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CAPABILITY EVALUATION

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2.1 Introduction

Capability of land can be considered as the capacity of an area to support a particular land use. This capacity will vary with:

- (i) the nature of the natural resources of the land;
- (ii) the level of management and inputs available;
- (iii) the required level of output or performance;
- (iv) the level of deterioration which is acceptable.

If a particular land use can be sustained over a time at a level where the land resources are not irreversibly depleted, then the area is considered to be capable of supporting that use.

When land is used within its capability, there are wide ranging benefits to both the individual user and to the community. An acceptable level of productivity or performance is ensured, input and maintenance costs are minimized and deterioration is held to a tolerable level. Sound land use is essential for the maintenance of “environmental quality”.

When land is not used in accordance with its natural resources, deterioration can have serious consequences, both on the site of the activity and in localities topographically related to the site. The consequences of inappropriate land use include such occurrences as soil loss and subsequent siltation and turbidity, depletion of plant nutrient reserves, eutrophication of water bodies, stream bank erosion, undermining and collapse of structures, loss of public amenity and aesthetic deterioration.

2.2 Land Capability in the Study Area

Where developmental pressures are operating, a considerable difference between actual land use and ideal land use may arise. As land use patterns stabilize over time, the location of particular activities will tend to be in accordance with the capability of the natural resources of the area. However, economic and social conditions alter with time and, on occasional land use patterns will be under pressure to change.

It is in a situation of change and also in anticipation of further change that guidance for the selection of appropriate land use in different areas is of importance to the community and the individual. If areas are appropriately zoned within their capability and if the range of land uses is limited to those which will not cause unacceptable deterioration, land use risk factors are consequently minimised and damage, if any, will be negligible.

In the study area, many of the land use patterns are the result of nearly a century of trial and error. Unfortunately it does not necessarily follow that all established land uses are in harmony with the existing land resources. Indeed, many instances of deterioration can be seen on developed land of long standing throughout much of the area.

Inappropriate land use can arise from a number of situations. It may be that the degree of physical limitation cannot be overcome by available technology, or else available management inputs, either skills or capital, may be insufficient to prevent deterioration under a particular land use. Regardless of the reason for the “misuse” of land, if the community is otherwise forced to accept the resulting consequences of deterioration, it should have some say in determining the nature and location of types of land use. From this, it can be seen that specification of management levels is equally as important in defining the capability of land resources as is classification and zoning of different land types. In defining the *land classes* for each of the broad land use categories (Urban, Agriculture and Rurban – See Subsection 2.4) an attempt has been made to reconcile management recommendations and natural resources.

The purpose of this exercise is not intended to lie in the selection of optimum use on each portion of land within the study area. In fact, such a task would be impractical if not impossible at present, in view of the data which would be required. Instead, an assessment of the capability of land described by the mapping units to support a range of representative land uses has been carried out within the constraints imposed by available data, time and personnel.

2.3 Capability Assessment

The degree of physical constraint imposed by the natural resources of different areas upon the nominated land uses has been considered.

Ratings of capability have been determined following the selection of class limits for a number of key land attributes. Details of the class limits for the different land use categories are described later in this section.

The ultimate choice of use lies in the hands of the planning authorities, who can overlay the land inventory and capability assessment with social, economic and political requirements. Essentially, the land resource inventory can be considered to form a constant base within the limits provided by present day land use technology.

Capability assessment of land in the area has proceeded, despite a severe lack of quantitative data relating to kind of activity to land type through levels of input, output and deterioration. To some extent, this lack of formal data has been balanced by the fact that a wide range of land uses are being and have been attempted over a wide range of land types for a considerable period. By means of inspection, observation and past experience, and by close contact with people involved in particular activities throughout the area, the survey team feels that a reasonable appreciation of the spectrum of deterioration has been developed. This has been subsequently correlated with kind and level of activity over a wide range of land types.

2.4 Land Classes

The principal land use categories considered are:

1. Urban;
2. Rurban;
3. Agriculture.

Four land classes for each use category are defined and these have been based essentially upon the degree of limitation imposed by the nature of the land resources. The land classes have been formulated taking into consideration presently available technology. The four classes differ in detail between the land uses, but basically the classes into which land is assessed range from the first class, which is suitable for the highest level of the stated purpose with a low degree of specified control, through the second and third classes, which require increasing input and management control, to the fourth class, which is considered to be unsuitable for the land use.

