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No: 84/7

**THE LAND SYSTEMS OF
FINNISS RIVER STATION**

by

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1.0 INTRODUCTION

1.1 General

The reconnaissance survey of the land systems on Finniss River Station was the result of a request for comment on various development proposals put forward by the owners of the Station.

In order to assess these proposals it was decided to extend the land resource mapping of the Darwin Regional Area (Land Conservation unit, in preparation) to include the whole Station (it already covers the eastern third), and evaluate this mapping in terms of broadscale development potential.

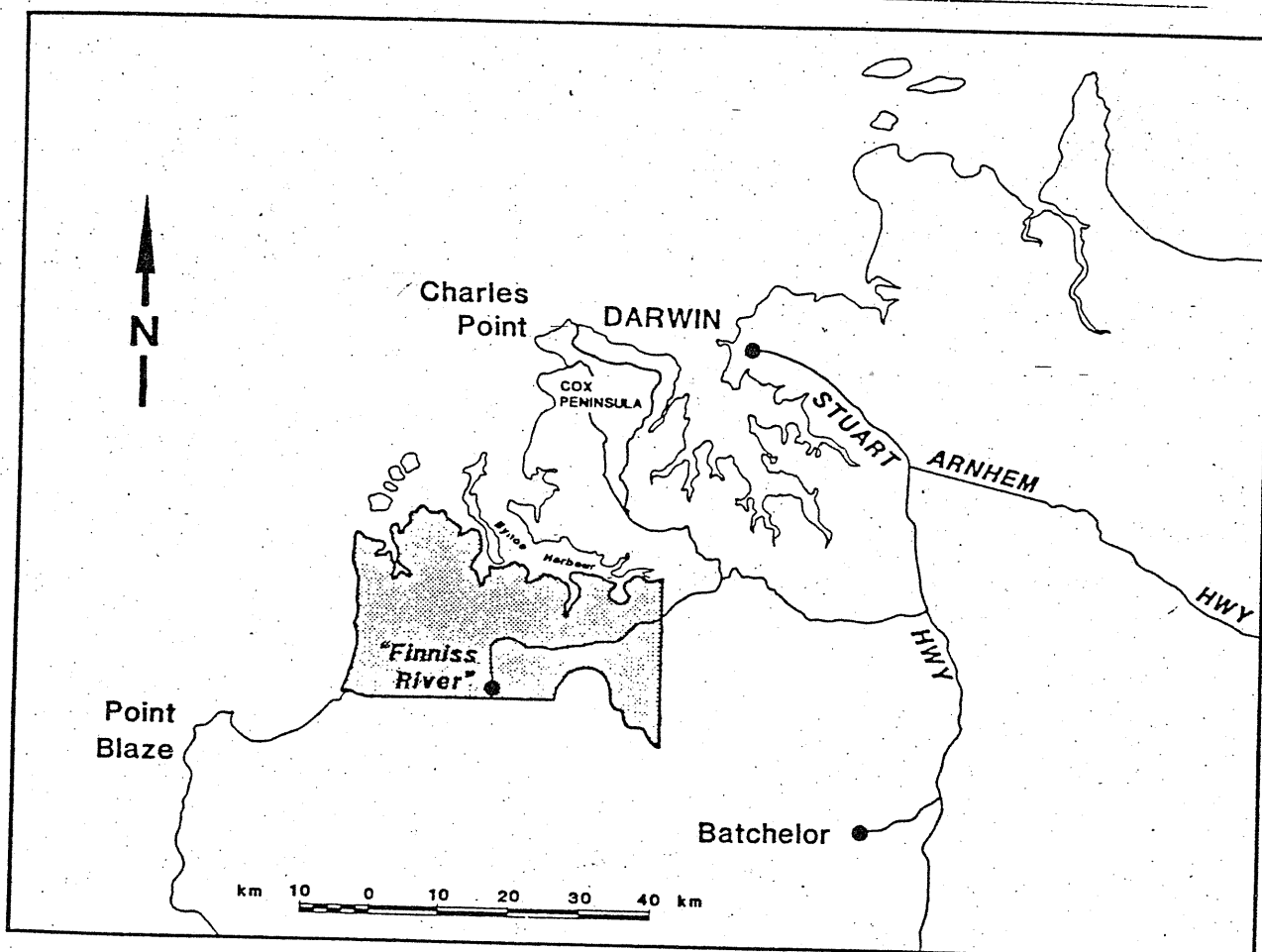
1.2 Size and Location of the Survey Area

The lease is approximately 700 km and, including the areas of freehold within the lease, the total survey area is 800 km. The location of the Station is in Figure 1.

1.3 Previous Mapping

Approximately one-third of the survey area has previously been mapped (Land Conservation Unit, in prep.). The mapping scale of 1:100,000 of this earlier mapping was continued over Finniss River. Some minor changes in the previous mapping were made in the light of subsequent field sampling conducted during this survey.

FIGURE 1: LOCATION OF SURVEY AREA - FINNISS RIVER STATION



1.4 Methodology

The land systems were delineated initially on high level RC9 black and white aerial photography. This initial delineation was backed up by the visual interpretation of a 1:100,000 false colour composite LANDSAT image, and amendments were made where thought necessary.

Field sampling sites were chosen to be representative of the range of units that could be observed from the aerial photographic interpretation. Where access created difficulties, some extrapolation of adjoining land system mapping was conducted.

Field work was undertaken during 13-20th July, 1982, by 4 x 4 vehicles and, 40 sites were described. This represents a site intensity of approximately 1 site/20 km. A further 16 sites were inspected on traverses through potential development sites on the Station, the results of which have been incorporated into the overall study.

At the completion of field work, final delineated land system boundaries were again checked and amended in the light of analysed field data. The boundaries were optically transferred onto a prepared base map at 1:100,000 and the final land system map produced.

2.0 POTENTIAL FOR DEVELOPMENT

2.1 The Land-Systems of Finnis River

- An Evaluation of their Potential for Development

Three types of development have been assessed from the Land System mapping and descriptions. These are:

1. Intensive Agricultural and Horticultural Development;
2. Extensive Horticultural and Agricultural Development;
and
3. Pastoral Utilisation and Improvement.

- (1) Intensive Agricultural and Horticultural Development infers extensive clearing with annual cultivations and sowings to produce a crop; e.g. rice, maize or market gardening.

Important factors considered in the evaluation of the systems were the requirements for arable soil, relatively free from physical and chemical constraints, a free draining soil and site, and minimal slopes and soil erodibilities.

- (2) Extensive Agricultural and Horticultural Development infers extensive clearing, but after initial establishment, no annual continuing cultivations. Land considered suitable for (1) above would also be generally suitable for this form of development. This land would be more suited to the production of hay or fruit tree crops.

- (3) Increased Pastoral Utilisation and Improvement. This evaluation concerns the potential for pasture improvement with introduced species or the increased utilisation of existing native pasture through more effective grazing control. For example, the introduction

of water tolerant grasses on flood plains.

Table No. 1 indicates the evaluations, and with reference to the area calculated in Table No. 2, the extent of land capable of being developed can be estimated.

2.2 Conclusions

1. Areas Capable of Intensive Development:

As concluded from the evaluations tabled in Table No. 1, there are few areas on Finniss River Station with a high capability for intensive agricultural or horticultural development; e.g. broadacre cropping or market gardening. The potential for rice development exists on the flood plains of Fabian and Flatwood land systems although a large technological input would be required to develop the area.

2. Areas Capable of Extensive Development:

These are areas of land on Finniss River which have the capability of being developed, for example, to hay production or fruit tree crops. Areas of suitable land occur in Keefer's Hut, Kosher and Grappa land systems. However, the sandy nature of many soils would only suit the production of crops which require a tight control of irrigation or fertiliser application; e.g. the sands and yellow podzolics in Grappa land system. The production of hay from native grasses (e.g. *Hymenachne acutigluma*) has also some potential from the seasonally inundated plains of Paludal land systems.

3. Areas Capable of Pastoral Improvement:

Whilst much of the land on Finniss River does not have a high potential for pasture improvement, there is scope for the introduction of improved species on areas of

Keefer's Hut, Kosher, Gecko, Grappa, Copeman and Paludal land systems, or at least the improvement of specific areas on upland terrain to be used in a grazing rotation with the seasonally inundated plain of Paludal, Pinwinkle and Copeman land systems. Areas within Grappa and Keefer's Hut land systems would offer the most suitable locations.

2.3 Other Developments

- Forestry: Significant areas of *Melaleuca* forests and Mangrove forests exist in Pinwinkle and Littoral land systems respectively which may have potential for timber production.

