Land Units of Mandorah - Cox Peninsula

By

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Conservation Commission of the N.T.
Darwin N.T.

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1. **Introduction**

1.1 **Aim**

This mapping exercise was undertaken to identify and evaluate the different physical characteristics of approximately 30km$^2$ of land on the Cox Peninsula, west of Darwin, (Fig I).

This was to provide information for the use in planning future urban development and private subdivisions. Parts of the area have been subdivided into .4ha and 1ha blocks, and hopefully the purchasers of these blocks can also utilise the information supplied in this report when developing their properties.

The organisation of the information collected leads to the classification of the land into land units. A land unit being an area of land in which soils, landform and vegetation are relatively uniform. The classification of these land units and the evaluation of limitations for urban and agricultural use are those documented in "The Land Resources of the Darwin Area" (Fogarty, Howe and Dunlop 1979).

1.2 **Previous Mapping**

The area covered by this report falls within that mapped by CSIRO and the Land Conservation Unit at 1:500,000 and 1:100,000 respectively, and documented in reports titled "Survey of the Katherine - Darwin Region" (Christian and Stewart, 1953) and "The Land Systems of the Darwin Region" (Resource Survey Staff (in press)), (Fig I).

A land system is a tract of land which has a recurring pattern of land form, soils and vegetation and is comprised of a number of land units (Fogarty et al. 1979).
Fig. 1 The area covered by "The Land Systems of the Darwin Region"; and other more detailed land resource surveys in the Darwin area.
(b) texture trend with depth, and actual soil textures present;

(c) soil gravel and stone content of the soil;

(d) soil drainage.

Vegetation: brief summary of the vegetation community (according to the classification of Specht, 1970), and the dominant species of each group.

Evaluation: an expression of the severity of those physical characteristics which may be limitations to urban and intensive agricultural development. The basis for determining limitation ratings is described in Appendix II.
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<th>Area (ha)</th>
<th>Percentage Area</th>
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<tr>
<td>1b1</td>
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<td>1b2</td>
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<tr>
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<tr>
<td>TOTAL</td>
<td>2988 ha</td>
<td>100%</td>
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</table>
2.2 DESCRIPTION

Land Unit 1a.

Landform : (a) low plateau surface
            (b) flat to gently sloping (<1.0%)
            (c) relief to 5 metres.

Occurrence : restricted occurrence; present in Kay land system.

Site drainage : moderately well drained.

Soils : (a) deep red massive earths and yellow massive earths.
        (b) gradational; sandy loam grading to light sandy clay at depth.
        (c) minor or no gravels.
        (d) well drained.

Vegetation : open forest: *E. tetrodonta*, usually dominant with *E. miniata*, *Erythrophleum chlorostachys* (Ironwood). Medium-dense tree understory: *Cycas media*, *Eugenia* spp., *Buchanania obovata*, *Planchonia careya* and seasonally dense grass cover (annual *Sorghum* spp. with *Chrysopogon* sp. and *Heteropogon* sp.).

Evaluation:

<table>
<thead>
<tr>
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<td>-</td>
</tr>
<tr>
<td>Intensive</td>
<td>none</td>
<td>-</td>
</tr>
<tr>
<td>agriculture</td>
<td></td>
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</table>
Land Unit 1bl

Landform : (a) low plateau surface.
(b) flat to gently sloping (<2.0%).
(c) relief to 5 m.
(d) extensive areas with thin veneer of gravel and loose sand.

Occurrence : minor component of Kay land system.

Site drainage : well drained.

Soils : (a) moderately deep red massive earths and yellow massive earths.
(b) gradational; sandy loam grading into sandy clay loam at depth.
(c) 10-40% gravels throughout.
(d) well drained.

Vegetation : open forest: *E. miniata*, *E. tetrodonta*, *Erythrophleum chlorostachys*; *E. tetrodonta* dominant on deeper soils. Open to moderately dense understory. Seasonally dense grass understory as for 1a.

Evaluation : Use | Limitation | Rating
---|---|---
Urban | none | -
Intensive agriculture | soil depth | moderate
Land Unit 1b2

Landform
(a) low plateau surface.
(b) gently sloping (<3.0%).
(c) relief to 8 m.
(d) common surface gravels, minor outcrop of indurated ironstone.

Occurrence: extensive; a component of Kay land system.

Site drainage: well drained, moderately rapid run-off.

