE	Complex
4.	FORM	Dissected plateau
5.	SOIL	Ferricrete; Prairies Soils, Chernozem.
6.	DESCRIPTION	Lateritised plateau on Cretaceous rocks, deeply dissected to rounded hills and ridges.
7.	REGOLITH	Ferricrete in lateritic weathering profile.
8.	GEOLOGY	Lower Cretaceous Merino Group (mudstone, arkose, siltstone).
9.	BOUNDARIES	Other laterite plateau units (Dundas, 23; Mooree, 25), and bordering land.
10.	ELEVATION	200 m
11.	RELIEF	100 m
12.	LNDFMS-MINOR	Valleys, landslides; alluvium along Wannon river.
13.	MAPS	
14.	REFS	Gibbons and Downs, 1964; LCC, 1979, 287.
15.	INITIALS/DATE	C.O. 6/86

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1.	UNIT NAME	Mooree
2.	ID	25
3.	STYLE	Erosional
4.	FORM	Dissected plateau
5.	SOIL	Yellow solodic; black cracking clay.
6.	DESCRIPTION	Dissected plateau on Permian bedrock; part of Dundas tableland.
7.	REGOLITH	Weathered Permian glacial sediments; laterite on plateau remnants.
8.	GEOLOGY	Permian Coleraine Glacials - tillite, sand, clay.
9.	BOUNDARIES	Other Dundas tableland units, and alluvium to north and west.
10.	ELEVATION	240 m
11.	RELIEF	100 m
12.	LNDFMS-MINOR	Includes Ordovician granodiorite, Older Volcanics, valley alluvium, landslides.
13.	MAPS	
14.	REFS	Gibbons and Downes, 1964; LCC, 1979, 288.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Rocklands
2.	ID	26
3.	STYLE	Complex
4.	FORM	Tablelands and hills
5.	SOIL	Yellow and brown solodics; podzols on sand sheets, mottled duplex.
6.	DESCRIPTION	Tablelands, and hills exposed by erosion through laterite.
7.	REGOLITH	Stony weathered volcanics; sand sheets.
8.	GEOLOGY	Silurian Rockland Rhyolite.
9.	BOUNDARIES	Inlier within Dundas tablelands
10.	ELEVATION	300 m
11.	RELIEF	100 m
12.	LNDFMS-MINOR	Valleys; sand sheet on main valley heads, equivalent to Lowan Sand.
13.	MAPS	
14.	REFS	LCC, 1979, 288.
15.	INITIALS/DATE	C.O. 6/86

