# LAND SYSTEMS
# OF THE
# UPPER McARTHUR RIVER CATCHMENT

by

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# LIST OF TABLES AND FIGURES

## SUMMARY

Resulting from an increased interest in the land use potential of the McArthur River Catchment, the Conservation Commission in 1981 mapped and described the land resources of a major part of the upper catchment. This work extended previous CSIRO mapping in the lower catchment. Approximately 8300 $km^2$ was surveyed and 31 land systems identified at the scale of 1:100,000. The geomorphology, soils and vegetation of the upper catchment are outlined and, using these data, the various land systems have been evaluated with respect to broadscale agricultural and pastoral development, recreation and conservation. Land systems in which there is a high potential for soil erosion are also indicated.

# 1.0 INTRODUCTION

## 1.1 General

The survey of the Upper McArthur River Catchment was initiated after requests from the Department of Transport and Works (Water Division) and the Department of Primary Production, both of the N.T. Government. Water Division was interested in the physical resources of the Upper McArthur River Catchment in order to obtain a basis for assessing various dam site options proposed by Mt. Isa Mines Ltd. This company has large mineral deposits on McArthur River Station in the central catchment area. Pasture agronomists from the Department of Primary Production required land resource information to be able to assist pastoralists in the area.

It was envisaged that a resource survey over the upper catchment would provide the basic information to satisfy both these requests.

## 1.2 Location of Survey Area

The survey area comprises the upper catchment of the McArthur River from its junction with Barney Creek and includes the sub-catchments of the Leila Creek, Tooganginie Creek and part of the Kilgour River (fig.1). The survey includes portions of McArthur River, Balbirini and Mallapunyah Springs Stations.

The total survey area approximates 8371 $km^2$. Access to the catchment is by sealed road via the Carpentaria Highway (approximately 250 km west to the Stuart Highway) and via the Tablelands Highway (approximately 400 km south to the Barkly highway).

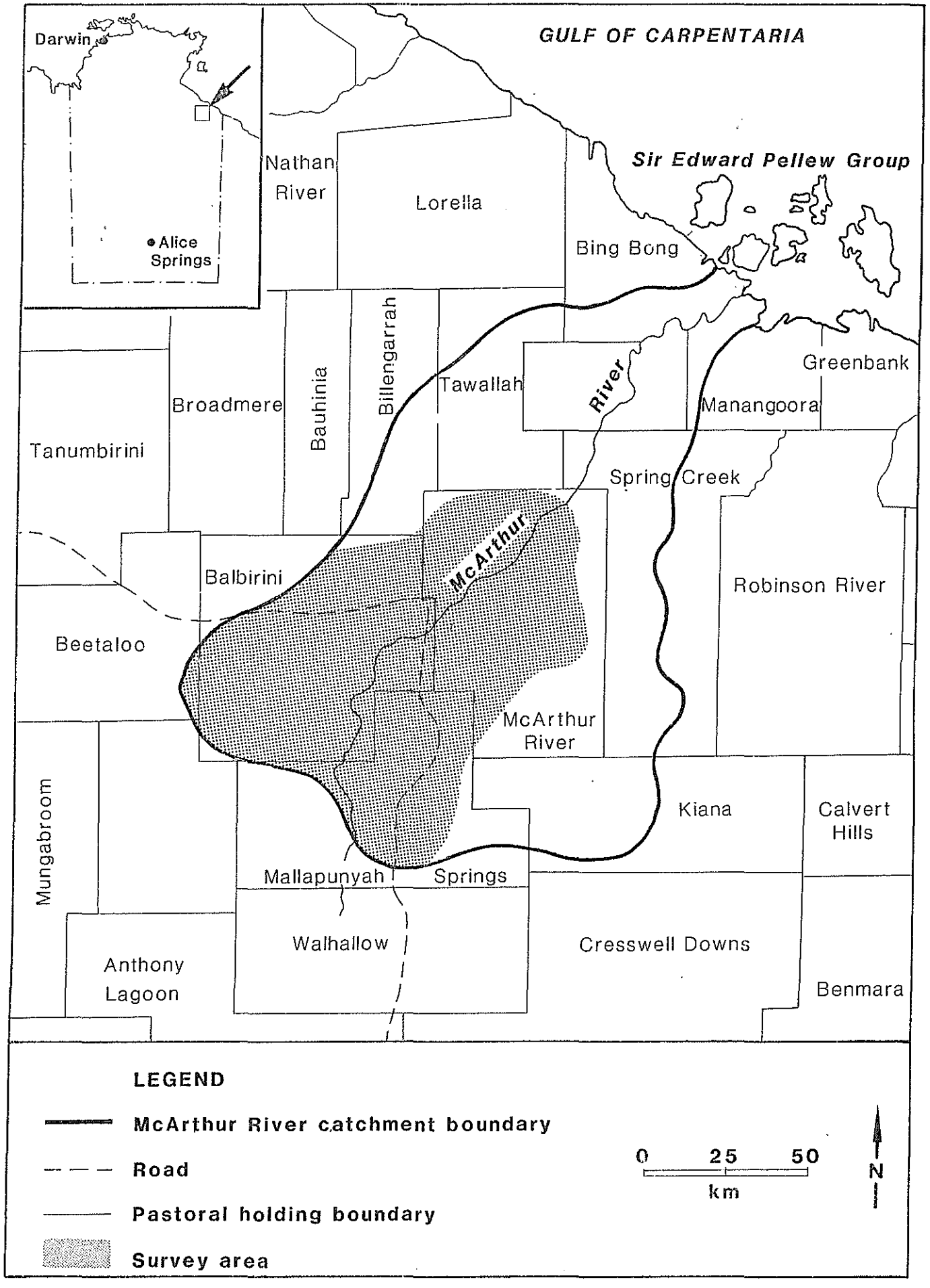



Figure 1: Location of Survey Area.

## 2.0 LAND SYSTEMS OF THE UPPER McARTHUR RIVER CATCHMENT

### 2.1 Introduction

Land System surveys are reconnaissance surveys of the natural features of land. These features are grouped according to distinctive terrain types observed on high level aerial photography. Each distinctive terrain type or Land System represents recurring patterns of similar landforms, soils and vegetation. These individual patterns or units, whilst not always mappable, can nevertheless be readily described as distinctive individual components of the Land System.

The number of individual units described within each mapped land system will depend on the complexity of the natural features occurring, the selected air photo scale, and the outlook of members of the survey team.

Land System mapping is an ideal method of presenting relatively uniform areas of natural resources at a small scale. From the maps and their associated land system descriptions, areas with similar land use potential can be determined and areas suitable for more intensive land uses can be outlined for more detailed study.

### 2.2 Previous Land Resource Mapping

The upper McArthur River Basin was included in the very broad scale (1:1,000,000) survey of the Barkly Region conducted by CSIRO in 1947-48 (Christian et al 1954). Whilst this survey gives an outline of the geomorphological history of the area it gives little detailed information on the landforms, soil or vegetation communities present. Approximately 3833 $km^2$, of the lower McArthur Basin was mapped into Land Systems at the much more informative scale of 1:126,000, by CSIRO in 1966 (Scott and Speight 1966). This 1966 mapping abutts the eastern boundary of the area described in this report. The similarity of scale and general approach of this survey to that of the 1966 CSIRO study

has enabled many of their land systems to be included 'as described' in this Upper Catchment study.

Geological map sheets at 1:250,000 are available for the upper catchment and were regularly consulted.

## 2.3 Method

The land systems have been mapped after interpretation of high level black and white aerial photographs at a scale of approximately 1:85,000 (Appendix I).

Sampling sites in representative land units within the delineated systems were visited in the field. Field work was conducted by two teams working concurrently. One team operated from a Bell 206B Jet Ranger helicopter and sampled the more inaccessible areas of the catchment while a ground team sampled areas using existing roads and tracks from two 4 x 4 vehicles. Field work was conducted during June/July, 1981.

The subsequent mapping and land system descriptions have been compiled from data collected at the sampling sites, from ground traverses and from reviewing relevant reference material.

An essential element of this free survey technique is the extrapolation of information from sampled sites to areas not visited in the field. Landsat imagery assisted in this extrapolation. In all, 182 sites were sampled, giving a site intensity of 1 site per 46 $km^2$.

## 2.4 Description of Land Systems

The Land Systems outlined in this section are described by the following parameters; a general system description, followed by specific descriptions of component units. Summaries of all land system descriptions and their physiographic association are presented in Tables 1 and 2.

Land System

| | | |
|---|---|---|
| Area/Number of observations | : | The approximate area in square kilometres/ no. of observations. |
| Location | : | The general location of the land system. |

General Description

| | | |
|---|---|---|
| Geology | : | The underlying geology. |
| Lithology | : | The prominent lithologies expected to occur throughout the units. |
| Physiography | : | The general description of the overall terrain. |
| Soil | : | The most extensive soil in the system. |
| Vegetation | : | The most common vegetation community. |

Unit Description

| | | |
|---|---|---|
| Unit | : | Unit designation. |
| Percentage | : | An indication of the expected percentage that the particular unit occupies within the total land system area. |
| Landform | : | (a) a brief description of the landform of the unit;<br>(b) relief, and any significant microrelief;<br>(c) an average range of slopes expected;<br>(d) an estimate of the density of termitaria occurring. |
| Soils | | (a) general description;<br>(b) Principal Profile Form;<br>(c) average depth. |
| Vegetation | : | (a) Community structure;<br>(b) Characterising Species. |

TABLE 2.1: BREAKDOWN OF THE LAND SYSTEMS OF THE UPPER McARTHUR RIVER CATCHMENT

| | | | | |
|---|---|---|---|---|
| Tertiary Lateritic Plain | Beetaloo Land System (some Pollyara) * | Tertiary Lateritic Plain | | K1, K2, TP, KD1, KD2, TES |
| Dissected Gulf Fall | Robinson Land System * | Bukalara Plateau | | B, BP |
| | | Abner Range | | PA, A1, A2, Ae, Co |
| | | Batten Range | | M, HLJ |
| | Redbank Land System * | Northern Undulating Hills | | HLS, HT, HT1, PCH |
| | | Balbarini Hills | | PL, TSS, U, UL |
| | | Central McArthur Hills | | H, HLL |
| | Kilgour and Rolyat Land Systems * | Mallapunyah Plains | | PTS, PCZ, PKL, PCC, FUC |
| Depositional Land Surfaces | Balbirini Land System, Keighran Land System * | Central McArthur River Basin | | PTU, PTD, PT, FL, FPB, FPD |

* 1:1,000,000 Land System - Christian *et al*. 1954

## TABLE 2: A SUMMARY DESCRIPTION OF LAND SYSTEMS OF THE UPPER McARTHUR RIVER CATCHMENT

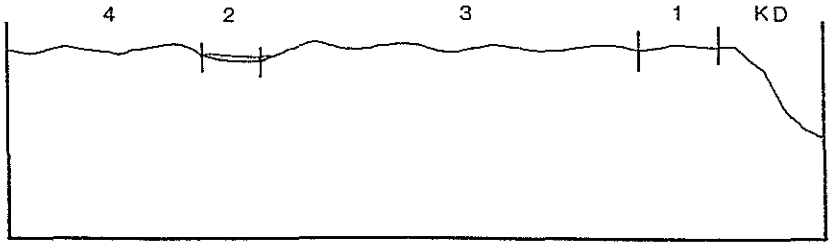
| | | |
|---|---|---|
| TERTIARY LATERITIC PLAIN | K1 | Slightly undulating plain; shallow ferruginous siliceous sands; low woodland (E. terminalis, E. dichromophloia, E. tectifica). |
| | K2 | Undulating low hills and rises; lithosols and shallow siliceous sands; open forest (Acacia shirleyi) and woodlands (E. dichromophloia, E. leucophloia). |
| | TP | Gently undulating plains; ferruginous yellow massive earths, grey cracking clays; woodland to open woodland (E. tectifica, E. pruinosa). |
| | KD1 | Escarpment, crenulate in places; lithosols; open forest (Acacia shirleyi) and eucalypt woodlands. |
| | KD2 | Rugged low hills; lithosols; open shrubland. |
| | TES | Erosion slopes off the Tertiary Lateritic Plain; lithosols; low woodland (E. pruinosa). |
| BUKALARA PLATEAU | B | Rugged, dissected plateau; lithosols; Eucalypt woodland. |
| | BP | Undulating plain; lithosols, shallow siliceous sands; woodland (E. phoenecia, E. dichromophloia, E. tectifica) over spinifex. |
| | PA | Flat to slightly undulating plain. |
| ABNER RANGE | A1 | Dissected plateau surface, plains; siliceous sands; open woodland (E. dichromophloia, E. miniata) over spinifex. |
| | A2 | Flat to slightly undulating plain; siliceous sand; low woodland to open woodland (E. ferrugenia, E. leucophloia) with areas of spinifex grassland. |
| | Ae | Escarpments; bare rock outcrop and scree; variable vegetation. |
| | Co | Broad valleys; siliceous sands, shallow red duplex soils; variable woodlands (E. miniata, E. leucophloia in upper areas, Melaleuca sp. and E. pruinosa in lower areas). |
| BATTEN RANGE | M | High broad-crested hills; lithosols; open woodland (E. grandifolia, E. leucophloia) over spinifex. |
| | HLJ | Low broad-crested hills; lithosols, siliceous sands; woodlands (E. leucophloia, E. grandifolia) over spinifex. |
| | HLS | Steep hills (branching ridges); lithosols; open to low open woodland (E. leucophloia, E. pruinosa, E. terminalis) over spinifex. |
| | HT | Low rolling hills (terraced); lithosols, shallow red massive earths; low open woodland or shrubland (E. leucophloia, Lysiphyllum cunninghamii). |

| | | |
|---|---|---|
| | HT1 | Undulating low hills; lithosols; low open woodland (E. terminalis, E. leucophloia, E. tectifica). |
| | PCH | Undulating plains; siliceous sands, minor yellow earths; woodland (E. leucophloia, E. miniata) mainly over spinifex. |
| NORTHERN UNDULATING HILLS, BALBIRINI HILLS and CENTRAL McARTHUR HILLS | PL | Flat to gently undulating plains; red massive earths; woodland (E. tectifica). |
| | TSS | Low rises (terraced); shallow siliceous sands; low open woodland (E. ferruginea, E. leucophloia) over spinifex. |
| | U | Undulating low rises; lithosols, shallow red massive earths; low open to open woodland (E. leucophloia, E. tectifica). |
| | UL | Undulating plains (often with linear outcrop); lithosols, shallow red massive earths; variable, woodland (E. terminalis, E. leucophloia) and areas of grassland. |
| | H | Rolling hills; lithosols; woodland to open woodland (E. leucophloia, E. terminalis) over spinifex, Heteropogon sp. or Aristida sp. |
| | HLL | Steep, linear hogbacks and ridges; lithosols; eucalypt open woodlands (E. leucophloia). |
| | PTS | Undulating plains and low rises; red massive earths; woodland to low open woodland ( E. terminalis, E. pruinosa, E. leucophloia). |
| | PCZ | Undulating plains; ferruginous yellow massive earths, lithosols; low woodland to woodland (E. pruinosa, E. leucophloia). |
| MALLAPUNYAH PLAINS | PKL | Undulating plains; lithosols, red massive earths; woodland to low open woodland (E. leucophloia, E. terminalis). |
| | PCC | Plains; cracking grey clays; grassland (Iseilema vaginiflorum, Astrebla sp.). |
| | FUC | Upper catchment alluvial plains; grey cracking clays; grasslands some woodland (E. camaldulensis). |
| | PTU | Plains; yellow and brown duplex soils, minor yellow and red massive earths; woodlands (E. tectifica, E. microtheca, E. papuana). |
| | PTD | Tributary flood plains; yellow duplex soils, grey cracking clays; woodland to open woodland (E. papuana, Lysiphyllium and Melaleuca sp.). |
| CENTRAL McARTHUR RIVER BASIN | PT | Major river depositional flood plains; grey cracking clays; woodland (E. microtheca, E. papuana). |
| | FL | Tributary alluvial plains; coarse to medium textured alluvial soils; grasslands with woodland (E. papuana). |
| | FPB | Braided, major river floodplains; brown cracking clays, fine textured alluvials; low open woodland (Lysiphyllium cunninghamii, E. terminalis). |
| | FPD | Dissected river margins; cracking clays, alluvial soils; low open woodland (Lysiphyllium cunninghamii). |

LAND SYSTEM K1

Area/observations : 230 sq. km/8 observations

Location : The rim of the catchment and residual plateau outliers (Tertiary lateritic Surface).




GENERAL DESCRIPTION

Geology : Lower Cretaceous Sediments - ferruginised.

Lithology : Sandstones.

Physiography : Flat to slightly undulating plain.

Soils : Lithosols, moderately deep gravelly yellow massive earths.

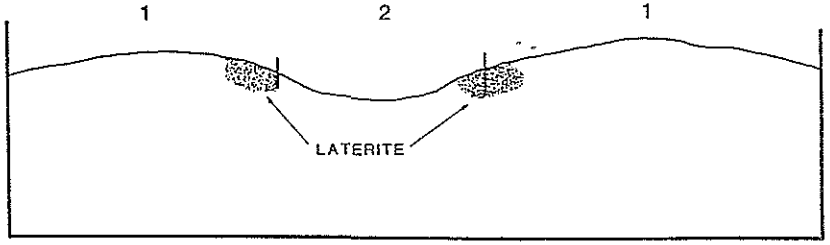
Vegetation : Low eucalypt woodland communities with minor grassland.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 10 | (a) Plain<br>(b) 0 relief<br>(c) 0 slope<br>(d) termitaria 0/ha | (a) Siliceous sands<br>(b) Uc5.11<br>(c) Moderate | (a) Spinifex Grassland.<br>(b) *Plectrachne pungens*, *Schizachysium fragile* with emergent *Melaleuca* spp. |
| 2 | 5 | (a) Closed depression<br>(b) .5 m relief<br>(c) .5% slope<br>(d) termitaria 0/ha | (a) Grey cracking clays<br>(b) Ug5.2<br>(c) Moderate | (a) Low Open Woodland.<br>(b) *E. pruinosa* over *Sorghum* sp. and *Dichanthium fecundum*. |
| 3 | 50 | (a) Slightly undulating plain<br>(b) 1 m relief<br>(c) 2% slope<br>(d) termitaria 60/ha | (a) Lithosols, siliceous sands<br>(b) Ks-Uc5.11<br>(c) Shallow | (a) Low Woodland or Open Woodland.<br>(b) Dominated by either *E. terminalis* or *E. dichromophloia* with grass storey dominated by either *Plectrachne pungens* or *Sehima nervosum*. |
| 4 | 30 | (a) Flat to slightly undulating<br>(b) .5 m relief<br>(c) 1% slope<br>(d) termitaria 40/ha | (a) Yellow massive earths<br>(b) Gn2.65,.85<br>(c) Moderate | (a) Low Open to open Woodland.<br>(b) *E. tectifica*, *E. terminalis* or *E. leucophloia* with *Eulalia fulva* or *Chrysopogon latifolius*. |

LAND SYSTEM K2

Area/observations : 720 sq. km/4 observations

Location : Western rim of the catchment - on the Tertiary lateritic surface.




GENERAL DESCRIPTION

Geology : Ferruginised, Lower Cretaceous sediments.

Lithology : Ferruginised detritus.

Physiography : Undulating low hills and rises.

Soils : Lithosols and shallow siliceous sands frequently with ferruginous gravels.

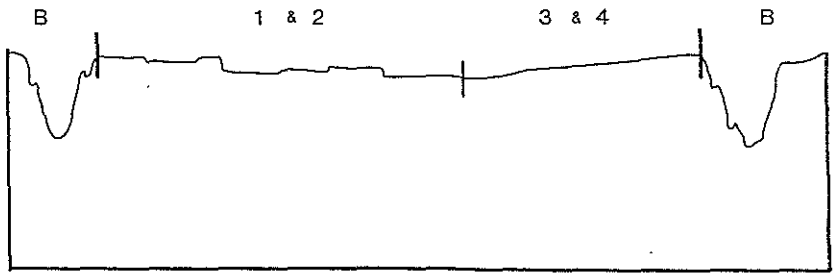
Vegetation : *Acacia shirleyi* open forest with eucalypt woodland.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 70 | (a) Hill crest<br>(b) -<br>(c) 1-3.5% slope<br>(d) termitaria 0-80/ha | (a) Lithosols, and siliceous sands<br>(b) Uc5.11<br>(c) Shallow | (a) Open Forest.<br>(b) *Acacia shirleyi* with sparce grass understorey of *Aristida* sp. or *Eriachine mucronata*. |
| 2 | 30 | (a) Hill slope<br>(b) 10 m relief<br>(c) 2.5% slope<br>(d) termitaria 0-40/ha | (a) Lithosols and siliceous sands<br>(b) Uc5.11<br>(c) Shallow | (a) Woodland.<br>(b) *E. dichromophloia* or *E. leucophloia* with dominant grasses of *Chrysopogon fallax* or *Plectrachne pungens* respectively. |

LAND SYSTEM BP

Area/observations : 27 sq. km/4 observations

Location : Plains on Bukalara Plateau - eastern boundary of the survey area.




GENERAL DESCRIPTION

Geology : Lower Cambrian sediments.

Lithology : Sandstones.

Physiography : Irregular plains.

Soils : Lithosols and shallow siliceous sands.

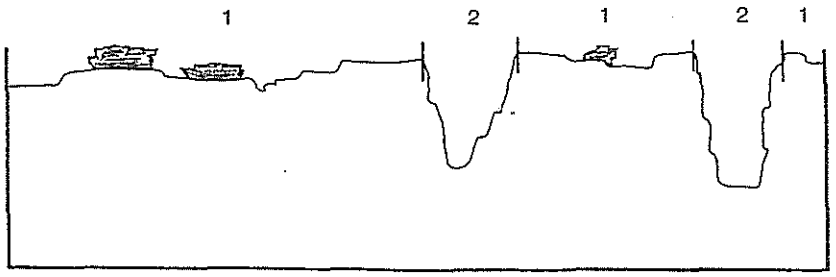
Vegetation : Eucalypt woodland over spinifex.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 30 | (a) Irregular plain<br>(b) -<br>(c) 1.5% slope<br>(d) 50% outcrop | (a) Lithosols<br>(b) Uc1<br>(c) Shallow | (a) Woodland.<br>(b) *E. phoenecia* with small trees and shrubs over *Plectrachne pungens*. |
| 2 | 30 | (a) Crests in slightly undulating plain<br>(b) 2 m relief<br>(c) 2.5% slope<br>(d) 50% outcrop | (a) Lithosols<br>(b) Uc1<br>(c) Shallow | (a) Low Open-Woodland.<br>(b) *E. dichromophloia* over *Plectrachne pungens*. |
| 3 | 30 | (a) Sloping plain<br>(b) -<br>(c) 1.5% slope<br>(d) - | (a) Siliceous sands (Tanarilla)<br>(b) Uc1.23<br>(c) Shallow | (a) Woodland.<br>(b) *E. tectifica* over *Plectrachne pungens*. |
| 4 | 10 | (a) Sloping plain<br>(b) -<br>(c) 1.5% slope<br>(d) - | (a) Siliceous sands (Pellew)<br>(b) Uc1.23<br>(c) Shallow | (a) Grassland.<br>(b) *Plectrachne pungens* with emergent *Grevillea pteridifolia*. |

LAND SYSTEM 8

Area/observations : 292 sq. km/3 observations

Location : Eastern boundary of the survey area - Bukalara Plateau.




GENERAL DESCRIPTION

Geology : Lower Cambrian Bukalara sediments.

Lithology : Sandstones.

Physiography : High rugged plateau.

Soils : Lithosols.

Vegetation : Eucalypt woodland.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 85 | (a) Rugged plateau Surface<br>(b) 10 m relief<br>(c) -<br>(d) 50% outcrop | (a) Lithosols<br>(b) Ucl<br>(c) Shallow | (a) Woodland.<br>(b) *E. dichromophloia* with minor *E. phoenecia* and areas of dense shrub dominated by *Grevillea refracta* and *Acacia latifolia*. |
| 2 | 15 | (a) Deep gorges<br>(b) Variable<br>(c) -<br>(d) - | (a) (Not Sampled) | (a) (Not sampled). |

LAND SYSTEM A1

Area/observations : 198 sq. km/5 observations

Location : Mainly on the Abner Range but occurs elsewhere.

GENERAL DESCRIPTION

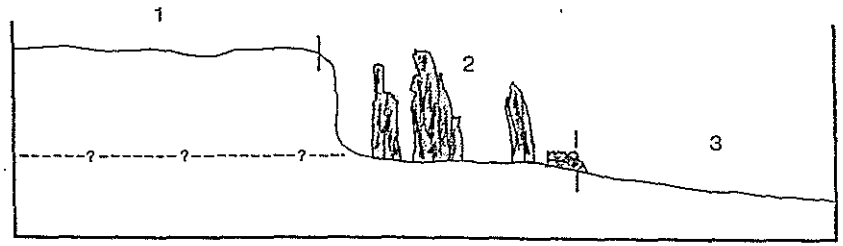
Geology : Upper Proterozoic sediments.

Lithology : Abner sandstones.

Physiogphy : Structural platforms and dissected plateau surface.

Soils : Siliceous sands.

Vegetation : Eucalypt open woodland over spinifex.

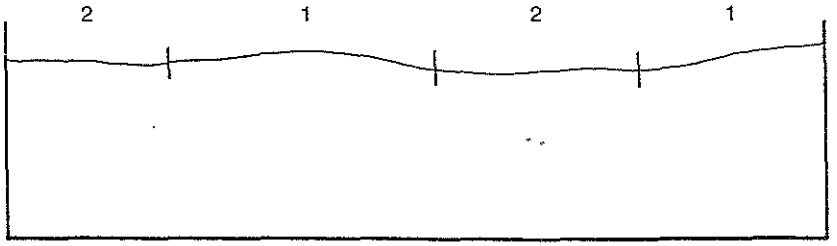



| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 50 | (a) Plains<br>(b) 3 m outcrop<br>(c) 1.5-3% slope<br>(d) termitaria 120/ha | (a) Siliceous sands<br>(b) Uc5.11<br>(c) Shallow | (a) Open Woodland.<br>(b) *E. dichromophloia* over *Plectrachne pungens* with minor patches of spinifex grassland. |
| 2 | 30 | (a) Dissected sandstone columns and inter-column flats<br>(b) 50 m relief<br>(c) -<br>(d) Large areas of outcrop | (a) Siliceous sands<br>(b) Uc4.21<br>(c) Shallow | (a) Woodland.<br>(b) *E. miniata* with few shrubs and sparse *Plectrachne pungens*. |
| 3 | 20 | (a) Colluvial footslopes<br>(b) 1 m relief<br>(c) 0-2% slope<br>(d) - | (a) Siliceous sands<br>(b) Uc4.21, Uc1.23<br>(c) Shallow | (a) Open Woodland.<br>(b) *E. leucophloia* (mallee) over *Plectrachne pungens* and *E. polycarpa* over *Aristida hygrometrica* and *Eragrostic tinella* in the lower areas. |

LAND SYSTEM A2

Area/observations : 182 sq. km/5 observations

Location : Abner Range




GENERAL DESCRIPTION

Geology : Upper Proterozoic sediments.