Soils
(a) moderately deep red massive earths and yellow massive earths, minor lithosols.
(b) gradational; sandy loam grading to sandy clay loam at depth.
(c) 10-40% gravels in massive earths; 30-60% gravels throughout lithosols.
(d) well drained.

Vegetation
(open forest: E. miniata, E. tetrodonta, Erythrophleum chlorostachys. More open than unit 1b1: E. miniata, E. bleeseri common on shallower soils. Open understory: Acacia spp., Cycas media. Seasonally dense grass cover of annual Sorghum spp. with Chrysopogon sp.)

Evaluation

<table>
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<th>Use</th>
<th>Limitation</th>
<th>Rating</th>
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</thead>
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<tr>
<td>Urban</td>
<td>soil depth</td>
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</tr>
<tr>
<td>Intensive agriculture</td>
<td>slope in places, moderate soil depth</td>
<td></td>
</tr>
</tbody>
</table>
Land Unit 1c

Landform: (a) low skeletal crests on plateau surface.  
(b) gently sloping (<5%).  
(c) relief to 8 m.  
(d) extensive surface gravel and stone; moderately extensive outcrop.

Occurrence: minor extent; found within Kay land systems.

Site drainage: excessively drained.

Soils: (a) lithosols and minor shallow massive earths.  
(b) uniform; loamy sand to sandy loam; earths have gradational profiles.  
(c) 30-70% gravels.  
(d) excessively drained.

Vegetation: woodland to open-forest: *E. bleeseri* dominant with *E. miniata*. Shrub and small tree layer is usually very sparse (Calytrix, Livistona). Grasses are short (Aristida, Plectrachne, Eriachne) though annual Sorghum may occur sporadically. Cleared areas of this unit usually produce a tall shrubland of *Calytrix extipulata* and various other species.

Evaluation

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<th>Limitation</th>
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<tr>
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<td>outcrop, slope, drainage, soil depth</td>
<td>moderate, severe</td>
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</tbody>
</table>

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Land Unit 1d

**Landform**
- (a) broad run-on areas on low plateau surface.
- (b) gently sloping (<2.0%).
- (c) relief <5m.

**Occurrence**
- moderate extent; found in Kay; and to a minor extent, Krokane; land systems.

**Site drainage**
- short periods of flooding; waterlogging in wet season.

**Soils**
- (a) deep yellow massive earths; minor red massive earths.
- (b) gradational; sandy loam grading to sandy clay loam or light sandy clay at depth.
- (c) 30-60% gravels throughout red earths.
- (d) moderately well drained.

**Vegetation**
- very variable; from woodland in poorly drained areas (dominated by *E. polycarpa* with *Melaleuca* spp., *Pandanus* sp.) and moderately well drained areas (*E. polycarpa* with *Erythrophleum chlorostachys*, *E. tetrodonta* and *Lophostenon* spp.), to open forest in better drained areas (species as for la, lb units). Understory is open to moderately dense *Pandanus* spp. in better drained areas. Seasonally dense grass cover of annual *Sorghum* spp. with *Chrysopogon* spp. and *Eriachne* spp. in drier areas. Sparse to moderately dense grass cover of *Eriachne*, *Ectrosia* sp. and *Panicum* sp. in wetter areas.

**Evaluation**

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</tr>
<tr>
<td>Intensive agriculture</td>
<td>site drainage</td>
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</table>

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Land Unit 2al.

Landform : (a) depressions and associated floodways on low plateau surface.
(b) very slight slope.
(c) very low relief.
(d) moderately extensive indurated ironstone outcrop along margin with upland areas.

Occurrence : moderate extent; a major unit of Krokane land system.

Site drainage : seasonal inundation.

Soils : (a) moderately deep to deep siliceous and earthy sands, often overlying indurated ironstone, or clay layer at depth.
(b) uniform; sand to sandy loam.
(c) minor gravels in some profiles.
(d) imperfectly to moderately well drained


Evaluation

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<th>Use</th>
<th>Limitation</th>
<th>Rating</th>
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<tr>
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<td>severe</td>
</tr>
<tr>
<td>Intensive agriculture</td>
<td>site drainage</td>
<td>severe</td>
</tr>
</tbody>
</table>
Land Unit 2a2.

Landform : (a) depressions on low plateau surface.
           (b) negligible.
           (c) negligible.

Occurrence : moderate extent; a major unit of Krokane land system.

