

SHIRE OF TRARALGON BROAD-SCALE LAND CAPABILITY ASSESSMENT

Prepared by

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May 1980

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PREFACE

This report on a broad-scale assessment of land capability was prepared to aid the Central Gippsland office of the Town and Country Planning Board in their evaluation on the Shire of Traralgon's Interim Development order 1979.

The information in this report is for broad-scale planning only and must not be reproduced without the approval of the Soil Conservation Authority.

The report does not recommend particular forms of development in any areas. No account has been taken of this socio-economic considerations which must influence planning decisions. The report does however provide a interpreted physical data-base onto which these other considerations may be imposed to derive a suitable regional development plan.

This work was carried out with the support of the Environmental Studies Division, Ministry for Conservation, Victoria, Australia. The contents of this publication do not necessarily represent the official views of the Ministry.

1. SUMMARY

This report describes a broad-scale land capability assessment of the Shire of Traralgon. Land in the Shire has been assessed for its capability to support three broad forms of land use, general farming, urban subdivision, and rural subdivision. In addition, the area was assessed for its erosion hazard. Results of these assessments are shown in Table 1.

The report shows that approximately 9430 ha or 20% of the Shire (map units C, F, G) contains land with capability class ratings of 2 to 3 for either general farming, urban subdivision. This land would be expected to provide relatively few constraints to those forms of development.

An area of approximately 9990 ha or a further 21.5% of the Shire (map unit E) contains land or capability class 3 for cropping and subdivision. A moderate number and degree of constraints and erosion hazard occur over this land. Map unit D covering approximately 10180 ha or 22% of the Shire, is a complex of land types in which some areas have similar capability class ratings to map unit E but can not be mapped at the present scale.

Map units A, B and H representing approximately 17090 ha or 36.5% for the Shire have restrictive or prohibitive land capability ratings for both cropping and subdivision. Further areas of similarly rated land occur in map unit D.

It is important that use of the capability information provided be consistent with the scale of mapping, that is an aid to regional or broad strategy planning only. More detailed subdivision or farm planning will require land capability assessment based on a more detailed mapping scale. Such further work is particularly recommended in areas of those map units believed to contain a high degree of land characteristic variability. This includes map units D and to a lesser extent, map unit E.

TABLE 1 SUMMARY OF LAND CAPABILITY

MAP UNIT	DESCRIPTION	%Area	LAND CAPABILITY RATINGS				EROSION HAZARD RATING	COMMENTS
			GENERAL CROPPING	FARMING GRAZING	URBAN SUB-DIVISION	RURAL SUB-DIVISION		
A	Steeply sloping mountains and hills on Cretaceous sediments	24.0	4	3	4	4	4	Areas of poor cropping and subdivision capability, and high erosion risk due to steep slopes
B	Steeply sloping hills on Tertiary basalt	1.5	3	2	4	4	4	Landscape already extensively landslipped Poor capability for subdivision and high erosion hazard
C	Undulating hills and low hills on Tertiary basalt	3.0	2	2	2	3	2	Land contains deep red soils commonly favoured for potato growing
D	Undulating hills and low hills on Tertiary sediments	22.0	3-4	3	3-4	3-4	3-4	Complex mapping unit with widely varying land characteristics; requires more detailed mapping to assess capability
E	Gently undulating low hills on Tertiary sediments	21.5	3	2	3	3	3	Areas with moderate farming and subdivision capability, but also with moderate erosion hazard; more detailed assessment recommended

TABLE 1 SUMMARY OF LAND CAPABILITY (Continued)

MAP UNIT	DESCRIPTION	%Area	LAND CAPABILITY RATINGS				EROSION HAZARD RATING	COMMENTS
			GENERAL CROPPING	FARMING GRAZING	URBAN SUB-DIVISION	RURAL SUB-DIVISION		
F	Gently undulating plains on Tertiary sediments	11.5	2	2	2	3	2	Fairly uniform mapping unit with generally good capability for farming and subdivision with low erosion hazard.
G	Relict alluvial terraces and outwash fans on Quaternary alluvium	5.5	3	2	3	3	2	Areas with moderate capability for farming and subdivision, with low erosion hazard
H	Active drainage floors and floodplains on Quaternary alluvium	11.0	5	3	5	5	2	Areas prohibitive to urban or rural subdivision due to flood risk

2. INTRODUCTION

This report provides a brief description and capability assessment of land in the Shire of Traralgon. It is based on preliminary, broad-scale land resource mapping of the area and considers the use of land within mapped units for general farming, urban and rural subdivision. The assessment of broad land use capability was undertaken to assist the Town and Country Planning Board in their evaluation of the Shire of Traralgon's Interim Development Order 1979.