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1.	UNIT NAME	Mirranatwa
2.	ID	27
3.	STYLE	Erosional
4.	FORM	Hills and rolling plains.
5.	SOIL	Skeletal; yellow and brown solodic.
6.	DESCRIPTION	Hills and plains on deeply weathered granite, with tors and rock outcrops.
7.	REGOLITH	Deeply weathered granite.
8.	GEOLOGY	Carboniferous "granite" including Victoria Valley "granite" (granodiorite).
9.	BOUNDARIES	Alluvial plains and sandstone hills.
10.	ELEVATION	500 m
11.	RELIEF	150 m
12.	LNDFMS-MINOR	Gullies, tors.
13.	MAPS	
14.	REFS	Sibley, 1967.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Dunkeld
2.	ID	28
3.	STYLE	Lava flows.
4.	FORM	Lava plains, less dissected than Hamilton unit.
5.	SOIL	Duplex red to grey clay soils, several metre deep, with buckshot in B horizon, and gilgai surface
6.	DESCRIPTION	Pliocene to Pleistocene (3 to 2 m.y.) lava flows, not lateritically weathered, forming extensive undulating plains in the central part of western Victoria.
7.	REGOLITH	1 metre of weathered basalt.
8.	GEOLOGY	Pliocene and Pleistocene lava flows and associated volcanoes (Earlier Newer Volcanics).
9.	BOUNDARIES	Varies around this extensive unit.
10.	ELEVATION	150 m on plains, to 350 m + in highlands
11.	RELIEF	<50 m
12.	LNDFMS-MINOR	Broad rises around rare centres of eruption.
13.	MAPS	
14.	REFS	Gibbons and Gill, 1964; Jackson et al., 1972; Joyce & Knight, 1973.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Kanawinka
2.	ID	29
3.	STYLE	Depositional
4.	FORM	Plain
5.	SOIL	Podzol, iron podzol, solodics.
6.	DESCRIPTION	Low plains between Dundas tablelands and Kanawinka Escarpment. Gentle quartz dunes and sand sheets over swampy lateritised tableland.
7.	REGOLITH	Sand, over varied substrate.
8.	GEOLOGY	Pleistocene to Recent Malanganee Sand, aeolian sheets and dunes (equivalent to Lowan Sand).
9.	BOUNDARIES	Kanawinka Escarpment to west, Dundas tableland to east, and in part volcanics.
10.	ELEVATION	80 m south, 160 m north.
11.	RELIEF	5 m
12.	LNDFMS-MINOR	Gambier Limestone units, alluvial units, swamps.
13.	MAPS	
14.	REFS	Gibbons and Downes, 1964.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Clay
2.	ID	30
3.	STYLE	Erosional
4.	FORM	Low hills, dissected plateaus, including an up-faulted block.
5.	SOIL	Krasnozems, podzols on sheet sand, brown earth.
6.	DESCRIPTION	Deeply weathered Tertiary basalt lava and ash, with ironstone; gently dissected.
7.	REGOLITH	Deep red weathering profiles, some with ferricrete; veneer of white sand in places.
8.	GEOLOGY	Tertiary basalt and ash (Early Newer Volcanics).
9.	BOUNDARIES	Tertiary and younger sediments, and younger lava flows.
10.	ELEVATION	80 to 100 m
11.	RELIEF	50 m
12.	LNDFMS-MINOR	Swamp, sand sheets, sinkholes, eruption centres (including one crater).
13.	MAPS	
14.	REFS	Gibbons and Downes, 1964; Gibbons and Gill, 1964 (Cobbobboonee Land system); Ollier and Joyce, 1964.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Hamilton
2.	ID	31
3.	STYLE	Lava flows
4.	FORM	Lava plains and plateaus, dissected to underlying rock along main stream courses.
5.	SOIL	Red earth, krasnozem.
6.	DESCRIPTION	Pliocene lava flows, 5 to 3 m.y., weathered to some metres, ferricrete on older flows.
7.	REGOLITH	Lateritic profile with up to 10 m of kaolinitic weathering profile, with characteristic mottled clay and nodular ironstone.
8.	GEOLOGY	Pliocene lava flows and associated volcanoes (Earlier Newer Volcanics).
9.	BOUNDARIES	Varies around this extensive unit.
10.	ELEVATION	150 m on plains, to 350+m in highlands.
11.	RELIEF	50 m
12.	LNDFMS-MINOR	Broad low rises at points of eruption. (In highlands this unit includes Dunkeld and Rouse units).
13.	MAPS	
14.	REFS	Gibbons and Downes, 1964; Gibbons and Gill, 1964.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Rouse
2.	ID	32
3.	STYLE	Lava flows
4.	FORM	Lava flow of stony rise type, weathered
5.	SOIL	Red loams (Girringurrup Land System of Gibbons and Gill, 1964; Corangamite stony loam (of Leeper), added quartz sand in some topsoils).
6.	DESCRIPTION	Lower Pleistocene (2 to 1 m.y.) lava flows with stony rise surfaces and associated volcanic cones.
7.	REGOLITH	Red loams averaging about 1 m thick, but thin over rises; many rounded basalt boulders in profile, and on rises and slopes.
8.	GEOLOGY	Lower Pleistocene stony rise lava flows and associated volcanoes (Later Newer Volcanics).
9.	BOUNDARIES	Generally confined to broad valleys, often bounded by Hamilton unit.
10.	ELEVATION	150 to 200 m, greater in the highlands.
11.	RELIEF	10 m
12.	LNDFMS-MINOR	Well-preserved scoria cones and craters; lava caves in flows.
13.	MAPS	
14.	REFS	Gibbons and Gill, 1964; Leeper et al., 1936 (for Gellibrand soils); Jackson et al., 1972 (for quartz sand).
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Eccles
2.	ID	33
3.	STYLE	Lava flows
4.	FORM	Little weathered lava flows of stony rise type and volcanoes with original features preserved.
5.	SOIL	Immature shallow stony soils, reddish brown to black, much rocky outcrop; Napier stony loam of Leeper.
6.	DESCRIPTION	Young volcanic landscape with original features preserved.
7.	REGOLITH	Very shallow weathering.
8.	GEOLOGY	Lava flows and cones, generally less than 100,000 years old (Later Newer Volcanics).
9.	BOUNDARIES	Confined within broad or sometimes narrow valleys.
10.	ELEVATION	150 m 10 m
11.	RELIEF	Very well-preserved scoria cones, craters and other features of eruption, including lava channels and lava caves.
12.	LNDFMS-MINOR	Very well-preserved scoria cones, craters and other features of eruption, including lava channels and lava caves.
13.	MAPS	
14.	REFS	Gibbons and Gill, 1964; Gibbons and Downes, 1964, p. 284
15.	INITIALS/DATE	C.O. 6/86