Definitions of the land classes for the three principal land uses are given in Table I(a), II(a) and III(a). Land classes are derived by keying out the physical characteristics of each land system *component*. Tables I(b), II(b) and III(b) are keys for determining the land classes for the three land uses. Refer to Subsection 2.5 for use of keys.

Overall *land system* capability is determined by the capability of the dominant component or components. If more than two-thirds of a land system is rated at the same capability, this rating is taken to represent the entire mapping unit. When no single capability rating exceeds two-thirds of a land system, the overall rating is one class lower than the higher class.

Overall land system land classes are presented to give an appreciation of the spatial distribution of land suitable for the different land uses. In the field and for specific cases, the capability of individual components must be considered rather than the overall land class. In some instances small components occur within land systems which have widely differing capabilities to the overall rating.

The land systems are listed in Table IV with overall capability ratings. Table V categorizes the land systems on the basis of terrain while at the same time summarising geological parent material.

2.5 Land Class Keys

The keys, Table (b) – Urban, Table II(b) – Rurban and Table III(b) – Agriculture, have been compiled on the assumption that for a given land use, a hierarchical relationship between physical characteristics exists. For example terrain, in general, is an overriding factor determining the suitability of land. However, other characteristics can render land more or less suitable depending upon their exact nature, e.g. a given land use can proceed on a steeper gradient if the soils have otherwise favourable characteristics compared to a lower gradient with soils of lower suitability.

In practice, the physical conditions which exist in a component are sieved through the key until the appropriate land class is arrived at for the land use.

Details of class limits and of terminology used are contained in Appendix 2.

Urban Land Use

In this report, urban land use includes the construction and domestic servicing of areas of dwelling with not more than two storeys on blocks smaller than 0.4 ha, the construction of light access roads and light commercial structures.

It should be noted that physical characteristics are solely used to determine land capability in this system. Additional factors, e.g. social, economic, will need to be considered to determine feasibility of urban development in different areas.

Table I(a) – Urban Land Class Definitions

Land Class	Definitions
I	Areas suitable for urban development. Standard designs, installation and management are satisfactory provided that area of bare soil are kept to a minimum and are vegetated at the earliest possible stage.
II	Areas basically suitable for urban development. However one or more land characteristics may not be compatible with development. Careful site selection and preparation, design and installations methods involving moderate costs will generally minimise impact upon the environment.
III	Areas with one or more land characteristics not compatible with urban development. Impediments can be largely overcome at high costs by careful site selection and preparation an by specialised design, installation techniques and management although some adverse effects upon the environment are likely.
IV	Areas not suitable for urban development because of one or more characteristics that make development impractical. Partial correction is possible with use of major inputs at very high cost (such as highly specialised design, construction techniques and management) however significant adverse effects upon the environment will most probably occur.

Table I(b) – Key for Urban Land Classes

Factor	Class Limits		Refer on to	Land Class
i	Gradient (ave. slope of area)			
	i.1	<5%	ii	
	i.2	<5% to 10%	iv	
	i.3	>10% to 17%	iv	
	i.4	>17% to 25%		III
	i.5	>25%		IV
ii	Flood Frequency			
	ii.1	Fewer than one in 100 years	iii	
	ii.2	More than one in 100 years		IV
iii	Site Drainage			
	iii.1	Good	iv	
	iii.2	Moderate - iii.2.1 easily drained iii.2.2 not easily drained	iv	III
	iii.3	Poor - iii.3.1 easily drained iii.3.2 not easily drained		II
	iii.4	Very poor		III IV
iv	Soil depth			
	iv.1	>0.8 m - iv.1.1 Gradient <10% iv.1.2 Gradient >10%	v	II
	iv.2	<0.8 m to 0.5 m		II
	iv.3	<0.5 m		III
	iv.4	Outcrop >10% of area		IV
v	Soil stability			
	v.1	Soil volume stable	vi	
	v.2	Minor to moderate seasonal volume change		II
	v.3	Particular foundation problems		III
	v.4	Unstable slopes		IV
vi	Soil Aggregate Stability (A.S.) of Subsoil			
	vi.1	A.S. Class > 3 or 4		I
	vi.2	A.S. Class < 1 or 2		II

Note: Details of class limits and terminology are contained in Appendix 2.

Rurban Land Use

The term rurban is used to indicate the indeterminate area of use separating urban for agricultural activities. Rurban land use rural – residential, weekender and hobby farming activities.