Land resource information presented herein and the delineation of map unit boundaries on the accompanying map is based largely on provisional land systems information from a current 1:100,000 scale mapping program being conducted by the Soil Conservation Authority. Within this report that data has been supplemented with previously mapped land systems information of 1:126,000 scale (Land Systems of Victoria 1975), and Terrain analysis mapping information (Grant and Ferguson 1978), at 1:250,000. For the purpose of this report land is mapped in terms of easily recognizable, topographical and geologically based map units on a 1:100,000 scale topographic base map.

It is emphasised that because the information presented relies greatly on air phot interpretation and that the scale of mapping is very broad, the assessment of capability is only meaningful at the regional or broad strategy planning stage of land use planning. More detailed land capability assessments involving more detailed mapping (scale 1:10,000 – 25,000), and greater data collection will be required at the local subdivision planning stage.

Detailed land capability assessment studies require a high degree of uniformity of land characteristics within map units. Such uniformity does not occur within map units at 1:100,000 scale. The capability ratings for the broad-scale map units herein are therefore intended as a guide only to the capability of the most commonly occurring type of terrain within each map unit.

3. MAP CAPABILITY ASSESSMENT SYSTEM:

Land capability assessment involves the determination of the constraints on development imposed by the physical characteristics of the land, and the constraints or hazards to the land itself. The objectives may be seen as two-fold. The first, as an aid to land use planners, is to delineate areas with minimal physical constraints to particular land use development activities. The second objective, or particular concern to the Soil Conservation Authority, is to ensure that sustained use of planned form of land use can be achieved with an acceptable minimal level of deterioration to the quality of the land and its run-off water. The assessment or rating of agricultural land productivity is not attempted in this study.

The Soil Conservation Authority is developing a five class capability rating system for wide range of land use activities. On this scale land is rated from Class 1, with a very high capability for a specified use, through to Class 5, which has a very low capability for the same use. These classes are defined in Table 2.

Capability ratings are determined by assessing the relative importance of a number of land characteristics which are considered to affect land performance. In order to meet the requirements of regional planning, rating assessments for a number of separate activities may be combined to determine capability for particular broad land use alternatives. The land use alternatives considered for this report are general farming, urban subdivision and rural subdivision. These land uses and their component activities are described in Table 3. Capability rating tables for each of these activities are included in the appendix.

In addition to assessing capability ratings for various forms of land use, an erosion hazard rating for bared soil is given for each map unit in this report. This hazard rating is expressed independently from the land use alternatives because soil surfaces can be rendered bare by a number of activities within any of the land use alternatives. Definitions of the hazard ratings for erosion correspond to the degree of limitation column in Table 1.

Table 2 - LAND CAPABILITY CLASSES

Land Class	Degree of Limitation	General Description
1	None to very slight	Areas with a high capability for the proposed activity or use. The limitations of long term instability, engineering difficulties or erosion hazard do not occur or they are very slight. Standard designs and installation techniques, normal site preparation and/or management should be satisfactory to minimise the impact on the environment.
2	Slight	Areas capable of the proposed activity or use. Slight limitations are present in the form of engineering difficulties and/or erosion hazard. Careful planning and/or the use of standard specifications for site preparation, construction and follow-up management should minimise developmental impact on the land.
3	Moderate	Areas with fair capability for the propose activity or use. Moderate engineering and/or high erosion hazard exist during construction. Specialised designs and techniques are required to minimise developmental impact on the environment.
4	High	Areas with poor capability for the proposed activity or use. There are considerable engineering difficulties during development and/or a high erosion hazard exists during and after construction. Extensively modified design and installation

Land Class	Degree of Limitation	General Description
		techniques, exceptionally careful site preparation and/or management are necessary to minimise the impact on the environment.
5	Severe	Areas with very poor capability for the proposed activity or use. Limitations, either long term instability hazards, erosion or engineering difficulties cannot be easily overcome with current technology. Severe deterioration of the environment will probably occur if the activity or use is attempted in these areas.