Table No. 1 Land System (Units) vs. Development Potential

Land System	Unit	Proposed Development			Overall Evaluation
		Intensive Ag. & Horticulture	Extensive Hort. & Extensive Ag.	Pastoral	
PEAKED	1	N	N	N	N
	2	N	N	N	
	3	N	N	N	
BAKER	1	N	N	N	C ₂ Pastoral
	2	N	N	C ₂	
	3	N	N	N	
BEND	1	N	N	N	C ₂ Pastoral
	2	N	N	C ₂	
	3	N	N	C ₂	
BUSTARD	1	N	N	N	N
	2	N	N	N	
	3	N	C ₂	C ₂	
KEEFER'S HUT	1	N	C ₁	C ₁	C ₁ Pastoral C ₁ Ext. Hort.
	2	C ₂	C ₁	C ₁	
	3	N	N	N	
	4	N	N	N	
KOSHER	1	N	C ₁	C ₁	C ₁ Ext. Hort. C ₁ Pastoral
	2	N	N	N	
	3	N	N	N	
	4	N	N	C ₂	
GECKO	1	N	C ₁	C ₁	C ₁ Ext. Hort. Pastoral
	2	N	C ₂	C ₁	
	3	N	N	C ₂	
GRAPPA	1	N	C ₂	N	C ₁ Ext. Hort. C ₁ Pastoral
	2	N	C ₁	C ₂	
	3	N	N	C ₂	
	4	N	C ₂	C ₁	
FABIAN	1	C ₂	N	N	C ₂ Int. Ag., (rice?)
	2	N	N	N	
	3	N	N	N	

Land System	Unit	Proposed Development			Overall Evaluation
		Intensive Ag. & Horticulture	Extensive Hort. & Extensive Ag.	Pastoral	
FLATWOOD	1	C ₂	N	N	C ₂ Int. Ag. (rice?)
	2	C ₂	N	N	
	3	N	N	N	
	4	N	N	N	
COPEMAN	1	N	C ₂	N	C ₁ Pasture utilisation & develop.
	2	N	C ₂	C ₁	
	3	N	N	N	
PALUDAL	1	N	N	C ₁	C ₁ Pasture ut. & Dev.
	2	N	N	C ₁	
PINWINKLE	1	N	N	N	C ₂ Ext. Ag. & Pastoral development & utilis.
	2	N	N	N	
	3	N	C ₂	C ₂	
	4	N	N	C ₂	
LITTORAL	1	N	N	N	N
	2	N	N	N	
	3	N	N	N	
CARPENTARIA DUNES	1	N	N	N	N
	2	N	N	N	
	3	N	N	N	

REFERENCE: N No potential, or extremely limited potential.

C₂ Either only capable of development using high levels of input or special species.

C₁ Contain areas capable of sustaining the proposed development.

3.0 LAND SYSTEMS OF THE SURVEY AREA

3.1 Land System Description

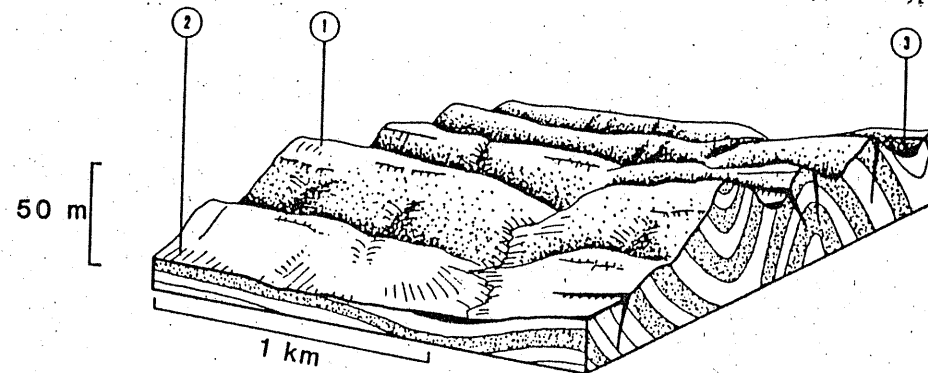
A summary of the Land System descriptions is presented together with a detailed description of component units. A more comprehensive account of the land systems will be found in the report of the 'The Land Systems of the Darwin Regional Area.

Table No. 2: Approximate Areas of Systems Occurring on Finniss R. Station

	km ² (excl. F'hold)	km ² (incl. F'hold)
BAKER	1	1
BEND	2.72	2.72
BUSTARD	13.28	13.28
CARPENTARIA DUNES	16.32	16.32
COPEMAN	4.48	4.48
FABIAN	12.32	15.04
FLATWOOD	2.72	2.72
GECKO	65.44	91.68
GRAPPA	112.8	183.2
KEEFER'S HUT	165.44	172
KOSHER	74.56	74.56
LITTORAL	129.44	129.44
PALUDAL	24.96	26.56
PEAKED	13.28	13.28
PINWINKLE	49.92	52
TOTAL	688.68	798.28

BAKER LAND SYSTEM (B)

Rugged dissected uplands with generally strike aligned ridges, intervening narrow valleys and short lower slopes; developed on siltstone, quartz greywacke, quartzite and minor conglomerates of Lower Proterozoic formations; shallow lithosols and outcrop; eucalypt woodland.



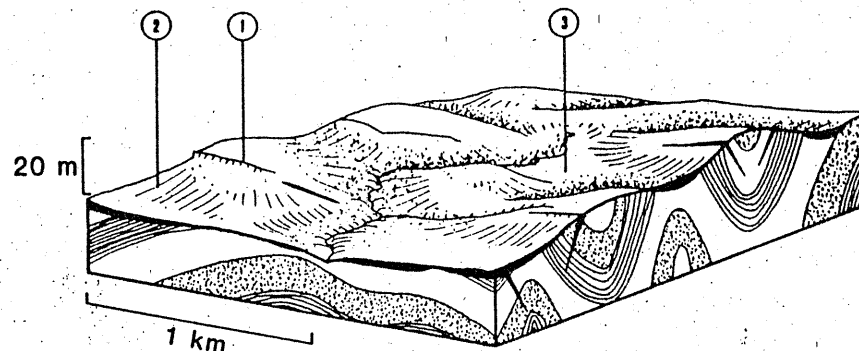
LOWER PROTEROZOIC SEDIMENTS
 ALLUVIUM & COLLUVIUM

Unit	%	Landform	Soils	Vegetation	Capability		
					Urban	Arable	Pasture
B1	70	Steep hillslopes and ridges, isolated lower hills, usually strike-aligned; commonly 10-30 m high, less frequently over 50 m; slopes to 40%; rocky frequent outcrop; very rapid drainage.	Shallow lithosols (L1) and outcrop.	Woodland (<i>E. dicromophloia</i> , <i>E. bleeseri</i> , <i>E. miniata</i> , <i>E. tetradonta</i> , <i>E. tectifera</i> , <i>E. foelscheana</i>) with a low tree understory (<i>Terminalia ferdinandiana</i> , <i>Xanthostemon</i> , <i>Owenia vernicosa</i>) and shrub layer (<i>Grevillea decurrens</i> , <i>Livistona humilis</i> , <i>Cochlospermum fraseri</i> , <i>Cycas armstrongii</i>).	N	N	N
B2	15	Gentle lower slopes below ridges; gently concave; relief to 10 m; slopes less than 8%; minor outcrop of rock and of laterite (lower in unit); moderately rapid drainage.	Moderately deep lithosols (L1) and moderately deep yellow massive earths (M2).		Steep slopes, shallow soils, outcrop.		
B3	15	Narrow linear alluvial flats between ridges; slopes generally less than 2%; slow drainage.	Moderately deep hard mottled yellow duplex soils.	Open woodland (<i>E. bigalerita</i> , <i>E. alba</i> var. <i>australasica</i> , <i>E. polycarpa</i> , <i>Lophostemon</i>) or perennial grassland (<i>Themeda australis</i> , <i>Eriachne burkittii</i> , <i>Germania grandiflora</i>); scattered to dense suckers (<i>Lophostemon</i> , <i>Melaleuca viridiflora</i>).	N	N	N

Low capability for urban, arable or pasture development due to extent of steep terrain and very shallow stony soils.

BEND LAND SYSTEM (Be)

Low ridges and hills of Lower Proterozoic siltstone, sandstone and quartz, with minor alluvial flats and stream lines; lithosols and shallow mottled yellow duplex soils; eucalypt woodland, with grassland on drainage lines.



ALLUVIUM & COLLUVIUM LOWER PROTEROZOIC SEDIMENTS

Unit	%	Landform	Soils	Vegetation	Capability		
					Urban	Arable	Pasture
					N	N	N
Be1	60	Upper slopes and crests of low, strike-aligned hills; commonly less than 15 m high; slopes to 10 m; scattered outcrop; rapid drainage.	Shallow lithosols (L1), minor moderately deep lithosols (L2), shallow yellow massive earths (M2).	Woodland (<i>E. bleeseri</i> , <i>E. miniata</i> , <i>E. tectifera</i> , <i>E. tetradonta</i> , <i>E. clavigera</i> , <i>Erythrophloeum</i>) with scattered low trees (<i>Terminalia ferdinandiana</i> , <i>Xanthostemon</i> , <i>Gardenia megasperma</i> , <i>Acacia</i> sp.) and shrubs (<i>Cycas</i> , <i>Grevillea decurrens</i> , <i>Livistona humilis</i> , <i>Cochlospermum fraseri</i>); sparse to mod. dense perennial grasses (<i>Eriachne avenacea</i> , <i>Heteropogon triticeus</i> , <i>Plectrachne pungens</i> , <i>Sorghum plumosum</i>).	Very gravelly shallow soils.		
					C ₂	N	C ₂
Be2	25	Gentle lower slopes below Be1; up to 400 m wide; relief to 5 m; slopes to 5%; infrequent laterite benches and pavements low in unit; rare rock outcrop; moderately rapid drainage.	Mod. deep (L2) lithosols, gravelly yellow massive earths (M2).	Woodland (<i>Erythrophloeum chlorostachys</i> , <i>E. miniata</i> , <i>E. tetradonta</i> , <i>E. clavigera</i>) with scattered low trees (<i>Terminalia ferdinandiana</i> , <i>Gardenia megasperma</i> , <i>Acacia</i> sp.) and shrubs (<i>Cycas</i> , <i>Livistona humilis</i> , <i>Pandanus</i> sp.); perennial grasses (<i>Sorghum plumosum</i> , <i>Heteropogon triticeus</i> , <i>Plectrachne pungens</i>).	Shallow gravelly soils.		