Site drainage : seasonal inundation.

Soils : (a) friable, apedal, mottled yellow duplex soils (humic gley).
        (b) duplex; organic loam over light clay or sandy clay.
        (c) no gravels.
        (d) imperfect drainage.

Vegetation : Melaleuca spp. open to closed forest.

Evaluation

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<th>Limitation</th>
<th>Rating</th>
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<td>site drainage</td>
<td>severe</td>
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<tr>
<td>Intensive agriculture</td>
<td>site drainage</td>
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</tbody>
</table>

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UNDULATING SIDE SLOPES TO PLATEAU

Land Unit 3a

Landform: (a) gently undulating slopes below low plateau surface.
          (b) slopes < 3%.
          (c) relief to 15 m.
          (d) extensive surface gravels.

Occurrence: very rare; mainly within Keefers Hut land system.

Site drainage: well drained.

Soils: (a) predominantly moderately deep red massive earths; minor yellow massive earths.
       (b) gradational; loamy sand grading to sandy clay loam or light clay at depth.
       (c) 10-30% gravels throughout.
       (d) well drained.

Vegetation: non-uniform structure with closed forest, open forest, woodland: E. miniata, E. tetrodonta, E. blysseri common.

Evaluation

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<td>Intensive agriculture</td>
<td>slope, soil depth</td>
<td>moderate</td>
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</table>
Land Unit 3b

Landform: (a) gentle lower footslopes and broadly domed erosional rises.
(b) slopes 1-2%.
(c) relief to 10 m.
(d) minor indurated ironstone outcrop.

Occurrence: very rare, mainly within Keefers Hut land system.

Site drainage: well drained.

Soils: (a) moderately deep to deep yellow massive earths; rare siliceous sands.
(b) gradational sandy loam or loamy sand, grading to sandy clay loam at depth.
(c) gravelly at depth.
(d) moderately well drained.

Vegetation: poorly developed open forest tending to woodland: *E. miniata*, *E. tetrodonta*, *E. clavigera*. *Erythrophleum chlorostachys*, with open to moderately dense understory: *Eugenia* spp. *Xanthostemon paradoxus*, *Planchonia careya*. Seasonally dense grass cover of annual *Sorghum* with *Eriachne triseta*, *Panicum* spp..

Evaluation

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<th>Use</th>
<th>Limitation</th>
<th>Rating</th>
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<tbody>
<tr>
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<td></td>
</tr>
<tr>
<td>Intensive agriculture</td>
<td>outcrop</td>
<td>moderate</td>
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</tbody>
</table>
Land Unit 3c

Landform: (a) rolling hills and gentle sidelopes. (b) slopes 2-5%. (c) relief to 15 m. (d) common surface stone and gravel, minor outcrop.

Occurrence: moderate extent; mainly Keefers Hut, minor Krans, land system.

Site drainage: excessively drained.

Soils: (a) lithosols; minor moderately deep yellow earths. (b) lithosols have uniform sandy loam; earths have a sandy loam grading to sandy clay loam at depth. (c) lithosols 40-70% gravel, earths 10-50% gravel. (d) well drained.

Vegetation: unit non-uniform in structure and species composition. Woodland and low open-forest are the most common structural types. Where an open-forest occurs, *E. miniata* is usually dominant. *E. clavigera* also common.

Evaluation

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<td></td>
<td>soil depth</td>
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</table>
Land Unit 4a.

Landform: (a) low scarps and rugged low hills.  
(b) slopes >8%.  
(c) relief 3-10 m.  
(d) extensive outcrop and surface stone.

Occurrence: minor extent; Krans land system.

Site drainage: excessively drained.

Soils: (a) shallow lithosols.  
(b) uniform: loamy sand to sandy loam.  
(c) 40-65% gravel and stone.  
(d) excessively drained.

Vegetation: *E. miniata* - *E. tetrodonta* open-forest  
widespread over the unit, occasionally with a well developed understory. Smaller areas of woodland and low open-forest.

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<td>soil depth</td>
<td></td>
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<td>Intensive agriculture</td>
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<td></td>
<td>soil depth,</td>
<td>severe</td>
</tr>
<tr>
<td></td>
<td>slope, outcrop</td>
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</table>

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Land Unit 5b

Landform: (a) footslope seepage zones and springlines.
(b) slopes < 2.5%.
(c) relief to 3 m.

Occurrence: very rare; Krans land system.