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1.	UNIT NAME	Tower Hill
2.	ID	34
3.	STYLE	Volcanic ash, scoria.
4.	FORM	Ash covered plains, and scoria cones and maars.
5.	SOIL	Brown friable loams.
6.	DESCRIPTION	Ash covered plains extending eastwards from Upper Pleistocene and Recent volcanoes, mainly maars and scoria cones, in central parts of Western Victorian volcanic plains.
7.	REGOLITH	Loosely-consolidated volcanic ash weathered to 1 to 2 m.
8.	GEOLOGY	Basaltic scoria and pyroclastics of Upper Pleistocene to Recent age (Later Newer Volcanics).
9.	BOUNDARIES	Varied, often merging.
10.	ELEVATION	From near sealevel, but mainly about 150 m in central part of plains.
11.	RELIEF	Tuff rings average 60 m, scoria cones 90 m.
12.	LNDFMS-MINOR	Tuff rings, swamps, lakes, lake shoreline benches.
13.	MAPS	
14.	REFS	Gill, 1967; Colac 1:250 000 explanatory notes; Joyce, 1975.
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Port Fairy
2.	ID	35
3.	STYLE	Depositional coast
4.	FORM	Coastal dunes and beaches
5.	SOIL	Immature; sandy rendzina; Terra rossa; calcrete.
6.	DESCRIPTION	High indurated dunes, beach ridge, lagoon, beach and dune.
7.	REGOLITH	Unconsolidated sand and calcarenite.
8.	GEOLOGY	Recent sands, indurated calcareous dunes (Bridgewater Fm.).
9.	BOUNDARIES	Sea to S, volcanic units to N in most places.
10.	ELEVATION	10 m
11.	RELIEF	10 m
12.	LNDFMS-MINOR	
13.	MAPS	
14.	REFS	Gibbons and Downes, 1964; (Nelson and Discovery Bay land systems); Gill, 1967.
15.	INITIALS/DATE	C.O. 6/86

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1.	UNIT NAME	Buloke
2.	ID	36
3.	STYLE	Depositional
4.	FORM	Alluvial plain and wide lunettes; drainage to north.
5.	SOIL	Red duplex, calcareous and sodic.
6.	DESCRIPTION	Alluvial plains, lunettes, clay pans and gypsum.
7.	REGOLITH	Surficial sand and clay.
8.	GEOLOGY	Shepparton Fm. (plain) and Coonambidgal Fm. (river courses); Recent sediment, lunettes 28,000 B.P.
9.	BOUNDARIES	Avon and Avoca plains to south and east, Woorinen plains to west.
10.	ELEVATION	150m
11.	RELIEF	20m
12.	LNDFMS-MINOR	Stranded lake deposits, source-bordering dunes, grani tors at Mt Wycheproof.
13.	MAPS	
14.	REFS	LCC, 1985
15.	INITIALS/DATE	CO 6/86

1.	UNIT NAME	Gredgwin
2.	ID	37
3.	STYLE	Depositional
4.	FORM	Plain with minor ridges
5.	SOIL	Red calcareous sodic duplex soils.
6.	DESCRIPTION	Clay plain.
7.	REGOLITH	Clay
8.	GEOLOGY	Shepparton Fm. and occasional rivers with Coonambidga FM. (less than Buloke unit).
9.	BOUNDARIES	Avoca to W, Loddon to E, bedrock hills to S.
10.	ELEVATION	150m
11.	RELIEF	5m
12.	LNDFMS-MINOR	Ridges of Parilla Sand, lunettes, lakes, Ordovician granite.
13.	MAPS	
14.	REFS	LCC, 1983, Butler et al., 1973
15.	INITIALS/DATE	CO 6/86