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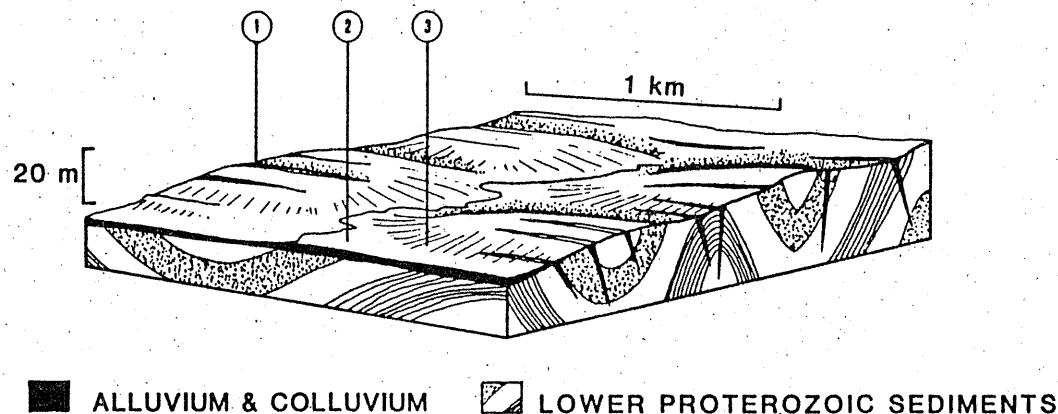
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Unit	%	Landform	Soils	Vegetation	Capability		
					Urban	Arable	Pasture
Be3	15	Alluvial flats, rarely channelled, to 500 m wide; slopes generally less than 2%; slow drainage.	Hard mottled yellow duplex soils (D3a, D3b).	Perennial grassland (<i>Eriachne burkittii</i> , <i>Themeda australis</i> , <i>Alloteroopsis semialata</i>) with scattered trees (<i>E. polycarpa</i> , <i>E. papuana</i> , <i>Melaleuca viridiflora</i>) and shrubs (<i>Grevillea pteridiifolia</i> , <i>Pandanus</i> sp.).	N	N	N
					Site drainage.		

Mostly low capability for urban, arable and pasture development due to very gravelly, shallow soils.

BUSTARD LAND SYSTEM (Bs)

Very low ridges and hills on Lower Proterozoic sediment and intervening alluvial flats; shallow and moderately deep lithosols with minor shallow yellow massive earths and earthy sands; eucalypt woodland, open woodland and low open woodland, shrubland to grassland on alluvial flats.

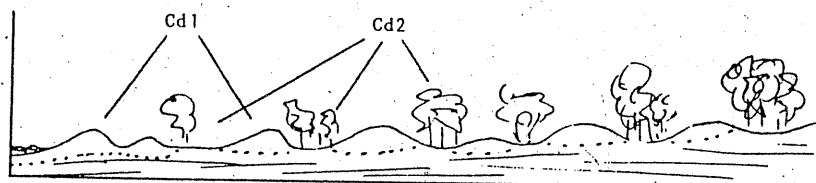


Unit	%	Landform	Soils	Vegetation	Capability		
					Urban	Arable	Pasture
					C ₂	N	C ₂
Bs1	70	Gently undulating upland plains interspersed with low linear stoney (quartz) and gravelly ridges; laterite and quartz outcrop common on ridges; relief to 8 m; slopes to 6%; rapid drainage.	Moderately deep lithosols (L2); less common shallow yellow massive earths (M2).	Extremely variable; woodland or open woodland (<i>E. tetradonta</i> , <i>E. miniata</i> , <i>E. bleeseri</i> , <i>E. confertiflora</i>) with scattered shrubs (<i>Livistona humilis</i> , <i>Grevillea decurrens</i> , <i>Acacia</i> sp.) and suckers (<i>Eucalyptus</i> spp., <i>Erythrophloeum</i> , <i>Petalostigma</i>) with scattered shrubs and suckers as above; or low shrubland (<i>Eucalyptus</i> spp., <i>Xanthostemon paradoxus</i> , <i>Buchanania</i> and <i>Erythrophloeum</i> suckers, <i>Petalostigma</i>).	Very gravelly soils, outcrop.		
Bs2	25	Alluvial flats to 200 m wide generally non-incised; very slow drainage.	Hard mottled yellow duplex soils (D3a), earthy sands (S1a) co-dominant.	Perennial grassland (<i>Eriachne burkittii</i> , <i>Themeda australis</i> , <i>Alloterropsis semialata</i>) with scattered shrubs (<i>Lophostemon lactifluus</i> , <i>Melaleuca viridiflora</i> , <i>Grevillea pteridiifolia</i>).	N	N	N
					Site drainage.		
Bs3	5	Gentle lower slopes, occasionally between Bs1 and Bs2; relief less than 5 m; slopes to 3%; slow drainage.	Hard mottled yellow duplex soils (D2), minor gravelly yellow massive earths (M2).	Woodland (<i>E. polycarpa</i> , <i>Lophostemon</i>) with low tree understorey (<i>Petalostigma</i> , <i>Banksia dentata</i> , <i>Owenia vernicosa</i>) and scattered shrubs (<i>Melaleuca dealbata</i> , <i>M. viridiflora</i> , <i>Grevillea pteridiifolia</i>); perennial grasses (<i>Themeda australis</i> , <i>Sorghum plumosum</i> , <i>Eriachne avenacea</i>).	N	N	C ₂
					Site drainage.		

Moderate capability for urban and pastoral development on upland areas; remainder subject to wet season waterlogging.

CARPENTARIA DUNES (Cd)

Areas of major dunes and beach ridge systems occurring north of the mouth of Finniss River.



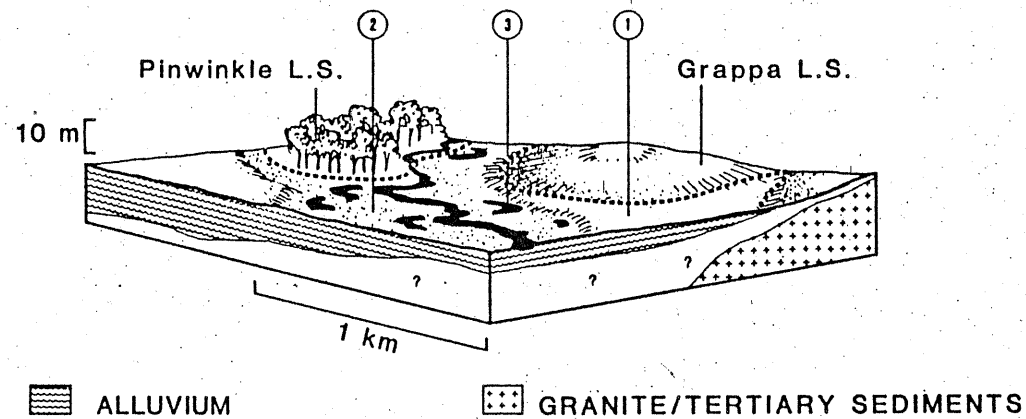
Unit	%	Landform	Soils	Vegetation	Capability		
					Urban	Arable	Pasture
Cd1	30	Coastal dune complex; active and stable beach ridges, up to 1 km wide; active outer dune shelving seawards up to gradients of 40%; deep; calcareous sands; up to 5 fixed dunes, each up to 200 m wide, 5 m high, with slopes up to 6%; deep siliceous sands and earthy sands.	Calcareous sands (S3).	Low Grassland, (<i>Sorghum</i> sp. <i>Chrysopogon fallax</i> and <i>Spinifex longifolius</i>) with emergent trees (<i>Melaleuca dealbata</i>).	N	N	N
					Tidal flooding, seasonal wave erosion.		
Cd2	70	Inter-dune swales up to 100 m wide; slopes up to 0.8%; coastal outcrops of laterite, or of calcareous beach rock, up to 50 m wide on 1% slopes, overlain by sandy beach to landward; tidal flooding over lower areas of unit; lateral seepage and run-off concentrated along swales.	Weakly cracking clays over sand in inter-dune swales; uniform saline clays (CS1) over sands in swales where tidal flooding occurs.	M.H.W.*, mainly non-eucalypts (<i>Acacia</i> , <i>Pandanus</i> , <i>Abrus</i> , <i>Eugenia</i> , <i>Canarium</i>) with lianes or semi-deciduous closed forest as for Kh1.	N	N	N

Low capability for development due to tidal inundation.

* Mid-High Woodland.

COPEMAN LAND SYSTEM (Cm)

Low swampy coastal plains, freshwater over estuarine clays, black cracking clays over saline muds; grassland.

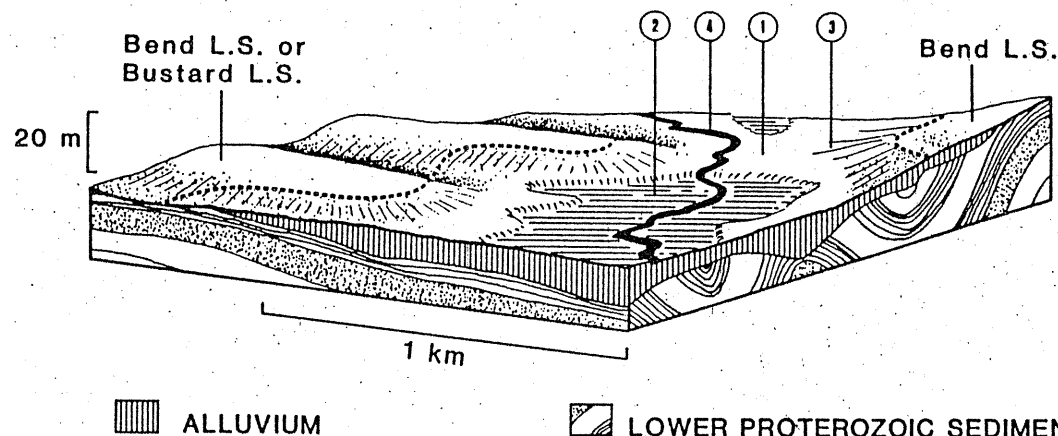


Unit	%	Landform	Soils	Vegetation	Capability		
					Urban	Arable	Pasture
Cm1	70	Slightly elevated clay plains to 1 km wide; slopes less than 0.4%; flooded most of wet season and subsequent months.	Massive cracking clays, usually carbonate rich.	Perennial grassland (<i>Imperata</i> , <i>Coelorrhachis</i> , <i>Germania</i> , <i>Ectrosia leporina</i> , <i>Fimbristylis</i> , <i>Cyperus</i> , <i>Phyla</i>); scattered clumps of <i>Melaleuca viridiflora</i> .	N	N(C ₂)*	N(C ₂)*
Cm2	20	Lower plains, to 0.75 km wide; slopes less than 0.3%, with scattered depressions; very slow drainage, flooded well into dry season.	Black massive cracking clays.	Short perennial grassland as for Pal and Pa2.	N	N	N(C ₂)*
Cm3	10	Waterfilled billabongs and channels.	-	Vegetation as for Pal, clumps of <i>Melaleuca</i> spp. and <i>Pandanus</i> spp.	N	N	N

Low capability for development due to wet season inundation *(except for specific agricultural or pastoral uses, e.g. rice).