Lithology : Abner sandstone.

Physiography : Flat to slightly undulating plain.

Soils : Siliceous sands.

Vegetation : Low eucalypt woodlands and spinifex grassland.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 50 | (a) Plain Rises<br>(b) 1 m relief<br>(c) 1.5% slope<br>(d) termitaria 20-30/ha | (a) Lithosols and siliceous sands<br>(b) K-Uc4.21<br>(c) Shallow | (a) Low to Low Open-Woodland.<br>(b) Low woodland of either *E. phoenecia* or *E. leucophloia*. Low open-woodland of *E. dichromophloia*. Both communities have an understorey of *Plectrachine pungens*. |
| 2 | 50 | (a) plains<br>(b) -<br>(c) 1% slope<br>(d) termitaria 10-15/ha | (a) Siliceous sands<br>(b) Uc1<br>(c) Shallow | (a) Grassland.<br>(b) *Plectrachne pungens* with occasional *E. leucophloia* emergents. |

LAND SYSTEM Co

Area/observations : 1432 sq. km/8 observations

Location : Within the Abner Range


GENERAL DESCRIPTION

Geology : Proterozoic sediments.

Lithology : Sandstone, detritus.

Physiography : Broad valleys.

Soils : Siliceous sands.

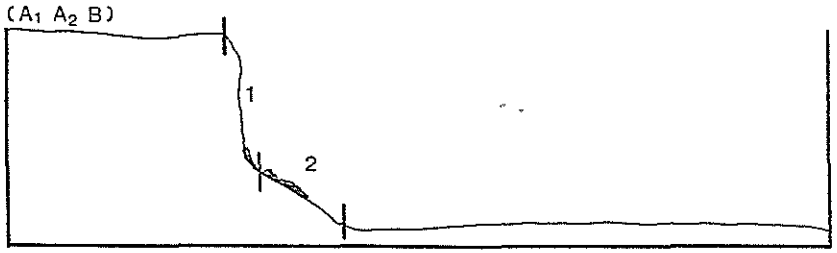
Vegetation : Variable, dominantly low eucalypt and melaleuca woodland.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 15 | (a) Slopes<br>(b) 10 m relief<br>(c) 10% slope<br>(d) termitaria 0/ha | (a) Lithosols and siliceous sands<br>(b) Ucl.23<br>(c) Shallow to moderate | (a) Open-Woodland.<br>(b) *E. miniata* or *E. dicromophloia* over *Plectrachne pungens*. |
| 2 | 50 | (a) Flats (run on areas)<br>(b) 2 m relief<br>(c) 1-3% slope<br>(d) termitaria 50-70/ha | (a) Siliceous sands<br>(b) Ucl.13, Uc5.11, Uc4.11<br>(c) Moderate | (a) Low Woodland.<br>(b) *Melaleuca nervosa* or *M. viridiflora* over *Plectrachne pungens*. |
| 3 | 35 | (a) Valley flats<br>(b) 1.5 m relief<br>(c) 1.5% slope<br>(d) termitaria 20 -60/ha | (a) Red Massive Earths<br>(b) K-Dr2.52<br>(c) Shallow to moderate | (a) Low Woodland to Low Open Woodland.<br>(b) *E. Leucophloia* over *Pletrachne pungens*. |
| 4 | 25 | (a) Valley flats<br>(b) <1 m relief<br>(c) 0% slope<br>(d) termitaria 50/ha | (a) Siliceous sands<br>(b) Uc5.22<br>(c) Shallow | (a) Low Open Woodland.<br>(b) *E. Pruinosa* over *Aristida inaequiglumis*. |

LAND SYSTEM Ae

Area/observations : 73 sq. km/0 observations

Location : Surrounding the Abner Range and other sandstone scarps in the Western catchment.




GENERAL DESCRIPTION

Geology : Lower Proterozoic Crawford formation.

Lithology : Sandstones.

Physiography : Escarpment - highest around Abner Range.

Soils : Large areas of bare rock outcrop.

Vegetation : Sparse woodland and shrubland communities.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | | (a) Free cliff face<br>(b) -<br>(c) -<br>(d) - | (a) - | (a) - |
| 2 | | (a) Scree slope<br>(b) -<br>(c) -<br>(d) - | | |

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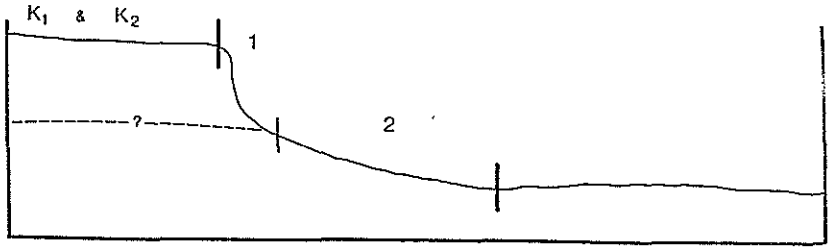
LAND SYSTEM KD1

Area/observations : 305 sq. km/ 3 observations

Location : Western and Southern rim of the catchment.




GENERAL DESCRIPTION

Geology : Lower Cretaceous sediments.

Lithology : Sandstones, siltstones.

Physiography : Escarpment, crenulate in places.

Soils : Lithosols.

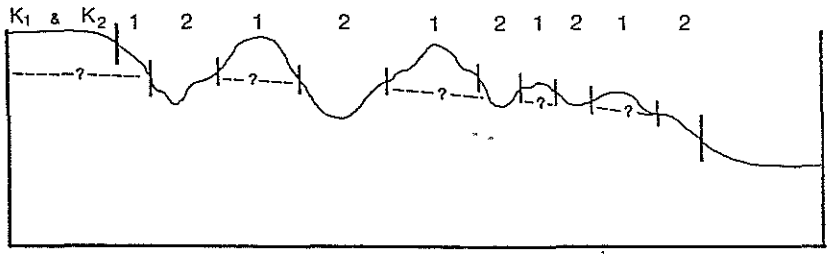
Vegetation : Variable, *Acacia shirleyi* open forest and Eucalypt woodlands.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 30 | (a) Cliff face and upper slope<br>(b) 5 m relief<br>(c) >20% slope<br>(d) termitaria 0/ha | (a) Lithosols<br>(b) Uc 1<br>(c) Shallow | (a) Open Forest.<br>(b) *Acacia shirleyi* over *Chrysopogon fallax*. |
| 2 | 70 | (a) Mid and lower slopes<br>(b) 2 m relief<br>(c) 4-8% slope<br>(d) termitaria 70/ha | (a) Lithosols<br>(b) Uf1.43<br>(c) Shallow | (a) Woodland, minor Low Woodland.<br>(b) *E. leucophiloia* over *Plectrachne pungens*. *E. pruinosa* with *Heteropogon contortus* in lower areas. |

LAND SYSTEM KD2

Area/observations : 107 sq. km/1 observation

Location : Western rim of the catchment.




GENERAL DESCRIPTION

Geology : Similar to KD1.

Lithology : Similar to KD1.

Physiography : Rugged low hills.

Soils : Similar to KD1.

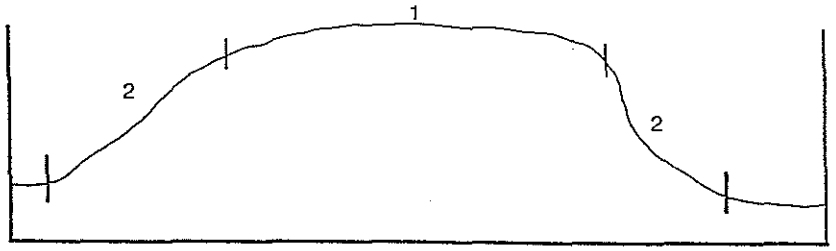
Vegetation : Open eucalypt shrubland over spinifex grass.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 50 | (a) Crests and upper slopes<br>(b) -<br>(c) 5% slope | (a) Lithosols<br>(b) Uc1<br>(c) Shallow | (a) Open Shrubland or Low Open Woodland.<br>(b) *E. normantonensis* over *Plectrachne pungens* or *E. leucophloia* over *Plectrachne pungens*. |
| 2 | 50 | (b) Lower slopes<br><br>Not sampled - suggest similarity to Unit 2, TES Land System. | | |

LAND SYSTEM M

Area/observations : 87 sq. km/3 observations

Locatio n : High hills throughout the survey area.




GENERAL DESCRIPTION

Geology : Lower Proterozoic sediments (Masterton, Limmen formations).

Lithology : Sandstones.

Physiography : High, broad crested hills.

Soils : Lithosols.

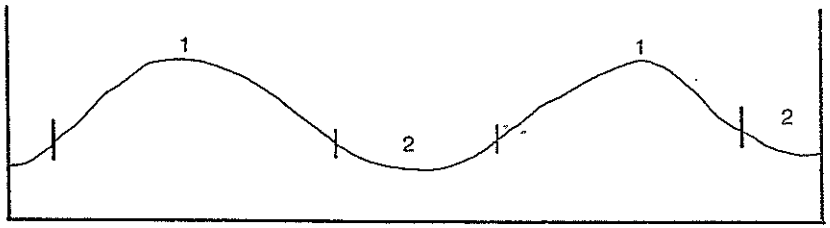
Vegetation : Open woodland of *E. grandifolia*, *E. leucophloia* over spinifex.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 50 | (a) Crests<br>(b) 3 m relief<br>(c) 2% slope | (a) Lithosols<br>(b) Uc1.23<br>(c) Shallow | (a) Open Woodland.<br>(b) *E. grandifolia* and *E. leucopholia* over *Plectrachne pungens*. |
| 2 | 50 | (a) Side slopes<br>(b) 3 m relief<br>(c) 12- 14% slope | (a) Lithosols<br>(b) Uc1.23<br>(c) Shallow | (a) Low Woodland.<br>(b) *E. leucopholia* over *Plectrachne pungens*. |

LAND SYSTEM HLJ

Area/observations : 124 sq. km/5 observations

Location : Throughout the survey area.




GENERAL DESCRIPTION

Geology : Lower Proterozoic sediments.

Lithology : Sandstones, dolomitic rocks.

Physiography : Low, broad crested hills.

Soils : Lithosols.

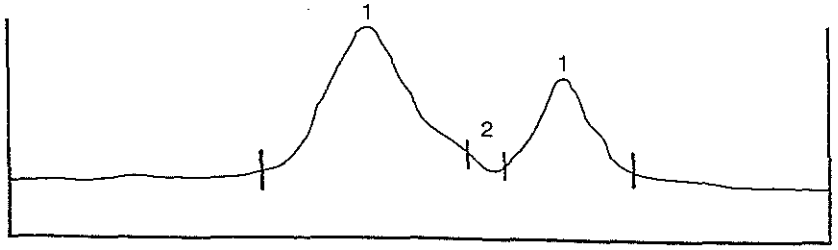
Vegetation : Low open to open eucalypt woodland.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 75 | (a) Crests and slopes<br>(b) -<br>(c) to 15% slope.<br>(d) termitaria 70/ha | (a) Lithosols<br>(b) Uc1.2<br>(c) Shallow | (a) Low Open to Oopen Woodland.<br>(b) *E. leucophloia* over minor *E. dichromophloia* over *Plectrachne pungens*. |
| 2 | 25 | (a) Lower slopes and sloping plains<br>(b) 1 m relief<br>(c) 1-2% slope<br>(d) termitaria 100-150/ha | (a) Siliceous sands<br>(b) Uc4.11<br>(c) Shallow | (a) Woodland to Open Woodland.<br>(b) *E. grandifolia* or *E. leucophloia* over *Plectrachne pungens*. |

LAND SYSTEM HLL

Area/observations : 627 sq. km/5 observations

Location : Throughout the survey area.




GENERAL DESCRIPTION

Geology : Lower Proterozoic sediments.

Lithology : Sandstones, dolomitic sandstones.

Physiography : Steep, linear hogbacks and ridges.

Soils : Lithosols.

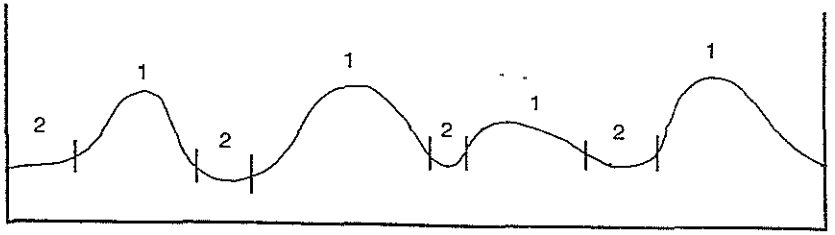
Vegetation : Open woodlands.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 95 | (a) Crests and slopes<br>(b) 2 m relief<br>(c) 10% slope<br>(d) termitaria 0/ha | (a) Lithosols<br>(b) Uc1.2<br>(c) Shallow | (a) Low Open Woodland.<br>(b) *E. leucophloia* over *Plectrachne pungens*, annual *Sorghum* sp. and *Cymbopogon bombycinus*. |
| 2 | 5 | (a) Drainange floors<br>(b) 0.5 m relief<br>(c) 0% slope<br>(d) termitaria 120/ha | (a) Yellow massive earths<br>(b) Gn2.65<br>(c) Shallow | (a) Open Woodland.<br>(b) *E. tetrodonta*, *E. microtheia*, minor *E. leucophloia* over dense perennial grasses. |

LAND SYSTEM HLS

Area/observations : 804 sq. km/9 observations

Location : Throughout the survey area.




GENERAL DESCRIPTION

Geology : Lower Proterozoic sediments.

Lithology : Sandstones, siltstones, dolomitic rocks.

Physiography : Steep, branching ridged hills.

Soils : Lithosols and minor shallow earthy sands.

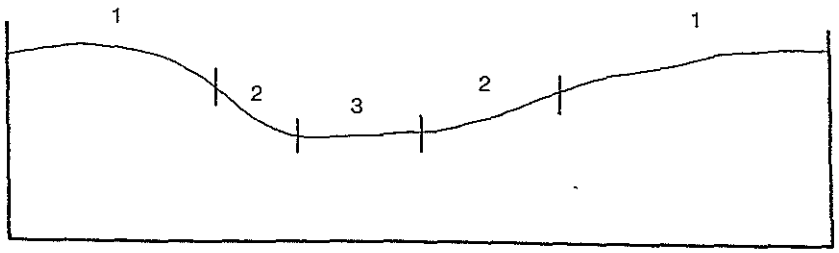
Vegetation : Variable, predominantly eucalypt woodlands.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 75 | (a) Crests and upper slopes<br>(b) 20-30 m relief<br>(c) Up to 30% slope<br>(d) 50% rock outcrop | (a) Lithosols<br>(b) Uc1.23<br>(c) Shallow | (a) Open to Low Open Woodland.<br>(b) *E. leucophloia* over *Plectrachne pungens* with some dominance of *E. terminalis* and *Terminalia canescens*. |
| 2 | 25 | (a) Lower slopes<br>(b) 2-3 m relief<br>(c) 5% slope<br>(d) 20% rock outcrop | (a) Lithosols and earthy sands<br>(b) Um1, Uc1<br>(c) Shallow | (a) Low Open Woodland.<br>(b) *E. leucophloia* or *E. pruinosa* over *Schizachyrium fragile* and *Plectrachne pungens* |

LAND SYSTEM H

Area/observations : 548 sq. km/6 observations

Location : Throughout the survey area.




GENERAL DESCRIPTION

Geology : Lower Proterozoic sediments - various formations.

Lithology : Dolomitic rocks.

Physiography : Rolling hills.

Soils : Lithosols.

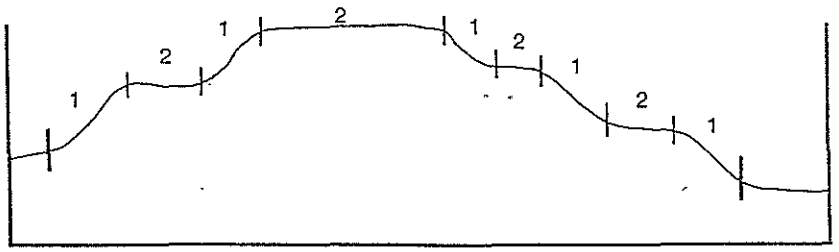
Vegetation : Eucalypt low woodland and woodland communities.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 50 | (a) Crests and upper slopes<br>(b) 4 m relief<br>(c) 5-20% slope<br>(d) 40% outcrop | (a) Lithosols<br>(b) Uc1.2<br>(c) Shallow | (a) Open Woodland or Low Woodland.<br>(b) *E. leucophloia* over *Plectrachne pungens* with rare occurences of *E. terminalis*. |
| 2 | 25 | (a) Footslopes<br>(b) 2 m relief<br>(c) 3-5% slope<br>(d) 5% outcrop | (a) Lithosols and siliceous sands<br>(b) Uc5.11<br>(c) Shallow to moderate | (a) Woodland to Open Woodland.<br>(b) *E. terminalis* over *Aristida hygrometrica*. and *Plectrachne pungens*. |
| 3 | 25 | (a) Flats<br>(b) -<br>(c) 0-3% slope | (a) Siliceous sands<br>(b) Uc1.2<br>(c) Moderate | (a) Variable.<br>(b) *E. tectifica terminalis* over *Plectrachne pungens* or *Heteropogn contortus*. |

LAND SYSTEM HT

Area/observations : 236 sq. km/3 observations

Location : Throughout Northern Undulating Plains and Balbirini Hills.




GENERAL DESCRIPTION

Geology : Lower Proterozoic sediments - Toonganginie and Emmerrugga Formation.

Lithology : Dolomitic siltstones and sandstones.

Physiography : Terraced, rolling, low hills.

Soils : Lithosols (red massive earths).

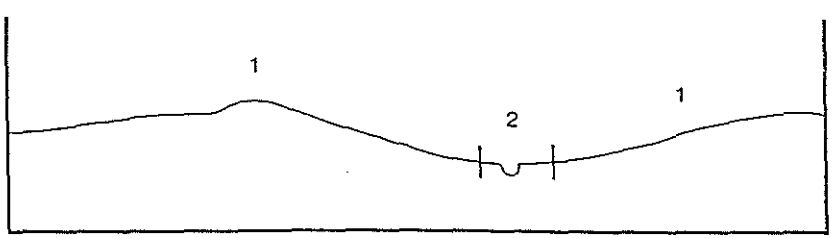
Vegetation : Shrubland to low open woodland.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 50 | (a) Rocky slopes<br>(b) 8-10 m relief<br>(c) 12-25% slope | (a) Lithosols<br>(b) K-Uc 1.2<br>(c) Shallow | (a) Shrubland.<br>(b) *Cochlospermum frazeri* over *Sehima nervosum*, and *Enneopogon* sp. |
| 2 | 50 | (a) Terrace<br>(b) <1 m relief<br>(c) 0-1.5% slope | (a) As above (occasionally shallow red massive earths) | (a) Shrubland.<br>(b) Shrubland *Lysiphyllum cunninghammii* and *Hakea arborescens* over *Brachyachne ambigua*. |

LAND SYSTEM HT1

Area/observations : 355 sq. km/6 observations

Location : Throughout Northern Undulating Plains and Balbirini Hills.




GENERAL DESCRIPTION

Geology : Lower Proterozoic sediments - mainly Toonganginie Formation.

Lithology : Dolomite, dolomitic siltstone and sandstone.

Physiography : Undulating, low hills.

Soils : Lithosols.

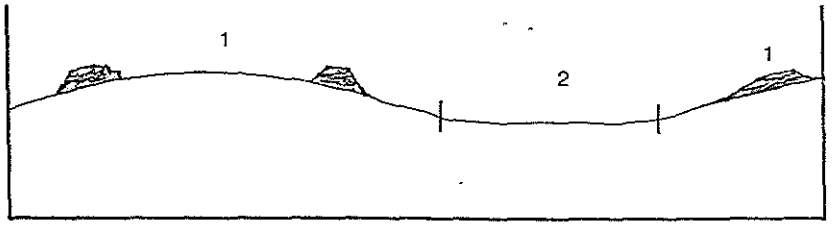
Vegetation : Eucalypt low open forest and low open woodland.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 95 | (a) Crests and hillslopes<br>(b) 2 m relief<br>(c) 2-3% Slope<br>(d) 30% outcrop | (a) Lithosols<br>(b) Um 1.43, Uc1.23<br>(c) Shallow | (a) Low Open Woodland.<br>(b) *E. terminalis*, *E. leucophloia* or or *E. tectifica* over *Chrysopogon fallax*, *Sorghum plumosum*, or *Heteropogon contortus*. |
| 2 | 5 | (a) Lower drainage floor<br>(b) -<br>(c) 0-1.5% slope | (a) Yellow duplex soils<br>(b) Dy 2.52<br>(c) Shallow to moderate | (a) Low Open Forest.<br>(b) *E. terminalis* over *Themeda australis* *Eulalia fulva* and *Dicanthium fecundum*. |

LAND SYSTEM UL

Area/observations : 120 sq. km/5 observations

Location : Throughout the survey area.




GENERAL DESCRIPTION

Geology : Lower Proterozoic sediments.

Lithology : Various, mainly dolomitic sandstones and siltstones.

Physiography : Undulating plains, often with linear outcrop.

Soils : Lithosols with areas of shallow red earths on lower slopes.

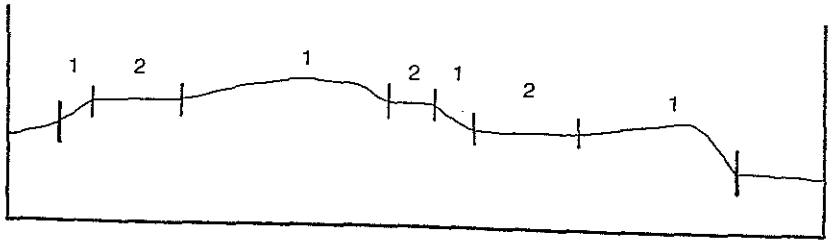
Vegetation : Eucalypt woodland and mixed grasslands.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 60 | (a) Crests and Slopes<br>(b) 2 m relief<br>(c) 2-3% slope | (a) Lithosols<br>(b) Um1.3<br>(c) Shallow | (a) Woodland.<br>(b) *E. terminalis* over *Themeda australis*. |
| 2 | 40 | (a) Plains<br>(b) -<br>(c) 0-2% slope | (a) Red massive earths<br>(b) Gn2.12<br>(c) Shallow | (a) Variable, Grassland with emergent trees.<br>(b) *Sporobolus australasicus*, *Aristida* sp. and *Heteropogon contortus* with emergent *Lysiphyllum cunninghamii*. |

LAND SYSTEM TSS

Area/observations : 44 sq. km/6 observations

Location : Mainly isolated occurrence in Balbirini Hills.




GENERAL DESCRIPTION

Geology : Lower Proterozoic sediments (Tawallah, Sly Creek and Masterton Sandstones).

Lithology : Sandstone.

Physiography : Low terraced rises.

Soils : Shallow siliceous sands.

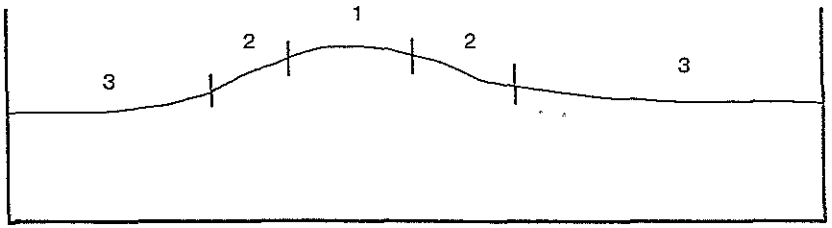
Vegetation : Eucalypt woodland over spinifex.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 60 | (a) Crests and slopes<br>(b) 2 m relief<br>(c) 2-15% slope | (a) Siliceous sands with rock outcrop<br>(b) Uc1.2<br>(c) Shallow | (a) Low Open Woodland.<br>(b) *E. ferruginia* or *E. leucophloia* over *Plectrachne pungens*. |
| 2 | 40 | (a) Terraces, inter crest flats.<br>(b) 1 - 2 m relief<br>(c) 0-2% slope | (a) Siliceous sands<br>(b) Uc1.2<br>(c) Shallow | (a) Variable Woodland.<br>(b) *E. dichromophloia* over *Plectrachne pungens*. |

LAND SYSTEM U

Area/observations : 659 sq. km/27 observations

Location : Throughout the survey area.




GENERAL DESCRIPTION

Geology : Various.

Lithology : Various - mainly Dolomitic sediments.

Physiography : Undulating low rises.

Soils : Lithosols and shallow red massive earths.