1.	UNIT NAME	Loddon
2.	ID	38
3.	STYLE	Depositional
4.	FORM	Flood plain
5.	SOIL	Silty gradational soils
6.	DESCRIPTION	Broad alluvial plain along the Loddon, many anastomosing streams in north, and terraces in south.
7.	REGOLITH	Alluvium
8.	GEOLOGY	Recent alluvium (Coonambidgal Fm. clay and sand) over Tertiary sediments; Shepparton Fm. on terraces in highlands to south.
9.	BOUNDARIES	Bedrock around confined valleys to south; Gredgwin un to north.
10.	ELEVATION	150m in highlands, 100m in the north.
11.	RELIEF	20m in south.
12.	LNDFMS-MINOR	Alluvial fans.
13.	MAPS	
14.	REFS	LCC, 1983
15.	INITIALS/DATE	6/86

1.	UNIT NAME	Glenorchy
2.	ID	39
3.	STYLE	Depositional
4.	FORM	Alluvial plain
5.	SOIL	Red calcareous duplex
6.	DESCRIPTION	Alluvial plain of the upper Wimmera River and tributaries; many streams and broad terraces.
7.	REGOLITH	Alluvium
8.	GEOLOGY	Pleistocene to Recent Shepparton Fm. clay, silt and sand, with flood plain of Coonambidgal Fm. clay and sand.
9.	BOUNDARIES	Mainly bedrock hills; other alluvial units to west.
10.	ELEVATION	200m
11.	RELIEF	10m
12.	LNDFMS-MINOR	Includes ridges of Hard Hills (Unit 45).
13.	MAPS	
14.	REFS	LCC, 1978
15.	INITIALS/DATE	CO 6/86

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1.	UNIT NAME	Avon
2.	ID	40
3.	STYLE	Depositional
4.	FORM	Alluvial plan
5.	SOIL	Red calcareous duplex
6.	DESCRIPTION	Complex alluvial plains associated with the upper Avon and tributaries
7.	REGOLITH	Alluvium
8.	GEOLOGY	Alluvium - broad plain of Shepparton Fm. with Coonambidgal Fm. along streams.
9.	BOUNDARIES	Bedrock mainly to S and E, alluvial units and Parilla Sand to W
10.	ELEVATION	160m in headwaters, 150m below.
11.	RELIEF	5m
12.	LNDFMS-MINOR	Woorinen Fm. dune sands.
13.	MAPS	
14.	REFS	LCC, 1978
15.	INITIALS/DATE	CO 6/86

1.	UNIT NAME	Avoca
2.	ID	41
3.	STYLE	Depositional
4.	FORM	Alluvial plain
5.	SOIL	Grey brown calcareous clays
6.	DESCRIPTION	Alluvial plain of the upper Avoca
7.	REGOLITH	Alluvium
8.	GEOLOGY	Pleistocene to Recent Coonambidgal Fm. clay and sand, and upstream terraces of Pleistocene Shepparton Fm.
9.	BOUNDARIES	Between Buloke and Gredgwin plains, with bedrock hills to S
10.	ELEVATION	180m
11.	RELIEF	10m
12.	LNDFMS-MINOR	Parilla Sand ridges.
13.	MAPS	
14.	REFS	LCC, 1985
15.	INITIALS/DATE	CO 6/86

1.	UNIT NAME	Pyrenees
2.	ID	42
3.	STYLE	Erosional
4.	FORM	Hills, ridges
5.	SOIL	Red shallow gradational on steep slopes
6.	DESCRIPTION	Hills and ridges on Palaeozoic slates etc.
7.	REGOLITH	Fresh rock to deep weathered shale, kaolin profiles
8.	GEOLOGY	Cambrian shale and sandstone, slate
9.	BOUNDARIES	Alluvial units mostly, with Dunolly to E
10.	ELEVATION	500m (maximum 760m)
11.	RELIEF	150m
12.	LNDFMS-MINOR	Cliffs, minor valleys with alluvium (Hard Hills Unit 45)
13.	MAPS	
14.	REFS	LCC, 1978
15.	INITIALS/DATE	CO 6/86