FABIAN LAND SYSTEM (Fb)

Broad alluvial flood plains; hard mottled yellow duplex soils; few erosional rises developed on Lower Proterozoic rocks; perennial grassland.

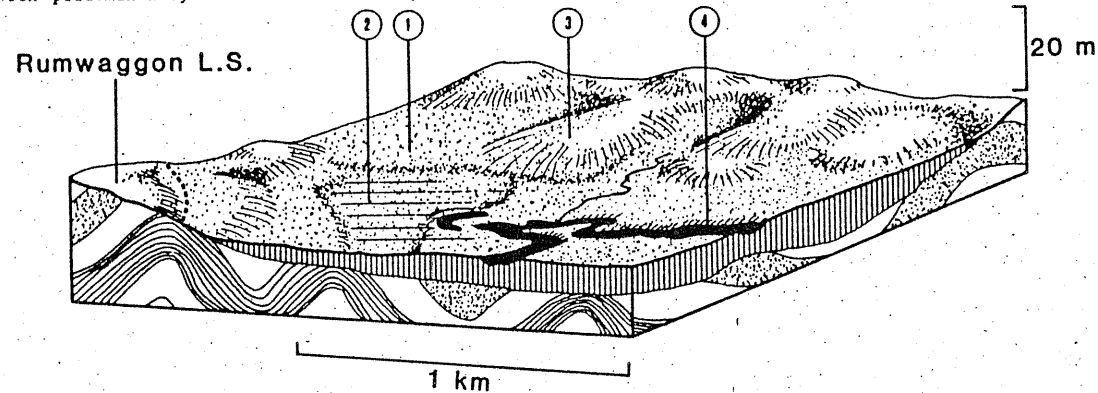


Unit	%	Landform	Soils	Vegetation	Urban	Capability Arable	Pasture
Fb1	30	Broad, slightly elevated flood plains to 800 m wide; slopes commonly below 1%, relief to 3 m.	Acid hard mottled yellow duplex soils (D3), minor alkaline duplex soils (D4).	Perennial grassland (<i>Chyrosopogon setifolius</i> , <i>Eriachne burkittii</i> , <i>Themeda australis</i> , <i>Alloterospis semi-alata</i> , <i>Eragrostis</i> sp.); minor sedges (<i>Fimbristylis</i> sp., <i>Haemodorum</i> sp.); widely scattered <i>E. polycarpa</i> and low <i>Terminalia fitzgeraldii</i> and <i>Melaleuca viridiflora</i> ; minor areas of woodland or open woodland as for Fw1.	N	N(C ₂)*	N(C ₂)*
Fb2	50	Poorly drained, almost level depressions within Fb1; slopes less than 0.5%; scattered billabongs.	Alkaline hard mottled yellow duplex soils (D4).	Perennial grassland as for Fb1, with more sedges and less <i>Themeda</i> ; trees absent.	N	N(C ₂)*	N(C ₂)*
Fb3	10	Low gravelly rises; relief to 8 m; slopes less than 4%; moderately rapid drainage.	Moderately deep lithosols (L2); gravelly yellow massive earths (M2).	Woodland or low woodland as for Rwl.	C ₂	N	C ₂
Fb4	10	Stream courses and minor channels; weakly developed levees and infrequent billabongs.	-	Variable, as for Fw4.	N	N	N

Generally low capability for development due to wet season inundation *(except for some specific agricultural or pastoral uses, e.g. rice).

FLATWOOD LAND SYSTEM (Fw)

Broad alluvial flood plains with predominantly acid hard mottled yellow duplex soils; small gravelly rises; Melaleuca or eucalypt woodland or open wood-land.



ALLUVIUM



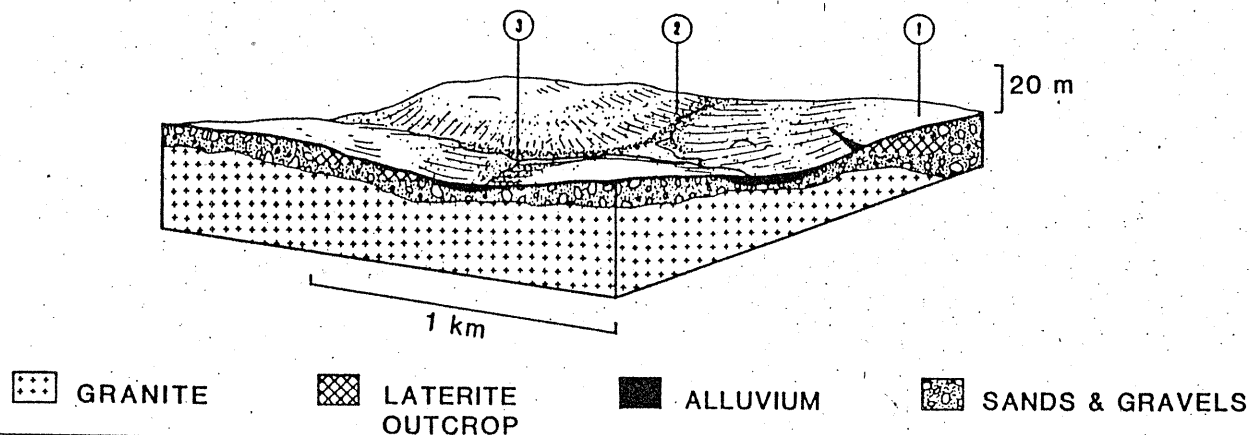
LOWER PROTEROZOIC SEDIMENTS

Unit	%	Landform	Soils	Vegetation	Urban	Capability	Pasture
					N	N(C ₂)*	N(C ₂)*
Fw1	50	Slightly elevated alluvial plains, up to 500 m wide; slopes less than 2%; relief to 3 m; slow drainage.	Acid hard apedal mottled yellow duplex soils (D3).	Woodland or open woodland (<i>E. polycarpa</i> , <i>E. papuana</i> , <i>E. foelscheana</i> , <i>lactiflua</i> , <i>Erythrophleum</i>) with <i>Pandanus</i> and many suckers (<i>Lophostemon</i> sp., <i>Eucalyptus</i> sp., <i>Erythrophleum</i> , <i>Eugenia bleeseri</i>); perennial grasses (<i>Themeda australis</i> , <i>Sorghum plumosum</i> , <i>Coelorhachis</i> , <i>Imperata</i>).	Site drainage.		
Fw2	25	Poorly drained lower plains, adjacent to Fw1; up to 250 m wide; slope less than 0.5%.	Acid hard mottled yellow duplex soils (D3), minor alkaline hard mottled yellow duplex soils (D4).	Grassland as for Fb1 and Fb2	Site drainage.		
Fw3	20	Low gravelly rises; relief to 8 m; slopes below 4%; moderately rapid drainage.	Moderately deep lithosols (L2) and gravelly yellow massive earths (M2).	Woodland or low woodland as for Rwl.	Gravelly soils.		
Fw4	5	Stream courses and scattered billabongs.	Deep alluvial yellow massive earths.	Very variable, from grassland through tall shrubland (<i>Bambusa arnhemica</i> , <i>Pandanus</i> sp.) to woodland (<i>Lophostemon</i> , <i>E. papuana</i> , <i>Erythrophleum</i> , <i>E. polycarpa</i> , <i>Pandanus</i> sp.); dense perennial grasses (<i>Coelorhachis</i> , <i>Imperata</i> , <i>Panicum</i>).	Flooding.		

Generally low capability for development due to wet season inundation *(except for specific agricultural or pastoral uses, e.g. rice).

GECKO LAND SYSTEM (Gc)

Gently undulating low hills, probably formed on granite, also minor sandstone and siltstone, and alluvium derived from these rocks; eucalypt woodland.