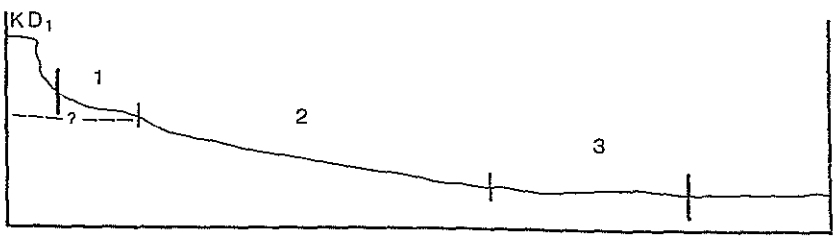
Vegetation : Eucalypt woodlands over spinifex.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 20 | (a) Crests<br>(b) -<br>(c) 0-2% slope | (a) Lithosols<br>(b) Uc1<br>(c) Shallow | (a) Variable Woodlands.<br>(b) *E. leucophloia* with minor *E. tectifica* *E. terminalis* over *Plectrachne pungens*. |
| 2 | 20 | (a) Slopes<br>(b) 3 m relief<br>(c) 2 - 10% slope | (a) Lithosols<br>(b) Uc1<br>(c) Shallow | (a) Low Open to Open Woodland.<br>(b) *E. tectifica* with minor *E. leucophloia* *E. terminalis* over *Heteropogon contortus* and other perennial grasses. |
| 3 | 60 | (a) Lower slopes and gently sloping flats<br>(b) 1 - 2 m relief<br>(c) 0-2% slope | (a) Red massive earths (Top Springs)<br>(b) Uc1.2, Gn 2.12<br>(c) Shallow | Variable, including Woodland communities of *E. leucophloia*, *E. tectifica*, *E. terminalis* and *E. grandifolia*; shrublands of *Melaleuca viridiflora*, *Terminalia canescens* and *Acacia oswaldii* as well as areas of *E. papuana*, Open Forest. |

LAND SYSTEM TES

Area/observations : 497 sq. km/4 observations

Location : Below and usually associated with KD1 and KD2 land system.




GENERAL DESCRIPTION

Geology : Lower Cretaceous sediments.

Lithology : Clayey sandstones, siltstones.

Physiography : Erosional slopes off the Barkly-Birdum Tableland.

Soils : Lithosols, shallow clays usually with a rock and stone mantle.

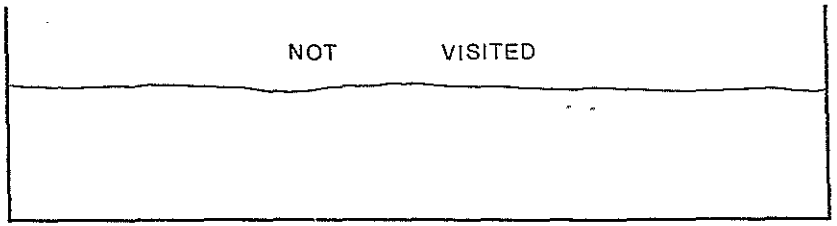
Vegetation : Low *E. pruinosa* Woodlands with mixed perennial grasses.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 25 | (a) Crests<br>(b) 2 - 3 m relief<br>(c) 2 - 5% slope<br>(d) rock cover | (a) Lithosols<br>(b) Um5.51, Uc1.2<br>(c) Shallow | (a) Low-Low Open Woodland.<br>(b) *E. pruinosa* over *Aristida inaequiglumis*. |
| 2 | 50 | (a) Side Slope<br>(b) 7-10 m relief<br>(c) 80% slope<br>(d) rock cover | (a) Lithosols, brown clays (Feathertop)<br>(b) Ks-Uf1.43<br>(c) Very Shallow | (a) Low Woodland.<br>(b) *E. pruinosa* over *Sehima nervosum*. |
| 3 | 25 | (a) Outwash plain<br>(b) 2-3 m relief<br>(c) 0-2% slope<br>(d) Large areas of rock mantle | (a) Red massive earths and brown duplex soils<br>(b) Db1.13, Dr 2.53<br>(c) Moderate (gravel throughout). | (a) Low-Low Open Woodland.<br>(b) *E. pruinosa* over *Sehima nervosum* with minor *Dichanthium fecundum*. Minor occurrence of *E. leucophloia* and *Eulalia fulva*. |

LAND SYSTEM PA

Area/observations : 17 sq. km/0 observations

Location : Abner Range




GENERAL DESCRIPTION

Geology : Lower Proterozoic sandstone and weathered Cainozoic mantle.

Lithology : Detritus, sand.

Physiography : Flat to slightly undulating plain.

Soils :

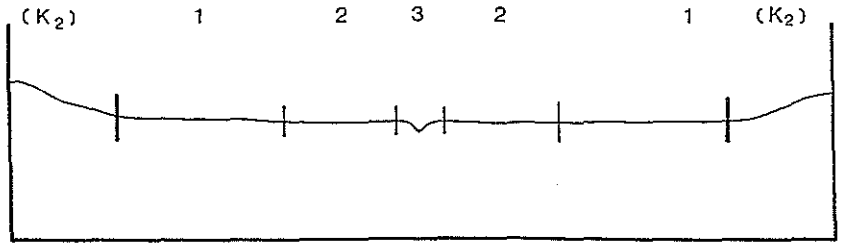
Vegetation :

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| | | NOT SAMPLED | | |

LAND SYSTEM TP

Area/observations : 357 sq. km/5 observations

Location : On Tertiary lateritic surface.




GENERAL DESCRIPTION

Geology : Cainozoic colluvium.

Lithology : Colluvium, alluvium.

Physiography : Gently undulating plains.

Soils : Yellow massive earths - ferruginous, grey cracking clays.

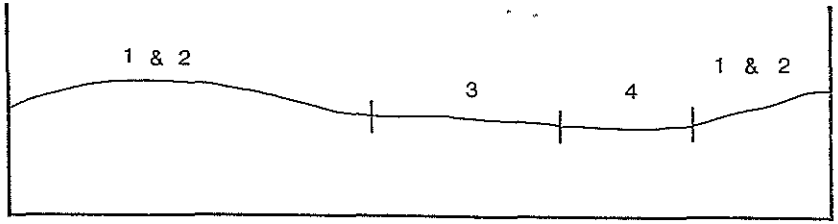
Vegetation : Eucalypt woodlands with perennial grasses, areas of grassland.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 75 | (a) Sloping plain<br>(b) 1-2 m relief<br>(c) 1-2% slope | (a) Yellow massive earths<br>(b) K s-Gn2.22<br>(b) Shallow-moderate | (i) (a) Woodland.<br>(b) *E. tectifica* over *Chrysopogon fallax* and *Dichanthium fecundum*.<br>(ii) (a) Low Open Woodland.<br>(b) *E. pruinosa* over *Dichanthium fecundum* and *Sehima nervosum*. |
| 2 | 20 | (a) Flat plain<br>(b) 0 m relief<br>(c) 0% slope | (a) Grey cracking clays<br>(b) Ug 5.24<br>(c) Moderate | (a) Grassland.<br>(b) *Sporobolus australasis* and *Dicanthium fecundum*. |
| 3 | 5 | (a) Stream Channels<br>(b)<br>(c) | No Data | No Data. |

LAND SYSTEM PCH

Area/observations : 37 sq. km/4 observations

Location : Restricted occurrence, along the Carpentaria Highway west of the Tablelands Highway junction.




GENERAL DESCRIPTION

Geology : Similar to K.

Lithology : Sand, ferruginous detritus.

Physiography : Undulating plains.

Soils : Gravelly siliceous sands and yellow massive earths.

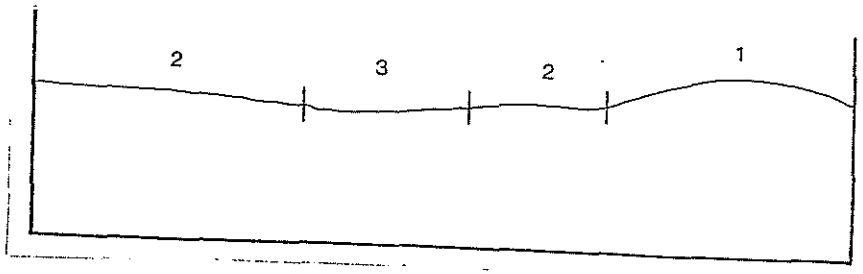
Vegetation : Variable; eucalypt and non-eucalypt woodland.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 30 | (a) Broad crests<br>(b) -<br>(c) 2.5-3% slope | (a) Yellow massive earths<br>(b) Gn2.25<br>(c) Moderate | (a) Woodland.<br>(b) *E. leucophloia* over *Plectrachne pungens*. |
| 2 | 40 | (a) Broad crests<br>(b) -<br>(c) 2.5-3% Slope | (a) Siliceous sands (Tanarilla)<br>(b) Ks-Uc5.12<br>(c) Shallow | (a) Woodland.<br>(b) *E. miniata* and *E. ferruginea* over *Plectrachne pungens*. |
| 3 | 20 | (a) Flat plain<br>(b) -<br>(c) 1.0% slope | (a) Siliceous sands<br>(b) Uc5.12<br>(c) Shallow | (a) Low Open Woodland.<br>(b) *Terminalia canescens* over *Schizacharium fragile* *Plectrachne pungens*. |
| 4 | 10 | (a) Shallow broad depression<br>(b) -<br>(c) 1.0% slope | (a) Siliceous sands<br>(b) Uc.5.11<br>(c) Deep | (a) Shrubland.<br>(b) *Melaleuca viridiflora* over *Eragrostis* sp. |

LAND SYSTEM PCZ

Area/observations : 117 sq. km/3 observations

Location : Mallapunyah Plains




GENERAL DESCRIPTION

Geology : Cainozoic weathered material.

Lithology : Soil, Sand, ferruginised detritus.

Physiography : Undulating Plain.

Soils : Lithosols and yellow massive earths.

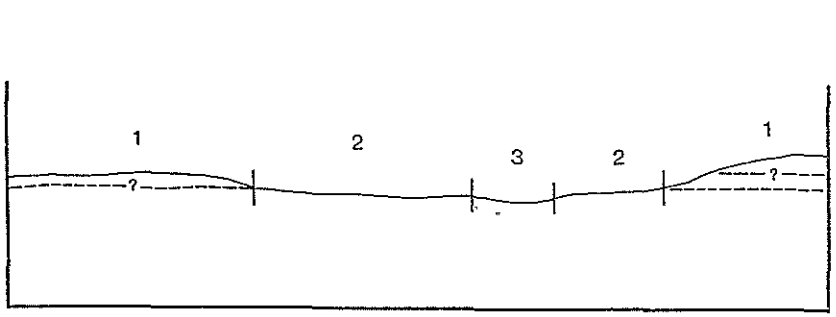
Vegetation : Woodland (*E. leucophloia*, *E. pruinosa*,)

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 30 | (a) Broad crests<br>(b) -<br>(c) 2.0% slope | (a) Lithosols (gravelly earths and sands)<br>(b) Ks-Uc5.1 | (a) Woodland.<br>(b) *E. leucophloia* over *Plectrachne pungens*. |
| 2 | 50 | (a) Gently sloping plain<br>(b) -<br>(c) 1.0% slope | (a) Yellow massive earths<br>(b) Gn2.25<br>(c) Shallow | (a) Low Woodland.<br>(b) *E. pruinosa* over *Chrysopogon fallax* and *Sehima nervosum*. |
| 3 | 20 | (a) Plain - with depressions<br>(b) -<br>(c) 2.0% Slope | (a) Grey cracking clays<br>(b) Ug5.24<br>(c) Deep | (a) Grassland.<br>(b) *Brachyachne convergens*, *Iseilema vaginiflorum* and *Eulalia fulva*. |

LAND SYSTEM PKL

Area/observations : 52 sq. km/4 observations

Location : Mallapunyah Plains, usually associated with TES.




GENERAL DESCRIPTION

Geology : Lower Cretacious sediments.

Lithology : Unconsolidated detritus.

Physiography : Undulating plains.

Soils : Lithosols and gravelly red earths.

Vegetation : *E. leucpholia* dominated woodlands.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 50 | (a) Crests, upper slopes<br>(b) 1.0 m relief<br>(c) 4-8% slope | (a) Lithosols<br>(b) Uc1.2<br>(b) Shallow | (a) Woodland.<br>(b) *E. leucophloia* and *E. terminalis* over *Plectrachne pungens* and *Eulalia fulva*. |
| 2 | 40 | (a) Plain<br>(b) 1-2m relief<br>(c) 1-2% slope | (a) Red massive earths and brown duplex soils<br>(b) Um 1.43, Db1.13<br>(c) Moderate | (a) Woodland with areas of Grassland.<br>(b) *E. leucophloia* over *Dichanthium fecundum* and areas of *Aristida inaequiglumis*. |
| 3 | 10 | (a) Depressions<br>(b) -<br>(c) - | (a) Grey cracking clays<br>(b) Ug5.22<br>(c) Moderate | (a) Grassland.<br>(b) *Dichanthium fecundum* dominates. |

LAND SYSTEM PTS

Area/observations : 211 sq. km/8 observations

Location : Plains on Top Springs limestones - southwest of Mallapunyah Homestead.

GENERAL DESCRIPTION

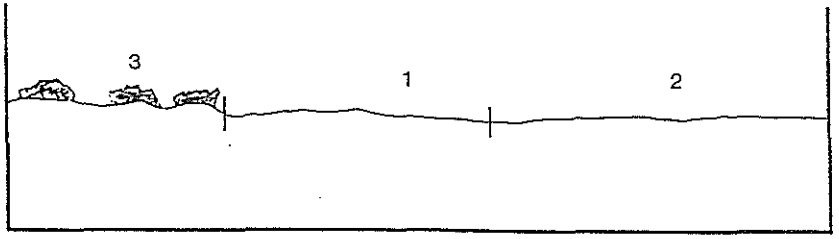
Geology : Palaeozoic - lower to middle Cambrian, Top Springs limestone.

Lithology : Massive limestone, chert limestones (sandstone interbedding sometimes).

Physiography : Undulating plains and rises.

Soils : Shallow to moderately deep red massive earths.

Vegetation : Woodland and low open woodland dominated by *E. terminalis*, *E. Pruinosa* and *E. leucophloia*.



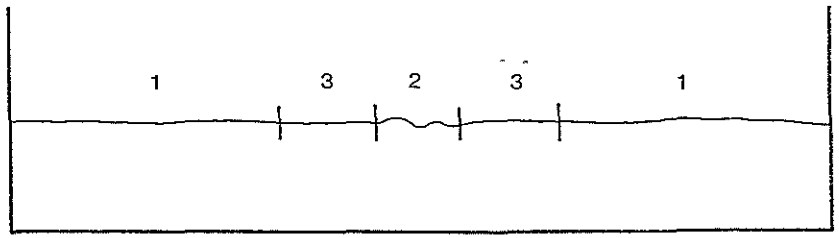

35

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 20 | (a) Undulating plains<br>(b) 2 m relief<br>(c) 2% slope | (a) Red massive earths (Top Springs)<br>(b) Gn 2.12<br>(c) Moderate | (a) Woodland.<br>(b) *E. terminalis* over *Dichanthium tenuiculum Chrysopogon latifolius* and *Schizachyrium fragile*. |
| 2 | 45 | (a) Undulating plains<br>(b) -<br>(c) 0-1% slope | (a) Red massive earths Brown duplex soils (Top Springs and Kilgour)<br>(b) Gn2.12.15, Ob1.13<br>(c) Moderate to deep | (a) Low Open Woodland with areas of Low Open<br>(b) Forest. (i) *E.pruinosa* over *Aristida inaequiglumis*. (ii) Clumps of *E. leucophloia* over *Aristida latifolius* and *Plectrachne pungens*. |
| 3 | 25 | (a) Rocky rises<br>(b) 4 m relief<br>(c) 0-10% slope<br>(d) 90% rock outcrop | (a) Red massive earths<br>(b) Gn2.12<br>(c) Shallow | (a) Woodland.<br>(b) *E. terminalis* over mixed perennial grasses. |

LAND SYSTEM PCC

Area/observations : 121 sq. km/4 observations

Location : Mallapunyah Plains - small occurrences elsewhere.




GENERAL DESCRIPTION

Geology : Cainozoic, unconsolidated material.

Lithology : Soil.

Physiography : Plains.

Soils : Grey cracking clays.

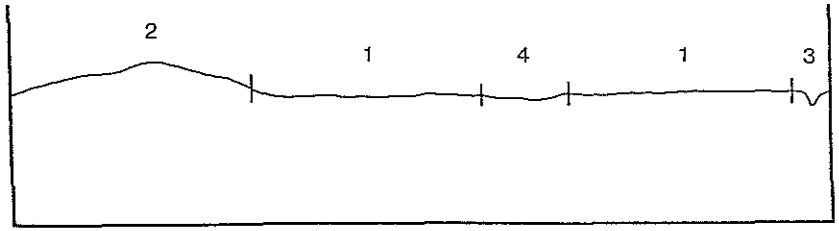
Vegetation : Perennial grassland, minor woodland and shrubland communities.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 70 | (a) Broad plains<br>(b) -<br>(c) 0% Slope | (a) Grey cracking clays<br>(b) Ug5.24<br>(c) Deep | (a) Grassland.<br>(b) *Sorghum plumosum*, *Astrebla squarrosa* and *Iseilema vaginiflorum* with emergent *Lysiphyllum cunninghamii*. |
| 2 | 10 | (a) Gravelly rises<br>(b) 1 m relief<br>(c) - | (a) Grey cracking clays with stone and gravel throughout<br>(b) Ug5<br>(c) Shallow | (a) Low Open Woodland.<br>(b) *E.pruinosa* and *Lysiphyllum cunninghamii* over *Eulalia fulva*. |
| 3 | 20 | (a) Plains<br>(b) <1m relief<br>(c) 0.5% Slope | (a) Brown duplex soils<br>(b) Db1.13<br>(c) Moderate | (a) Open Shrubland.<br>(b) *Acacia* sp. and *Lysiphyllum cunninghamii* over *Dichanthium fecundum* and *Aristida latifolia*. |

LAND SYSTEM PL

Area/observations : 125 sq. km/11 observations

Location : South east of Northern Undulating Plains.




GENERAL DESCRIPTION

Geology : Lower Proterozoic - Emmerugga, Liela and Toonganginie Dolomites.

Lithology : Dolomite, Dolomitic siltstones, shale.

Physiography : Flat to gently undulating plains (intergrades into Land System PTU).

Soils : Red massive earths.

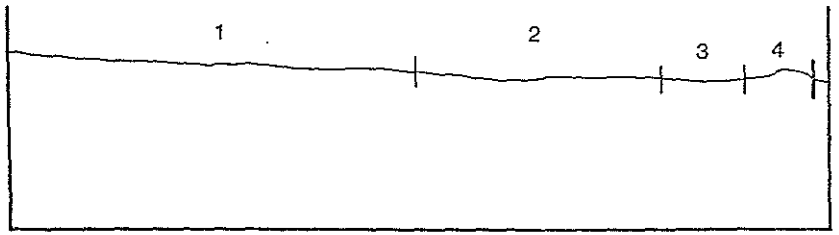
Vegetation : Predominantly *E. tectifica* dominated woodland communities.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 55 | (a) Gently undulating flats<br>(b) 1 m relief<br>(c) 0-2% slope | (a) Red massive earths (Amelia)<br>(b) Gn2.12<br>(c) Moderate to deep | (a) Woodland.<br>(b) Various sp. *E. tectifica*, *E. terminalis*, and *E. leucophloia* with minor occurrences of grassland (*Eulalia fulva*). |
| 2 | 30 | (a) Footslopes and rises<br>(b) 3 m relief<br>(c) 3% slope | (a) Lithosols and red massive earths<br>(b) Gn2.12<br>(c) Shallow to moderate | (a) Woodland to Open Woodland.<br>(b) *E. tectifica* and *E. terminalis* over mixed perennial grasses. |
| 3 | 5 | (a) Creek flats<br>(b) <1 m relief<br>(c) 0-3% slope | (a) Red massive earths (Amelia)<br>(b) Gn2.12<br>(c) Deep | (a) Tall Woodland.<br>(b) *E. papuana* over *Dichanthium fecundum* and *Sorghum plumosum*. |
| 4 | 10 | (a) Flats<br>(b) -<br>(c) 0% slope | (a) Grey cracking clays<br>(b) -<br>(c) Deep | (a) Grassland.<br>(b) Isolated *E. terminalis* over Digitaria sp. and *Eulalia fulva*. |

LAND SYSTEM PTU

Area/observations : 395 sq. km/7 observtions

Location : Central McArthur River Basin (East and north-east of McArthur River Homestead)




GENERAL DESCRIPTION

Geology : Cainozoic, unconsolidated suficial deposits.

Lithology : Soil, sand, detritus.

Physiography : Broad non depositional plains.

Soils : Yellow massive earths with duplex yellow and brown soils.

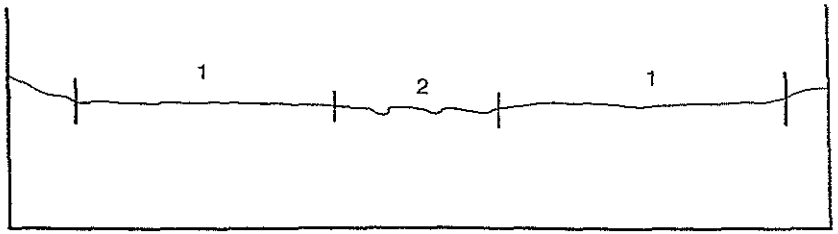
Vegetation : Eucalypt woodlands *E. tectifica*, *E. microtheca* and f2 papuanaflover perennial grasses.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 50 | (a) Plain<br>(b) <1 m relief<br>(c) 0-1.5% Slope | (a) Yellow and brown duplex soils<br>(b) Dy 5.53, Db1 13.22.23<br>(c) Deep | (a) Woodland to Low Woodland.<br>(b) *E. tectifica* over dense perennial grasses. |
| 2 | 30 | (a) Plain<br>(b) -<br>(c) 0-1% slope | (a) Yellow and red massive earths<br>(b) Gn2.21, Gn2.75<br>(c) Deep | (a) Open Woodland.<br>(b) *E. microtheca* and *Erythrophleum chlorostachys* over dense grasses. |
| 3 | 10 | (a) Plain<br>(b) <1m relief<br>(c) 0.1.5% Slope | (a) Cracking clays (Liela)<br>(b) Ug5<br>(c) Deep | (a) Low Open Woodland.<br>(b) *Lysiphyllum cunninghamii* over mixed perennial grasses. |
| 4 | 10 | (a) Alluvial plain<br>(b) -<br>(c) 0-2% slope | (a) Coarse textured alluvial soils<br>(b) Uc1<br>(c) Deep | (a) Woodland to Open Woodland.<br>(b) *E. microtheca*, *E. camalduldensis* and *E. papuana* over mixed perennial grasses. |

LAND SYSTEM FUC

Area/observations : 115 sq km/2 observations

Location : Upper catchment fluvial plains.




GENERAL DESCRIPTION

Geology : Cainozoic alluvium.

Lithology : Unconsolidated alluvium.

Physiography : Fluvial plains and channels.

Soils : Brown cracking clays.

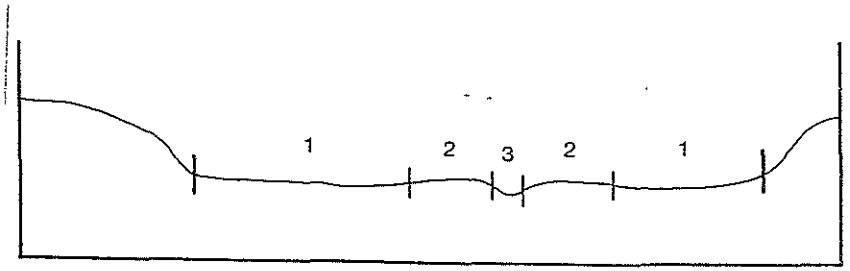
Vegetation : Perennial grasslands, minor woodland of *E. camauldulensis*.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 80 | (a) Flats<br>(b) Gilgai 7 m, 5cm high<br>(c) 1% slope | (a) Brown cracking clays (Liela)<br>(b) Ug.5.22<br>(c) Deep | (a) Sparse Shrubland.<br>(b) *Dicrostachys spicata* over *Eragrostis tenellula*, *Chrysopogon latifolius* and *Brachyachne convergens*. |
| 2 | 20 | (a) River channel and bank<br>(b) -<br>(c) - | (a) Grey and brown clays<br>(b) Ug 5.22<br>(c) Deep | (a) Woodland.<br>(b) *E. camaldulensis* over *Eragrostis tenellula*. |

LAND SYSTEM FL

Area/observations : 67 sq. km/4 observations

Location : River lands - upper tributary valleys - lower hill division.




GENERAL DESCRIPTION

Geology : Cainozoic unconsolidated sediments.

Lithology : Alluvium.

Physiography : Upper tributary river valleys, entrenched, single channel.

Soils : Alluvial and earthy sands.

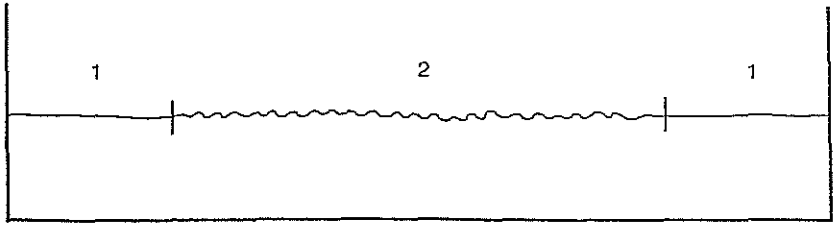
Vegetation : Perennial grassland with *E. papuana* woodlands.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 55 | (a) Flat<br>(b) -<br>(c) 1.5% slope | (a) Alluvial sands<br>(b) Uc1.23<br>(c) Deep | (a) Open Woodland and Grassland with emergent trees.<br>(b) *Aristida browniana*, *Setaria apiculata*, with emergent *E. latifolia* and Ironwood or with many small shrubs. |
| 2 | 40 | (a) Levee<br>(b) 2-3 m relief<br>(c) <1% slope | (a) Coarse and medium textured alluvial soils, earthy sands.<br>(b) Uc5.22, Um5.52<br>(c) Deep | (a) Woodland or Open Forest.<br>(b) *E. papuana* and *Lysiphyllum cunninghamii* over *Aristida browniana* and *Bothrochloa decipiens*. |
| 3 | 5 | (a) River channel<br>(b) 2-3 m relief<br>(c) - | | |

LAND SYSTEM PT

Area/observations : 31 sq. km/3 observations

Location : Central McArthur River Basin and Plains - East of McArthur River Homestead.




GENERAL DESCRIPTION

Geology : Cainozoic, Quaternary alluvium.

Lithology : Recent alluvium - clays.

Physiography : Depositional flood plains, very little drainage line dissection.

Soils : Grey cracking clays (gilgaied).