Site drainage: long periods of waterlogging in wet and early dry season.

Soils: (a) deep, layered organic soil.
(b) interstratified gravelly, sandy and organic layers.
(c) 20-40% gravels in some subsoil horizons.
(d) well drained.

Vegetation: closed-forest. (a) footslopes; species composition diverse. Widely spaced trees with large canopies with a continuous lower canopy layer of smaller trees. Many species partly or wholly deciduous. Dense vines are a feature of these forests. Palms: *Carpentaria acuminata* may be present but never in large numbers.
(b) spring-lines; where the closed-forest is confined to the stream edges, species diversity is not great (*Melaleuca, Nauclea* etc.). In the more extensive areas, large trees (*Acacia, Terminalia, Cleistocalyx*) form a continuous, high canopy. Palms (*Carpentaria, Livistona benthami*) and ferns (*Stenochlaena*) are present. Vines usually not as numerous as in (a).
<table>
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<th>Rating</th>
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<td>Intensive</td>
<td>site drainage</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>agriculture</td>
<td></td>
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</table>

N.B. These areas are of restricted occurrence and easily disturbed. They also have a relatively large plant species diversity. It is recommended that they be protected from development.
Land Unit 6b.

Landform: (a) sandy margins to streams, and more poorly drained areas associated with unit 6a.

(b) slopes < .5%.

(c) relief < 2 m.

Occurrence: very rare; Krans and Keefers Hut land system.

Site drainage: subject to flooding and waterlogging in the wet season.

Soils: (a) moderately deep to deep siliceous and earthy sands; minor friable mottled yellow duplex soils (humic gleys).

(b) uniform; loamy sand grading to sandy loam at depth; humic gleys duplex (i.e. texture contrast) with loam overlying light clay.

(c) minor subsoil gravels in some profiles.

(d) sands well to excessively drained; humic gleys imperfectly drained.

Vegetation: low woodland common: Melaleuca viridiflora. E. polycarpa, E. papuana, with open understory Pandanus sp., Grevillea pteridiiflora, Banksia dentata. Moderately dense grass cover: Panicum mindanaense. Eriachne burkittii, annual Sorghum spp.. Occasionally woodland to low open-forest forms are present.
<table>
<thead>
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<th>Rating</th>
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<td></td>
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<td>severe</td>
</tr>
<tr>
<td>Intensive agriculture</td>
<td>soil drainage</td>
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<td>moderate</td>
</tr>
<tr>
<td></td>
<td>site drainage</td>
<td></td>
<td>severe</td>
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</tbody>
</table>
**Land Unit 8sl.**

**Landform**
- (a) extensive plains.
- (b) negligible slope.
- (c) negligible relief.

**Occurrence**
- very rare; confined to Littoral land system.

**Site drainage**
- inundated at peak tides.

**Soils**
- (a) saline grey cracking clays (Solonchaks), marine muds along channels.
- (b) uniform medium clay.
- (c) no stone or gravel.
- (d) poorly drained.

**Vegetation**
- grassland; mosaic of bare mud, *Sporobolus virginicus* and small patches of Samphire.

**Evaluation**

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<th>Rating</th>
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<tbody>
<tr>
<td>Urban site and soil drainage</td>
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<tr>
<td>Intensive site and soil agriculture drainage</td>
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</tbody>
</table>
Land Unit 8a2.

Landform : (a) plains as for 8a1.
(b) as for 8a1.
(c) as for 8a1.

Occurrence : moderately extensive coastal plains unit; major component of Littoral land system.

Site drainage : tidal inundation.

Soils : (a) saline marine muds, minor grey cracking massive clays (strongly alkaline soil reaction trend).
(b) uniform, silty clay to heavy clay.
(c) no stone or gravel.
(d) very poor drainage.

Vegetation : low closed mangrove forest.

Evaluation : not suitable for any development; should be conserved in natural state.
Land Unit 8bl.

Landform : (a) beach dune.
            (b) seaward slopes to 8%, landward slopes 2-4%.
            (c) relief to 3 m.
            (d) occasional outcrop of calcareous beach rock.

Occurrence : very rare; found in Littoral land system.

Site drainage : very well drained, subject to periodic wave attack.

Soils : (a) dune sands, often with calcareous hardpan.
        (b) uniform sand.
        (c) no stone or gravel; hardpan in places.
        (d) excessively drained.

Vegetation : grassland with scattered Casuarinas.