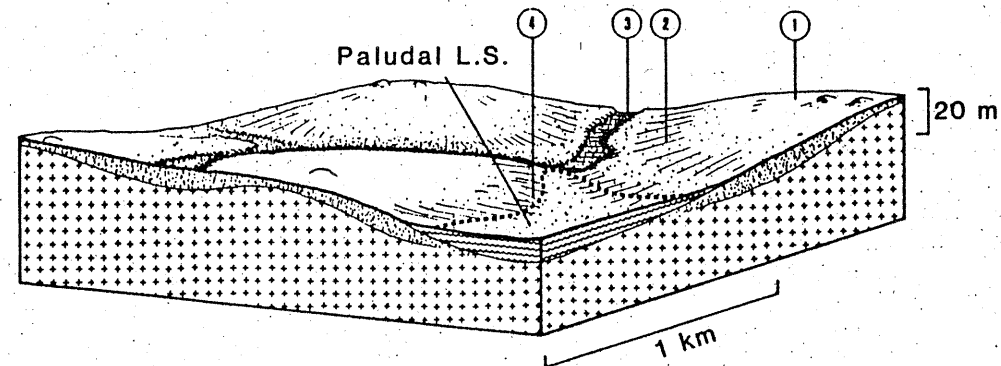


Unit	%	Landform	Soils	Vegetation	Capability		
					Urban	Arable	Pasture
Gc1	60	Level to gently undulating surface; relief 8 m; slopes to 2.5%; minor laterite outcrop; rapid drainage.	Gravelly red massive earths (M1), sometimes shallow; minor lithosols (L2).	Woodland, minor open forest (<i>E. tetradonta</i> , <i>E. miniata</i> , <i>E. bleeseri</i>) with a low tree understory (<i>Xanthostemon</i> , <i>Terminalia ferdinandiana</i> , <i>Planchonia</i> , <i>Buchanania</i>) and shrubs (<i>Livistona humilis</i> , <i>Cycas</i> , <i>Persoonia</i> , <i>Pachynema dilatatum</i>).	C ₂	N	C ₂
					Shallow gravelly soils.		
Gc2	25	Lower slopes; often gravelly; relief up to 10 m; slopes commonly 4% and locally to 7%; minor low laterite scarps at upper margin, occasional granite and sandstone outcrop; moderately rapid drainage.	Shallow and moderately deep lithosols (L1 and L4).	Woodland to open woodland (<i>E. confertiflora</i> , <i>Erythrophleum</i>) with low trees (<i>Petalostigma</i> , <i>Planchonia</i>) with shrubs; or low open shrubland (<i>Livistona humilis</i> , <i>Petalostigma</i> , <i>Acacia gonocarpa</i> , <i>Pachynema dilatatum</i> , <i>Persoonia</i> , <i>Calytrix</i> sp.); perennial grasses (<i>Heteropogon triticeus</i> , <i>Eriachne avenacea</i> , <i>Plectrachne pungens</i>).	C ₂	N	C ₂
					Shallow gravelly soils.		
Gc3	15	Sandy drainage floors to 200 m wide; channels frequently incised; poor drainage.	Yellow earthy sands (S1) and siliceous sands (S2); minor areas of friable apedal mottled yellow duplex soils (D5).	Grassland with <i>Leptocarpus spathaceus</i> or low woodland (<i>Pandanus</i> , <i>Lophostemon</i> , <i>Grevillea pteridiifolia</i>).	N	N	N
					Site drainage.		

Moderate capability for urban and pastoral development; small areas waterlogged or inundated in wet season.

GRAPPA LAND SYSTEM (Gr)

Gently rolling hills, usually convex slopes developed on granite and granodiorite; predominantly mottled yellow duplex soils; tall shrubland (*Livistona*).



ALLUVIUM

LITCHFIELD COMPLEX

Unit	%	Landform	Soils	Vegetation	Capability		
					Urban	Arable	Pasture
Gr1	60	Low rounded hill crests and upper slopes; relief 15 to 20 m; slopes to 3.5%; scattered massive granite outcrop; rapid drainage.	Shallow lithosols (L4) and shallow gravelly yellow duplex soils (D1).	Tall shrubland (<i>Livistona humilis</i> , <i>Grevillea pteridiifolia</i>) with scattered low trees (<i>Xanthostemon</i> , <i>Petalostigma</i>) and common low shrubs (<i>Calytrix</i> spp., <i>Grevillea angulata</i>); minor areas of low woodland (<i>E. grandifolia</i> , <i>E. foelscheana</i> , <i>E. confertiflora</i>) associated with granite outcrops.	C ₂	N	C ₂
					Gravelly shallow soils.		
Gr2	20	Sandy, convex wash slopes merging with Gr1; relief to 10 m; slopes to 5%; moderately rapid drainage.	Gravelly, sandy mottled yellow duplex soils (D1) and shallow earthy sands (S1b) directly onto weathered granite.	Tall shrubland (<i>Livistona humilis</i> , <i>Grevillea pteridiifolia</i>) with widely scattered low trees (<i>Xanthostemon</i> , <i>Melaleuca viridiflora</i> , <i>Owenia Vernicosa</i>) and common low shrubs (<i>Grevillea angulata</i> , <i>G. dryandrii</i> , <i>Acacia gonocarpa</i>) and suckers (<i>Syzygium bleeseri</i> , <i>Pandanus</i> sp.); rare <i>Pandanus</i> tall shrubland on lowest slopes.	C ₂	N	C ₂
					Moderate slope gradients, gravelly soils.		

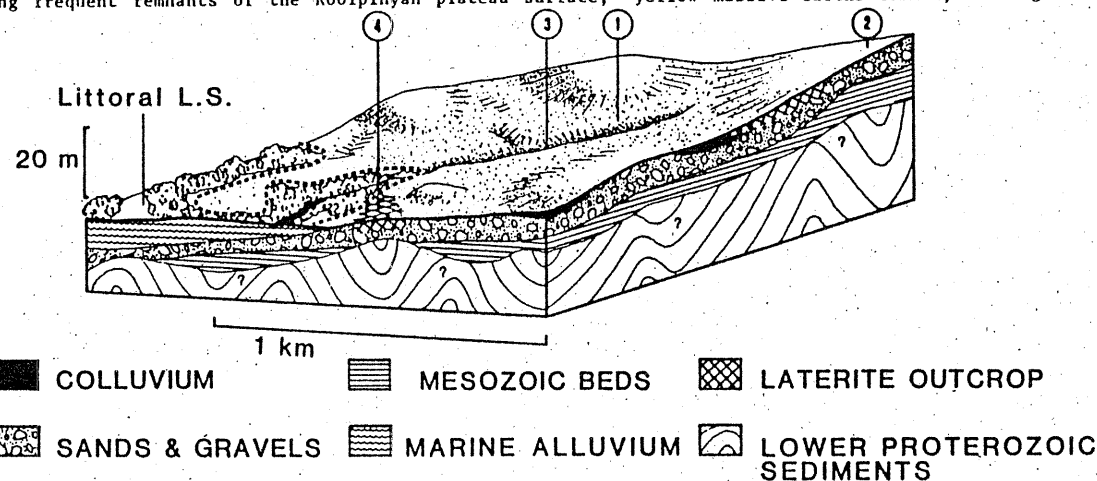
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KEEFER'S HUT LAND SYSTEM (Kf)

Dissected, rolling terrain including frequent remnants of the Koolpinyah plateau surface; yellow massive earths common, often gravelly and shallow; eucalypt woodland or open forest.



Unit	%	Landform	Soils	Vegetation	Capability		
					Urban	Arable	Pasture
Kf1	60	Gentle gravelly sideslopes, often to 300 m wide; relief to 20 m, slopes to 3.5%; scattered laterite outcrops, more common on lower slopes; rapid drainage.	Shallow gravelly yellow massive earths (M5) and mod. deep lithosols (L2).	Woodland (<i>E. bleeseri</i> , <i>E. confertiflora</i> , <i>E. tetradonta</i>) with widely scattered low trees (<i>Planchonia</i> , <i>Buchanania</i>) and shrubs (<i>Cycas</i> , <i>Grevillea decurrens</i>) grading to low woodland (<i>Melaleuca viridiflora</i>) with scattered shrubs (<i>Lophostemon lactiflorus</i> , <i>Pandanus</i>).	C ₂	N	C ₂
Kf2	20	Level margins and convex remnants of Kay plateau surface; relief to 10 m; slopes to 3%, locally up to 7%; scattered laterite outcrop, moderately rapid drainage.	Gravelly red massive earths, gravelly massive yellow earths (M4, M5b) and mod. deep lithosols (L2).	Tall open forest or open forest as for K1.	C ₂	N	C ₂
Kf3	10	Narrow drainage lines to 80 m wide; often incised channel; axial slopes to 2.5%; slow drainage.	Yellow earthy and siliceous sands, often gravelly (S1, S2); mottled grey massive earths (M6); minor yellow massive earths and mottled yellow duplex soils.	Open forest (<i>Melaleuca cajuputi</i> , <i>M. dealbata</i> , <i>Erythrophloeum chlorostachys</i> , <i>E. papuana</i>) with <i>Pandanus</i> sp. understory along shallow creek lines, merging to woodland or open woodland (<i>E. polycarpa</i> , <i>E. papuana</i> , <i>Planchonia</i> , <i>Lophostemon</i>) away from creek lines; perennial grasses (<i>Coelorhachis</i> , <i>Heteropogon</i> , <i>Imperata</i> , <i>Themeda</i>).	N	N	N

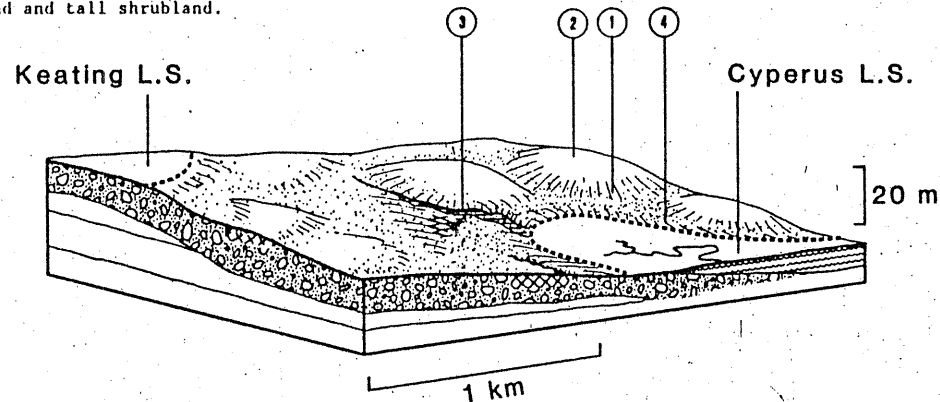
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Unit	%	Landform	Soils	Vegetation	Capability		
					Urban	Arable	Pasture
Kf4	10	Outcropping laterite pavement and low benches with extensive ferruginous gravels; relief to 10 m; slopes about 3%; moderately rapid drainage.	Shallow to mod. deep lithosols (L1 and L2); minor shallow gravelly red massive earths and shallow gravelly yellow massive earths (M5).	Mid-High Woodland (<i>Erythrophleum chlorostachys</i> , <i>E. confertiflora</i>) with a second story tree layer (<i>Xanthostemon</i> , <i>Buchanania</i> , <i>Petalostigma</i>) and numerous shrubs (<i>Cycas</i> , <i>Xanthostemon</i> , <i>Pandanus</i> , <i>Melaleuca</i>); annual grasses (<i>Sorghum</i> sp.) and perennial grasses (<i>Heteropogon triticeus</i> , <i>Chrysopogon latifolius</i>).	C ₂	N	C ₂
Moderate capability for urban development and pastoral development; gravelly soils common.					Outcrop, shallow soils.		