1.	UNIT NAME	Korong
2.	ID	43
3.	STYLE	Erosional
4.	FORM	Hills
5.	SOIL	Uniform coarse sand on steep slopes, red duplex over silica-rich hard pan on gentler slopes.
6.	DESCRIPTION	Granites weathered to various depths and stripped. Hills, valleys, tors
7.	REGOLITH	Grus to variable depth, up to 100m
8.	GEOLOGY	Granite and granodiorite, mainly Lower Devonian.
9.	BOUNDARIES	Very variable
10.	ELEVATION	400m
11.	RELIEF	100m
12.	LNDFMS-MINOR	Tors, major peaks, valleys; alluvium, some Hard Hills (Unit 45); to south outliers of Korong Unit project through basalt plain.
13.	MAPS	
14.	REFS	LCC, 1978
15.	INITIALS/DATE	CO 6/86

1.	UNIT NAME	Dunolly
2.	ID	44
3.	STYLE	Erosional
4.	FORM	Hills and ridges
5.	SOIL	Shallow red gradational on upper slopes, sodic red duplex in drainage lines.
6.	DESCRIPTION	Hills and ridges on dissected Palaeozoic sediments, mainly shale and sandstone.
7.	REGOLITH	Bare rock to deeply kaolinized weathering profiles to 100m.
8.	GEOLOGY	Lower Ordovician shale, siltstone and sandstone; contact metamorphism around granites.
9.	BOUNDARIES	Very varied
10.	ELEVATION	500m, very variable.
11.	RELIEF	80m
12.	LNDFMS-MINOR	Ridges on contact metamorphosed rock; included units alluvium and colluvium, Hard Hills gravels, patches of granite.
13.	MAPS	
14.	REFS	LCC, 1978; Douglas and Ferguson, 1976 (for deep weathering).
15.	INITIALS/DATE	C.O. 6/86

1.	UNIT NAME	Hard Hills
2.	ID	45
3.	STYLE	Complex
4.	FORM	Terrace remnants, mesas, plateaus.
5.	SOIL	Yellow-brown clay soil, sometimes with gilgai.
6.	DESCRIPTION	Remnants of ancient Tertiary alluvium (pre-Deep Leads) and intervening areas of bedrock outcrop
7.	REGOLITH	Early Tertiary sands, and red quartz gravels, variably duricrusted with iron and silica, and Palaeozoic rocks, variably weathered, often kaolinized.
8.	GEOLOGY	Early Tertiary sands and gravels, some possibly Mesozoic
9.	BOUNDARIES	Palaeozoic bedrock
10.	ELEVATION	Top at 200 to 240 m
11.	RELIEF	50m (base of unit 15 to 50m above present valley floors.
12.	LNDFMS-MINOR	Quaternary alluvium of valley floors.
13.	MAPS	St Arnaud Deep Leads 1:100,000 1984 Geol Surv Vict D.M.E.
14.	REFS	King, 1985
15.	INITIALS/DATE	C.O. 6/86

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1.	UNIT NAME	Ararat
2.	ID	46
3.	STYLE	Erosional
4.	FORM	Hills
5.	SOIL	Yellow duplex soils, strongly gradational on steeper slopes.
6.	DESCRIPTION	Low hills with gentle slopes on Palaeozoic rocks
7.	REGOLITH	Variable depth of weathering of slate, shale, etc.
8.	GEOLOGY	Palaeozoic (Cambrian?) shale, sandstone, slate,
9.	BOUNDARIES	Alluvium to N.Hamilton basalt, Hard Hills to west.
10.	ELEVATION	400m
11.	RELIEF	40m
12.	LNDFMS-MINOR	Contact aureole ridges, valleys, granite inliers.
13.	MAPS	
14.	REFS	LCC, 1977.
15.	INITIALS/DATE	CO 6/86

1.	UNIT NAME	Stavely
2.	ID	47
3.	STYLE	Erosional/depositional complex.
4.	FORM	Plains, hills, ridges
5.	SOIL	Podzolic, Red-yellow duplex.
6.	DESCRIPTION	Complex on Cambrian and other rocks, including ultrabasics.
7.	REGOLITH	Variable weathering profile.
8.	GEOLOGY	Cambrian ultrabasics, and other Palaeozoic rocks.
9.	BOUNDARIES	Hamilton basalt and alluvium (overlying). Granite intrusion
10.	ELEVATION	300m
11.	RELIEF	30m
12.	LNDFMS-MINOR	
13.	MAPS	
14.	REFS	Duncan, 1982.
15.	INITIALS/DATE	CO 6/86