Evaluation : not suitable for development due to coastal erosion potential. Should be conserved and protected for aesthetic and amenity uses.
Land Unit 8b2.

| Landform                  | (a) beach ridge system - stabilized ancient sand dunes.  
|                          | (b) <4% slopes.  
|                          | (c) relief to 2.5 m.  
| Occurrence                | very rare; found in Littoral land system.  
| Site drainage             | occasional tidal inundation of swales, dune ridges well drained  
| Soils                     | (a) grey clays in swales, calcareous sands on dunes.  
|                          | (b) both soils have uniform texture profiles.  
|                          | (c) no stone or gravel, hardpan occurs in places.  
|                          | (d) dune sands excessively drained, swale muds poorly drained.  
| Vegetation                | closed forest; wide diversity of tree and vine species.  
| Evaluation                | not suitable for any development due to surface instability, and flooding of swales.  

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Northcote K.H., Hubble G.D., Isbell R.F., Thompson C.H., and
Bettenay E., (1975) A Description of Australian Soils, CSIRO

4th edition, CSIRO

Stace H.C.T., Hubble G.D., Brewer R., Northcote K.H., Sleeman J.R.,
Soils, Rellim 2nd edition
Internal Drainage: is the freedom with which excess water can move through the soil profile. It is determined by assessing physical characteristics which control drainage, including texture, structure, presence of hardpans. Classes as defined by U.S.D.A. (1951) are:

- **very poor**: no water will pass through the soil;
- **poor**: water passes through soil profile very slowly - saturated in root zone for extended periods;
- **imperfect**: water passes through soil profile slowly - short periods of waterlogging;
- **moderately well**: minor impedence to water movement through profile - occasional waterlogging only;
- **well**: no impedence to water movement through profile;
- **excessive**: rapid drainage of soil profile usually associated with a low moisture storage capacity;

\( \text{pH} \): is a numerical expression of the concentration of hydrogen ions in the soil i.e. the acidity or alkalinity of the soil. Plant growth is generally not limited by a pH between 6.0 and 7.8.
Soil type: as defined by Northcote et al. (1975) is a broad grouping of soils in which morphological and chemical characteristics are similar. The scheme is applicable to all Australian soils.

Soil depth: is determined from soil cores taken to a maximum depth of 150 cm, to a hard (i.e. bedrock or hardpan) layer which would be expected to impede excavation.

Soil structure: is the aggregation of primary soil particles (i.e. sand, silt and clay) into compound particles, which are separated from each other by a regular series of pores, which act as lines of weakness. Strength of structure indicates the degree to which aggregates can be defined in the soil mass, i.e. the extent of continuous interaggregate pores. A structureless (i.e. massive) soil has no readily discerned aggregates whereas a strongly structured soil (e.g. grey clays) has many clearly defined aggregates.

Soil structure is an important determinant of soil drainage, moisture storage capacity and availability to plants, and soil penetrability to plants.

Structural (aggregate) stability: is the degree to which soil aggregates remain consolidated when wet. It is an important factor in assessing soil erodibility.

Soil texture: describes the particle size composition of the mineral soil. Soils in which coarse particles dominate (i.e. >.2 mm diameter) are termed sands; those in which fine particles dominate (i.e. <.002 mm diameter are termed clays. The
intermediate particle sizes are termed silts. An even mixture of all these particles gives a texture of a loam or clay loam.

Slope gradient is measured as the percentage of the vertical rise over horizontal distance. Slope is an important determinant of erosion potential, the greater the slope, the greater the velocity of run-off water, and hence its ability to do erosive work. Slope has a bearing on engineering costs in development.

Site drainage is a subjective assessment of the freedom with which excess water is removed from the site. It is assessed on the basis of the following observable characteristics:

- slope gradient, relief and position in landscape;
- surface conditions, such as crusting and pugging;
- indicator plant species.

The drainage classes are defined as:

- very poor: inundation or flooding for much of the year;
- poor: inundation or flooding during the wet season;
- imperfect: waterlogging for much of the wet season;
- moderately well: waterlogging for short periods during the wet season;
well: free water is readily removed from the site;

excessive: rapid removal of water from the site, associated with moderately steep to steep slopes.

Outcrop and surface stone: acts as a barrier to excavation and cultivation, if sufficiently extensive.