Land has been classified on the basis of its ability to withstand deterioration resulting from activities associated with rurban use.

In this system, capability of land to support rurban development is determined by considering physical characteristics solely. Determining feasibility or practicality of rurban development should involve additional considerations such as social and economic requirements and also the implications of compatibility with adjacent land uses.

Table II(a) – Rurban Land Class Definitions.

Land Class	Definitions
A	Areas suitable for intensive subdivision (lots in the order of 0.4 ha to 2 ha). Serious deterioration should be minimised in these areas provided that normal safe management practices are followed. Bare areas of soil should be kept to a minimum and vegetated at the earliest possible stage.
B	Areas suitable for medium density subdivision, (approximately 5 ha lots). Some land characteristics are not compatible with development, however deterioration can be minimised by careful location of boundary and subdivisional fences, building sites, access tracks and water storages on suitable sites within the specified area. <u>Strict control on management of vegetative cover may be required.</u>
C	Land not normally suitable for “rurban” use because of limitations imposed by land features. Areas in the order of 10 ha are required to allow safe location of buildings, access tracks, water storages and fences on suitable sites within the specified area. These precautions, combined with normal safe management practices, should minimise impact upon the environment.
D	Areas unsuitable for subdivision for “rurban” purposes because of the high degree of hazard imposed by the land characteristics.

Factor	Class Limits		Refer on to	Land Class
i	Gradient (ave. slope of area)			
	i.1	<8%	ii	
	i.2	<8% to 20%	iv	
	i.3	>20% to 30%		C
	i.4	>30		D
ii	Flood Frequency			
	ii.1	Fewer than one in 100 years	iii	
	ii.2	More than one in 100 years <u>but</u> fewer than one in 25 years		B
	ii.3	More than one in 25 years		D
iii	Site Drainage			
	iii.1	Good to moderate	iv	
	iii.2	Poor: iii.2.1 easily drained iii.2.2 not easily drained	iv	C
	iii.3	Very Poor		C
iv	Soil depth			
	iv.1	>0.5 m	v	
	iv.2	<0.5 m		C
v	Soil surface texture			
	v.1	Northcote texture class 2, 3, or 4	vi	
	v.2	Northcote texture class 1, 5 or 6		B
vi	Structure of upper 0.2 m of soil			
	vi.1	Moderate to strong	vii	
	vi.2	Structureless to weak		B
vii	Soil Aggregate Stability (A.S. of Topsoil)			
	vii.1	AS class 3 or 4	viii	
	vii.2	AS class 1 or 2		B
viii	Whole Profile Permeability			
	viii.1	Rapid through to slow		A
	viii.2	Excessive or very slow		B

Note: Details of class limits and terminology are contained in Appendix 2.

Agricultural Land Use

Agricultural land use includes activities which contribute to primary production and a more or less viable base.

Land Class	Definitions
1	Land suitable for intensive cropping. Land characteristics permit cultivation on short rotations or annually. Safe management practices are required to minimise environmental deterioration.
2	Land suitable for cropping and/or grazing. One or more land characteristics not compatible with intensive cropping, however longer rotations between crop and pasture, combined with normal safe management, will generally minimise environmental deterioration.
3	Land suitable for grazing only. One or more land characteristics are not compatible with cultivation. Moderate degree of hazard can be largely overcome by normal safe management practices with emphasis on the maintenance of vegetative ground cover. Flexible control of grazing pressure will further reduce risk of environmental deterioration.
4	Land not suitable for cropping or grazing because of the high degree of hazard imposed by the land characteristics.

Factor	Class Limits		Refer on to	Land Class
i	Gradient (ave. slope of area)			
	i.1	<5%	ii	
	i.2	>5% to 15%	iii	
	i.3	>15% to 35%	iv	
	i.4	>35%		4
ii	Flood Frequency			
	ii.1	Fewer than 1 in 5 years	iii	
	ii.2	More than 1 in 5 years		3
iii	Site Drainage			
	iii.1	Good	iv	
	iii.2	Moderate iii.2.1 easily drained iii.2.2 not easily drained	iv	3
	iii.3	Poor		3
	iii.4	Very poor		4
iv	Effective Soil depth			
	iv.1	>0.5 m	v	
	iv.2	<0.5 m		3
v	“Topsoil” texture			
	v.1	Northcote texture class 2, 3 or 4	vi	
	v.2	Northcote texture class 1, 5 or 6		3
vi	Whole Profile Permeability			
	vi.1	Slow to rapid	vii	
	vi.2	Excessive		3
vii	Structure of upper 0.20 m of soil			
	vii.1	Moderate to strong vii.1.1 < gradient 25% vii.1.2 > Gradient 25%	viii	2
	vii.2	Structureless to weak		3
viii	Soil Aggregate Stability (AS) of Topsoil			
	viii.1	AS class 4	ix	
	viii.2	AS class 3		2
	viii.3	As class 1 or 2		3
ix	Available Supplementary Water			
	ix.1	Irrigation water readily available	x	
	ix.2	Water supply for irrigation absent or not reliable		2
x	Growing season			
	x.1	Not restricted other than by “normal” weather conditions		1
		Shortened by severe cold		3