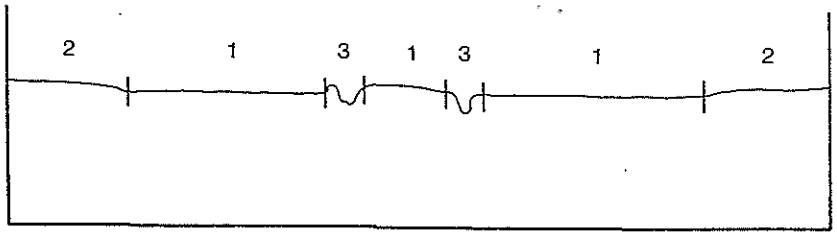
Vegetation : Eucalypt woodland and perennial grasslands.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 40 | (a) Flood Plain<br>(b) -<br>(c) 0-1% slope | (a) Brown cracking clays<br>(b) Ug5.24<br>(c) Deep | (a) Low Open Woodland.<br>(b) *E. microtheca* over *Brachyachne convergens*. |
| 2 | 60 | (a) Flood plain<br>(b) Gilgai (3 m x 50cm.)<br>(c) 0-1.5% slope | (a) Brown cracking clays<br>(b) Ug5.34<br>(c) Deep | (a) Grassland with fringing areas of Woodland to Open Woodland.<br>(b) *E. papuana* over *Chrysopogon fallax*. |

LAND SYSTEM FPB

Area/observations : 225 sq. km/6 observations

Location : Major river alluvials - Central McArthur River Plains.




GENERAL DESCRIPTION

Geology : Cainozoic - Quaternary alluvium.

Lithology : Alluvium.

Physiography : Major river alluvial floodplains, braided river channels.

Soils : Brown cracking clays and red duplex soils.

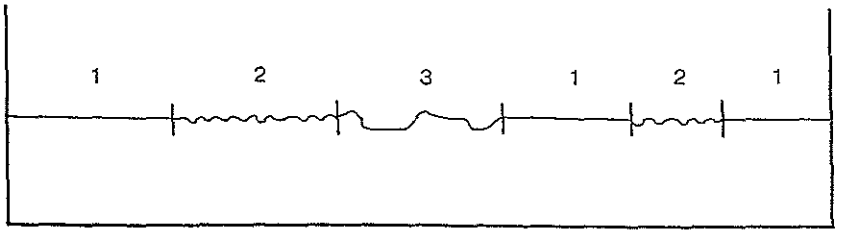
Vegetation : Low open woodland of *E. terminalis* and *Lysiphyllum cunninghamii*.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 50 | (a) Flood plain<br>(b) Occasional gilgai<br>(c) 0-2% Slope | (a) Brown cracking clays<br>(b) Ug5.34<br>(c) Deep | (a) Low Open Woodland.<br>(b) *Lysiphyllum cunninghamii* or *E. microtheca* over *Brachyachne convergens*. Minor areas of *E. papuana* Woodland. |
| 2 | 40 | (a) Raised plains beside Unit 1<br>(b) -<br>(c) to 4% slope | (a) Red massive earths<br>(b) Dr2.52<br>(c) Variable | (a) Low Open Woodland, occasional shrubland.<br>(b) *E. terminalis* over *Sehima nervosum*, with *Dicrostachys spicta* occasionally. |
| 3 | 10 | (a) Major river and flood Channel | (No site Data) | |

LAND SYSTEM PTD

Area/observations : 108 sq. km/3 observations

Location : Central, McArthur River Plain.




GENERAL DESCRIPTION

Geology : Cainozoic - Quaternary alluvium.

Lithology : Alluvial sediments.

Physiography : Tributary stream flood plains, intermittent stream channel.

Soils : Yellow duplex soils with grey cracking clays.

Vegetation : Mixed eucalypt and non-eucalypt woodland.

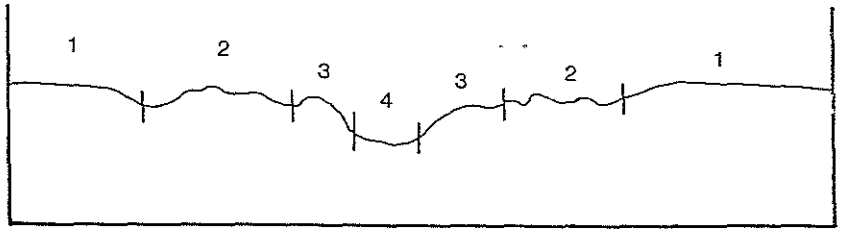
| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1* | 50 | (a) Plain<br>(b) -<br>(c) 0% slope | (a) Yellow duplex soils<br>(b) Dy3.41<br>(c) Deep | (a) Woodland.<br>(b) *E. terminalis* and *E. microtheca* over *Chrysopogon fallax* or *Melaleuca* sp. over moderately dense grasses. |
| 2 | 30 | (a) Broad depressions<br>(b) Gilgai<br>(c) <1.5% slope | (a) Grey cracking clay<br>(b) Ug5.24<br>(c) Deep | (a) Open Woodland to Woodland.<br>(b) *Lysiphyllum cunninghamii*. and *E. papuana* over *Chrysopogon latifolius*, *Erogrostis tenellula* and *Dichanthium fecundum* |
| 3 | 20 | (a) Tributary channels and billabongs | (a) Clays, alluvial soils | |

* From Scott and Speight (1966)

LAND SYSTEM FPD *

Area/Observations : 17 sq. km/0 observations*

Location : Central McArthur River Plains - East of survey area. Restricted in occurrence.




GENERAL DESCRIPTION

Geology : Cainozoic - Quaternary alluvim.

Lithology : Alluvial sediments.

Physiography : Dissected river margins.

Soils : Grey cracking clays.

Vegetation :

Drainage : Slow-very slow drainage.

| Unit | % | Landform | Soils | Vegetation |
|---|---|---|---|---|
| 1 | 50 | (a) Crests and slopes<br>(b) 3 m relief<br>(c) 2-5% slope | (a) Grey cracking clays<br>(b) Ug5.5<br>(c) Deep | -<br>-<br>- |
| 2 | 40 | (a) Dissected levee<br>(b) 3 m relief<br>(c) - | (a) Clays<br>(b) Ug5<br>(c) Deep | |
| 3 | 5 | (a) Levees<br>(b) 1 m relief<br>(c) 3 - 6% slope | (a) Siliceous sands<br>(b) Uc<br>(c) Deep | - |
| 4 | 5 | (a) Channel and channel wall. | (a) Alluvial soils | - |

* N.B. Not visited in the field; extracted from Scott and Speight (1966).

## 3.0 GEOMORPHOLOGY IN RELATION TO LAND SYSTEMS

The Upper McArthur River Catchment can be divided into nine (9) geomorphic divisions, each of which is different when geology, landform processes and topography are taken into consideration. This breakdown follows that outlined in Scott and Speight (1966) for the lower catchment although only two divisions are common to each survey area.

The nine divisions are presented below, and outlined in figure 4.1.

1. Tertiary Lateritic Surface (Barkly - Birdum Tableland).
2. Mallapunyah Plains (Top Springs erosional surface).
3. Abner Range.
4. Bukalara Plateau.
5. Batten Range.
6. Northern Undulating Hills.
7. Balbirini Hills.
8. Central McArthur Hills.
9. Central McArthur River Basin and Plains.

Each division usually will have a characteristic group of land systems although some common land systems will occur throughout. The relationship between land system and division is presented in figure 2.

### 1. Tertiary Lateritic Surface

The McArthur River catchment is bounded by the Barkly-Birdum Tableland in the south and west. This tableland is composed of Cretaceous sediments and is the remnant of a land surface thought to have extended throughout the region (Tertiary surface). This surface was extensively laterised in places before being dissected and eroded during the late Tertiary period (Christian et al. 1954). Scott and Speight (1966) have shown strong evidence of this continuous surface, based on a stratigraphic continuum of 'lateritized' surfaces found throughout the lower catchment. Where this is extrapolated through to the upper catchment it is possible to envisage a slightly anticlinal land surface from the coastal plain to the Barkly Tableland.

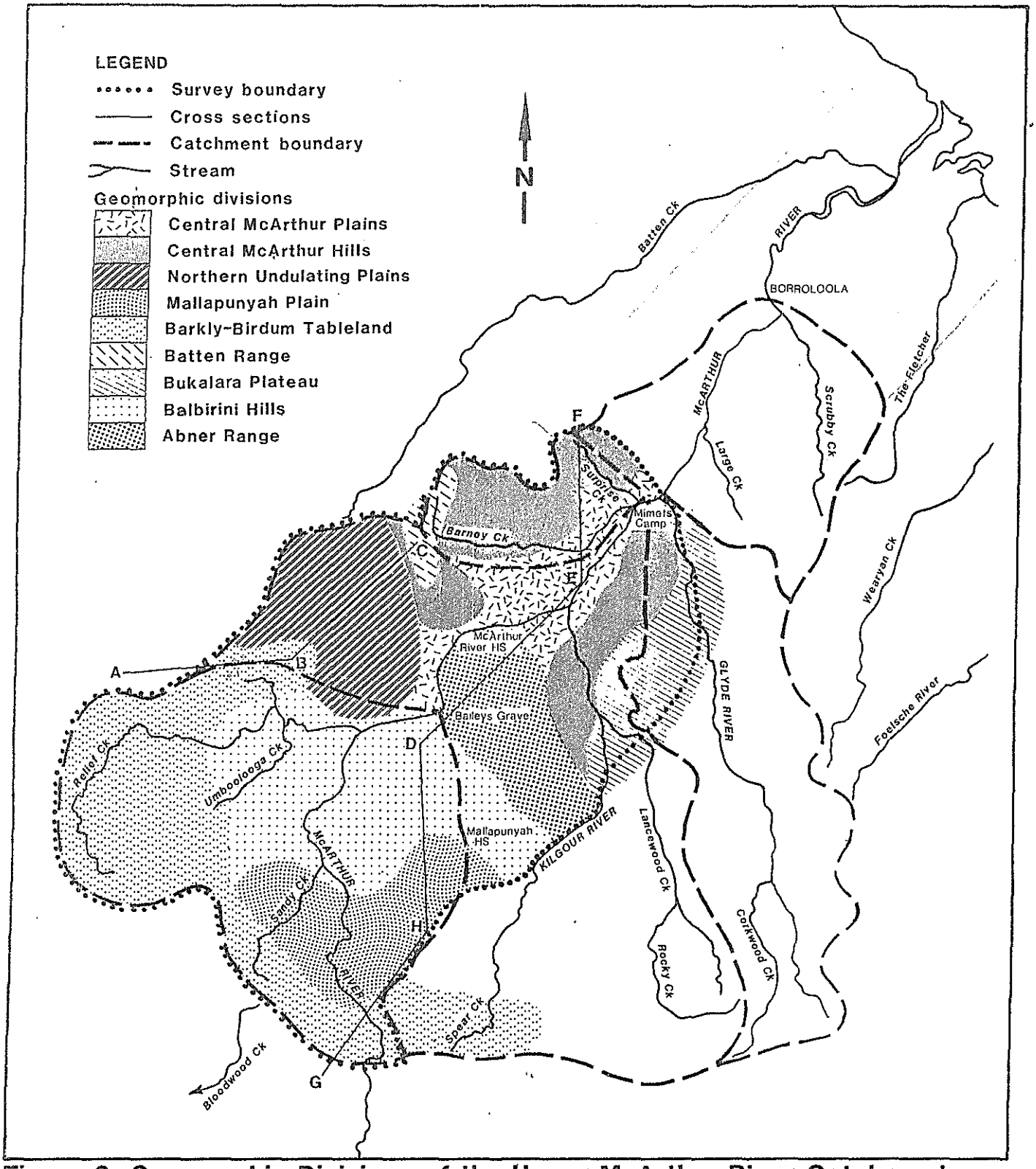



**Figure 2: Geomorphic Divisions of the Upper McArthur River Catchment.**

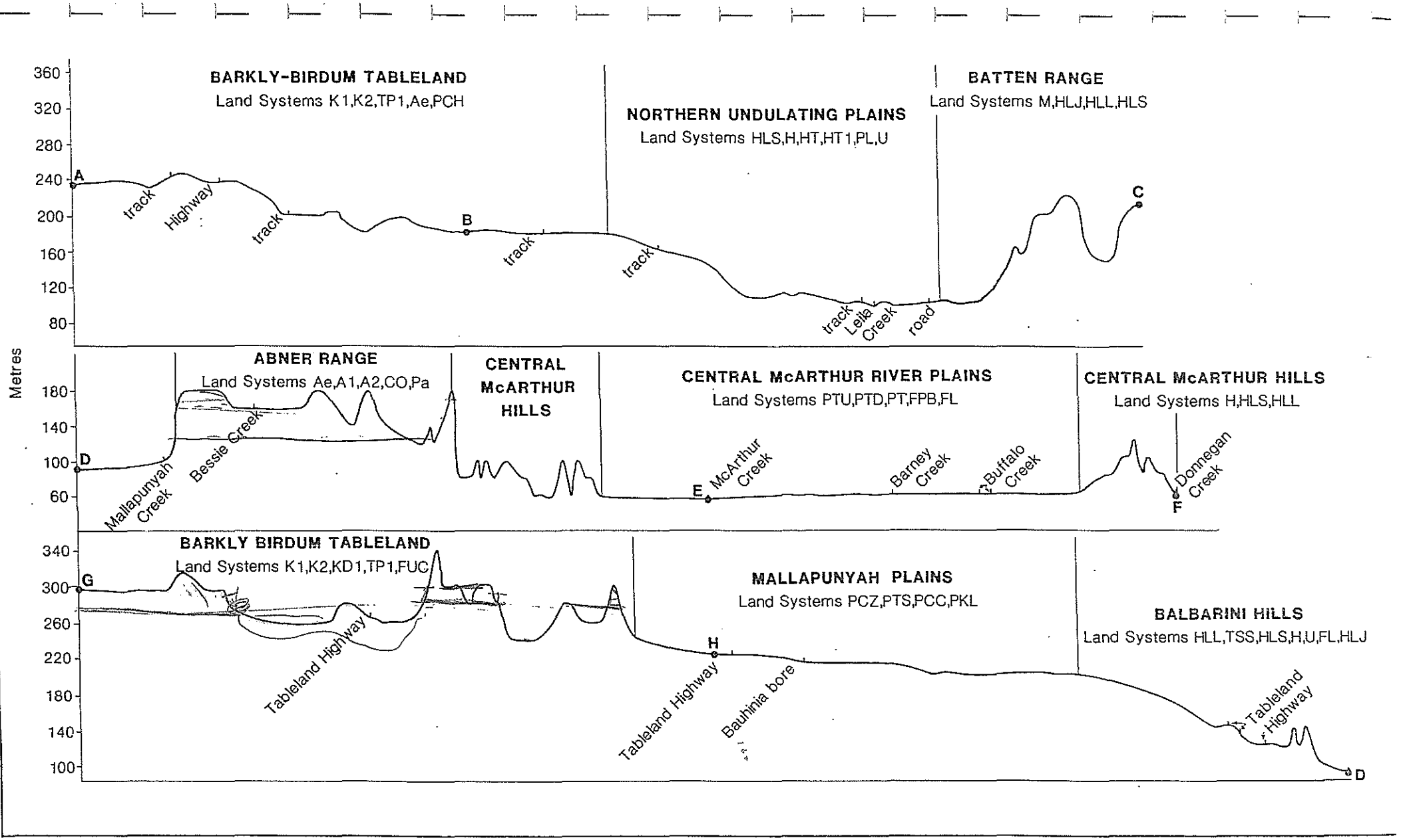



**Figure 3 : Schematic Cross-sections Showing Relationships Between Geomorphic Division and Land Systems.**

The lateritic surfaces ($K_1$ and $K_2$ land systems) are being eroded in the north and south by an actively retreating scarp, often crenulate ($KD_1$ land system). In areas were this active scarp is occurring, the scarp itself is usually the McArthur River catchment boundary with drainage off the tableland being to the south and west away from the survey area. In the central Toonganinie Creek area, erosion of the edge of the surface is less definitive because Proterozoic sandstone formations have formed an effective barrier to drainage incision. This restriction of drainage has resulted in the Cretaceous sediments being widely dissected into rugged hills and valleys ($KD_2$ land system), the relief of which is much less than that of the scarps in the northern and southern areas. Broad plains (TP land system) have formed in association with the undulating plateau surface ($K_2$ land system). Major drainage lines are usually braided and shallow (FUC land system) with alluvial deposition occurring where the sandstone formations ($A_1$, $A_e$, M land systems) have restricted drainage.

The drainage of Tooganginie Creek off the tertiary surface is superimposing itself through the sandstone hills and scarps. Erosional slopes below the hills and scarps, but still within the Cretaceous sediments, occur throughout the area (TES land system).

2. Mallapunyah Plains

The geomorphic unit described as the Mallapunyah Plains occurs in the south and south-west of the McArthur River Catchment and concurs with part of the Top Spring Erosion surface described by Plumb and Rhodes (1964).

The major area of the plains is formed on Cambrian, Top Springs limestones. Drainage of the limestone areas is dendritic, although not intense, and produces a landscape of undulating low hills and plains (PTS land system). Other areas of the plains, particularly in the south, are formed on remnant basement Cretaceous sediments overlying the Top Springs formation. These plains are flat to very gently undulating (PKL Land system) and often adjoin the lower erosional slopes off the Tertiary lateritic surface (TES land system). In places they are mantled by ferruginous detritus (PCZ land system), possibly from

the original laterised Tertiary surface.

Geologic erosion of the Mallapunyah plains appears to be checked by the temporary drainage base levels imposed by more resistant bands of Proterozoic sandstones at Weirk Spring on the McArthur River, Kilgour Gorge on the Kilgour River and George Springs on Tops Springs Creek. This has allowed deep clay formation on the limestone and the development of broad clay plains (PCC land system). Between the Tableland and Mallapunyah Plains is often an obvious scarp foot valley with depositional drainage areas being developed along the major streams (FUC land system).

3. Abner Range

The Abner Range or Plateau, similar to the Bukalara plateau, has been formed by the almost complete erosion of the Tertiary land surface and subsequent erosion of the surrounding less resistant lithologies. The range is composed of upper Proterozoic, Crawford, Abner, Corcoran and Bessie Springs sediments, overlain by Bukalara sandstones in a small area to the south. The Crawford and Abner formations are essentially horizontally bedded sediments and form the flat to undulating plateau surface that constitutes the majority of the range. The Corcoran and Bessie Springs sandstone formations are evident in the plateau surface as the gently dipping sides of a pound running almost the length of the range on the eastern side (Co land system).

Surface drainage of the flat to gently undulating plateau surface (PA and A2 land systems) is minimal with water apparently infiltrating through the weathered mantle of the Abner sandstones and reappearing in the permanent waterholes of the small creeks in the pound or in springs at the base of the range.

Where the overlying mantle has been removed or is thin, the strong retangular jointing pattern of the Abner Sandstones is obvious (A2 land system) and in places the surface has been dissected into isolated sandstone pillars, 15-20 metres tall.

The Abner Range is an area of strong structural relief in the McArthur River catchment, with the plateau edge being a sharply defined escarpment of up to 100 m relief (Ae land System).

4. Bukalara Plateau

The Bukalara Plateau, part of which occurs in the survey area, has formed when complete removal of the Tertiary surface has exposed the underlying lower Cambrian sandstones of the Bukalara formation. The plateau is large, and extends beyond the survey area to the east and south-east. The sediments are extensively jointed and subsequent stream dissection is intense, sometimes rectangular, producing rugged country of shallow to deep gorges, often linear, and rocky irregular plains (B land system).

The Glyde River, a major tributory of the McArthur River, is eroding through the plateau to form a spectacular gorge 60-70 meters deep in places, with large permanent waterholes throughout. Where stream dissection has not been active, plains on the plateau surface occur (BP land system). These plains are usually well drained internally although occasional shallow perched lakes were observed.

5. Batten Range

The Batten Range is an imposing mass of Lower Proterozoic sandstone occurring in the central north of the survey area. The range is composed of high, broad-crested ridges of Sly Creek and Masterton sandstones (M land system). These have high relief, particularly on the eastern edge of the range where the crests drop steeply 100-150 metres to the adjoining valley floors. Relief decreases westward where erosion of the less resistant Mulholland sandstones has produced an area of moderately sloping, broad crested hills (HLJ land system).

## 6. Northern Undulating Hills

This geomorphic division occurs north and south of the Carpentaria Highway, west of the Batten Range and is the area drained by Leila Creek and its tributaries. Other similar areas occur south of the McArthur River but they are not as distinctive. The landforms in this division are essentially undulating to rolling hills interspersed with flat to undulating plains.

Highest relief of 30-50 meters occurs in the division where Christmas, Little and Leila Creeks are eroding through the Billengarrah dolomitic sandstones and siltstones to produce steep, branching ridges (HLS land system) and rolling hills (H land system). The division is characterised, however, by terraced hills of the Lower Proterozoic Tooganginie formation (HT land system) with large areas of lower hills where this terracing is not obvious (HT1, land system). The terracing is reflecting the differential rates of weathering and erosion of the bedded dolomitic sediments.

Drainage throughout the division is dendritic but not intense and there is no major fluvial landform development occurring. Broad non-depositional plains have developed to the south of the division and along Leila Creek on Cainozoic sediments (PL land system). Undulating low rises occur in conjunction with these plains, often in conjunction with the Amelia dolomites (U land system).

## 7. Balbirini Hills

This division is an area of fall from the Mallapunyah Plains in the south, and the Barkly-Birdum Tableland in the west (Fig. 3). It is an area of high geological and landform diversity.

Relief in this division is relatively high in the west, where escarpments to the Barkly-Birdum Tableland are up to 50 m high. Relief decreases to the east and north-east.

The faulted and folded Proterozoic sandstones in the west of the area are being eroded by Tooganginie Creek and its tributaries to form

linear hills and valleys (HLL land system) and terraced sandstone hills and rises (TSS land system).

The less resistant dolomitic sediments in the division have been dissected into areas of steep, branching ridged hills (HLS land system), rolling hills (H land system) and large areas of terraced and non-terraced hills which characterise the Northern Hill division outlined previously (HT and HT1, land system).

Over most of the dolomitic sediments drainage is dendritic although the land can become deeply dissected in areas near the Barkly-Birdum Tableland to the north-west. Permanent waterholes occur throughout the division, but especially near the escarpment to the west where Toogganginie Creek and its tributaries have eroded deep gorges along faults in the underlying sediments.

River landforms are developing along the McArthur River which flows through the middle of the division. The stream channel has branched in places with obvious levee and clay plain development occurring near the Abner Range (FPB land system). River planation is equally evident along Mallapunyah and Dunganminnie Creeks which flow north along the base of the Abner Range. However, streams are incised, non-braided, and there is little flood plain development (FL land system).

## 8. Central McArthur Hills

This division essentially corresponds with the Hill Zone as outlined by Scott and Speight (1966), and occurs as the fringing hills of the flood plains of the McArthur River from the Abner Range to where the river crosses the Emu Fault. These hills are formed from moderately folded to flat Proterozoic sandstones and dolomitic rocks, and occur mainly as rolling hills on Amelia dolomites (H land system) or more dissected, branching ridged hills over the younger Lynott dolomites (HLS land system). Linear hills and crests occur where the underlying folding is obvious (HLL land system).

## 9. Central McArthur River Basin and Plains

This division includes the major plain associated with the McArthur River and its major tributaries. Six land types can be recognised, all of which are direct extrapolations from those outlined by Scott and Speight (1966).

The plains can be divided into broad, non-depositional, sheet flood plains formed on Cainozoic detritus, mantling Proterozoic dolomitic rocks (PTU land system), drainage areas within or associated with these plains (PTD land system), or alluvial back plains of the McArthur River (PT land system). The back plains of the McArthur River are extensively gilgaied and often small swampy depressions occur within the plain. The tributary flood plains and drainage areas (i.e. PTD land system) are usually characterised by many shallow, incised streams connecting billabongs and depressions. Gilgai occur on lower tributary plains.

The river lands are active, depositional landforms of Quaternary alluvia, associated with the major rivers and tributaries within the division. Maximum development of these landforms in the Upper McArthur River Basin occurs downstream of the Balbirini Homestead, where the McArthur River forms an extensive braided network of flood channels, clay plains and levees (FPB land system). Before the junction of the Glyde River at the eastern boundary of the survey area, the McArthur River reforms to become an entrenched channel with dissected margins and levees (FPD land System). Tributary streams of the McArthur and Kilgour Rivers, where they drain the Bukalara Plateau are usually single channelled, with narrow sandy levees and flood plains (FL land system).

# 4.0 SOILS

## 4.1 Previous Soil Investigations in the Catchment

Soils of the area were first described during a 1947-48 CSIRO survey (Christian et al. 1954). However, the scale of the survey precluded anything other than a synoptic assessment of the soils in the region.

Subsequently, more detailed soil descriptions of the lower catchment were conducted by CSIRO (Scott and Speight 1966) as part of a Land System study conducted at the request of Mount Isa Mines. Morphological descriptions of soil families were outlined, however, no chemical or physical details were provided. As part of the Environmental Baseline Report for a proposed mine in the catchment (Dames and Moore 1978), representative soils in the area were also identified, described and analysed.

These descriptions and analyses have been used in the outline of the Soil Profile classes presented in the following sections.

## 4.2 Data Collection

Soils were described at 182 sites from material obtained using a 100 mm diameter soil auger to a depth of 150 cm where possible. The criteria and terms used to describe profile morphology are those of the Australian Soil and Land Survey Handbook (McDonald et al. 1984). Munsell colours were obtained from a moist soil sample.

Some representative soil profiles were sampled for particle size and chemical analysis. Data obtained from these analyses are presented in Appendix (III).

## 4.3 Soil Classification

Soils of the Upper McArthur River Basin were classified on the basis of information obtained from the 182 described profiles. They have been classified into 19 profile classes. These 19 profile classes have subsequently been grouped into 11 groups for ease of presentation at

this scale. A summary of the classification of soils is presented in table 3. Where the profile classes fit the description outlined by previous authors, they have been allocated similar names. Otherwise they have been allocated local names where applicable.

## 4.4 Soil Descriptions and Characterisation

The following section outlines the main profile classes of soils, gives general information on their occurrence, and where data is available, gives an outline of their chemical and physical properties. Table 4 summarises the soil occurrence in land systems.

### 4.4.1 Lithosols

Lithosols are by far the most common soils in the catchment, being dominant in 14 of the 37 land systems, and co-dominant in a further 6. In general these are shallow (less than 30 cm) rocky soils, with uniform textured profiles and particle size distributions being strongly related to parent lithology.