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1.	UNIT NAME	Chatsworth
2.	ID	48
3.	STYLE	Depositional
4.	FORM	Plains; ridge and swale (very subdued).
5.	SOIL	Red-yellow duplex; buckshot (incipient laterite).
6.	DESCRIPTION	Inland patches of Tertiary with Pliocene beach ridges
7.	REGOLITH	Miocene and Pliocene sand, clay, marl. Swamps in swal Mottling, incipient laterite profile.
8.	GEOLOGY	Miocene sand, clay, marl, overlain by Pliocene Moorab Viaduct Fm. sand and clay.
9.	BOUNDARIES	Often bounded by lava flows
10.	ELEVATION	100 to 200m.
11.	RELIEF	10m.
12.	LNDFMS-MINOR	
13.	MAPS	
14.	REFS	LCC, 1976
15.	INITIALS/DATE	CO 6/68

1.	UNIT NAME	Muirhead
2.	ID	49
3.	STYLE	Depositional
4.	FORM	Swamps, plains, lunettes.
5.	SOIL	Alluvial soils. Prairie; organic.
6.	DESCRIPTION	Quaternary complex behind dam created when basalt flowed against S end of Grampians Range. Mainly swamp and lake.
7.	REGOLITH	Alluvium and swamp deposits
8.	GEOLOGY	Quaternary alluvium
9.	BOUNDARIES	Hamilton basalt and Grampians Group sandstone. Patches of Dundas tableland and Stavely (Cambrian) unit.
10.	ELEVATION	240m
11.	RELIEF	5m
12.	LNDFMS-MINOR	lunettes
13.	MAPS	
14.	REFS	Sibley, 1967; LCC, 1979
15.	INITIALS/DATE	CO 6/86

1.	UNIT NAME	Scotts Creek
2.	ID	50
3.	STYLE	Erosional
4.	FORM	Dissected plateau
5.	SOIL	Mottled yellow and red gradational soil with ironston on remnants; duplex on slopes.
6.	DESCRIPTION	Plateau capped by Pliocene sediments with beach ridge: which caused parallel streams to form, now incised in underlying Tertiary rocks
7.	REGOLITH	Tertiary sand and marl, deeply weathered
8.	GEOLOGY	Pliocene Moorabool Viaduct Fm. with beach ridges over Miocene Heytesbury Group sand, limestone and marl.
9.	BOUNDARIES	Basalt or other Tertiary units
10.	ELEVATION	160m
11.	RELIEF	40m
12.	LNDFMS-MINOR	Landslides.
13.	MAPS	
14.	REFS	Pitt, 1981; LCC, 1976.
15.	INITIALS/DATE	CO 6/86

1.	UNIT NAME	Timboon
2.	ID	51
3.	STYLE	Erosional
4.	FORM	Low hills
5.	SOIL	Gradational and duplex soils.
6.	DESCRIPTION	Lowlands with hills on Tertiary sediments, and major valleys.
7.	REGOLITH	Shallow weathered marl and limestone.
8.	GEOLOGY	Miocene Heytesbury Group limestone and marl.
9.	BOUNDARIES	The sea or Port Fairy unit to the south; Chatsworth, Scotts Creek, Hamilton basalt to the north.
10.	ELEVATION	80m
11.	RELIEF	40m
12.	LNDFMS-MINOR	Some steep-sided valleys; alluvial flats in main valleys.
13.	MAPS	
14.	REFS	LCC, 1976
15.	INITIALS/DATE	CO 6/86

51

1.	UNIT NAME	Beech
2.	ID	52
3.	STYLE	Erosional
4.	FORM	Plateau
5.	SOIL	Brown gradational.
6.	DESCRIPTION	Plateau on Cretaceous rocks
7.	REGOLITH	Weathered shale, etc.
8.	GEOLOGY	L. Cretaceous Otway Group lithic sandstone and shale.
9.	BOUNDARIES	Aire unit (dissected plateau)
10.	ELEVATION	520m
11.	RELIEF	20m
12.	LNDFMS-MINOR	Landslides.
13.	MAPS	
14.	REFS	Pitt, 1981
15.	INITIALS/DATE	CO 6/86

1.	UNIT NAME	Aire
2.	ID	53
3.	STYLE	Erosional
4.	FORM	Steep slopes
5.	SOIL	Yellow to Brown gradational soils, duplex near coast.
6.	DESCRIPTION	Steep slopes on Cretaceous rocks, dissecting old plateau.
7.	REGOLITH	Disintegrating Cretaceous sediments, weathered to several metres, even on steep slopes.
8.	GEOLOGY	L. Cretaceous Otway Group lithic sandstone and shale.
9.	BOUNDARIES	Beech plateau above. Other Tertiary units at base.
10.	ELEVATION	480m.
11.	RELIEF	200m.
12.	LNDFMS-MINOR	Landslides, coastal cliffs and shore platforms.
13.	MAPS	
14.	REFS	Pitt, 1981; LCC, 1976.
15.	INITIALS/DATE	CO 6/86