Outcrop is defined as surface exposure of bedrock, while surface stone are fragments of rock 75 mm diameter and gravel is 2-75 mm diameter.

Gravel and stone content: the presence of stone and gravel reduces ease of excavation and the stability of excavations once completed. They also reduce moisture holding capacities compared to equivalent soils without stone and gravel.
APPENDIX II. DERIVATION OF LIMITATION RATINGS.

1:1 A limitation is any attribute of the land or soil which is likely to adversely affect a particular form of land use. The limitation rating is an expression of the severity of the limitation in a land unit.

1:2 A limitation can only be defined if a land use has been proposed. Land and soil features may be a limitation for one form of development, and not another, for instance excessive drainage is not a limitation for urban development, whereas it is a limitation for agriculture. Hence it is not possible to simply list out for all land units a series of general limitations.

1:3 This survey has only determined limitation ratings for general urban and agricultural development, in the absence of any more specific land use proposals. However, it is possible for land use planners to evaluate limitation ratings for other land uses, including more specific aspects of urban and agricultural development. The procedure is to define the physical (i.e. land and soil) requirements for the particular land use. With these clearly in mind, it is then possible, by comparison with the land unit descriptions, to determine which features are adverse to the particular land use.

2:1 The limitation rating tables (Table II, III) indicate how the ratings shown in the land unit descriptions were derived. The class limits used to determine the limitation ratings are arbitrary, but are necessary to permit consistency between workers, and also to permit analysis of ratings from first principles. They have been determined by consultation with relevant local agencies, review of similar studies in other states, and using standards set by U.S. Soil Conservation Service (anon. 1971).
### TABLE II. Limitation rating for urban development

<table>
<thead>
<tr>
<th>Limitation Rating</th>
<th>None to Slight</th>
<th>Moderately Severe</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Slope</strong></td>
<td>0-3%</td>
<td>3-6%</td>
<td>&gt;6%</td>
</tr>
<tr>
<td><strong>Soil Depth</strong></td>
<td>&gt;120 cm</td>
<td>60-120 cm</td>
<td>&gt;60 cm</td>
</tr>
<tr>
<td><strong>Outcrop and stone (surface cover)</strong></td>
<td>&lt;3%</td>
<td>3-10%</td>
<td>&gt;10%</td>
</tr>
<tr>
<td><strong>Site drainage</strong></td>
<td>excessive, well, imperfect, moderately well</td>
<td>poor, very poor</td>
<td></td>
</tr>
</tbody>
</table>

**Notes on the table.**

1. Soil depth is taken to a layer which will impede excavation. It was found that soil depth varies considerably over small distances in the "1" and "3" groups of land units (ie. upland areas), and the hardness of the underlying rock also varied considerably over short distances. The table above, and the land unit descriptions have tended to generalise such small scale variations.

2. On all soils on upland areas, susceptibility to degradation following disturbance is a limitation. On flat areas, compaction will result. On sloping terrain (even very gently sloping terrain), disturbance will contribute to loss of soil by sheet and gully erosion (See Appendix 11).
### TABLE III. Limitation Ratings for Agriculture.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>None to Slight</th>
<th>Moderately</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope</td>
<td>0-2%</td>
<td>2-5%</td>
<td>5%</td>
</tr>
<tr>
<td>Site drainage</td>
<td>well to</td>
<td>imperfect,</td>
<td>poor, very</td>
</tr>
<tr>
<td></td>
<td>moderately well</td>
<td>excessive</td>
<td>poor</td>
</tr>
<tr>
<td>Internal drainage</td>
<td>well to</td>
<td>imperfect,</td>
<td>poor, very</td>
</tr>
<tr>
<td></td>
<td>moderately well</td>
<td>excessive</td>
<td>poor</td>
</tr>
<tr>
<td>Depth</td>
<td>&gt; 80cm</td>
<td>40-80cm</td>
<td>&lt; 40cm</td>
</tr>
<tr>
<td>Rock outcrop</td>
<td>&lt; 2%</td>
<td>2-15%</td>
<td>&gt; 15%</td>
</tr>
<tr>
<td>Surface stone</td>
<td>&lt; 2%</td>
<td>2-10%</td>
<td>&gt; 10%</td>
</tr>
</tbody>
</table>

Notes on the table.

All upland soils are highly infertile. Whilst specific requirements will vary between sites, all upland soils will require fertilizer dressings, according to the crop or pasture's requirements, as recommended by Department of Primary Production.