(i) Lithosols formed from sandstone usually are coarse textured, pale and are associated with shallow siliceous sands. These soils are acid throughout and are usually associated with spinifex (*Plectrachne pungens*). Where the sandstones have been laterised, e.g. K1 and K2 land systems, large quantities of ferruginous nodules are often present.

(ii) Lithosols formed on dolomitic rocks tend to have finer textures, are less acid and are not so distinctly associated with the presence of spinifex. In some areas these soils could almost be classified as shallow calcareous earths.

(iii) Lithosols formed on clayey sandstones and siltstones (e.g. in TES and KD land systems) have medium to fine textures and often intergrade to shallow brown clays on the lower slopes.

TABLE 3 SUMMARY OF CHARACTERISTICS OF THE SOIL PROFILE CLASSES

| SOIL PROFILE GROUPS | SUMMARY DESCRIPTION | GREAT SOIL GROUP (Stace *et al*, 1968) | PRINCIPAL PROFILE FORM (Northcote, 1979) | REP. SITE(S) * |
|---|---|---|---|---|
| 1. LITHOSOLS | Shallow, skeletal soils on various lithologies throughout the catchment. | Lithosols | Uc, Um, Uf | - |
| 2. ALLUVIAL SOILS | | | | |
| - Sandy alluvial soil | Upper tributory alluvial soils, parent material coarse-grained sandstones. | Alluvial Soils | Uc1.23 | 5, 41, 42, 43 |
| - Loamy alluvial soil | Major river alluvials, deep levee soil loam to clay loam throughout. Calcareous parent materials. | Alluvial Soils | Um5.52 | 161, (Scott & Speight, 1966) |
| - Clayey alluvial soil | Shallow, layered clays of the lower river flats and margins of swamps and lagoons. | Alluvial Soils | Uf | (Scott & Speight, 1966) |
| 3. SILICEOUS SANDS | | | | |
| - 'PELLEW' sands | Shallow to moderately deep sands forming on sandstones, acid reaction throughout. | Siliceous Sands | Uc1.1, .22 .23 | 2, 3, 4, 19 |
| - 'TANARILLA' sands | Shallow to moderately deep sands, Fe gravels throughout, acid reaction trend, forming on laterised sediments and colluvium. | Siliceous Sands | Uc4.11, 5.11, .12, .32 | 1, 112, 82, 83, 143 17, 21, 141, 142 |
| 4. EARTHY SANDS | | | | |
| - 'MANBULLOO' sands | Deep, loamy sands, forming on levees and alluvial terraces, reddish brown to yellowish red. | Earthy Sands | Uc5.22 | 7 |
| 5. NON-CRACKING CLAYS | | | | |
| - 'FEATHERTOP'clays | Shallow, brown clays, acid reaction trend, Fe stone and gravel mantle and throughout. Observed on slopes on fine-grained Cretaceous sediments. | Brown Clays | Uf1.43, 6.71 | 88 |

| | | | | |
|---|---|---|---|---|
| 6. CRACKING BROWN CLAYS<br>- 'LIELA' clays | Deep, brown clays, alkaline reaction trends, sodic and saline with depth. Strongly gilgaied. Forming from alluvia. | Brown Clays | Ug5.24, .34<br>Dy2.13 | 57, 58, 61, 61A,<br>40, 118 |
| 7. CRACKING GREY CLAYS<br>- 'BARKLY' clays | Deep, grey to grey brown self-mulching clays, alkaline reaction trend. Formed on limestone plains in the upper catchment. | Grey Clays | Ug5.11, .28 | 109, 153, (60),<br>81, 100,150,139 |
| 8. RED MASSIVE EARTHS<br>- 'MINNGARDA" red earths | Shallow to moderately, deep, moderate % of Fe gravels throughout. Neutral to slightly acid. Forming on laterised sediments, or detrital deposits. | Red Earths | Gn2.12,<br>Um1, 43 | 65, 99 |
| - 'TOP SPRINGS' red earths | Shallow to moderately deep on limestones and dolomitic rocks. Sandy loam to light sandy clay loam surface textures. Usually gradational textures although can be duplex on lower slope situations. | Red Earths | Gn2.12, .13, .15<br>Dr2.51, 52 | 105, 159, 177, 46, 23, 35<br>104, 151, 152, 128, 110. |
| - 'AMELIA' red earths | Deep red earths formed on dolomite. High proportions of fine sand throughout and strong soil consistencies. Surface textures of sandy clay, loam to fine sandy clay loam. | Red Earths | Gn2.12 | 68, 67, 136, 69 |
| - 'LYNOTT' red earths | Deep red earths forming on layered alluvial deposits. Very strong consistencies and high proportion of fine sand throughout. | Red Earths | Dr2.12, .82 | 59,43 |
| 9. YELLOW MASSIVE EARTHS<br>- 'BOSTOCK' yellow earths | Gravelly yellow earths forming from lateritic Cretaceous sediments, moderate % of Fe gravels throughout, often mottled. The yellow equivalent of Minngarda. | Yellow Earths | Gn2.82, .25,<br>.65, .68 | 146, 115, 116,<br>84, 120, 49 |
| - 'ELLIOT' yellow earths | Yellow earth formed from colluvium, occurring in the lower catchment. | Yellow Earths | Gn2.21 | (Dames & Moore 1978) |

| | | | | |
|---|---|---|---|---|
| 10. BROWN DUPLEX SOILS<br>- 'KILGOUR' soils | Deep, brown, texture contrast soils, alkaline reaction trend. Strongly structured sodic subsoils. | Red Brown Earths | Db1.13, .22, .23 | 66, 108, 39, 179, 18, 48, 112, 177, 103, 77 |
| 11. YELLOW DUPLEX SOILS<br>- 'MIRANDA' soils | Deep, duplex soils forming on plains in the lower catchment. Strongly structured subsoils, A2 horizons present, alkaline reaction trend. | Solodic (Solodized Solonetz) | Dy2.73 | Scott & Speight (1966) 171, |
| - 'BATTEN' soils | Deep, duplex soil forming on plains in lower catchment. Strongly structured, neutral to acid reaction trend. | Yellow Podzolics | Dy2.72, 3.32 | 79, 176, 138 |

* These are sites considered are to be representative of the Soil Profile Classes. Analytical data for some is presented in the Appendix. Where profile classes are included from other studies the source is noted.

TABLE 4 DISTRIBUTION OF SOILS IN LAND SYSTEMS

| | SOIL GROUP | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| LAND SYSTEM | Lithosols | Alluvial Soils | Siliceous Sands | Earthy Sands | Non-Cracking Clays | Cracking Brown Clays | Cracking Grey Clays | Red Massive Earths | Yellow Massive Earths | Brown Duplex Soils | Yellow Duplex Soils |
| High Plateau Surface | | | | | | | | | | | |
| B | D | | | | | | | | | | |
| A1 | | | D | | | | | | | | |
| A2 | d | | d | | | | | | | | |
| Co | m | | d | | | | | m | | | |
| Escarpments | | | | | | | | | | | |
| Ae | D | | | | | | | | | | |
| KD1 | D | | | | | | | | | | |
| KD2 | D | | | | | | | | | | |
| Hills and Low Rises | | | | | | | | | | | |
| M | D | | | | | | | | | | |
| HLJ | D | | | | | | | | | | |
| HLS | D | | | | | | | | | | |
| HLL | D | | | | | | | | m | | |
| H | D | | m | | | | | | | | |
| HT | D | | | | | m | | | | | |
| HT1 | D | | | | | | | | | | m |
| U | d | | | | | d | | | | | |
| UL | d | | | | | d | | | | | |
| TSS | | | D | | | | | | | | |
| Erosional Slopes | | | | | | | | | | | |
| TES | d | | | | | m | | m | | m | m |
| Non Depositional Plains | | | | | | | | | | | |
| K1 | d | | d | | | | | | m | | |
| K2 | D | | m | | | | | | | | |
| PA (No Data) | | | | | | | | | | | |
| BP | D | | d | | | | | | | | |
| TP1 | | | | | | | | | D | | |
| PCH | | | D | | | | | | m | | |
| PCZ | m | | | | | | m | | d | | |
| PKL | d | | | | | | m | d | | | |
| PTS | | | | | | | | D | | | |
| PCC | | | | | | | D | | | m | |
| PL | | | | | | | m | D | | | |
| PTU | | m | | | | | m | m | m | d | d |
| Depositional Plains and River Lands | | | | | | | | | | | |
| TP2 | | | | | | | m | | d | | |
| PTD | | m | | | | | | | | d | |
| PT | | | | | | d | d | | | | |
| FUC | | | | | | | D | | | | |
| FL | | m | D | m | | | | | | | |
| FPB | | m | | | | d | | m | | | |
| FPD | | m | | | | | m | | | | d |

### 4.4.2 Alluvial Soils

These soils have formed from flooding of the major watercourses and minor occurrences were observed throughout the catchment. However, significant areas occur within the levees and flood plains of the major streams (land systems PTU, PTD and FL). Where the source material is sandstones, e.g. the Kilgour and Glyde Rivers, then the resultant alluvials are coarse-textured (Uc-soils). The soils of the Upper McArthur River west of the Abner Ranges tend to have loam textures throughout, no doubt reflecting the finer nature of the dolomitic parent materials. The drainage floors of Liela, Barney and Buffalo Creeks tend to have minor areas of clayey alluvial soils where flooding is frequent.

One profile of a loamy, alluvial soil from land system FL was submitted for mechanical and chemical analysis and the results are presented in Appendix III. The soil is massive and earthy throughout, with an alkaline reaction trend. The analysis shows low amounts of soluble salts. The soil is almost totally base saturated (i.e. very weakly leached). Total N, extractable P and K, whilst not high, are significantly higher than for other soils in the area.

These soils would be equivalent to the loamy, alluvial soil described by Scott and Speight (1966).

### 4.4.3 Siliceous Sands

(i) Pellew Sands (Scott and Speight, 1966)
(Uc1.1,1.23)
Pellew Sands are associated with coarse-textured lithosols and also with spinifex (*Plectrachne pungens*). Soil colours are brown to yellowish brown. Profiles show little differentiation and are acid throughout. Textures are sands to loamy sands throughout, with massive structures and weak to moderately weak consistence. They occur on the sandstone land systems of B and BP dominantly, although can occur throughout the catchment. The soils are well drained.

(ii) Tanarilla Sands (Scott and Speight, 1966)
(Uc4.11, Uc5.11, Uc5.32, Uc1.14)

Tanarilla sands are shallow to moderately deep sands forming from ferruginous sandstones and lateritic material, and as such can be characterised by the presence of ferruginous gravels throughout the profile. The soils are neutral to acid throughout and usually the profile shows some degree of profile differentiation. Textures are usually finer than Pellew, being commonly clayey sand to light sandy clay loam. These soils intergrade to lithosols and gravelly earths of the Bostock and Minngarda classes. They occur on the land systems comprising the high plateau surfaces (the weathered tertiary lateritic surfaces and their remnants).

Soil colours range from brown to dark brown and, less commonly yellowish red on the surface to yellowish brown, brown or red in the subsoil. Three series can be identified based on drainage, depth and colour of the B horizon. These three are associated with particular vegetation communities.

*Acacia shirleyi* communities occur on the shallow, excessively well drained redder soils; Eucalypt woodlands occur on the well drained brown to yellowish brown soils; and areas of slow to very slow drainage usually are characterised by Melaleuca and Grevillea species.

### 4.4.4 Earthy Sands

Manbulloo Sands (Scott and and Speight, 1966; Stewart, 1955)
(Uc5.22)

Earthy sands occur primarily along the levees and alluvial terraces of the major tributaries of the McArthur River, but specifically in land system FL. Only one profile was examined during this investigation, however, they are equivalent to the Manbulloo soils outlined by Scott and Speight. They obviously achieve greater significance in the lower catchment.

These soils are deep, uniform, loamy sands with reddish brown surfaces grading into yellowish red subsoils. They are massive with an earthy fabric. Internal drainage is rapid. Soil reaction is neutral throughout.

### 4.4.5 Non-Cracking Clays

These soils are uniform, fine textured clays which do not show evidence of significant seasonal cracking (Northcote 1979).

Feathertop Clays (Scott and Speight, 1966)
(Uf6.71)
Shallow, brown clays forming on weathered Cretaceous sediments in the upper catchment erosion slopes (land system TES). They are often intergrading with lithosols and usually have a ferruginous gravel mantle with gravel and stone throughout. Colours are brown to dark brown on the surface grading to dark yellowish brown after 10 cm. Textures are light to medium clays and the surface at one site was self-mulching. The soils are slightly acid throughout.

### 4.4.6. Brown Cracking Clays

Liela Clays
(Ug5.24)
These soils occur throughout the catchment on the clay plains and alluvial drainage floors (land systems FPB, TP). They are uniform textured brown clays with surface textures of light to medium clay and subsurfaces of medium clay. Colours range from dark brown to dark greyish brown on the surface and are commonly brown, strong brown or dark yellowish brown in the subsoil. The profile is structured with predominantly angular blocky peds with smooth ped fabric. Strong gilgai was observed (up to 50 cm in depth and 3 m in diameter). Characteristically these soils crack deeply upon drying. The soils examined have an alkaline reaction trend.

Chemical results indicate that these soils have high levels of soluble salts and could be considered saline at depth. This

concurs with other analyses from a brown cracking clay in the area (Dames and Moore, 1978). The soil has a high cation exchange capacity and the exchange complex is shared equally by calcium and magnesium in the surface with magnesium becoming dominant after 60 cm. The lower than expected values of C.E.C. (from the addition of exch. cations) indicate that the soil contains a high level of insoluble salts. Sodium is very high in the subsoil and would indicate the possibility of the subsoil being prone to dispersion. Negligible quantities of extractable phosphorous or sulphur were present in the soil.

Clay mineralogical examination from one profile shows a slight dominance of Smectite over Kaolinite (44% compared with 35% profile average) with low proportions of Illite and Goethite (12% compared with 8%).

### 4.4.7. Grey Cracking Clays

Barkly Clays
(Ug5.11,.28)

These soils are moderately deep to deep, uniform textured clays which exhibit significant seasonal cracking. Colours range from very dark grey to very dark greyish brown on the surface, to dark greyish brown or dark grey in the subsoil. Mottling can occur in the subsoil. The soils have an alkaline reaction trend often with carbonate accumulations. Surfaces can either be massive and earthy or more often structured and strongly self-mulching while the subsoils show strong angular blocky structure with smooth ped fabrics. Gilgai are common where drainage is very poor. Large areas of these clays are forming under sedentary conditions in land systems PTS, PCC and PKL.

Chemically, the grey cracking clays appear similar to the brown cracking clays, however, they contain only medium quantities of soluble salts as indicated by electrical conductivity. The possibility of significant quantities of insoluble salts (possibly calcium and magnesium sulphates) are indicated by the C.E.C. values being less than the sum of cations. Calcium is the dominant exchangable cation. Some soils would be classed as

sodic, (Northcote and Scene 1972) and tunnel erosion was observed along drainage flats in land system PTS. The soils are low in both nitrogen and phosphorous with negligible amounts of extractable sulphur.

Clay mineral analysis indicates a dominance of Smectites as one would expect from a cracking clay soil.

4.4.8. Red Massive Earths

These soils are gradational textured soils, generally massive and porous throughout, with red coloured subsoil. Four groups were observed in the catchment and these can be separated on the basis of depth and parent material. Moderately deep to deep red earths occur over large areas only in land systems PL, PKL and PTS. In other systems red massive earths are usually shallow.

(i) Minngarda Red Earths
(Um1.43; Gn2.12)
These soils are shallow to moderately deep red earths with ferruginous gravel throughout, formed on detrital material from the Tertiary lateritic surface (land system PKL). The soils have hard-setting surfaces of dusky red or dark reddish brown clay loam or light sandy clay loam grading into dark red sandy clay loam to clay loam. Up to 30% ferruginous gravels were observed in the subsoil and reaction trends were neutral to slightly acid throughout.

(ii) Top Springs Red Earths
(Gn2.12, .13, .15; Dr2.51,. 52)
Top Spring soils are shallow to moderately deep red earths forming on limestones and dolomites. They occur throughout the catchment in land systems H, U, UL, PTS, and HT.

Surfaces are hard setting, dark reddish brown, light sandy loams to light sandy clay loams which grade into dark reddish brown to dark red, light clays with depth.

Soil reaction trends are neutral to acid. One profile analysis indicated very low soluble salts, low cation exchange capacities and calcium as the dominant base. Negligible amounts of extractable phosphorous and sulphur were recorded for this soil.

(iii) Amelia Red Earths
(Gn2.12)

These soils are deep red earths formed from dolomite, and are restricted to land system PL and U. Surfaces are hard setting, dark reddish brown, sandy clay loam to fine sandy clay loam which grades into red, yellowish red or dark reddish brown subsoil of light to medium clay. Fine sand is dominant throughout, with fine to coarse sand ratios of 3:1 and up to 6:1 recorded. This high fine sand content may be influencing the soil consistence which is either moderately strong or very strong throughout. These soils are similar chemically to the other red earths, and although significant quantities of extractable phosphorous were recorded in the surface, the value is still low.

(iv) Lynott Red Earths
(Dr2.12)

These soils are restricted in occurrence to the alluvial plains of system FPB. They occur on terraces above the cracking clay plains, and would be flooded only rarely. Dark reddish brown loam surface horizons overlie yellowish red light medium clay subsoils. An obvious clay bulge was evident from particle size analysis. The position in the landscape of the soil would suggest layering rather than clay translocation. The soils are massive with earthy fabrics throughout. Chemical analysis of a representative profile indicated very low concentrations of soluble salts with a moderate cation exchange capacity dominated by calcium. Extractable phoshorous and sulphur were negligible. Very strong consistence throughout and strongly hardsetting surfaces were evident.

4.4.9. Yellow Massive Earths

Two groups of yellow earths were recorded and they can be separated primarily on the basis of parent material, the amount of ferruginous gravels throughout the profile and subsurface colour.

(i) Bostock Yellow Earths
(Gn 2.22, .25, .65, .68)
Bostock yellow earths were observed mainly in land systems derived from the Tertiary lateritic surface or its erosion products, i.e. systems K1, TP, PCZ, and TP. Soil surfaces are hard-setting, dark yellowish or greyish brown and have textures of sandy loam to sandy clay loam. Sub-surfaces are yellowish brown, often mottled with high percentages of ferruginous gravels ( 40%). Soil reaction trends are acid. Two profiles were submitted for analysis and the results indicate very low soluble salts, generally low exchange capacities and negligible phosphorous and sulphur. Clay mineral analysis shows a dominance of Kaolinite (55-65%) and Goethite (15-20%) as would be expected for material derived from deeply weathered and leached sediments of the laterised surface. Illite and Smectite were found in similar amounts (10-15%). These soils intergrade with the 'Tanarilla' sands and lithosols of lateritic areas.

(ii) Elliot Yellow Earths (Scott and Speight, 1966)
(Gn 2.21)
These soils were recorded during an environmental study in the lower catchment in colluvial and depositional areas (Dames & Moore 1978). They occur in land system PTU and are associated with the yellow duplex soils probably intergrading with them. Their extent within the survey area is unknown and their description is taken from Dames and Moore (1978).

Surface colours are dark yellowish or greyish brown and sub-surface colours are yellow. Textures grade from loam on the surface to clay loam with depth.

4.4.10 Brown Duplex Soil

Kilgour Soil

(Db 1.13, .22, .23)

These texture contrast soils are moderately deep to deep, with alkaline structured subsoils and an alkaline reaction trend. A horizons are reddish brown to dark greyish brown and overlie brown to yellowish brown subsoils. These soils were recorded on the undulating plains of systems PTU, U, and PTS, and the lower slopes of TES.

B horizons are strongly structured with angular blocky or prismatic peds and smooth ped fabrics. Carbonate accumulations were present in the subsoil. Textures range from loams on the surface to light medium clays at depth. Three profiles were submitted for chemical analysis. Results show the soils contain very low soluble salts, and have low surface cation exchange capacities. They exhibit very low organic carbon and nitrogen values and negligible quantities of phosphorous and sulphur.

4.4.11 Yellow Duplex Soils

These soils are characterised by their abrupt increase in clay content with depth, brown to yellowish brown colours and the development of $A_2$ horizons. They have been divided into subgroups based on reaction trend.

(i) Miranda Soils (Scott and Speight, 1966)

(Dy 2.73)

These soils occur on the plains of land systems PTU and PTD. A1 horizons are dark brown to dark greyish brown and overlie obvious lighter $A_2$ horizons. Surface textures are loam fine sandy. B horizons were observed to have columnar structure by Scott and Speight (1966), although the strong B horizon consistence made observations of structure by auger during this survey difficult. Reaction trends are strongly alkaline. Subsoil textures are medium to heavy clay.

(ii) Batten Soils (Scott and Speight, 1966)
(Dy 2.72, 3.31, .41)

These soils were also described by Dames and Moore (1978), and occur on the plains of land system PTU. The main feature of contrast with the above group is the acid to neutral soil reaction trend. Colours are similar and the surfaces are pulverilent. Soil structure is angular blocky with smooth ped fabric. Cation exchange capacities are very low with sodium being the dominant cation. These soils would have subsoils very prone to dispersion. Very low values for all other nutrients were recorded.

# 5.0 VEGETATION

## 5.1 Introduction

Vegetation community descriptions for the study area have been very limited in the past. As with land systems and soils, the report on the Lands of the Barkly Region (Christian et al. 1954) provides only very broad descriptions of the vegetation. The work of Scott and Speight (1966), whilst being more detailed, concentrates on the lower McArthur River Catchment and hence has a limited degree of overlap with this study area, although some communities, e.g. on flood plains, are very similar. This work, then, can be regarded as a first approximation of the botanical ecology of the area and may be subject to some change as more detailed local knowledge becomes available.

The botanical ecology of the Upper McArthur River Catchment has proved to be quite complex. In all, thirty-nine (39) different communities have been recognised which is quite a high number for an area of this size in the Northern Territory's Top End. The species diversity however, is not great. Katherine Gorge National Park (180,000ha) has 460 species recorded, Keep River National Park (26,200ha) has 300 (Sivertsen and Day, in prep), whilst the current survey area (383,000 ha) has only 300 species so far recorded.

The observed diversity in community types seems to be due to two main factors, namely the great diversity in geology and landform. The distribution of some species and their associated communities is controlled by the geology, whilst for others the controlling factor appears to be the landform and associated soil types. For example *Acacia shirleyi* and *Eucalyptus normantonensis* are confined to the Cretaceous Sediments where they become exposed i.e. on escarpments and breakaways. By contrast, the array of *Eucalyptus leucophloia* dominated communities are found on many lithologies yet are confined to the lithosols and very shallow soils of the hillslopes and denudational plateau surface.

Changes to community structure and species composition also occur in response to such edaphic factors as depth, texture and moisture. Such

relationships are very complex and have not been considered fully in this report.

## 5.2 Vegetation Classification

The structural classification of the vegetation is based on a classification by Specht (1970), a prerequisite of which is that at each site is recorded:

(i) the life form and height of the tallest stratum; and

(ii) the species composition of that stratum together with notes on distribution and characteristics of trees, shrubs, grasses and herbs.

## 5.3 Community Descriptions

The following descriptions have been grouped as communities under their dominant species and briefly summarised (Table 5). Only the dominant trees and grasses have been presented. The shrub layers usually being scattered and inconsistant, are only included when characteristic of a community or where they form the upper stratum. Each stratum is divided by an oblique '/' and minor, but characteristic species follow the main species in brackets.

The community groups have been arranged in a more or less stratigraphic sequence distinguishing those occurring on the Barkly-Bridum Tablelands from those occurring on the alluvial plains and riverlands of the McArthur River. However, it has not been possible to adhere strictly to this sequence since many communities are represented in a number of geomorphic zones.