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1. UNIT NAME Bunker
2. ID 54
3. STYLE Erosional
4. FORM Hills
5. SOIL Leached grey sand; yellow gradational soil; laterite plateau remnants.
6. DESCRIPTION Moderate hills, mainly on Palaeocene rocks.
7. REGOLITH Shallow-weathered sand, gravel and clay.
8. GEOLOGY L. Tertiary (Palaeocene-Eocene-Oligocene) Wangerrip Group sandstone, conglomerate, clay.
9. BOUNDARIES Aire (Cret.) to S, Scotts Creek and Anglesea (Tert.) to N.
10. ELEVATION 240m.
11. RELIEF 40m.
12. LNDFMS-MINOR Alluvium along Gellibrand River; Older Volcanics.
13. MAPS
14. REFS Pitt, 1981; LCC, 1976.
15. INITIALS/DATE CO 6/86

1. UNIT NAME Anglesea
2. ID 55
3. STYLE Erosional
4. FORM Hills and plains
5. SOIL Mottled red and yellow duplex soils with ironstone; gradational soils.
6. DESCRIPTION Hills and plains on moderate to fine grained Tertiary sediments. Remnants of laterite plateau.
7. REGOLITH Laterite in part; weathered to several metres.
8. GEOLOGY Pliocene Moorabool Viaduct Fm. sand and clay.
9. BOUNDARIES Other Tertiary and Quaternary units.
10. ELEVATION 160m.
11. RELIEF 40m.
12. LNDFMS-MINOR Extensive alluvium along the Barwon River, alluvial terraces.
13. MAPS
14. REFS Pitt, 1981; LCC, 1976.
15. INITIALS/DATE CO 6/86

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1.	UNIT NAME	Beeac
2.	ID	56
3.	STYLE	Depositional
4.	FORM	Plains
5.	SOIL	Gradational soils on alluvium; saline around lakes; some calcareous soils, Rendzinas; Black clays.
6.	DESCRIPTION	Quaternary sediments and lunettes on former extent of Lake Corangamite (Lake Currey)
7.	REGOLITH	Surficial alluvium over Quaternary lake sediments; lunette sediments.
8.	GEOLOGY	Quaternary to recent alluvium and lunettes over Quaternary lake sediments
9.	BOUNDARIES	Basalt to N, Tertiary units to S.
10.	ELEVATION	100m.
11.	RELIEF	10m.
12.	LNDFMS-MINOR	Some river alluvium is included in this unit
13.	MAPS	
14.	REFS	Currey, 1964; LCC, 1976.
15.	INITIALS/DATE	CO 6/86

1.	UNIT NAME	Lawry
2.	ID	57
3.	STYLE	Depositional
4.	FORM	Dunes and sand plain.
5.	SOIL	Red-yellow to brown calcareous sandy soils, uniform texture.
6.	DESCRIPTION	Coastal dunes near Cape Otway, including cliff-top dunes.
7.	REGOLITH	Quaternary sand.
8.	GEOLOGY	Quaternary sand
9.	BOUNDARIES	Sea. Cretaceous or Tertiary units
10.	ELEVATION	80m.
11.	RELIEF	5m.
12.	LNDFMS-MINOR	
13.	MAPS	
14.	REFS	Pitt, 1981; LCC, 1976,
15.	INITIALS/DATE	CO 6/86