Note: Details of class limits and terminology are contained in Appendix 2.

Table IV: Land System Capability

Land System	Symbol	Land Class		
		Urban	"Rurban"	Rural
1. Belgrave Heights	Bel	III	B	3
2. Cardinia	Car	II	B	3
3. Chirnside	Chi	II	A	2
4. Chateau Yering	Chy	II	A	2
5. Cockatoo	Ckt	II	A	2
6. Dandenong Creek	Dac	III	B	2
7. Deep Creek	Dee	III	B	3
8. Don Valley	Don	III	B	2
9. Gembrook	Gem	I	A	1
10. Gilwell Park	Gil	II	A	2
11. Lilydale	Lil	I	A	2
12. Lysterfield	Lys	I	A	2
13. Millgrove	Mil	II	A	1
14. Montrose	Mon	II	A	3
15. Mt Myrtaia	Mmy	IV	D	4
16. Mt Riddell	Mri	IV	D	4
17. Olinda	Oli	I	A	1
18. Paul Range	Pau	IV	D	3
19. Reefton Spur	Res	IV	D	4
20. Sassafras	Sas	II	A	1
21. Schoolhouse Ridge	Scr	IV	C	3
22. Settlement Road	Set	III	B	1
23. Seville	Sev	II	A	3
24. Siberia Gap	Sib	II(-)	B	3
25. Silvan	Sil	III	B	2
26. Tentpole Ridge	Tpr	III	B	3
27. The Triangle	Tri	I(-)	A(-)	3
28. Toolangi	Too	I	A	1
29. Upper Bakers Creek	Ubc	IV	C(-)	3
30. Upwey	Upw	II	A	3
31. Yarra Floodplain	Yaf	IV	D	3
32. Yarra Glen	Yag	I	A	2

- Note:
- (i) (-) = additional climatic factors may be considered
 - (ii) Overall Land System capability represents the combination of component capability ratings. Refer to
 - (iii) Section IV (Land Classes) for explanation.

Table V: Land Systems Grouped by Land Form

Land Form	Land System	Geology
Alluvial Plains	Yaf Dac Set Mil	Unconsolidated alluvial sediments
Undulating terrain	Chy Lys	Silurian/Devonian mudstones Lysterfield granodiorites
Rolling terrain	Yag Lil Gem Gil	Silurian/Devonian mudstones Mt Dandenong volcanics Tertiary olivine basalts Lysterfield granodiorites
Hilly terrain	Car Ckt Chi Don Mon Sev	Lysterfield granodiorite Metamorphosed rocks, incl. Hornfels Tertiary olivine basalts Devonian volcanics, granodiorite, related colluvium and mudstones Mt Dandenong volcanics Silurian/Devonian mudstones
High and/or steep hills	Bel Sil Scr Tpr Upw	Lysterfield granodiorite Tertiary olivine basalts Silurian/Devonian mudstones Metamorphosed rocks, incl. Hornfels Mt Dandenong volcanics
Rolling hill crests	Oli Too	Mt Dandenong volcanics Silurian/Devonian mudstones
Dissected hill crests	Sas	Mt Dandenong volcanics
Mountainous to rugged terrain	Mmy Mri Pau Res	Devonian granodiorites and granites Devonian volcanics Silurian/Devonian mudstones Silurian/Devonian mudstones
Elevated dissected crests	Dee Ubc	Volcanics, granodiorites and metamorphosed rocks Silurian/Devonian mudstones
Elevated rolling or undulating plateaux	Sib Tri	Volcanics, granodiorites and metamorphosed rocks Silurian/Devonian mudstones.