TABLE 5 VEGETATION COMMUNITIES AND COMMUNITY COMPLEXES OF THE SURVEY AREA

| NO. | DOMINANT SPECIES (TREES AND GRASSES) | STRUCTURAL FORMATION (S) | ASSOCIATED LANDFORMS AND SOILS | OCCURRENCE BY LAND SYSTEM* |
|---|---|---|---|---|
| 1. | *Acacia shirleyi*/minor sparse grasses | Open Forest | Breakaways and lateritic benches of the undulating low hills, rises and low rugged hills of the Barkly-Birdum Tableland Soils - lithosols. | K++++, KD1 ++. |
| 2. | *E. pruinosa* (Ironwood, *Grevillea striata*) *Sehima nervosum*, *Chrysopogon fallax*, *Heteropogon contortus*, *Themeda australis* | Low Open Woodland and Low Woodland | Denudational plains and hillslopes occurring in most of the geomorphic groups except for the Bukalar Range and the McArthur River plains and riverlands. Soils are variable with a predominance of shallow earths and clays. | K1++, TP+++, KD1++, TES++++ PCZ++++, Co++, HLS++,PTS+++ PCC++ |
| 3. | *E. leucophloia (E. pruinosa, E. tectifica, E. grandifolia, E. terminalis)/Plectrachne pungens (Eulalia fulva, Chrysopogon fallax, Dichanthium fecundum, Aristida* spp.) | Low Open Woodland, Open Woodland and Woodland (Low Woodland and Low Open Forest) | Hillcrests and gravelly slopes mainly associated with systems on the Abner and Batten Ranges and with the Central McArthur and Bulbarini Hills. Minor occurence on the Barkly-Birdum Tableland and low hills of the Mallapunyah Plains. The dominant soils are lithosols and shallow red earths with minor yellow earths, sands and clays. | K1+, K2++, KD1++++, PCH+++, PCZ++, PKL+++, A1++, A2+++, M++++, Co++++, HLS++++, HLL++++, HLJ++++, H++++, HT1+++, UL+, U++, PL+++, PTS+++ |
| 4. | *E. phoenecia*, *E. miniata/Plectrachne pungens.* | Woodland (Open Woodland) | Denudational plains and plateau surfaces associated with the Lower Proterozoic sandstones with minor occurrence on the erosional crests of the Cretaceous sediments. Soils are moderately deep sands. | PCH++++, BP+++, A1++, A2+++ Co++ |
| 5. | *E. dichromophloia (E. miniata, Ironwood) Plectrachne pungens (Chrysopogon fallax)* | Open Woodland (Woodland and Open Woodland) | Hillslopes, plateau surface and denudational plains associated mainly with the Central McArthur Hills and to a lesser extent with the Barkly Tableland and the Bukalara, Abner and Batten Ranges. Soils are either lithosols or shallow siliceous sands. | K1+++, K2++, BP+++, B++++, A1++++, A2++, Co++, TSS++, HLJ++ |
| 6. | *E. tectifica*, *E. terminalis*, Ironwood *(E. grandifolia*, *E. leucophloia* and *E. clavigera)/Sehima nervosum Chrysopogon fallax*, *Heteropogon contortus Plectrachne pungens* and *Schizacharium fragile* | Woodland to Open Woodland (Low Woodland Low Open Woodland) | Denudational plains with some occurrence on crests, hillslopes and footslopes mainly associated with the undulating plains and low hills of the Central McArthur River and Balbarini Hills and the Northern undulating plains. Soils are predominantly lithosols with lesser occurrence of red and yellow earths. | K1++, TP+++, BP+++, H++, HT1+++, UL+++, U+++, PL+++, PTU++++ |
| 7. | *E. terminalis*, *E. tectifica*, *(E. leucophloia, E. grandifolia)/Chrysopogon fallax*, *Themeda australis*, *Sehima nervosum*, *Dichanthium fecundum*, *Plectrachne pungens and Schizacharium fragile.* | Woodland, Low Open Woodland, (Open Woodland, Low Woodland and Low Open Forest) | Denudational plains, colluvial footslopes and crests of the undulating low hills, rises and plains of the Central McArthur River and Balbarini hills, the northern undulating plains, the Mallapunyah Plains, the Central McArthur River Plains and Riverlands. Soils are lithosols and red earths with minor occurrence of yellow earths, sands and clays. | K1+++. HLS++, H++, HT1++++, UL+++, U++, PL+++, PTS++++, PTU++, PTD++++, FPB++ |
| 8. | *Melaleuca viridiflora* with emergent *E. grandifolia*/mod-dense *Eragrostis* spp. | Shrubland | Alluvial back plains and denudational plains below the Barkly-Birdum Tableland and on the Bulbarini [illegible] and [illegible]ern undulating plains. Soils are [illegible] and yellow [illegible] | U+, PCH++ |

Cont/..

| NO. | DOMINANT SPECIES (TREES AND GRASSES) | STRUCTURAL FORMATION (S) | ASSOCIATED LANDFORMS AND SOILS | OCCURRENCE BY LAND SYSTEM* |
|---|---|---|---|---|
| 9. | *Terminalia canescens (Petalostigma pubescens, Hakea arborescens)* | Low Open Woodland and Open Shrubland | Rocky hillslopes, very minor occurrence on stable plains, associated with the Central McArthur River Hills and the weathered Tertiary Lateritic surface. Soils are lithosols. | PCH++, HLS++, U+ |
| 10. | *Plectrachne pungens* with emergent shrubs and low trees *Grevillea pteridiifolia*, *E. leucophloia* and *E. ferruginea* | Grassland | Denudational plains and hillslopes of the Abner and Bukalara Ranges with minor occurrence on the Barkly-Birdum Tableland. Soils are shallow to moderately deep siliceous and earthy sands. | K1++, BP++, A1+, A2++++ |
| 11. | *E. ferruginea* or *E. polycarpa*, *(E. dichromophloia)/Plectrachne pungens*, *Aristida hygrometrica* and *Eragrostis tenella*. | Woodland to Low Open Woodland | Colluvial alcoves, small occurrence on crests, on terraced rises of the Central McArthur Hills and on the dissected plateau surface of the Abner Range. | A1++, TSS++++ |
| 12. | *Grevillea refracta*, *Acacia latifolia/ Plectrachne pungens* - sparse | Shrubland | Alcoves in the dissected surface of the Bukalara Plateau. Soils, sandy lithosols. | B++ |
| 13. | *Melaleuca* spp, *E. camaldulensis* | Open Forest | Permanent and semi-permanent river margins occurring in the Bukalara, Abner and Batten Ranges. Soils- probably sandy bed loads - not sampled. | B+ |
| 14. | *Dichanthium fecundum*, *Sporobolus australasicus*, *Aristida inaequiglumis* and/or *Brachyachne* spp. (occasional emergent *Dicrostachys spicata*). | Grassland to Open Grassland | Alluvial and denudational plains associated with the Barkly-Birdum Tableland and the Northern Undulating Plains. | TP++, PCZ++, PKL++, UL++ |
| 15. | *E. normantonensis/Plectrachne pungens* - sparse | Open Shrubland | Remnant chalky plateau surfaces on the edge of the Barkly-Birdum tableland. Soils are skeletal. | KD+++ |
| 16. | *Lysiphyllum cunninghamii (Hakea arborescens)*. | Shrubland to Open Shrubland | Terraces and hillsopes of the Balbarini Hills and Northern Undulating Plains. Soils, shallow gravelly red earths and lithosols. | HT+++, UL+ |
| 17. | *Cochlospermum fraseri/Heteropogon contortus* and *Plectrachne pungens* - sparse | Shrubland to Open Shrubland | Crests and hillslopes of the Balbarini Hills and Northern Undulating Plains (see previous community). Soils as above. | HT+++ |
| 18. | *E. grandifolia*, Ironwood or *E. clavigera/ Aristida* spp, *Plectrachne pungens* and *Brachyachne convergens*. | Open Woodland and Low Open Woodland | The Northern Undulating Plains, the Central McArthur and Balbarini Hills. Soils are earthy sands with minor deep red earths. | U++ |
| 19. | *Acacia oswaldii (Hakea arborescens)/ Plectrachne pungens* - sparse | Shrubland | As for previous community. Soils are lithosols. | U+ |
| 20. | *Digitaria* sp and *Eulalia fulva* with emergent *Lysiphyllum cunninghamii* | Grassland | Alluvial flood plains of the Northern Undulating Plains. Soils, deep brown clays. | PL++ |

Cont/...

| NO. | DOMINANT SPECIES (TREES AND GRASSES) | STRUCTURAL FORMATION (S) | ASSOCIATED LANDFORMS AND SOILS | OCCURRENCE BY LAND SYSTEM* |
|---|---|---|---|---|
| 21. | *Cymbopogon bombycinus* - sparse | Open Grassland | Rocky hill crests in the Central McArthur River and Balbarini Hills. Soils, skeletal. | HLL+ |
| 22. | *E. microtheca/Chrysopogon fallax*, *Dichanthium fecundum*, *Aristida latifolia*, *Heteropogon contortus*, *Brachyachne convergens*. | Low Woodland (Low Open Woodland) | Denudational plains and gentle hillslopes with some occurrence on alluvial flood plains of the McArthur River Plains and Riverlands and less frequently the Central McArthur Hills. Soils are variable and include shallow sands and earths and some clays. | HLS+, HLL++, PT+++, PTU+++ |
| 23. | *Sorghum plumosum*, *Astrebla squarrosa* and *Iseilema vaginiflorum* | Grassland | Alluvial plains of the Mallapunyah Plains. Soils are grey cracking clays. | PCC++++ |
| 24. | *Acacia* sp, *Terminalia volucris* and *Lysiphyllum cunninghamii/Dichanthium fecundum* and *Aristida latifolia*. | Open Shrubland | Alluvial back plains in the Mallapunyah Plains. Soils are brown clays. | PCC++ |
| 25. | *Acacia farnesiana* and *Carissa lanceolata* (emergent *E. tectifica) Eragrostis tenellula*, *Dichanthium fecundum* and *Heteropogon contortus*. | Shrubland | Alluvial flood plains and levees of McArthur River plains. Soils predominantly brown clays with minor shallow red earths. | FUC++++, FPB++ |
| 26. | *Lysiphyllum cunninghamii/Carissa lanceolata/ Aristida browniana*, *A. latifolia*, *Chrysopogon fallax* and *Brachyachne convergens*. | Woodland-Low Open Woodland | Alluvial landforms generally in the Central River Plains and Riverlands. Soils, predomminately brown clays with minor earthy sands. | PTD++, FL++, FPB+++ |
| 27. | *E. papuana*, *(E. microtheca)*/dense perennial *Heteropogon contortus*, *Dichanthium fecundum*, *Sorghum plumosum*, *Chrysopogon fallax* and *Eulalia fulva*. | Open Forest, (Woodland) | Active alluvial flood plains and levees mainly in the depositional plains of the Central McArthur River Plains and Riverlands. Soils are variable and may be uniform textured loams and clays or yellow duplex soils. | PL++, PTU++, PT++, PTD++ FL+++, FPB+, U+ |
| 28. | *E. camaldulensis*, *E. microtheca (Terminalia carpentariae)/ Vetiveria pauciflora*, *Dichanthium fecundum*, *Heteropogon contortus*, *Eragrostis tenellala*. | Open Forest (Woodland) | Active alluvial flood plains, stream banks and levees occurring on the Central McArthur River and the Mallapunyah plains. Soils are uniform textured clays with some occurrence of polygenetic alluvium. | PTS+, PTU++, FUC++ |
| 29. | *E. latifolia*, Ironwood/ *Aristida browniana*, *A. inaequiglumis* and *Setaria apiculata*. | Open Woodland (Grassland with emergent trees) | Flood plains and levees of the Central McArthur River Plains and Riverlands. Soils are moderately deep siliceous sands. | FL+++ |

++++ - dominant community type
+++ - co-dominant community or important secondary community
++ - minor community
+ - isolated occurrence

## 6.0 POTENTIAL SOIL EROSION

One of the objectives of this survey was to indicate areas within the catchment which are susceptible to or are already suffering from accelerated soil erosion.

### 6.1 Stable areas

Large areas within the catchment are very stable. These areas occur mainly as the structural land systems and areas of high relief, where little soil development has occurred. The dominant soil type is the lithosol. The run-off rates would be extremely high from some areas, and whilst in themselves stable, the extent of these areas in upper catchments of the major tributaries will influence the volume and speed of water passing through the catchment. In other areas, e.g. the Abner Plateau, the lack of drainage lines on the plateau and permanent springs along the base of the range would indicate little run-off but high infiltration rates into the deep sands and sandstones of PA, Co, A2, and A1 land systems.

The stable areas with low potential to erode are those systems occurring in the Bukalara Plateau (B, BP), Abner Plateau (Ae A, A1, A2, Co), Batten Range (M, HLS) and the majority of the Barkly Birdum Tablelands (K1, K2, KD1, KD2, Ae, M). Those land systems of small extent within the tableland, e.g. the drainage line system (TP) have the potential to erode, particularly with overgrazing or clearing of vegetation. However little significant erosion was observed probably because of limited permanent cattle watering points in the area.

### 6.2 Areas Moderately Susceptible to Soil Erosion

Small units within some land systems are potentially, highly erodible e.g. the drainage lines, however because of the limited extent of these areas the whole land system would only be rated as having a moderate erosion potential. Similarly some units have a high potential to form scalded areas with overgrazing. However, unless these areas form a major proportion of the land system, the whole system would be only rated as moderately erodible.

The lower slopes and drainage floor units of land systems TP, HLS, HLL and H will have the potential to erode, especially if overgrazed. However, little significant erosion was observed in these areas during the survey.

The undulating hills and plains on calcareous rocks (HT, HT1, PL and U land systems) whilst not usually receiving large amounts of run-off from adjoining areas have a moderate potential to erode, especially on the shallow red earths and lithosols of HT and HT1 land systems. These are good grazing lands. Overgrazing on similar country in the Victoria River District has resulted in significant soil erosion (Wood et al. 1979), but once cattle were removed fairly rapid pasture regeneration occurred on many of the eroded areas.

The undulating plains of land systems PL, UL, U, PCZ, PKL and PTS contain significant areas of red massive earths which support open eucalypt woodlands and perennial tall grasses. Large areas are scalded particularly in systems U and UL and any increase in these scalded areas will result in a rapid reduction in the quantity of pasture available and an increase in the run-off from these areas.

As noted by Mott et al. (1979) and Bridge et al. (1983) the formation of these scalded areas can rapidly follow overgrazing, and once initiated they are difficult and extremely costly to rehabilitate. Close monitoring of pasture condition and sound stock management is required on these systems to prevent an increase in the extent of scalding.

## 6.3 Areas with High Susceptibility to Soil Erosion

Land systems PCC, PKL, PTS and FUC contain areas of grey and brown cracking clays which, as outlined in section 4, can be dispersible at depth. Gully and tunnel erosion were observed along eroded tracks and drainage lines in PCC and FUC land systems and aerial reconnaissance indicates that, while not extensive, the problem is expanding. The grey clays of land system PCC are naturally quite stable, being well structured often with gilgai. Both these factors allow large quantities of water to be ponded and absorbed in the soil profiles. However, once gully systems are initiated they will quickly become

established. Care should be exercised in the construction and siting of roads, fencelines and watering points to avoid stripping the top-soil and exposing any sodic subsoil material.

Areas in the Central McArthur Plain (land system PTU) also contain soils with a high potential erodibility i.e. the yellow and brown duplex soils. Chemical analyses again suggest sodicity of the subsoil and so the above comments on the siting of fences etc. will again apply, particularly as these are more sloping areas.

Land systems PTD, PT, FPB, FPD and FL, consist of alluvial flood plains, levees and river channels which can be expected to be inundated annually. The extent of run-off in the upper catchment and the gradient of streams will of course influence the amount and velocity of water flow but, in general the drainage channels and levees are highly erodible especially if stabilising channel wall vegetation is removed. The river back plains (land system PT) that are not subjected to high velocity flows would not be expected to have a high potential erodibility unless the velocity of flow is increased by water channel diversions.

## 7.0 POTENTIAL LAND USE

The land systems of the upper catchment have been evaluated with respect to potential agricultural development (broadacre cropping), intensive pastoral development, extensive pasture improvement, and scenic/ recreational value.

Obviously in a reconnaissance survey of this nature only general evaluations can apply, however, the results should indicate those systems worthy of further investigation. These evaluations only concern the inherent physical and chemical characteristics of soil and **no climatological or economic evaluations have been considered.** A summary of the evaluation is presented in table 6.

### 7.1 Agricultural Development

There are very few areas capable of agricultural development (i.e. broadacre cropping) in the catchment. Lithosols and shallow sands are the dominant soils of the catchment and bare rock outcrop occupies significant areas, especially in the upper catchment. Areas with the least limitations are likely to be found in land systems PTS, PCC and PL. These systems contain deep, red massive earths and the grey cracking clay plains which are not flooded. They have been assessed as only having moderate capability for agriculture on the basis of possible depth restrictions in land systems PTS and PL and the limited extent of land system PU. The possibility of salinity and sodicity at depth on the cracking grey clays (PCC) would also downgrade their agricultural capability.

Land systems associated with the major rivers contain soils with some potential for agriculture but the frequency of flooding would preclude agricultural development from much of the area. Broad clay plains were usually severely dissected by stream channels or severely gilgaied. Limited areas of alluvial soil on the levees which would flood only rarely i.e. in land system FL may have potential although accessibility to these areas may be a problem.

## 7.2 Intensive Pastoral Development

Intensive pastoral development implies areas of hay or fodder production or intensive improved pastures for supplementary feeding of breeders or stud animals. It is assumed that the areas will not be tilled except possibly for initial establishment. Whilst many of the criteria used to evaluate land for cropping will still apply, they need not be so rigid (e.g. the percentage of rock or gravel is not as important, extent and frequency of flooding is not as critical). The clay plains of land system PCC would have a high capability for this form of development, especially if irrigation from bores becomes available. Systems offering significant areas with moderate potential are the undulating plains containing red earth soil, i.e. PKL, PTS, PL, PTU, and the river lands and plains of PT, FL and FPB.

## 7.3 Extensive Pasture Improvement

Extensive pasture improvement implies the introduction of a pasture grass or legume into existing native pastures to improve the protein or energy supply throughout the year, or the rehabilitation of scalded or eroded areas which would increase the stability and productivity of the land. Some systems contain areas that intrinsically have a moderate to high productivity and so in these areas (eg PCC) pasture improvement would more likely relate to sound management of the existing resource.

Land systems with little scope for pasture improvement are those of the rugged hills, escarpments and the plains with siliceous sands and lithosols. The undulating hills and plains of land systems HT, HT1, U, UL and PCC contain areas of productive native pastures although they require care in their utilisation to avoid overgrazing. In areas where scalding is evident (particularly in UL) some mechanical rehabilitation could be warranted. This approach, using Buffel grass (*Cenchrus sp.*) in other degraded areas of the Northern Territory has been shown to be most effective. More details can be obtained from Soil Conservation Officers in Katherine.

Units on the land systems PKL, PTS, PL, PTU and TP, contain moderately deep red and yellow earth soils supporting sometimes dense perennial

grasses. These areas would be capable of being improved with introduced legumes such as the stylos (*Stylosanthes sp.*).

The clay plains and river lands appear capable of being improved given a suitable pasture species adapted to seasonal flooding and cracking clay conditions.

## 7.4 Areas with Landscapes of Recreational and Scenic Value

The land systems have been evaluated for their recreational and scenic values based on the following criteria:

(i) the presence of landscapes of high relief, with unusual or interesting geological formations or areas with views over significant areas of the catchment.

(ii) the presence of permanent water bodies, waterfalls, springs or billabongs along major rivers.

Using these criteria the values are assessed as high, moderate or low in a similar way to other land use options.

(a) Systems with high recreational or scenic landscape values

In the Northern Territory, areas of contrasting relief from the otherwise flat topography are of high scenic value. High plateau systems with deep gorges, areas of scenic views and areas of unusual geological formations occur in land systems, B, A1, Ae, KD1 and the major hills of land system M.

Of particular note is the Glyde River Gorge near the eastern boundary of the survey area which traverses through land system B. Much of this system is rugged and generally inaccessible by vehicle. The gorge contains permanent deep water bodies which further increase its value as a scenic resource.

Land System A1 contains areas of particular geological interest. The regular jointing and weathering of the Abner Sandstones has

resulted in an area on the Abner Range being composed of a series of spectacular columns a few metres wide and up to 50 m high.

Within land system Ae, particularly along the edge of the Abner Range and in the upper Tooganginie Creek area there are permanent waterholes and enclosed valleys which are accessible by vehicle. Particular points of interest include Paradise Pool Rockhole and Umboobaga Rockhole (on Tooganginie Creek) and Bessie and Beetle Springs at the base of the Abner Range south of McArthur River homestead.

(b) Systems containing landscapes of moderate scenic or recreational value

The mid reaches of the McArthur River contain permanent waterholes which offer moderate scenic but possibly high recreational values. These waterholes are used as cattle watering points which may detract from their value, particularly late in the dry season, when this use would increase. These waterholes occur in land system FPB, FL and FPD and include the '8 Mile Waterhole', midway between Barney Hill and the Abner Range.

Obviously, the markedly seasonal rainfall would mean that of the many tributaries of major steams containing water for some months after the wet season, few would last through the dry.

The broken hills of land systems HLS and HLJ may offer some potential as scenic or recreational landscapes particularly where associated with areas of striking relief (land systems Ae, M, KD1) outlined in section (a). The broad, open, treeless plains of system PCC may also offer scenic diversity due to the extended vistas generally not available in other areas of low relief.

(c) Systems containing landscapes of low scenic or recreational value

Much of the survey contains areas of relatively low relief with few natural, permanent water bodies. These areas have been rated as having a low scenic or recreational value.

## 7.5 Areas of Ecological/Biological Significance

Two ecological aspects of an area may affect its overall significance rating on a scale similar to that described in the previous section. These aspects are:

(i) the rarity of a community or its component species; and
(ii) the representativeness of the community.

Both these aspects may also be considered on a local basis, i.e. in context of the survey area only, or on a Territory wide basis. For the purpose of this exercise the botanical communities are considered in a local context.

On the basis of the above criteria two land systems rate highly with respect to rarity of species. A1 is the only system in which *Calytrix mimiana* was found, a shrub which is considered rare and endangered because of its very limited ecological range(Leigh et.al. 1981). Land system KD2 contains a mallee shrubland of *Eucalyptus normantonensis*, although not rare or endangered, this occurrence puts the species well out of its previously known range (The validity of this record needs to be reinforced with herbarium collections).

The high rating codes for these two systems, appearing in Table 6, are followed by an asterisk, indicating the presence of a rare community or species.

By and large the remaining land systems do not contain any outstanding communities or species, even when taken in a Territory wide context. Land systems M and TES have been designated as being of high ecological importance because they are dominated by woodland communities of *E. leucophloia* and *E. pruinosa* respectively. Both these communities are very characteristic of the Upper McArthur River Catchment.

Eleven land systems have been designated as being of moderate ecological importance. These land systems are dominated by, or contain the most representative example of the more important vegetation communities. Following is a list of these land systems showing the communities present:

B - Sandstone shrublands and *E. dichromophloia* woodland;
A2 - *Plectrachne pungens* grassland;
HT - *Cochlospermum fraseri* and *Lysiphyllum cunninghamii* Shrublands;
HT - *E. terminalis* Low Open Woodland to Low Open Forest
TSS - *E. ferruginea* Low Open Woodland
K2 - *Acacia shirleyi* Open Forest:
PCH - *E. miniata* Woodland;
PCC - *Sorghum plumosum* dominated grassland
FUC - *Dicrostachys spicata* Open Shrubland;
FL - *E. papuana* Open Forest and Woodland; and
FPB - *E. microtheca* Open Woodlands

The remainder of the land systems are rated as having low ecological importance.

These ratings are based upon broad and preliminary information and may need alteration in the light of new and more detailed data. It is quite conceivable that any of these land systems may prove, upon closer examination, to contain new or rare species or small areas of unusual associations, particularly on the Bukalara and Abner plateaux.

TABLE 6 LAND USE POTENTIAL AND ECOLOGICAL IMPORTANCE

| LAND SYSTEM | AGRICULTURE | INTENSIVE PASTURE IMP | EXTENSIVE PASTURE IMP | RECREATIONAL SCENIC | ECOLOGICAL IMPORTANCE |
|---|---|---|---|---|---|
| **High Plateau Surface** | | | | | |
| B | L | L | L | H | M |
| A1 | L | L | L | H | H* |
| A2 | L | L | L | L | M |
| Co | L | L | L | MH | L |
| **Escarpments** | | | | | |
| Ae | L | L | L | H | M |
| KD1 | L | L | L | H | L |
| KD2 | L | L | L | L | H* |
| **Hills and Low Rises** | | | | | |
| M | L | L | L | H | H |
| HLJ | L | L | L | L | M |
| HLS | L | L | L | M | L |
| HLL | L | L | L | L | L |
| H | L | L | L | L | L |
| HT | L | L | M | L | M |
| HT1 | L | L | M | L | M |
| U | L | L | M | L | L |
| UL | L | L | M | L | L |
| TSS | L | L | L | L | M |
| **Erosional Slopes** | | | | | |
| TES | L | L | M | L | H |
| **Non Depositional Plains** | | | | | |
| K1 | L | L | L | L | L |
| K2 | L | L | L | L | M |
| PA | L | L | L | L | L |
| BP | L | L | L | L | L |
| PCH | L | L | L | L | M |
| PCZ | L | L | M | L | L |
| PKL | L | M | M | L | L |
| PTS | M | M | M | L | L |
| PCC | M | M | H | M | M |
| PL | M | M | M | L | L |
| PTU | L | M | M | L | L |
| **Depositional Plains and River Lands** | | | | | |
| TP | L | M | M | L | L |
| PTD | L | L | M | L | L |
| PT | L | M | M | L | L |
| FUC | L | M | M | M | L |
| FL | L(M) | M | M | M | M |
| FPD | L | L | M | M | L |

L = low land use potential M = moderate land use potential. H = High land use potential.

* Indicates the presence of rate species or community.

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# APPENDIX I

## AERIAL PHOTOGRAPHY AND LANDSAT IMAGERY

(a) AERIAL PHOTOGRAPHY:

Scale: Approx 1:85,000

Bauhinia Downs (1968)

| | | |
|---|---|---|
| cag 337 | run 3 | No's 157 - 183 |
| cag 335 | run 4 | No's 145 - 175 |
| cag 335 | run 5 | No's 96 - 125 |
| cag 333 | run 6 | No's 141 - 175 |
| cag 333 | run 7 | No's 90 - 125 |
| cag 332 | run 8 | No's 147 - 183 |

Wallhallow (1968)

| | | |
|---|---|---|
| cag 330 | run 1 | No's 45 - 76 |
| cag 330 | run 2 | No's 176 - 206 |
| cag 329 | run 3 | No's 227 - 252 |
| cag 329 | run 4 | No's 172 - 196 |

(b) LANDSAT IMAGERY

| | | | |
|---|---|---|---|
| 3/4 scene B & W (Band 7) | F6 | Path 109 | Row 071 |
| 1/4 scene B & W (Band 7) | F2 | Path 109 | Row 071 |
| 1/4 scene B & W (Band 7) | B6 | Path 109 | Row 072 |
| 1/4 scene B & W (Band 7) | B2 | Path 109 | Row 072 |
| Full Scene B & W (Band 7) | - | Path 109 | Row 672 |

## APPENDIX II

## REPRESENTATIVE SOIL PROFILE DESCRIPTIONS

These descriptions are not derived modal profiles of the various profile classes or subclasses. Significant variation, particularly in surface texture and horizonation would be expected. The following are site specific descriptions thought to best represent each group. Many have corresponding chemical and particle size data presented in Appendix III.

1. LITHOSOLS

2. ALLUVIAL SOILS

(a) : Sandy Alluvial Soils
Site : 5
Land System : FL
P.P.F. * : Uc1.23

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-10 | A11 | Dark brown to brown (10YR 4/3); sand; single grained and sandy; dry loose consistence; pH 7.0. |
| 10-40 | A12 | Strong brown (7.5YR 4/6); sand; single grained and sandy; dry very weak consistence; pH 7.5. |
| 40-60 | A13 | Strong brown (7.5YR 4/6), sand; single grained and sandy; dry very weak consistence; pH 6.5. |

(b) : Loamy Alluvial Soils
Site : 161
Land System : FL
P.P.F. : Um5.52 Um1.23

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-70 | A | Very dark brown (10YR 2/2); sandy loam; massive and earthy; dry moderately firm consistence; pH 8.0. |
| 70-150 | B | Dark yellowish brown (10YR 3/6); loam; massive and earthy; slightly moist moderately firm consistence; pH 8.5. |

*Throughout Appendix II P.P.F. refers to Principal Profile Form.