KOSHER LAND SYSTEM (Kh)

Sloping coastward margins of the gently undulating upland terrain; gravelly red massive earths, commonly shallow; earthy and siliceous sands; mixed closed forest and open forest, woodland and tall shrubland.



MARINE ALLUVIUM
 LATERITE OUTCROP
 TERTIARY SANDS & GRAVELS

Unit	%	Landform	Soils	Vegetation	Capability		
					Urban	Arable	Pasture
Kh1	55	Lower sandy wash slopes; relief to 15 m; slope commonly less than 2.5% but locally to 5%; laterite pavement common in unit with scattered laterite rubble; slow drainage.	Red massive earths, sandy, usually gravelly and sometimes shallow (M3); less common earthy sands (S1b); minor mod. deep lithosols (L2, L3).	Semi-deciduous closed forest (<i>Melaleuca cajuputi</i> , <i>M. viridiflora</i> , <i>E. tetrodonta</i> , <i>Acacia auriculiformis</i> , <i>Bombax ceiba</i>) with dense low tree understory (<i>Lophostemon lactifluus</i> , <i>Alphitonia excelsa</i> , <i>Alstonia actinophylla</i> , <i>Planchonia</i> , <i>Strichnos lucida</i> , <i>Sterculia quadrifida</i>) and shrubs (<i>Acacia</i> sp., <i>Pandanus</i> sp.); rare minor grasses (<i>Aristida</i> sp.).	C ₂	C ₂	C ₂
					Site drainage.		
Kh2	25	Low hills and gentle crests; usually gravelly; relief to 10 m; slopes less than 4%; common laterite outcrop and pavement; similar to Kel; well drained.	Shallow to moderately deep lithosols, minor shallow gravelly red massive earths (M4) and shallow siliceous sands.	Open forest to woodland with moderately dense low trees and shrubs as in Kel.	C ₂	N	C ₂
					Shallow gravelly soils, outcrop.		
Kh3	10	Drainage lines and floors to 80 m wide, occasionally channelled. slopes to 2.5%; poor drainage.	Earthy sands (S1a), sometimes with free carbonate in subsoil; friable mottled yellow duplex soils (D5).	Open forest (<i>Melaleuca cajuputi</i>) with dense low tree understory (<i>Barringtonia acutangula</i> , <i>Timonius timon</i>).	N	N	N
					Site drainage.		

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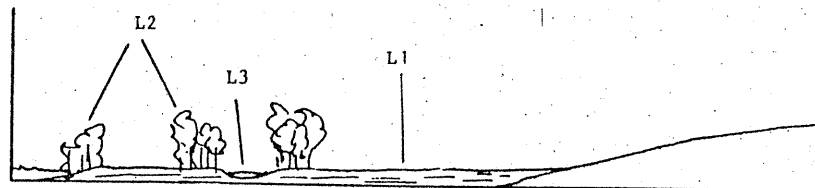
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Unit	%	Landform	Soils	Vegetation	Capability		
					Urban	Arable	Pasture
Kh4	10	Sandy lower slopes, usually adjacent to Cyperus or Littoral land systems; up to 400 m wide; relief to 2 m; slopes less than 3%; laterite benches and pavement common; slow drainage.	Frisble mottled yellow duplex soils (E5), earthy sands (S1) co-dominant.	Pandanus tall shrubland with widely scattered <i>Melaleuca viridiflora</i> ; scattered grasses (<i>Eriachne burkittii</i>) and sedges (<i>Fimbristylis</i> sp.).	N	N	C ₂

Large areas have moderate capability for urban, arable and pastoral development; wet season waterlogging the major limitation.

LITTORAL LAND SYSTEM (L)

Level idal flats and coastal plains; saline muds and massive cracking clays; samphire, sedgeland, or mangrove low closed forest.

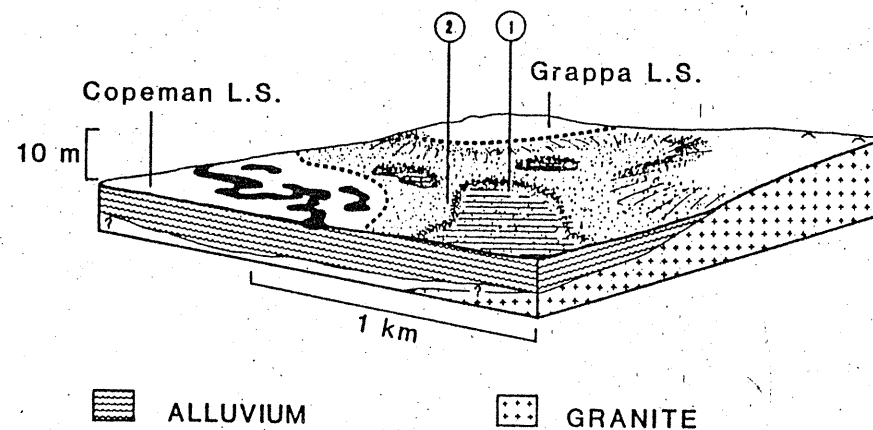


Unit	%	Landform	Soils	Vegetation	Urban	Capability Arable	Pasture
L1	60	Tidal flats; up to 1 km wide; slopes less than 0.4%; recent estuarine and marine clays, in places over buried mangroves; seasonal drying and surface cracking; intermittent tidal flooding.	Uniform saline muds and clays (CS1); cracking grey clays (C2).	Samphire (<i>Arthrocnemum</i>) Low Open Sedgeland or bare of vegetation.	N	N Tidal flooding	N
L2	25	Coastal and riverine mangrove fringe; up to 100 m wide; slopes up to 0.9%; riverine mangroves on low clay levees up to 100 m wide and 1 m elevation; daily tidal flooding; also common laterite outcrop.	Saline muds (CS1), often interspersed between laterite outcrop.	Mangrove Low Closed Forest.	N	N Tidal flooding.	N
L3	10	Channels up to 10 m deep and 200 m wide with outlets up to 5 km wide; minor channels up to 5 m deep and 15 m wide.	-	-	N	N -	N

Low capability for development due to tidal inundation.

PALUDAL LAND SYSTEM (Pa)

Low swampy plains; fresh water clays over marine sediment; no distinct channels; friable duplex soils and massive clays; short perennial grassland.

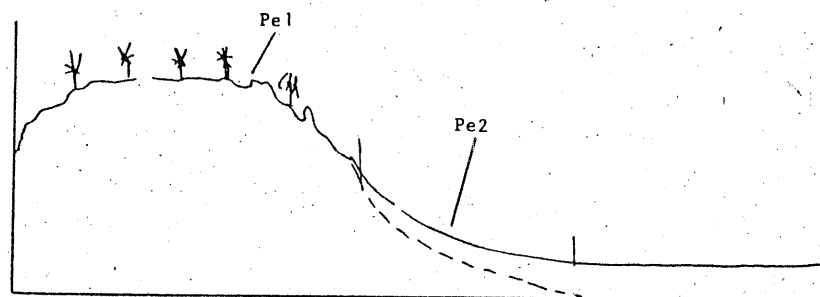


Unit	%	Landform	Soils	Vegetation	Capability		
					Urban	Arable	Pasture
Pa1	50	Depressed plains 150 m to 1 km wide which are permanently inundated up to 1 m deep; almost level.	Friable mottled yellow duplex soils, alkaline sub-soil (D5).	Short perennial grassland (<i>Hymenachne</i> , <i>Oryza</i> dominant also <i>Eleocharis</i> , <i>Nelumbo</i> , <i>Phragmites</i>).	N	N Site drainage.	N
Pa2	50	Slightly elevated plain up to 1 km wide usually in association with Pa1; seasonally inundated; slopes less than 0.3%, relief less than 2 m.	Massive cracking grey clays, friable mottled yellow duplex soils co-dominant (C1, D5).	Short perennial grassland (<i>Oryza australiensis</i> dominant, also <i>Scleria</i> , <i>Pseudoraphis</i> , <i>Eleocharis</i> , <i>Hymenachne</i>).	N	N Site drainage.	C ₂

Generally low capability for development due to wet season drainage, some areas with moderate capability for pasture improvement.

PEAKED LAND SYSTEM (Pe)

High, strike aligned ridge on Moyle river Quartzite/Sandstone in the west of the survey area. Akin to Pinkerton Land System occurring in the Port Keats area. Skeletal soils.