TABLE 3 - BROADSCALE LAND USE ALTERNATIVES

Broad Land Use	Activities Rated	General Definition
General Farming	Cropping Grazing Dam construction	Agricultural production involving cropping and or grazing, and the construction of farm dams. Cropping is considered a more intense form of land use due to cultivation requirements. Grazing is generally less hazardous to the land as it involves less actual soil disturbance although this obviously depends on stocking rates. Farms usually in excess of 25 ha .
Urban subdivision	Constructing building foundations, constructing secondary roads, digging shallow excavations	Intensive housing developments on small blocks with sealed roading, curbing and channelling, and full servicing, including sewerage and town water supply. Subdivision blocks generally less than 1 ha.
Rural subdivision	Construction building foundations, constructing secondary roads, digging shallow excavations, provision for on-site effluent disposal, small dam construction	Farmlets requiring a house site, a dam site, effluent disposal site and low-cost access – i.e gravel roads and access tracks. Subdivision blocks generally between 1 and 25 ha.

MAP UNIT C

DESCRIPTION:

- (i) Area: 1404 ha (3%)
- (ii) Topography: Undulating hill and low hill terrain with dissected slopes and broad rounded crests. Slope gradients are generally less than 15%.
- (iii) Geology: Tertiary basalt capping Tertiary gravel, sand, silt and clay.
- (iv) Soils: Dominantly gradational red-brown earths (Krasnozems) with fine structure. These soils are generally deeper than two metres, have friable clay loam surfaces over light to medium clay subsoils, and moderately permeable. The soils have a low to moderate shrink-swell potential but do not appear to be formed on an unstable regolith. Some 'gritty' variants of these soils also occur less commonly.

EVALUATION:

LAND USE	CONSTRAINTS TO LAND USE	CAPABILITY RATING
General Farming: (a) Cropping, (b) Grazing (c) Dam construction	Slope (a) Soil permeability (c) Unified soil classification (c)	(a) 2 (b) 2
Urban Subdivision: (a) Building foundations, (b) Roads, (c) Shallow excavations	Slope shrink-swell potential (a) Slope (b, c) Subgrade unified soil classification (b, c)	2
Rural Subdivision: (a) Building foundations, (b) Roads, (c) shallow excavations, (d) Effluent disposal, (e) Dam construction (small)	Soil permeability (e) Unified soil classification (b, c, e) Soil shrink swell potential (a) Slope (b, c)	3

EROSION HAZARD OF BARED SOIL:

From: Sheet erosion risk and landslip potential on slopes Erosion Hazard Rating
2

MAP UNIT D

DESCRIPTION:

- (i) Area: 10, 181 (22%)
- (ii) Topography; Undulating, dissected, hill and low hill terrain. Country is commonly sandy with irregular slopes and terrain patterns. Slope gradients generally less than 15%, rarely to 20%. To the north of the Latrobe River this unit includes elevated undulating terrain mostly bounded by dissected slopes. Elsewhere this unit occurs between the strongly undulating mountain and hill terrain (map unit A) and lower, gently undulating plains (map unit E).
- (iii) Geology: Tertiary gravel, sand , silt and clay.
- (iv) Soils: Variable, often mottled yellow duplex soils, incipient podzols and yellow gradational soils. Uniform sandy soils, including some 'giant' podzols also occur. Soils are generally deeper than two metres with sand to sandy loam surface textures. Subsoil textures and soil permeabilities vary and are related. Soils with clay at depth (duplex and gradational) have low to moderate permeabilities whilst those with uniform sandy to sandy loam profiles have higher permeabilities.