3. SILICEOUS SANDS

(a) : 'Pellew' Sands
Site : 3
Land System : BP
P.P.F. : Uc1.22

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-1 | A11 | Very dark greyish brown (10YR 3/2); veneer of coarse sand; massive and sandy; dry moderately weak consistence; pH 5.5. |
| 1-14 | A12 | Dark yellowish brown (10YR 4/4); coarse sand; massive and sandy; dry very weak consistence; pH 5.5. |
| 14-50 | A13 | Yellowish brown (10YR 5/6); coarse sand; single grained, sandy; slightly moist loose consistence; pH 5.5. |

(b) : 'Tanarilla' Sands
Site : 143
Land System : K2
P.P.F. : Uc5.12

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-15 | A11 | Dark brown (10YR 3/3); sand; single grained and sandy; dry very weak consistence; pH 7.0. |
| 15-35 | A12 | Strong brown (7.5YR 5/6); clayey sand; massive and sandy; dry very weak consistence; pH 6.8. |
| 35-60 | A/C | Strong brown (7.5YR 5/8); clayey sand; massive and sandy; dry very weak consistence; pH 6.5; 60% rounded ferruginous gravels 12mm diameter. |
| 60+ | C | Dense ferruginous pan. |

4. EARTHY SANDS

| | | |
|---|---|---|
| (a) | : | 'Manbulloo' Sands |
| Site | : | 7 |
| Land System | : | FL |
| P.P.F. | : | Uc5.22 |

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-10 | A11 | Reddish brown (5YR 4/4); coarse loamy sand; massive and earthy; dry moderately weak consistence; pH 7.5. |
| 10-60 | A12 | Yellowish red (5YR 5/8); coarse loamy sand; massive and earthy; dry moderately firm consistence; pH 7.5. |

5. NON CRACKING CLAYS

| | | |
|---|---|---|
| (a) | : | 'Feathertop' Clays |
| Site | : | 88 |
| Land System | : | TES(KD1) |
| P.P.F. | : | Uf1.43 |

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-10 | A11 | Dark brown (10YR 3/3); light clay; massive and earthy; dry moderately strong consistence; pH 5.5; 20% rounded gravels, 3mm diameters. (60% of surface covered with gravels 10 mm dia). |
| 10-35 | A12 | Dark yellowish brown (10YR 4/4); light medium clay; massive and earthy; dry moderately strong consistence; pH 5.5; 20% subrounded gravels, 8mm diameter. |
| 35+ | C | Stone and gravel. |

6. CRACKING BROWN CLAYS

(a) : 'Liela' Clays
Site : 58
Land System : FPB
P.P.F. : Ug5.34

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-10 | A1 | Dark brown (7.5YR 3/2); medium clay; angular blocky structure with smooth peds; dry moderately strong consistence; pH 7.0. |
| 10-50 | A3 | Strong brown (7.5YR 4/6); medium clay; angular blocky structure with smooth peds; slightly moist moderately firm consistence; pH 8.5; slight carbonate concretions. |
| 50-150+ | A/D | Strong brown (7.5YR 4/6); medium clay; massive and earthy; slightly moist moderately firm consistence; pH 8.5. |

7. CRACKING GREY CLAYS

(a) : 'Barkly' Clays
Site : 109
Land System : PCC
P.P.F. : Ug5.24

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-30 | A1 | Dark greyish brown (10YR 4/2); medium clay; angular blocky structure with rough peds; dry moderately strong consistence; pH 7.0. |
| 30-120 | A31 | Dark greyish brown (2.5Y 4/2); medium clay; angular blocky structure with smooth peds; slightly moist moderately firm consistence; pH 8.5. |
| 120-140 | A32 | Dark greyish brown (2.5Y 4/2), 5% distinct yellow mottles; medium clay; angular blocky structure with smooth peds; slightly moist, moderately firm consistence; pH 8.5. |
| 140-170 | A/C | Light olive brown (2.5Y 5/6); heavy clay; massive and earthy; slightly moist moderately firm consistence; pH 8.5; 10% soft carbonate accumulations. |

## 8. RED MASSIVE EARTHS

(a) : 'Minngarda' Red Earths
Site : 99
Land System : PKL
P.P.F. : Um1.43

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-15 | A11 | Dusky red (2.5YR 3/2); clay loam; massive and earthy; dry moderately strong consistence; pH 6.0; 20% subrounded, 10 mm diameter ferruginous and sandstone gravels. |
| 15-40 | A12 | Dark red (2.5YR 3/6); clay loam; massive and earthy; dry moderately strong consistence; pH 5.5; 30% subrounded, 8mm diameter ferruginous and sandstone gravels. |
| 40+ | | Ferruginous gravel. |

(b) : 'Top Springs' Red Earths
Site : 105
Land System : U
P.P.F. : Gn2.12

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-15 | A1 | Dark reddish brown (5.0YR 3/3); light sandy clay loam; massive and earthy; dry moderately firm consistence; pH 6.5. |
| 15-50 | B1 | Dark reddish brown (2.5YR 3/4); sandy clay loam; massive and earthy; dry moderately firm consistence; pH 7.0. |
| 50-70 | B2 | Dark reddish brown (2.5YR 3/4); light clay; massive and earthy; slightly moist moderately firm consistence; pH 7.0. |

(c) : 'Amelia' Red Earths
Site : 69
Land System : PL
P.P.F. : Gn2.12

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-10 | A | Dark reddish brown (5.0YR 3/3), fine sandy clay loam; massive and earthy; dry very strong consistence; pH 7.5. |
| 10-70 | B1 | Yellowish red (5.0YR 4.6); light clay; massive and earthy; dry very strong consistence; pH 7.5. |
| 70-135 | B2 | Yellowish red (5.0YR 4/6); medium clay; massive and earthy; dry very strong consistence pH 7.5. |

(d) : 'Lynott' Red Earth
Site : 59
Land System : FPB
P.P.F. : (Dr 2.32)

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-13 | A | Dark reddish brown (5.0YR 3/4); sandy clay loam; massive and earthy; dry very strong consistence; pH 6.0. |
| 13-80 | D1 | Dark red (2.5YR 3/6); light medium clay; massive and earthy; dry moderately strong consistence; pH 7.0. |
| 80-150 | D2 | Yellowish red (5.0YR 4/6); fine sandy clay loam; massive and earthy; dry very strong consistence; pH 7.5. |

9. YELLOW MASSIVE EARTHS

(a) : 'Bostock' Yellow Earths
Site : 84
Land System : K1
P.P.F. : Gn2.65

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-5 | A1 | Dark greyish brown (10YR 4/2); clay loam; massive and earthy; dry moderately strong consistence; pH 6.5. |
| 5-20 | A2 | Brown (10YR 5/3); clay loam; massive and earthy; dry moderately strong consistence; pH 6.0. |
| 20-60 | B21 | Brownish yellow (10YR 6/6), 10% prominent yellow mottle; light clay; massive and earthy; dry moderately strong consistence; pH 6.5; 20% ferruginous gravels 10mm diameter. |
| 60-85 | B22 | Yellowish brown (10YR 5/6), 10% prominent yellow mottle; light clay; massive and earthy; slightly moist moderately firm consitence; pH 6.5; 30% ferruginous gravels 10mm diameter. |

## 10. BROWN DUPLEX SOILS

(a) : 'Kilgour' Soil
Site : 48
Land System : TES
P.P.F. : Db1.23

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-5 | A1 | Reddish brown (5.0YR 4/4); loam fine sandy; massive and earthy; dry moderately firm consistence; pH 7.5. |
| 5-45 | A2 | Yellowish red (5.0YR 4/6); loam fine sandy; massive and earthy; slightly moist, moderately strong consistence; pH 7.5. |
| 45-65 | B21 | Brown (7.5YR 5/4); light medium clay; angular blocky to prismatic structure with smooth ped fabric; slightly moist, moderately strong consistence; pH 8.5. |
| 65-95 | B22 | Strong brown (7.5YR 5/6); light medium clay; angular blocky to prismatic structure with smooth ped fabric; slightly moist, moderately strong consistence; pH 8.5; 30% soft carbonate accumulations. |

## 11. YELLOW DUPLEX SOILS

(a) : 'Miranda' soils
Site : 171
Land System : PTU
P.P.F. : Dy2.73

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-5 | A1 | Dark greyish brown (10YR 4/2); sandy loam; massive and earthy; dry moderately firm consistence; pH 6.5. |
| 5-25 | A21 | Yellowish brown (10YR 5/4 2.5Y7/2 dry); light sandy clay loam; massive and earthy; dry very strong consistence; pH 7.0. |
| 25-35 | A22 | Greyish brown (10YR 5/2 2.5Y6/2 dry); sandy clay loam; massive and earthy; dry very strong consistence; pH 8.5. |
| 35+ | B | Onto strongly cemented pan. |

(b) : 'Batten' Soil
Site : 79
Land System : PL
P.P.F. : Dy3.32

| Depth (cm) | Horizon | Description |
|---|---|---|
| 0-5 | A1 | Dark brown to brown(10YR 4/3); light sandy clay loam, massive and earthy; dry moderately firm consistence; pH 6.0. |
| 5-60 | A2 | Pale brown (10YR 6/3 10YR 7/4 dry); sandy clay loam; massive and earthy; dry very firm consistence; 25%, 5mm gravels; pH 6.0. |
| 60-110 | B | Yellowish brown (10YR 5/6 10YR 6/6 dry); light clay; angular blocky structure with smooth ped fabric, dry moderately firm consistence, pH 6.5. |

APPENDIX III — SOIL CHEMICAL CHARACTERISTICS

| Soil & location | Depth (cm) | Particle Size Analysis (%) Clay | Silt | Sand Fine | Sand Coarse | pH | Conduct. mmho cm⁻¹ (1:5) | Org.C (%) | Tot.N (%) | Bic. P | Exch. K | Phos Extr S | Exchangeable cations Ca | Mg | Na | K | CEC (Meq%) | Clay Mineralogy* I | K | G | S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (Fine Earth) | | | | | | | | | | | | | | | | | | | |
| **ALLUVIAL SOIL (2)** | | | | | | | | | | | | | | | | | | | | | |
| Loamy Alluvial Soil (Site 161) | | | | | | | | | | | | | | | | | | | | | |
| | 0-10 | 9.7 | 10.8 | 45.7 | 33.8 | 7.9 | 104.5 | 2.10 | 0.120 | 18.4 | 540 | X | 10.15 | 2.50 | 0.09 | 0.85 | 13.60 | | | | |
| | 30-40 | 12.9 | 15.5 | 42.9 | 28.7 | 8.4 | 87.7 | 1.76 | 0.068 | 4.6 | 400 | X | 8.90 | 1.50 | 0.04 | 0.62 | 11.10 | | | | |
| | 60-90 | 13.4 | 14.9 | 43.3 | 28.4 | 8.4 | 127.5 | - | - | - | - | - | 6.55 | 2.08 | 0.04 | 0.74 | 9.40 | | | | |
| **CRACKING BROWN CLAY (6)** | | | | | | | | | | | | | | | | | | | | | |
| Liela (Site 58) | | | | | | | | | | | | | | | | | | | | | |
| | 0-10 | 37.1 | 13.6 | 46.9 | 2.4 | 6.7 | 43.6 | 0.420 | 0.033 | X | 160 | X | 10.50 | 11.33 | 1.31 | 0.46 | 26.80 | 10 | 35 | 10 | 45 |
| | 10-20 | 40.0 | 7.4 | 50.1 | 2.5 | 7.2 | 86.0 | 0.430 | 0.032 | X | 150 | X | 11.50 | 11.33 | 1.74 | 0.46 | 27.0 | 10 | 35 | 5 | 50 |
| | 20-30 | 38.1 | 15.4 | 44.1 | 2.4 | 7.9 | 174.0 | 0.465 | 0.028 | X | 135 | X | 13.0 | 11.83 | 2.39 | 0.41 | 28.0 | 15 | 40 | 5 | 40 |
| | 50-60 | 46.4 | 14.9 | 36.7 | 2.0 | 7.9 | 1096 | - | - | - | - | - | 10.65 | 13.00 | 2.96 | 0.28 | 27.00 | 15 | 30 | 10 | 45 |
| | 80-90 | 48.1 | 18.0 | 32.4 | 1.5 | 7.1 | 4340 | " | - | - | - | - | - | - | - | - | - | 10 | 30 | 10 | 50 |
| | 110-120 | 49.7 | 14.5 | 33.3 | 2.5 | 7.8 | 1429 | - | - | - | - | - | 10.90 | 13.33 | 4.11 | 0.35 | 21.00 | 15 | 35 | 10 | 40 |
| | 140-150 | 45.3 | 17.1 | 33.7 | 3.9 | 8.1 | 1167 | - | - | - | - | - | 9.65 | 12.83 | 2.31 | 0.31 | 25.20 | 10 | 40 | 10 | 40 |
| **CRACKING GREY CLAY (7)** | | | | | | | | | | | | | | | | | | | | | |
| Barkly (Site 109) | | | | | | | | | | | | | | | | | | | | | |
| | 0-10 | 48.1 | 15.1 | 22.7 | 14.1 | 7.2 | 59.9 | 0.475 | 0.035 | X | 175 | X | 11.6 | 11.08 | 0.70 | 0.47 | 26.2 | 15 | 15 | 5 | 65 |
| | 10-20 | 46.8 | 14.8 | 25.1 | 13.3 | 7.7 | 76.4 | 0.490 | 0.036 | X | 160 | X | 19.90 | 10.67 | 0.26 | 0.23 | 31.6 | 10 | 20 | Tr | 70 |
| | 20-30 | 48.5 | 14.5 | 23.1 | 13.9 | 8.3 | 109.4 | - | - | - | - | - | 18.15 | 10.83 | 0.39 | 0.13 | 31.0 | 5 | 20 | Tr | 75 |
| | 30-40 | 49.5 | 14.4 | 22.4 | 13.7 | 8.9 | 160.4 | - | - | - | - | - | 17.15 | 11.83 | 1.39 | 0.13 | 30.8 | Tr | 20 | Tr | 80 |
| | 40-50 | 49.7 | 15.9 | 21.5 | 12.9 | 8.6 | 134.5 | - | - | - | - | - | 18.65 | 11.67 | 0.91 | 0.13 | 32.0 | Tr | 15 | 5 | 80 |
| | 50-60 | 47.2 | 15.1 | 22.0 | 15.7 | 8.8 | 193.2 | - | - | - | - | - | 16.65 | 12.17 | 1.83 | 0.15 | 31.2 | Tr | 20 | 5 | 75 |
| | 60-90 | 50.2 | 14.5 | 22.3 | 13.0 | 8.6 | 372 | - | - | - | - | - | 8.80 | 6.08 | 1.48 | 0.08 | 25.0 | Tr | 15 | 5 | 80 |
| | 90-120 | 51.7 | 15.7 | 20.3 | 12.3 | 8.5 | 620 | " | - | - | - | - | 16.15 | 13.33 | 3.05 | 0.18 | 33.0 | Tr | 20 | Tr | 80 |
| | 120-150 | 54.2 | 13.1 | 21.7 | 11.0 | 8.3 | 1030 | " | - | - | - | - | 23.60 | 19.75 | 4.96 | 0.33 | 29.6 | Tr | 10 | 5 | 85 |
| | 150-170 | 42.4 | 10.8 | 31.6 | 15.2 | 8.9 | 720 | " | - | - | - | - | 12.90 | 11.17 | 2.39 | 0.33 | 28.4 | 20 | 10 | 5 | 65 |
| Barkly (Site 139) | | | | | | | | | | | | | | | | | | | | | |
| | 0-10 | 39.6 | 21.5 | 31.0 | 7.9 | 8.5 | 147.7 | 0.57 | 0.038 | X | 305 | X | 20.15 | 10.00 | 0.13 | 0.59 | 31.00 | | | | |
| | 10-20 | 38.9 | 18.8 | 34.7 | 7.6 | 8.4 | 116.6 | 0.50 | 0.043 | X | 280 | X | 21.15 | 11.17 | 0.09 | 0.59 | 33.40 | | | | |
| | 20-30 | 40.4 | 17.2 | 35.0 | 7.4 | 8.6 | 133.3 | - | - | - | - | - | 19.40 | 11.67 | 0.09 | 0.56 | 36.00 | | | | |
| | 50-60 | 44.1 | 17.2 | 30.7 | 8.0 | 8.7 | 131.1 | - | - | - | - | - | 17.90 | 13.17 | 0.22 | 0.56 | 35.60 | | | | |
| | 80-90 | 44.9 | 16.9 | 29.3 | 6.9 | 8.9 | 159.0 | - | - | - | - | - | 17.40 | 16.17 | 0.78 | 0.59 | 36.50 | | | | |
| **RED MASSIVE EARTHS (8)** | | | | | | | | | | | | | | | | | | | | | |
| (a) Top Springs (Site 105) | | | | | | | | | | | | | | | | | | | | | |
| | 0-10 | 16.8 | 16.0 | 28.6 | 38.6 | 6.3 | 44.0 | 0.850 | 0.043 | X | 265 | X | 3.80 | 1.42 | 0.09 | 0.38 | 7.6 | | | | |
| | 20-30 | 34.3 | 11.4 | 22.6 | 31.7 | 6.2 | 55.7 | 0.445 | 0.046 | X | 245 | X | 6.25 | 1.58 | 0.04 | 0.74 | 10.2 | | | | |
| | 50-60 | 45.1 | 9.8 | 19.9 | 25.2 | 6.2 | 58.0 | " | - | - | - | - | 7.55 | 2.00 | 0.04 | 0.69 | 11.8 | | | | |
| (b) Amelia (Site 68) | | | | | | | | | | | | | | | | | | | | | |
| | 0-10 | 17.3 | 17.3 | 47.9 | 17.5 | 6.3 | 60.3 | 0.61 | | 7 | 185 | X | | | | | | | | | |
| | 10-20 | 22.6 | 22.1 | 42.1 | 13.2 | 6.8 | 73.7 | 0.35 | | 7 | 180 | X | | | | | | | | | |
| | 20-30 | 28.4 | 20.8 | 37.6 | 13.2 | 6.3 | 177.9 | 0.25 | | 5 | 250 | X | | | | | | | | | |
| | 50-60 | 37.7 | 15.5 | 35.8 | 11.0 | 6.6 | 26.4 | 0.18 | | X | 210 | X | | | | | | | | | |
| | 60-70 | 35.1 | 20.5 | 32.6 | 11.8 | 6.5 | 36.0 | 0.13 | | X | 210 | X | | | | | | | | | |
| | 90-100 | 41.6 | 14.7 | 31.9 | 11.7 | 6.4 | 31.3 | 0.09 | | X | 220 | X | | | | | | | | | |
| | 120-130 | 44.0 | 15.7 | 30.0 | 10.3 | 6.6 | 17.6 | 0.08 | | X | 235 | X | | | | | | | | | |
| | 140-150 | 46.9 | 11.9 | 30.3 | 10.9 | 6.4 | 26.7 | 0.09 | | X | 250 | X | | | | | | | | | |
| Amelia (Site 69) | | | | | | | | | | | | | | | | | | | | | |
| | 0-10 | 21.2 | 17.3 | 53.3 | 8.2 | 7.0 | 58.5 | 1.50 | 0.090 | 14.0 | 400 | X | 8.85 | 3.50 | 0.04 | 0.62 | 13.0 | | | | |
| | 30-40 | 36.8 | 15.4 | 41.8 | 6.0 | 7.2 | 65.5 | 0.53 | 0.049 | X | 360 | X | 5.85 | 3.17 | 0.04 | 0.69 | 11.4 | | | | |
| | 100-110 | 36.8 | 18.5 | 40.5 | 4.2 | 7.3 | 96.5 | - | - | - | - | - | 5.15 | 4.17 | 0.04 | 0.74 | 11.2 | | | | |
| (c) Lynott (Site 43) | | | | | | | | | | | | | | | | | | | | | |
| | 0-10 | 9.9 | 24.3 | 62.7 | 3.1 | 6.9 | 62.2 | 0.83 | 0.052 | X | 260 | X | | | | | | | | | |
| | 10-20 | 4.3 | 16.5 | 74.6 | 4.6 | 6.9 | 30.8 | 0.30 | 0.020 | X | 195 | X | 2.0 | 1.17 | 0.48 | 0.38 | 6.0 | | | | |
| | 20-30 | 12.9 | 14.5 | 69.8 | 2.8 | 6.7 | 24.7 | - | - | - | - | - | 1.30 | 2.17 | 0.61 | 0.44 | 7.20 | | | | |
| | 50-55 | 45.8 | 19.8 | 29.5 | 4.8 | 6.7 | 88.9 | - | - | - | - | - | 2.90 | 7.75 | 1.00 | 0.97 | 14.8 | | | | |
| Lynott (Site 59) | | | | | | | | | | | | | | | | | | | | | |
| | 0-10 | 19.8 | 15.4 | 60.6 | 4.2 | 5.7 | 22.1 | 0.480 | 0.034 | X | 350 | X | - | - | - | - | - | | | | |
| | 10-20 | 32.7 | 13.1 | 50.5 | 3.7 | 5.6 | 23.2 | 0.475 | 0.039 | X | 355 | X | 6.0 | 4.08 | 0.52 | 0.85 | 15.60 | | | | |
| | 20-30 | 42.8 | 10.1 | 43.3 | 3.8 | 5.5 | 42.0 | " | - | - | - | - | 7.70 | 5.25 | 0.61 | 0.77 | 18.80 | | | | |
| | 50-60 | 37.3 | 9.8 | 48.3 | 4.6 | 5.8 | 50.0 | - | - | - | - | - | 7.40 | 5.50 | 0.57 | 0.49 | 17.40 | | | | |
| | 80-90 | 26.7 | 9.1 | 59.1 | 5.1 | 5.9 | 41.8 | - | - | - | - | - | 5.40 | 3.83 | 0.52 | 0.41 | 13.0 | | | | |
| | 110-120 | 21.0 | 7.6 | 65.4 | 6.0 | 6.1 | 52.1 | - | - | - | - | - | 4.0 | 3.0 | 0.61 | 0.36 | 11.80 | | | | |
| | 140-150 | 20.8 | 7.5 | 65.0 | 6.7 | 6.2 | 57.9 | - | - | - | - | - | 4.80 | 3.58 | 0.52 | 0.41 | 11.60 | | | | |
| Lynott (Site 46) | | | | | | | | | | | | | | | | | | | | | |
| | 0-10 | - | - | - | - | 6.5 | 77.4 | 0.610 | 0.049 | X | 280 | X | - | - | - | - | - | | | | |
| | 10-20 | - | - | - | - | 6.3 | 71.9 | 0.540 | 0.044 | X | 265 | X | 8.30 | 13.50 | 1.09 | 0.67 | 28.00 | | | | |
| | 20-30 | - | - | - | - | 6.6 | 108.1 | " | - | - | - | - | 7.25 | 16.67 | 0.83 | 0.38 | 26.00 | | | | |
| | 50-60 | - | - | - | - | 7.4 | 419.7 | - | - | - | - | - | 6.06 | 15.20 | 1.84 | 0.35 | 21.00 | | | | |
| Lynott (Site 23) | | | | | | | | | | | | | | | | | | | | | |
| | 0-5 | 17.2 | 16.3 | 47.9 | 18.6 | 5.6 | 33.0 | 0.4 | 0.028 | X | 130 | 0.3 | 0.45 | 3.42 | 0.74 | 0.26 | 8.8 | | | | |
| | 20-30 | 38.0 | 13.4 | 34.4 | 14.2 | 5.0 | 293.7 | 0.375 | 0.031 | X | 140 | 31.8 | 0.35 | 8.17 | 2.31 | 0.15 | 11.80 | | | | |
| | 50-60 | 31.2 | 13.0 | 40.3 | 15.5 | 7.2 | 693.7 | - | - | - | - | - | 0.25 | 7.50 | 2.70 | 0.18 | 13.6 | | | | |
| **YELLOW MASSIVE EARTH (9)** | | | | | | | | | | | | | | | | | | | | | |
| Bostock (Site 84) | | | | | | | | | | | | | | | | | | | | | |
| | 0-5 | 22.4 | 10.7 | 36.1 | 30.8 | 5.9 | 40.2 | 0.590 | 0.043 | X | 200 | X | 2.50 | 1.67 | 0.04 | 0.26 | 6.80 | | | | |
| | 10-20 | 34.7 | 8.6 | 28.4 | 28.3 | 0.4 | 32.0 | 0.335 | 0.033 | X | 195 | X | 2.80 | 1.58 | 0.13 | 0.21 | 6.80 | | | | |
| | 30-40 | 51.8 | 7.0 | 21.1 | 20.1 | 5.1 | 41.3 | - | - | - | - | - | 4.55 | 2.17 | 0.04 | 0.26 | 9.80 | | | | |
| | 70-80 | 54.9 | 7.1 | 20.3 | 17.7 | 5.7 | 44.5 | - | - | - | - | - | 3.30 | 2.17 | 0.17 | 0.03 | 7.80 | | | | |
| Bostock (Site 49) | | | | | | | | | | | | | | | | | | | | | |
| | 0-10 | 29.7 | 12.5 | 35.8 | 22.0 | 5.7 | 27.1 | 0.70 | 0.048 | X | 280 | X | 6.65 | 2.58 | 0.65 | 0.77 | 13.8 | 15 | 55 | 20 | 10 |
| | 10-20 | 35.6 | 11.3 | 32.4 | 20.7 | 5.6 | 29.4 | 0.55 | 0.042 | X | 260 | X | 6.0 | 2.33 | 0.44 | 0.67 | 13.8 | 10 | 60 | 15 | 15 |
| | 20-30 | 41.2 | 9.2 | 27.8 | 21.8 | 5.6 | 47.1 | " | - | - | - | - | 6.3 | 2.25 | 0.52 | 0.69 | 14.60 | 10 | 60 | 20 | 10 |
| | 30-40 | 45.8 | 8.8 | 22.9 | 22.5 | 5.5 | 44.8 | " | - | - | - | - | 6.50 | 2.08 | 0.70 | 0.67 | 13.60 | 10 | 65 | 20 | 5 |
| **BROWN DUPLEX SOIL (10)** | | | | | | | | | | | | | | | | | | | | | |
| Kilgour (Site 66) | | | | | | | | | | | | | | | | | | | | | |
| | 0-10 | 13.7 | 24.3 | 47.6 | 14.4 | 5.8 | 34.8 | 0.585 | 0.045 | X | 305 | X | 2.35 | 1.83 | 0.04 | 0.38 | 5.60 | | | | |
| | 10-20 | - | - | - | - | 5.2 | 14.8 | 0.345 | 0.028 | X | 230 | X | 1.90 | 1.33 | 0.44 | 0.51 | 8.2 | | | | |
| | 40-50 | 24.4 | 19.1 | 40.1 | 16.4 | 5.3 | 29.8 | - | - | - | - | - | 2.20 | 2.25 | 1.04 | 0.41 | 11.6 | | | | |
| | 90-100 | 35.2 | 16.6 | 35.5 | 12.7 | 6.6 | 122.3 | - | - | - | - | - | 4.30 | 4.33 | 2.35 | 0.62 | 13.4 | | | | |
| Kilgour (Site 103) | | | | | | | | | | | | | | | | | | | | | |
| | 0-5 | 26.2 | 14.0 | 38.9 | 20.9 | 6.4 | 33.5 | 0.715 | 0.055 | 4.6 | 225 | X | 4.10 | 4.17 | 0.04 | 0.28 | 11.60 | | | | |
| | 10-20 | 29.9 | 13.5 | 26.7 | 30.9 | 6.2 | 34.6 | 0.445 | 0.030 | X | 145 | X | 4.90 | 4.92 | 0.26 | 0.15 | 13.40 | | | | |
| | 40-50 | 39.7 | 12.7 | 22.8 | 24.8 | 7.5 | 40.7 | " | - | - | - | - | 7.20 | 7.50 | 0.91 | 0.08 | 17.80 | | | | |
| Kilgour (Site 177) | | | | | | | | | | | | | | | | | | | | | |
| | 0-10 | - | - | - | - | 6.0 | 45.0 | 0.625 | 0.039 | X | 200 | X | 2.70 | 0.92 | 0.04 | 0.36 | 5.20 | | | | |
| | 20-30 | 27.8 | 21.2 | 43.3 | 7.7 | 6.0 | 62.6 | 0.45 | 0.036 | X | 200 | X | 3.50 | 1.00 | 0.04 | 0.41 | 5.40 | | | | |
| | 60-70 | 49.2 | 11.0 | 32.9 | 6.9 | 6.0 | 79.4 | - | - | - | - | - | 3.80 | 0.83 | 0.04 | 0.51 | 5.60 | | | | |
| **YELLOW DUPLEX SOILS (11)** | | | | | | | | | | | | | | | | | | | | | |
| (a) Miranda (Site 171) | | | | | | | | | | | | | | | | | | | | | |
| | 0-5 | 6.7 | 18.9 | 57.7 | 16.7 | 16.7 | 19.4 | 0.390 | 0.023 | X | 130 | X | 0.75 | 0.58 | 0.58 | 0.27 | 3.00 | | | | |
| | 10-20 | 15.9 | 12.6 | 54.1 | 17.4 | 7.2 | 87.8 | 0.245 | 0.019 | X | 90 | X | 0.90 | 1.25 | 1.48 | 0.03 | 4.60 | | | | |
| | 20-30 | - | - | - | - | 8.0 | 183.9 | - | - | - | - | - | 9.80 | 1.25 | 2.09 | 0.04 | 5.20 | | | | |
| (b) Batten (Site 79) | | | | | | | | | | | | | | | | | | | | | |
| | 0-5 | 10.4 | 33.8 | 36.4 | 19.4 | 6.2 | 33.7 | 0.745 | 0.043 | X | 270 | X | 1.95 | 1.33 | 0.04 | 0.36 | 6.60 | | | | |
| | 20-30 | 17.6 | 22.8 | 37.0 | 22.6 | 6.0 | 95.5 | 0.13 | - | X | 200 | X | - | - | - | - | - | | | | |
| | 90-100 | 49.7 | 20.2 | 19.2 | 10.9 | 6.8 | 95.8 | - | - | - | - | - | 2.10 | 4.58 | 0.70 | 0.62 | 9.60 | | | | |