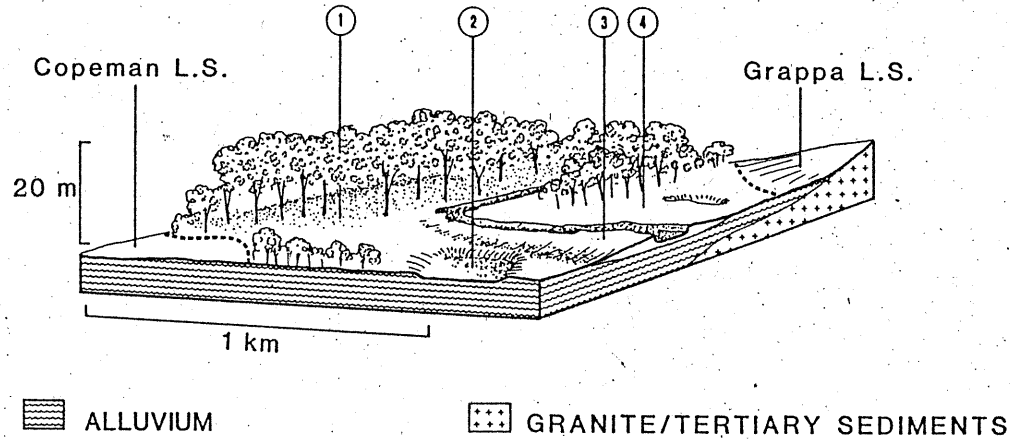


Unit	%	Landform	Soils	Vegetation	Capability		
					Urban	Arable	Pasture
Pe1	65	Broad crests and steep side slopes, relief to 25 m, slopes 0-40%, very rocky, outcrop extensive.	Lithosols, shallow siliceous sands (L5).	Mid-High Isolated Clumps of Tall shrubs (<i>Livistona humilis</i>); grasses very sparse (<i>Plectrachne pungens</i>).	N	N	N
Pe2	35	Lower colluvial slopes; slopes less than 3%, up to 100 m wide, relief 5 m.	Deep siliceous and earthy sands (S2c).	Low Open Woodland (<i>Pandanus spiralis</i> , <i>Livistona humilis</i>); scattered shrubs (<i>Syzygium</i> sp.) very sparse grasses (<i>Ectrosia leporina</i>).	N	N Erodible.	N

Low capability for urban, arable and pasture development.

PINWINKLE LAND SYSTEM (Pw)

Large swampy depressions on clay plains, and broad back plains along river courses; soils predominantly black massive cracking clays overlying marine alluvium; paperbark tall closed forest to open forest.



Unit	%	Landform	Soils	Vegetation	Urban	Capability Arable	Pasture
Pw1	70	Wooded swamps to 3 km wide; almost level; seasonally inundated to a depth of 2 m.	Black massive cracking clays; organic surface horizons; usually over alkaline subsoils (C2).	Tall closed forest to open forest (<i>Melaleuca cajuputi</i> , <i>M. viridiflora</i>); rare grasses (<i>Pseudoraphis</i> , <i>Eleocharis</i>); minor areas of evergreen tall closed forest (<i>Terminalia sericarpa</i> , <i>Vavaea australiana</i> , <i>Acacia auriculiformis</i> , <i>Melaleuca cajuputi</i> , <i>Livistona benthamii</i> , <i>Barringtonia</i>).	N	N	N
						Site drainage.	
Pw2	15	Lower very slowly drained depressions; seasonally inundated and rarely dry; similar to Pal.	Friable mottled yellow duplex soils; organic surface horizons, usually over alkaline subsoil (D5).	Short perennial grassland as for Pal.	N	N	N
						Site drainage.	
Pw3	10	Levees; up to 250 m wide; back slopes to 3%; includes river channels and water filled billabongs.	Alluvial soils with silty bed loads. Deep, loamy alluvial massive earths and black massive cracking clays (C2).	Short perennial grassland (<i>Pseudoraphis</i>) with low shrubs (<i>Grewia retusifolia</i>); often bare; scattered trees (<i>Melaleuca viridiflora</i> , <i>Alstonia actinophylla</i>).	N	N	C ₂
						Site drainage.	
Pw4	5	Alluvial plains to 0.5 km wide, moderately well drained; seasonally inundated to 1 m depth.	Black massive cracking clays, usually carbonate-rich, over saline muds (C2).	Bare	N	N	N
						Site drainage.	

Low capability for development due to wet season or permanent inundation.

4.0 SOILS

The soils over much of Finnis River Station are similar to those occurring in the Darwin area. They are forming on similar parent materials under the same environmental conditions. The soil profile data obtained from this survey has been incorporated into the report on the Land System of the Darwin Regional Area (Land Conservation Unit, 1984) and for an outline of the soils in a regional context, you are referred to this report.

However, Table 4.1 gives a summary of the various soils on the station and these soils are classified by The Great Soil Group* and the Principal Profile Form** of the Factual Key. These are the two common Australian soil classification systems.

Soils within areas proposed by the owners to be potential irrigation areas were sampled in greater detail than other areas on the Station and representative samples taken for particle size determinations. The data obtained is presented in Table 4.2.

Three soils not observed in the Greater Darwin Area but present on Finnis River, are outlined here. These are Lithosols formed from sandstones of the Moyle River formation (L5) and deep to moderately deep siliceous and earthy sands formed from sandstones and granodiorite respectively. (S2c, S1b).

(i) Lithosols on sandstones (L5)

These soils are shallow coarse sands to loamy sands forming on the crest of the large sandstone ridge in the west (Peaked land system). They are predominantly brown to dark brown in the surface horizon. Spinifex is an associated grass.

* Stace, H.C.T., Hubble, G.D., Brewer, R., Northcote, K.H., Sleeman, J.R., Mulcahy, M.J., and Hallsworth, E.G. (1968) : A Handbook of Australian Soils : Rellim, Technical Report.

** Northcote, K.H. (1979) A Factual Key for the Recognition of Australian Soils. CSIRO. Rellim Technical Pubs.

Table 4.1 : Scheme of soil classification for the land systems of the Darwin Regional Area, including Finnis River Station

			Subgroup	Usual P,P,F.	Great Soil Group	Alternative Family Name
Lithosols	Shallow, stony on Lower Proterozoic rocks		L1	Uc1	Lithosol	Skeletal Soils (Burrell)
	Shallow-mod. deep, gravelly, Lower Proterozoic rocks		L2	Uc1	Lithosol	Skeletal Soils (Burrell)
	Shallow-mod. deep, Fe gravels, uniform texture		L3	Um1	Lithosol	Hotham
	Shallow, on granite, uniform, sandy texture		L4	Uc1	Lithosol	-
	Shallow on Sandstone		L5	Uc1,23	Lithosol	-
Uniform sands	Earthy sands	Deep	S1a	Uc5.11, .23, 4.2	Earthy Sand	Boroalba, Cullen
		Shallow-mod. deep	S1b	Uc5.11, 4.2	Earthy Sand	Boroalba
	Siliceous sands	Deep	S2a	Uc1,21, 4.21	Siliceous Sand	Kapelga
		Shallow-mod. deep	S2b	Uc1,21	Siliceous Sand	Kapelga
	Calcareous sands		S2c	Uc2,2	Siliceous Sand	-
			S3	Uc1,11	Calcareous Sand	Dune Sands
				Uc5,12		
Gradational massive earths	Granite		M1	Gn2,84	Yellow Earth	Masson
	Lower Proterozoic rocks, gravelly, sandy surface, loamy subsoil		M2	Gn2,24	Yellow Earth	Batten
	Tertiary lateritic sediments	Deep massive earths, sandy loam grading to light clay	M3a	Gn2,11	Red Earth	Berrimah
			M3b	Gn2,64	Yellow Earth	Hagait, Ramil
		Mod. deep gravelly red	M4	Gn2,14, .24	Red Earth	Stuart, Hotham
		Shallow-mod. deep, gravelly yellow	M5	Gn2,24	Yellow Earth	Koolpinyah
		Mottled grey subsoil, sandy surface, mod. deep	M6	Gn2,94	Grey Earth	(Koolpinyah?)
Yellow duplex soils	Granite, lower slopes		D1	Dv5,51	Yellow Podzolic	Masson
	Lower Proterozoic rocks, lower slopes		D2	Dv3,81	Yellow Podzolic	Stapleton
	Alluvial, acid, hardsetting, apedal		D3	Dy3,53	Soloth	Ringwood
	Alluvial, alkaline, hardsetting		D4	Dy3,63	Solodic	Keppler, Bunday
	Alluvial, friable		D5	Dy, Dg	Humic Gley	Dashwood, Murribibbi, Burton
Massive cracking clays	Acid cracking clays		C1	Ug5,16, .28	Grey Clay	Wildman
	Alkaline cracking clays		C2	Ug5,16, .28	Grey Clay	Wildman, Carmor
Non-cracking saline clays			CS1	Ug5,5	Solonchak	Carpentaria

(ii) Uniform, coarse textured sands (S2C)

Moderately deep to deep siliceous sands, are forming on the lower colluvial slopes of Peaked land system. Surfaces are sandy and greyish brown and sub-surfaces brownish yellow.

A horizons are evident. Subsoil mottling indicates poor soil drainage.

They could possibly be considered as immature sands of the Kapalga soil family, found in other areas of the 'Top End'.

(iii) Uniform, coarse textured earthy sands (S1b)

Earthy sands of the Cullen soil family are forming on granite and granodiorite in Grappa land system. They are not extensive soils. These soils intergrade with the yellow podzolics forming similar geologies, and are usually shallow, overlying a quartz stone layer. They are yellowish brown and sandy throughout.

4.2 Notes on the soils and land capabilities in the proposed development areas:

An outline of the resources of the areas and comments on the development proposals are as follows:

1. Areas of proposed clearing to facilitate cattle control, and pasture improvement.

Area A: (1:100,000 Topographic map reference 591 E 845N)

The area comprises a gently sloping plain of 1-2% with moderately deep gravelly red earth soils. (Unit 2 of Keefers Hut land system). The approximate extent of this type of terrain in the area is 70 ha. There are no foreseeable problems with clearing the area for hay production or pasture improvement so long as the area is not continually

cultivated. (If this were the case soil conservation structures would be required).