EVALUATION:

LAND USE	CONSTRAINTS TO LAND USE	CAPABILITY RATING
General Farming: (a) Cropping, (b) Grazing (c) Dam construction	Slope (a, c) Permeability of some soils (a, c) Unified soil classification (c) Low water holding capacity of some soils (a, b)	(a) 3 - 4 (b) 3
Urban Subdivision: (a) Building foundations, (b) Roads, (c) Shallow excavations	Slope (a, b, c) Unified soil classification (b) Temporary seasonal water-logging in some soils (a, b, c)	3 - 4
Rural Subdivision: (a) Building foundations, (b) Roads, (c) shallow excavations, (d) Effluent disposal, (e) Dam construction (small)	Slope (a, b, c, d, e) Permeability of some soils (d, e) Unified soil classification (b, e) Temporary seasonal waterlogging in some soils (a, b, c, d)	3 - 4

EROSION HAZARD OF BARED SOIL:

From:	Sheet and gully erosion hazard on slopes greater than 15%. Sheet and gully erosion hazard elsewhere.	Erosion Hazard Rating 3 - 4
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MAP UNIT E

DESCRIPTION:

- (i) Area: 9994 ha (21.5%)
- (ii) Topography: Undulating to gently undulating terrain with broad rounded crests and gentle planar slopes. The country is a weakly to moderately dissected plain with slope gradients generally less than 10%, rarely to 15% in localized areas.
- (iii) Geology: Tertiary fluvial gravel, sand, silt and clay.
- (iv) Soils: Dominantly mottled yellow duplex soils although gradationally textured variants occur less commonly. The soils are deeper than two metres, low to moderately permeable and have hardsetting surface horizons. Surface textures are commonly sandy loam to fine sandy loam over mottled medium clay subsoils.

EVALUATION:

LAND USE	CONSTRAINTS TO LAND USE	CAPABILITY RATING
General Farming: (a) Cropping, (b) Grazing (c) Dam construction	Slope (a, c) Site drainage (a) Low water holding capacity of some soils (b)	(a) 3 (b) 2
Urban Subdivision: (a) Building foundations, (b) Roads, (c) Shallow excavations	Slope (a, b, c) Site drainage (a) Low water holding capacity of some soils (b)	3
Rural Subdivision: (a) Building foundations, (b) Roads, (c) shallow excavations, (d) Effluent disposal, (e) Dam construction (small)	Slope (a, b, c, d) Site drainage (a, d) Unified soils classification (b) Temporary seasonal waterlogging of some soils (a, b, c, d)	3

EROSION HAZARD OF BARED SOIL:

From: Sheet and gully erosion hazard.

Erosion Hazard Rating

3

MAP UNIT F

DESCRIPTION:

- (i) Area: 5414 ha (11.5 %)
- (ii) Topography: Gently undulating to almost level plains which have a low degree of dissection. Slope gradients generally less than 5%.
- (iii) Geology: Tertiary gravel, sand, silt and clay commonly as hillwash deposits.
- (iv) Soils: Mottled yellow duplex soils which are often sodic. The soils are usually deeper than two metres, have sandy loam to fine sandy loam surfaces over medium subsoils, and low to moderate permeabilities. The soils are imperfectly drained and have a low to moderate shrink swell potential.

EVALUATION:

LAND USE	CONSTRAINTS TO LAND USE	CAPABILITY RATING
General Farming: (a) Cropping, (b) Grazing (c) Dam construction	Hardsetting soil surfaces (a) Site drainage (a) Low water holding capacity of some soils (b) Low dryland salting risk (a, b)	(a) 2 (b) 2
Urban Subdivision: (a) Building foundations, (b) Roads, (c) Shallow excavations	Temporary seasonal waterlogging in some soils (a) Unified soil classification (b)	2
Rural Subdivision: (a) Building foundations, (b) Roads, (c) shallow excavations, (d) Effluent disposal, (e) Dam construction (small)	Temporary seasonal waterlogging in some soils (a, d) Unified soil classification (b)	3

EROSION HAZARD OF BARED SOIL:

From: Sheet and gully erosion hazard.

Erosion Hazard Rating
2

MAP UNIT G

DESCRIPTION:

- (i) Area: 2615 (5.5 %)
- (ii) Topography: Very gently sloping flat, relict alluvial plains, terraces and outwash fans. Minor swampy depressions may be included. Slope gradients normally less than 3%.
- (iii) Geology: Quaternary alluvial gravel, sand, silt and clay.
- (iv) Soils: Variable, uniform and gradational soils. Red brown to yellow brown gradational soils with sandy loam to fine sandy loam surfaces over fine sandy clay loam to light clay subsoils, occur in moderately well drained areas. These soils are deep with low to moderate shrink swell potentials and moderate permeabilities. Elsewhere, in less well drained areas deep uniform textured grey brown soils occur with fine sandy clay loam to light clay surfaces over light to medium clay subsoils. These have moderate shrink swell potentials and low to moderate permeabilities.