* I = Illite, K = Kaolinite, G = Goethite, S = Smectite, Tr = Trace
X = Below detection limit

APPENDIX IV

CHECKLIST OF PLANT SPECIES

The following are botanical species observed on sites visited during 26 June 1981 to 7 July 1981.

| LIFE FORM | GENUS AND SPECIES | FAMILY | COMMON NAME | OCCURRENCE (Community No.) |
|---|---|---|---|---|
| TREES: | *Acacia bidwillii* | Mimosaceae | corkwood wattle | 12 |
| | *A. shirleyi* | Mimosaceae | lancewood | 1 |
| | *Brachychiton diversifolium* | Sterculiaceae | northern kurrajong | 12, 13, 19, 22, 29, 32 |
| | *Erythrophleum chlorostachys* | Caesalpinaceae | ironwood | 6, 7, 8, 12, 13, 16, 17, 22, 23, 24, 27, 28, 29, 31,32, 33 |
| | *Eucalyptus aspera* | Myrtaceae | brittle range gum | |
| | *E. argillacea* | " | southern box | 36 |
| | *E. brevifolia* | " | snappy gum | 1, 4, 5, 11, 12, 13, 18, 19, 22, 27, 28 |
| | *E. camaldulensis* | " | red river gum | 3, 10 |
| | *E. clavigera* | " | cabbage gum | 12, 13, 17, 23, 27, 29, 32, 36 |
| | *E. confertiflora* | " | carbeen gum | 22 |
| | *E. dichromophloia* | " | red barked bloodwood | 6, 9, 18, 20, 25, 26, 28, 30, 35 |
| | *E. ferruginea* | " | rusty bloodwood | 7, 9, 11, 16, 18, 19, 20, 22, 26, 28, 30, 33 |
| | *E. foelscheana* | " | smooth barked bloodwood | 12 |
| | *E. grandifolia* | " | large leafed cabbage gum | 6, 11, 12, 13, 16, 20, 26, 27, 28, 35 |
| | *E. latifolia* | " | round leafed bloowood | |
| | *E. leucophloia* | " | snappy gum | 1, 4, 5, 11, 12, 13, 18, 19, 22, 25, 27, 28, 29, 31, 35, 38 |
| | *E. microtheca* | " | coolibah | 8, 10, 12, 13, 29, 32 |
| | *E. miniata* | " | Darwin woolly butt | 6, 7, 18, 26 |
| | *E. normantonensis* | " | Normanton box | |
| | *E. papuana* | " | ghost gum | 2, 8, 15 |
| | *E. phoenicea* | " | scarlet gum | 9, 18, 25, 35 |
| | *E. polycarpa* | " | grey bloodwood | |
| | *E. pruinosa* | " | silver leafed box | 12, 23, 24, 27, 36, 39 |
| | *E. tectifica* | " | northern box | 4, 5, 10, 11, 12, 13, 17, 20, 23, 26, 28, 29, 31, 35 |
| | *E. terminalis* | " | inland bloodwood | 4, 5, 8, 11, 12, 13, 16, 17, 19, 22, 23, 24, 27, 28, 29, 31, 34, 35, 36, 39 |

APPENDIX IV (Contd)

| LIFE FORM | GENUS AND SPECIES | FAMILY | COMMON NAME | OCCURRENCE (Community No.) |
|---|---|---|---|---|
| TREES: | *Gardenia fucata* | Rubiaceae | | |
| | *Grevillea heliosperma* | Proteaceae | | |
| | *G. pteridiifolia* | " | fern leaf grevillea | |
| | *G. refracta* | " | | |
| | *G. striata* | " | beefwood | 27 |
| | *Gyrocarpus americanus* | Hernandiaceae | cooliman | 22, 35 |
| | *Hakea arborescens* | Proteaceae | | |
| | *Lophostemon grandiflorus* | Myrtaceae | swamp mahogany | 3, 16 |
| | *Lysiphyllum cunninghamii* | Caesalpinaceae | bauhinia | 6, 8, 12, 22, 27, 29, 32, 34, 39 |
| | *Melaleuca nervosa* | Myrtaceae | paperbark | 6, 21, 23 |
| | *M. stenostachys* | " | | 28, 32 |
| | *M. viridiflora* | " | green melaleuca | 9, 21 |
| | *Owenia vernicosa* | Meliaceae | emu apple | 30 |
| | *Persoonia falcata* | Proteaceae | geebung | 17, 35 |
| | *Planchonia careya* | Lecythidaceae | cocky apple | 18 |
| | *Terminalia birdsariana* | Combretaceae | | |
| | *T. carpentariae* | " | | 10, 15 |
| | *T. canescens* | " | | 11, 12, 16, 17, 18, 28, 29, 31, 33 |
| | *T. ferdinandiana* | " | billy goat plum | |
| | *T. latipes* | " | | |
| | *T. platyphylla* | " | | 2 |
| | *T. volucris* | " | rosewood | |
| | *Timonus timon* | Rubiaceae | | |
| | *Wrightia saligna* | Apocynaceae | white wood | |
| SHRUBS: | *Abutilon indicum* | Malvaceae | Indian lantern flower | |
| | *Acacia acradenia* | Mimosaceae | | |
| | *A. conjunctifolia* | " | | 28 |
| | *A. dimidiata* | " | | 4, 5, 13, 16, 18, 19, 21, 23, 26 |
| | *A. farnesiana* | " | needle bush | 8, 10, 13, 29, 34, 35, 39 |

APPENDIX IV (Contd)

| LIFE FORM | GENUS AND SPECIES | FAMILY | COMMON NAME | OCCURRENCE (Community No.) |
|---|---|---|---|---|
| SHRUBS: | *A. gladioides* var. *gladioides* | " | | 27 |
| | *A. hammondii* | " | | 12, 18, 21, 35 |
| | *A. hemignosta* | " | | 14 |
| | *A. holosericea* | " | | 10 |
| | *A. latifolia* | " | | 35 |
| | *A. lycopodiifolia* | " | | 18, 21 |
| | *A. oswaldii* | " | nelia | 28, 29, 35 |
| | *A. ?plectrocarpa* | " | | 3, 21, 29 |
| | *A.* spp. | " | | 6, 7, 10, 12, 13, 14, 18, 19, 22, 27, 28, 31, 36, 38, 39 |
| | *A. subternata* | " | | 25 |
| | *A. sutherlandii* | " | | |
| | *A. tanumbirrinensis* | " | | 18 |
| | *A. torulosa* | " | | 28 |
| | *A. wickhamii* | " | | 1, 13, 29 |
| | *Alphitonia excelsa* | Rhamnaceae | red ash, soap bush | 29 |
| | *Antidesma parvifolium* | Euphorbiaceae | | 28 |
| | *Atalaya hemiglauca* | Sapindaceae | white wood | 6, 8, 12, 13, 14, 27, 29, 31, 32, 34 36, 39 |
| | *Atylosia pubescens* | Fabaceae | | 12 |
| | *Bossia bossioides* | " | | 6, 9, 21, 30 |
| | *Brachychiton diversifolium* | Sterculiaceae | northern kurrajong | 20 |
| | *Buchanania obovata* | Anacardiaceae | green plum | |
| | *Calytrix brachychaeta* | Myrtaceae | fringe myrtle | 37 |
| | *C. extipulata* | " | turkey bush | 6 |
| | *C. mimiana* | " | | 28 |
| | *Carissa lanceolata* | Apocynaceae | conkerberry | 1, 6, 11, 12, 13, 18, 19, 20, 23, 27, 29, 31, 32, 34, 36, 39 |
| | *Cassia venusta* | Caesacpinaceae | cockroach bush | |
| | *Celtis philippensis* | Ulmaceae | | 28 |
| | *Cochlospermum fraseri* | Cochlospermaceae | kapok bush | 19, 22, 29, 34, 35 |
| | *Dodonaea lanceolata* | Sapindaceae | hop bush | 1 |

APPENDIX IV (Contd)

| LIFE FORM | GENUS AND SPECIES | FAMILY | COMMON NAME | OCCURRENCE (Community No.) |
|---|---|---|---|---|
| SHRUBS: | *D. oxyptera* | Sapindaceae | | 4, 5, 13, 27, 28, 37 |
| | *D. physocarpa* | " | | 11, 12, 13, 16, 20, 23, 26, 28 32 |
| | *D. polyzyga* | " | native hops | 27 |
| | *Dolichandrone heterophylla* | Bignoniaceae | | 13, 23 |
| | *D. filiformis* | " | | 23, 27 |
| | *Distichostemon hispidulus* | Sapindaceae | | 7, 11, 13, 18, 29 |
| | *Erythrophleum chlorostachys* | Caesalpinaceae | ironwood | 16, 20 |
| | *Erythroxylum ellipticum* | Erythroxylaceae | kerosene wood | 6, 13, 27, 28, 29, 33 |
| | *Eucalyptus normantonensis* | Myrtaceae | Normanton box | 37 |
| | *Excaecaria parvifolia* | Euphorbiaceae | gutta percha | 3, 34 |
| | *Ficus leucotrica* | Moraceae | native fig | 28 |
| | *F. opposita* | " | rough leafed fig | 2, 8, 11, 22 |
| | *Galactia* sp., | Papilionaceae | | 38 |
| | *Gardenia* sp., | Rubiaceae | | 12, 18, 23 |
| | *Grevillea dimidiata* | Proteaceae | | 9, 11, 13, 35 |
| | *G. heliosperma* | " | | 20 |
| | *G. pteridiifolia* | " | fern-leaf grevillea | 6, 9, 28, 38 |
| | *G. parallela* | " | | 18 |
| | *G. refracta* | " | | 1, 6, 18, 35 |
| | *G. striata* | " | | 24, 27, 28 |
| | *G. wickhamii* | " | | |
| | *Grewia retusifolia* | Tiliaceae | emu berries | 2, 3, 4, 8, 10, 11, 12, 15, 16, 17, 23, 27, 28, 29, 31, 35, 39 |
| | *Hakea arborescens* | Proteaceae | | 3, 8, 10, 11, 12, 14, 15, 22, 23, 27, 29, 31, 32, 34, 35, 36, 39 |
| | *Hibiscus meraukensis* | Malvaceae | merauk hibiscus | 10, 13, 17, 39 |
| | *H. panduriformis* | " | | 16 |
| | *H. zonatus* | " | | |
| | *Jacksonia dilatata* | Papilionaceae | | 6, 28 |
| | *J.* sp., | " | | 21, 26, 28, 35 |
| | *Lysiphyllum cunninghamii* | Caesalpinaceae | bauhinia | 8, 10, 11, 12, 13, 22, 28, 29, 31, 32, 35, 36, 39 |

APPENDIX IV (Contd)

| LIFE FORM | GENUS AND SPECIES | FAMILY | COMMON NAME | OCCURRENCE (Community No.) |
|---|---|---|---|---|
| SHRUBS: | *Maytenus cunninghamii* | Celastraceae | | 13 |
| | *Melaleuca acacioides* | Myrtaceae | paper bark | |
| | *M. alsophila* | " | " " | 14 |
| | *M. nervosa* | " | " " | 38 |
| | *M. stenostachya* | " | " " | 25, 28, 38 |
| | *M. viridiflora* | " | green melaleuca | 6, 16, 20, 28, 35, 38 |
| | *Owenia vernicosa* | Meliaceae | emu apple | |
| | *Petalostigma banksii* | Euphorbiaceae | quinine bush | 13 |
| | *P. pubescens* | " | " " | 1, 13, 21, 28, 29, 33, 35 |
| | *P. quadriloculare* | " | " " | 9, 11, 13, 16, 18, 20, 21, 25, 26, 28, 31, 38 |
| | *Planchonia careya* | Lecythidaceae | cocky apple | 29 |
| | *Santalum lanceolatum* | Santalaceae | sandalwood | |
| | *Securinega virosa* | Euphorbiaceae | | 1, 2, 3, 4, 5, 13, 14, 17, 18, 22, 27 |
| | *Sida* sp., | Malvaceae | | |
| | *Tephrosia* spp., | Papilionaceae | | 1, 3, 6, 11, 12, 13, 14, 16, 17, 18, 19, 20, 22, 23, 26, 28, 29, 31, 32, 33, 35, 36, 38 |
| | *Terminalia canescens* | Combretaceae | | |
| | *T. platyphylla* | " | | |
| | *T. platyptera* | " | | |
| | *T. pterocarya* | " | | 28 |
| | *T. volucris* | " | rosewood | 10, 11, 36 |
| | *Verticordia* sp., | Myrtaceae | feather flower | 28 |
| | *Vitex acuminata* | Verbenaceae | | 19 |
| | *Wrightia saligna* | Apocynaceae | whitewood | 10, 15, 27, 29, 32, 35 |
| GRASSES: | *Aristida browniana* | Poaceae | three awn grass | 11 |
| | *A. holorantha* | | " | |
| | *A. hygrometrica* | | corkscrew grass | 7, 14, 16, 17, 28, 33, 35 |
| | *A. inaequiglumis* | | unequal threeawn | 11, 16, 27, 28, 31, 32, 35 |
| | *A. ingrata* | | " | |
| | *A. latifolia* | | feathertop wiregrass | 11, 12, 13, 14, 22, 27, 28, 32, 34, 36, 39 |

APPENDIX IV (Contd)

| LIFE FORM | GENUS AND SPECIES | FAMILY | COMMON NAME | OCCURRENCE (Community No.) |
|---|---|---|---|---|
| GRASSES: | *A. muricata* | Poaceae | " | |
| | *A.* spp., | | " | 1, 8, 11, 12, 13, 14, 16, 17, 19, 22, 23, 24, 27, 28, 30, 31, 32, 33, 34, 39 |
| | *Astrebla* sp., | | Mitchell grass | 39 |
| | *Bothriochloa decipiens* | | pitted bluegrass | 2 |
| | *Brachiaria* sp., | | | 29, 39 |
| | *Brachyachne ambigua* | | | 10, 27 |
| | *Brachyachne convergens* | | spider grass | 2, 11, 27, 32, 34, 35, 36, 39 |
| | *Chrysopogon fallax* | | goldenbeard grass | 1, 2, 3, 4, 5, 6, 8, 10, 11, 12, 13, 14, 15, 17, 18, 20, 22, 23, 27, 28, 31, 32, 33, 34, 35, 36, 38, 39 |
| | *Coelorhachis rottboellioides* | | blady grass | 2, 8, 15 |
| | *Cymbopogon bombycinus* | | lemon scented grass | 1, 17, 19, 22, 28 |
| | *Dicanthium annulatum* | | sheda grass | 29, 34 |
| | *D. fecundum* | | curley bluegrass | 4, 5, 8, 10, 12, 13, 14, 16, 18, 23, 27, 29, 31, 34, 35, 36, 39 |
| | *D. tenuiculum* | | tassel blue grass | 3, 11, 12, 13, 17 |
| | *Digitaria bicornis* | | " " | 2 |
| | *D.* sp., | | | 1, 8, 13, 17, 19, 27, 31, 39 |
| | *Echinochloa colonum* | | barnyard grass | 2 |
| | *Enneapogon asperatus* | | | 11 |
| | *E. ?caerulescens* | | | |
| | *E. glaber* | | hairless nineawn | 27 |
| | *E. oblongus* | | purple-head nineawn | 1, 27 |
| | *E. pallidus var. breviseta* | | cone-top nineawn | |
| | *E. planifolius* | | limestone nineawn | |
| | *E. polyphyllus* | | leafy nineawn | 2, 12, 14, 17, 18, 22, 31, 34, 36 |
| | *E.* spp., | | | 12, 28, 35, 38 |
| | *Eragrostis japonica* | | delicate lovegrass | |
| | *E.* sp., | | | 2, 12, 13, 14, 15, 17, 27, 28, 29, 31, 35 |
| | *E. tenellula* | | | 10, 11, 12, 23, 27, 28, 29, 35, 38 |
| | *Eriachne basedowii* | | | 12, 31 |
| | *Eriachne ciliata* | | | 1, 12, 13, 18, 28, 33 |

APPENDIX IV (Contd)

| LIFE FORM | GENUS AND SPECIES | FAMILY | COMMON NAME | OCCURRENCE (Community No.) |
|---|---|---|---|---|
| GRASSES: | *E. mucronata* | Poaceae | mountain wanderrie grass | 1, 4, 5, 7, 12, 13, 14, 17, 18, 22, 23, 26, 27, 28, 29, 31, 36 |
| | *E.* sp., | | | 38 |
| | *E. squarrosa* | | | 14, 35 |
| | *Eulalia fulva* | | brown top | 1, 4, 5, 11, 12, 13, 14, 16, 17, 19, 20, 23, 24, 26, 27, 28, 29, 33, 36, 39 |
| | *Heteropogon contortus* | | bunch spear grass | 2, 3, 6, 8, 10, 11, 12, 13, 14, 15, 16, 17, 19, 22, 24, 27, 29, 31, 32, 33, 34, 35, 36 |
| | *H. triticeus* | | giant spear grass | 12, 15 |
| | *Iseilema vaginiflorum* | | flinders grass | 8, 27, 34, 36, 39 |
| | *Leptochloa neesii* | | canegrass | |
| | *Panicum decompositum* | | native millet | 1, 2, 8, 12, 14, 22, 24, 34, 35, 39 |
| | *P. mindanense* | | panic grass | 15, 32 |
| | *P.* sp., | | | 10, 15 |
| | *Perotis rara* | | comet grass | |
| | *Plectrachne pungens* | | soft spinifex | 6, 7, 11, 12, 13, 16, 18, 19, 20, 21, 22, 25, 26, 27, 28, 29, 30, 31, 32, 33, 35, 37, 38 |
| | *Pseudopogonatherum contortum* | | black top | |
| | *Schizachyrium fragile* | | red spathe grass | 6, 7, 11, 12, 13, 14, 17, 18, 19, 23, 27, 28, 29, 31, 33, 34, 35, 36, 38, 39 |
| | *Sehima nervosum* | | white grass | 6, 11, 12, 13, 17, 18, 22, 23, 24, 27, 28, 29, 30, 35, 36 |
| | *Setaria apiculata* | | piaeon grass | 4, 5, 7, 11, 17, 19, 22, 28, 32 |
| | *Sorghum plumosum* | | perennial spear grass | 4, 5, 7, 8, 11, 12, 13, 14, 16, 18, 20, 22, 24, 26, 28, 29, 33 |
| | *S.* sp., | | annual spear grass | 17, 24, 27, 31, 35, 39 |
| | *Sporobolus australasicus* | | rats tail grass | 1, 12, 13, 17, 19, 23, 24, 29, 31, 36, 39 |
| | *S. lenticularis* | | | |
| | *Thaumastochloa major* | | | |
| | *Themeda australis* | | kangaroo grass | 3, 4, 5, 8, 11, 12, 13, 23, 24, 27, 28, 29, 31, 32, 36 |
| | *Vetiveria pauciflora* | | | 2, 3 |

APPENDIX IV (Contd)

| LIFE FORM | GENUS AND SPECIES | FAMILY | COMMON NAME | OCCURRENCE (Community No.) |
|---|---|---|---|---|
| HERBS: | *Abutilon* sp., | Malvaceae | | 39 |
| | *Ammannia* sp., | Lythraceae | | |
| | *Andrachne decaisnei* | Euphorbiaceae | | 39 |
| | *Bergia pedicellaris* | Elatinaceae | | |
| | *Bidens bipinnata* | Asteraceae | cobbler's pegs | 1 |
| | *Boerhavia diffusa* | Nyctaginaceae | tah-vine | 27 |
| | *Borreria* sp., | Rubiaceae | | 12, 28, 36 |
| | *Cassia pumila* | Caesalpinaceae | | 21 |
| | *Chamaesyce hirta* | Euphorbiaceae | | 2 |
| | *C. vachelii* | " | | |
| | *Cleome viscosa* | Capparidaceae | | 37 |
| | *Crotalaria novae-hollandiae* | Papilionaceae | rattle pod | 12 |
| | *Cyperus* spp., | Cyperaceae | sedge | 2, 8, 13, 19, 20, 22, 27, 28, 34, 35, 36, 39 |
| | *Drosera petiolaris* | Droseraceae | sundew | 28 |
| | *Fibristylis* spp., | Cyperaceae | sedge | 19, 22, 24, 27, 28, 29, 35, 39 |
| | *Hedyotis gladioides* | Rubiaceae | | 38 |
| | *Hybanthus enneaspermus* | Violaceae | | |
| | *Jasminum aemulum* | Oleaceae | | 13 |
| | *Leptocarpus spathaceus* | Restoniaceae | twine rush | 38 |
| | *Nelsonia brunellodes* | Acanthaceae | | 2 |
| | *Philydrum lanuginosum* | Philydraceae | woolly waterlily | 9 |
| | *Polycarpaea* sp., | Caryophyllaceae | | 13, 17, 22, 23, 27, 29, 35, 36, 39 |
| | *P. spirostylis* ssp., *glabra* | " | | 6 |
| | *Psoralea plumesa* | Fabraceae | | 27 |
| | *Pterocaulon* sp., | Asteraceae | flannel weed | 2 |
| | *Ptilotus* sp., | Amaranthaceae | mulla-mulla | 13, 23, 36 |
| | *Rhynchosia minima* | Fabaceae | | 39 |
| | *Rhynchospora affinis* | Cyperaceae | sedge | 20, 35, 38 |
| | *Rostellularia pogonanthera* | Acanthaceae | | 39 |
| | *Sida* sp., | Malvaceae | | 2 |
| | *Stemodia vixcosa* | Scrophulariaceae | | 39 |

APPENDIX IV (Contd)

| LIFE FORM | GENUS AND SPECIES | FAMILY | COMMON NAME | OCCURRENCE (Community No.) |
|---|---|---|---|---|
| HERBS: | *Stylosanthes humilis* | Papilionaceae | Townsville stylo | 2 |
| | *Tephrosia* sp., | " | | |
| | *Trichodesma zeylanicum* | Boraginaceae | cattle bush | 2, 22, 28, 39 |
| | *Waltheria indica* | Sterculiaceae | | 2, 29 |
| | *Unnamed genus and species | Scrophulariacea | | |
| TREE PARASITES: | *Endrophthoe glabrescens* | Loranthaceae | mistletoes | |
| | *Lysiana spathulata* ssp., *spathulata* | " | | |
| FERNS AND ALLIES: | *Platyzoma microphyllum* | Adiantaceae | braid fern | 21 |

# APPENDIX V

## LAND SYSTEM MAPS

A Land System Map of the Upper McArthur River catchment at a scale of 1:250000, accompanies this report.

Copies of the original 1:100000 map sheets are available from the Land Conservation Unit, Conservation Commission of the Northern Territory.