Area B: (1:100,000 Topographic map reference 520 E 85N)
A previously cleared area. The area comprises erosional slopes and plains containing very gravelly skeletal soils and shallow sands. The area has limited capability for improvement.

Area C: (1:100,000 Topographic map reference 770 E 810N)
This area occurs on Unit 2 and 4 of Grappa land system. These are the wash slopes and alluvial areas containing gravelly yellow earths and yellow podzolics. Much of this area has previously been cleared and some areas of the lower slopes are suffering severe gully erosion.

Further clearing or re-clearing of regrowth should be accompanied by a drainage stabilization plan as it would appear that any increase in run off or lateral subsurface drainage may result in gully erosion where this water is concentrated. Roads and fence location on these granitic areas needs careful planning to avoid running them directly down slope, which with grading and maintenance may result in channelized water flow and erosion as observed on existing tracks in the area. The erodibility of the soils would preclude the area from any form of arable agriculture without intensive soil conservation inputs.

Area D: (1:100,000 Topographic map reference 645 E 810N)
Similar topographic situation to Area C and similar comments apply.

Area E: (1:100,000 Topographic map reference 545 E 830N)
A cleared area which should pose no major problems if used as a cattle control area (yards etc.).

Area F: (1:100,000 Topographic map reference 490 E 845N)
This area comprises units of Peaked and Keefer's Hut Land Systems, both of which offer little in the way of potential areas for clearing to facilitate pasture improvement. However the areas do not appear particularly erodible and would pose few problems if used for cattle control areas.

2. Proposed Horticulture/Irrigation Areas.

Three areas were inspected in detail (indicated 1,2,3 on attached map) being areas proposed for horticultural development.

All three areas show essentially similar soil/landform associations and all are within Units 1 and 2 of Grappa Land System, i.e. granitic areas.

Area 1: The soils in this area are yellow podzolics of the Masson Family as described by Forster in the Wagait Reserve. (Forster 1977, Report on the Land Units of the Wagait Aboriginal Reserve, Tech. Bull. 20, Land Conservation Unit).

In general they have loose sandy surfaces overlying sandy clayloams to light clay subsoils. There appears to be a quartz gravel layer between 15-40cm. in most soils examined. One soil profile examined to 430 cm. indicated the possibility of significant water storage with depth within the deeply weathered granitic parent material. Soil mottling was observed in almost all subsoils examined. Much of the area had been cleared at the time of the inspection. The area is a broad convex rise with slopes to 2% recorded.

Area 2: The soils are similar to those of Area 1 although the surface sand layer appears to be deeper to the gravel layer. The main soils are again yellow podzolics with some areas of earthy sands. The depth of surface sand will have implications for irrigation which is discussed below.

Area 3: Again similar to Areas 1 and 2.

General Comments:

All three proposed horticultural areas do not have a high capability of supporting arable agricultural development because of the erodible nature of the soil and site and the extremely sandy nature of the surface horizons. However, the area may have potential for horticultural tree crops where the degree of surface soil disturbance will be minimum. The droughty nature of the surface may make tight water control and fertilizer applications necessary. This tight control of both of the above in a horticultural situation may be advantageous as it may allow some manipulation of flowering, fruit set and harvesting dates. As such, the proposal to grow Mangoes and Cashews would be feasible. However irrigation will be required and the nearest surface water supplies are the billabongs of the Finnis River. The effect of removing volumes of water from these billabongs can not be gauged until the full water requirements are outlined.

Table 4.2 Particle Size Analysis of some Selected Soils on Finniss River

Site	Depth cm.	Texture*	Particle size (fine earth)			
			CS	FS	Si	C
Earthy Sand (Grappa LS)						
44	0-10	S	22.5	70.4	2.5	4.6
	20-30	S	18.4	75.6	2.3	3.7
Yellow Podzolic (Grappa LS)						
41	0-10	LS	24.4	61.7	6.0	7.9
	10-30	SL	33.7	50.7	4.1	11.5
	30-50	SL	34.8	46.5	3.5	15.2
	50-70	SCL	35.8	40.0	4.5	19.7
	80-100	SL	47.8	26.7	7.4	18.1
	300-310	LS	26.3	59.2	7.6	6.9
42	0-10	S	13.6	77.0	4.5	4.9
	10-20	S	21.7	70.7	3.0	4.6
	40-50	S	24.4	65.2	3.0	7.4
	90-100	SL	34.3	47.9	5.4	12.4
	170-180	CL	17.6	45.4	11.9	25.1
48	0-10	S	21.2	70.1	1.2	7.5
	20-30	SL	21.3	66.4	2.4	9.9
	60-70	SCL	18.1	50.7	4.3	26.9
	90-100	SCL	28.8	42.9	4.8	23.5
51	0-5	S	23.4	69.0	3.2	4.4
	20-30	S	17.2	72.8	2.8	6.2
	60-70	S	16.6	74.1	1.5	7.8
	90-100	SCL	28.7	42.9	5.8	22.5

* S = Sand SCL = Sandy clay loam
 LS = Loamy sand CL = Clay loam
 SL = Sandy loam

5.0 VEGETATION

The botanical ecology of Finnis River Station is similar to that observed elsewhere in the greater Darwin area, although several differences do occur. These differences will be pointed out in the following section.

The botanical ecology will be dealt with the relation to the physiographic units occurring in the survey area, and will be classified in accordance with* Walker (1984).

See Fig. 5.1 for a breakdown of this system.

(a) Communities of Ridges and Rolling Terrain

The dominant vegetation type on both the quartzite ridges and the rolling granite hills is Low Open Woodland. This community is dominated by *Pandanus spiralis* or *Livistona humilis* or *Petalostigma pubescens* and is characteristically very open with the upper stratum often being significantly clumped; ground cover is sparse and usually consists of low shrubs of *Syzygium suborbiculare* and *Acacia auriculiformis*.

This community complex is characteristic of Peaked and Grappa land systems and also has minor occurrence in Keepers Hut land system. These communities are not commonly encountered in other areas of the Darwin region.

Small patches of monsoon closed forest are associated with seepage zones at the base of quartzite ridges. Such communities seem to have developed opportunistically at these sites rather than being remnant populations, as is often thought to be the case.

* Walker, J. and Hopkins, M.S. (1984). Vegetation In "Australian Soil and Land Survey Field Handbook" (McDonald, R.C., Isbell, R.F., Speight, J.G., Walker, J., and Hopkins, M.S.) (Inkata Press, Melbourne).

- (b) Communities of the Tertiary Plateau Surface and Side Slopes
The Tertiary sediments in the survey area appear to be breaking down, or changing relatively rapidly. The result is a physiographic unit formed of a heterogeneous mix of undulating terrain; broad, flat drainage floors; distinct drainage lines; internally drained, depressed areas; side slopes and laterite benches. All of these may support one or more than one vegetation communities.

Eucalyptus miniata and *E. tetradonta* dominated Tall Open Forest to Tall Woodland, typical of much of the Darwin area, tending to dominate on the deeper red earths of the plateau surface and gentle side slopes.

Where shallower soils occur this community gives way to one dominated by *Eucalyptus bleeseri* in combination with *E. tetradonta*. As stated previously, small patches of the ridge top communities also occur within the plateau surface.

Low Open Woodland of *Grevillea pteridiifolia*, *Livistona humilis* *Melaleuca nervosa* and *Banksia dentata* dominate in the broad drainage floors, whilst drainage lines support a Mid High to Tall Open Forest of *Melaleuca* spp. Both these communities, with some floristic variation, are commonly encountered in the Darwin region.

Internally drained depressions contained very dense stands of *Melaleuca* spp. forming a Low Open Forest; there is some evidence that some of these areas have been subject to catastrophic disruption in the recent past. At some sites the whole stand consists of immature trees, the tallest being just over 3 metres. At undisturbed sites these species form a Mid-High to Tall Open Forest, typical of the lagoon vegetation in the Darwin region.

Laterite benches and outcrops support a variety of vegetation types. Where these structures occur within a

Eucalypt open Forest or Woodland, they tend to support a Tall Shrubland of *Calytrix extipulata* and *C. brachychacta*; where they occur at the break of a slope adjacent to an internally drained depression, they tend to support *Melaleuca nervosa*-dominated communities.

The above section of communities are characteristic of Keefers Hut, Kosher, Bend, Baker and Bustard land systems. The latter three systems were not visited in this survey.

(c) Communities of the Flood Plains and Coastal Plains

Areas of the greatest elevation in the plains tend to support Low to Mid-High Woodlands of *Lophostemon grandiflorus* or *Xanthostemon paradoxus*. Such zones are probably subject to limited inundation during the wet season. Lower in the landscape are areas Mid-High Open Woodland of *Melaleuca viridiflora* with a characteristic understory of clumped *Barringtonia acutangula*, which is being replaced in some areas by debil-debil plains, dominated by sedges. Such areas would be subject to extensive inundation and minor flooding.

Permanent swamps in this zone support either Tall Open Forests of *Melaleuca cajuputi* and *M. viridiflora* or Very Tall Closed Grasslands and Sedgeland of *Phragmites* sp. and *Eliocharus* sp.

The floodplains of the Finniss River are dominated by Low Closed Grasslands of *Hymenachne acutigluma*.

(d) Communities of the Littoral Areas

Three main communities occur in these areas. Tidal saline muds are dominated by the usual suite of Mangrove species, usually forming a Mid-High to Low Closed Forest.

Stabilised dunes support grasslands of *Spinifex longifolius*, *Sorghum* sp. and *Chrysoporon fallax*.

Swales between the stabilised dunes support either a dry *Melaleuca* woodland of *M. dealbata* or a clumped, seasonally inundated Woodland or Open Forest of *Melaleuca* spp. with *Pandanus spiralis* and *Timonius timon*.