EVALUATION:

LAND USE	CONSTRAINTS TO LAND USE	CAPABILITY RATING
General Farming: (a) Cropping, (b) Grazing (c) Dam construction	Low flood risk (a, c) Soil and site drainage (a, c) Structure and texture of some soils (a)	(a) 3 (b) 2
Urban Subdivision: (a) Building foundations, (b) Roads, (c) Shallow excavations	Low flood risk Temporary seasonal waterlogging and ponding in some areas (a, b, c) Unified soil classification (b) Shrink-swell potential of some soils (a)	3
Rural Subdivision: (a) Building foundations, (b) Roads, (c) shallow excavations, (d) Effluent disposal, (e) Dam construction (small)	Low flood risk (a, c) Temporary seasonal waterlogging and ponding in some areas (a, b, c, d, e) Unified soil classification (b) Shrink-swell potential of some soils (a)	3

EROSION HAZARD OF BARED SOIL:

From: Levee bank erosion dur to flooding. Erosion Hazard Rating
2
Sheet and gully erosion risk.

MAP UNIT H

DESCRIPTION:

- (i) Area: 5137 ha (11%)
- (ii) Topography: Essentially flat lower terraces, drainage floors and floodplains with incised stream channels. Slope gradients less than 1.5%
- (iii) Geology: Quaternary alluvial gravel, sand, silt and clay.
- (iv) Soils: Commonly deep dark cracking clay soils with clay loam to light clay surfaces over light to medium clay subsoils. Layered alluvial soils with fine sandy loam to silty clay loam textures may also occur. All soils are deep and the heavier clay soils have a high shrink swell potential and are poorly drained, whilst the layered alluvial soils have a low to moderate shrink swell potential and are less poorly drained.

EVALUATION:

LAND USE	CONSTRAINTS TO LAND USE	CAPABILITY RATING
General Farming: (a) Cropping, (b) Grazing (c) Dam construction	High flood risk (a, b, c) Soil shrink-swell potential (c) Seasonal watertable (a, b, c) Soil permeability	(a) 5 (b) 3
Urban Subdivision: (a) Building foundations, (b) Roads, (c) Shallow excavations	High flood risk (a, b, c) Soil shrink-swell potential (a, b) Unified soil classification (b) Seasonal water table (a, b, c)	5
Rural Subdivision: (a) Building foundations, (b) Roads, (c) shallow excavations, (d) Effluent disposal, (e) Dam construction (small)	High flood risk (a, b, c, d, e) Soil shrink-swell potential (a, b, c) Unified soil classification (b) Seasonal water table (d) Soil permeability (d, e)	5

EROSION HAZARD OF BARED SOIL:

From: Stream bank erosion. Erosion Hazard Rating
2

Sheet and gully erosion.

REFERENCES

- Anonymous (1975) Land Systems of Victoria – an unpublished report and mapping at 1: 250, 000 scale prepared by the Soil Conservation Authority, Melbourne.
- Aldrick J. M (1980) Land systems of the Central Gippsland Region – unpublished mapping and personal communication relating to report yet to be produced by the Soil Conservation Authority, Melbourne.
- Grant K and Ferguson (1978) Terrain analysis and Classification for Engineering Purposes of the Warragul Area, Victoria. C. S. I. R. O Div. Of App. Geomechanics Tech Pap. No. 21
- Rowe R. K, Howe D. F, and Alley, N. F. 1978 Guidelines for Land Capability Assessment in Victoria - unpublished report. Soil Conservation Authority, Melbourne.

APPENDIX LAND CAPABILITY ASSESSMENT TABLES

LAND CAPABILITY RATING OFR BUILDING FOUNDATIONS: - Areas capable for being used for the construction of structures with one or two stories. It is assumed that commonly used earth moving equipment is available. The table considers factors which affect both construction and the capability of the immediate site for activities closely related to dwellings. Effluent disposal, ease of servicing and access are considered separately.