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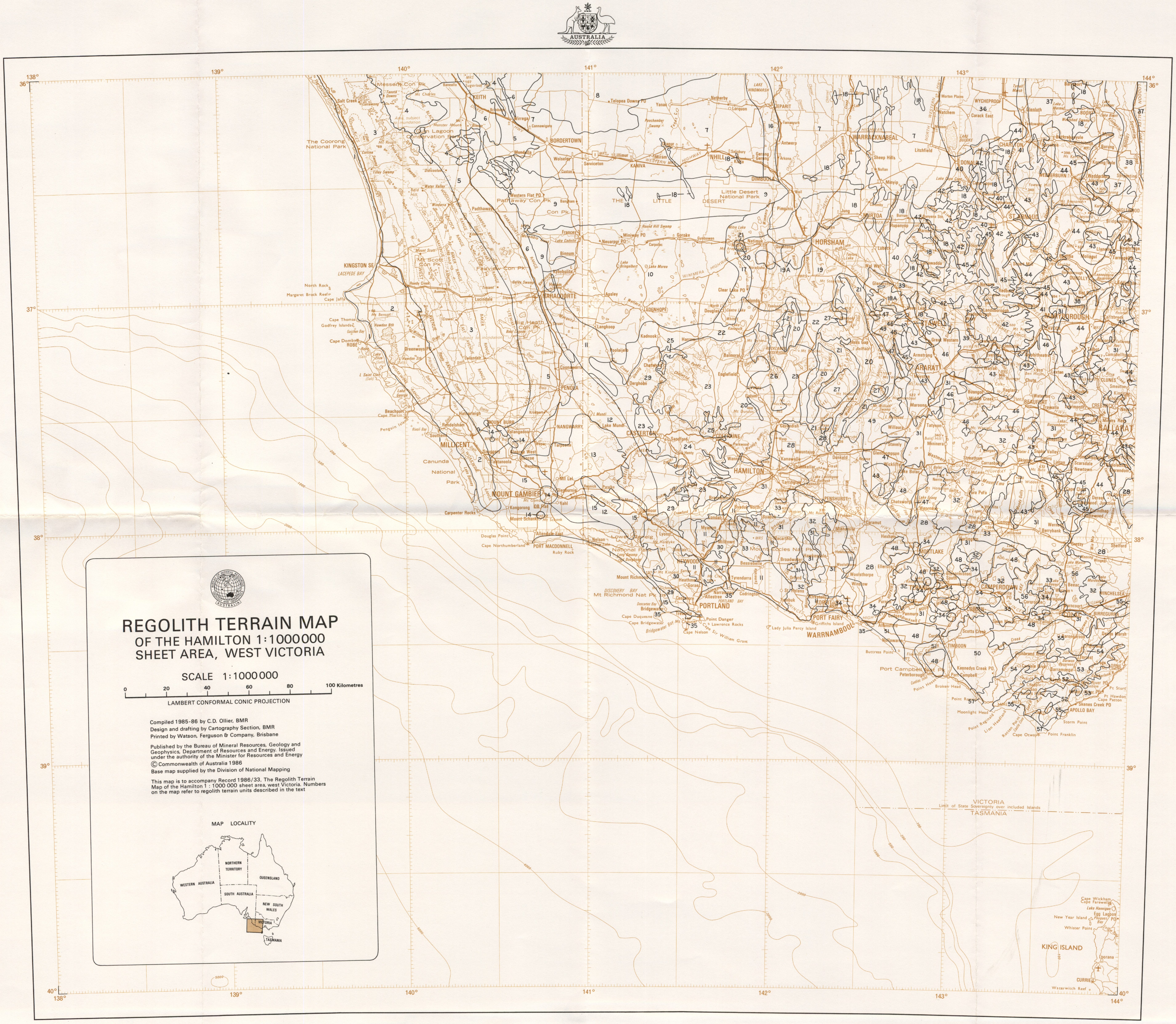
REGOLITH TERRAIN MAP
OF THE HAMILTON 1:1000000
SHEET AREA, WEST VICTORIA
SCALE 1:1000000
0 20 40 60 80 100 Kilometres
LAMBERT CONFORMAL CONIC PROJECTION
Compiled 1985-86 by C.D. Ollier, BMR
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Base map supplied by the Division of National Mapping
This map is to accompany Record 1986/33, The Regolith Terrain Map of the Hamilton 1 : 1000 000 sheet area, west Victoria. Numbers on the map refer to regolith terrain units described in the text
MAP LOCALITY
NORTHERN TERRITORY
QUEENSLAND
WESTERN AUSTRALIA
SOUTH AUSTRALIA
NEW SOUTH WALES
VICTORIA
TASMANIA
The Coorong National Park
KEITH
BORDERTOWN
NHILL
HORSHAM
KINGSTON SE
NARACOORTE
MILLICENT
Canunda National Park
MOUNT GAMBIER
CASTERTON
HAMILTON
PORTLAND
PORT FAIRY
WARRNAMBOOL
Little Desert National Park
KING ISLAND
VICTORIA
TASMANIA