LAND FEATURES AFFECTING USE	TYPE OF CONSTRUCTION	CAPABILITY CLASS				
		1	2	3	4	5
SLOPE (1)	<ul style="list-style-type: none"> Stumps or strip footings; Concrete slab; Piles: 	Less than 5%	5% to 8%	8% to 15%	15% to 35%	More than 35%
FLOODING		None	-	-	Less than once in 100 years	More than once in 100 years
SITE DRAINAGE		Excessively well drained, Well drained.	Moderately well drained	Imperfectly drained	Poorly drained	Very poorly drained
DEPTH TO SEASONAL WATER TABLE		Deeper than 120 cm	120 cm to 80 cm	80 cm to 50 cm	50 cm to 30 cm	Shallower than 30 cm
DEPTH TO HARD ROCK (2)		More than 120 cm	120 cm to 80 cm	80 cm to 30 cm	Less than 30 cm	-
STONES (Fragments 75 to 250 mm in soil profile)	<ul style="list-style-type: none"> Stumps, strip footings or piles: Concrete slabs: 	Less than 10%	10% to 15%	15% to 30%	More than 30%	-
BOULDERS (Fragments over 250 mm on surface) (3)	<ul style="list-style-type: none"> Stumps, strip footings or piles: Concrete slab: 	Less than 0.1%	0.1% to 0.5%	0.5% to 5%	More than 5%	-
ROCK OUTCROP (3)		Less than 0.05%	0.05% to 0.1%	0.1% to 1%	1% to 5%	More than 5%

LAND FEATURES AFFECTING USE	TYPE OF CONSTRUCTION	CAPABILITY CLASS				
		1	2	3	4	5
UNIFIED SOIL GROUP (4)	• Stumps, strip footings or piles:	GW, SW, GP, GM, GC, SC,	SP, SM, CL	MH, CH	OL, OH, ML	Pt
	• Concrete slab:	GW, SW, GP, GM, SP, SC, SM, GC	CL, CH, MH	ML, OL	OH	Pt
SHRINK-SWELL POTENTIAL (5)	• Stumps, strip footings or piles:	Less than 4%	4% to 12 %	12% to 20%	More than 20%	-
	• Concrete slab:	Less than 12%	12% to 20%	More than 20%	-	-

NOTES:

- (1) SLOPE: Downgrade by one class in slope failure hazard areas.
- (2) DEPTH TO HARD ROCK: Material which cannot be excavated by normal earthmoving equipment.
- (3) BOULDERS & RCK OUTCROP:
- | | |
|--------------------------------------------------|-----------------------------------------------|
| 0.05% is 1m ² per 2000 m ² | 1% is 1 m ² per 100 m ² |
| 0.1% is 1m ² per 1000 m ² | 2% is 1 m ² per 50 m ² |
| 0.2% is 1m ² per 500 m ² | 5% is 1 m ² per 20 m ² |
| 0.5% is 1m ² per 200 m ² | |
- (4) UNIFIED SOIL GROUP: This is determined for material at the sides and base of excavation. Topsoil is ignored.
- (5) SHRINK-SWELL POTENTIAL: Comments as for Unified Soil Group

LAND CAPABILITY RATING FOR SECONDARY ROADS AND CAR PARKS: Areas capable of being used for the construction of roads with sealed surfaces for light vehicles and with drainage and kerbing. It is assumed that commonly used earthmoving equipment is available.

LAND FEATURES AFFECTING USE	CAPABILITY CLASS				
	1	2	3	4	5
SLOPE (1) Secondary Roads Car Parks	Less than 4% Less than 3%	4% to 8% 3% to 5%	8% to 12% 5% to 8%	12% to 25% 8% to 15%	More than 25% More than 15%
SITE DRAINAGE (2)	Excessively well drained, well drained	Moderately well drained	Imperfectly drained	Poorly drained	Very poorly drained
FLOODING (3)	None	-	-	Less than once in 10 years	More than once in 10 years
DEPTH TO SEASONAL WATER TABLE	More than 150 cm	150 cm to 90 cm	90 cm to 60 cm	60 cm to 30 cm	Less than 30 cm
UNIFIED SOIL GROUP FOR SUB-GRADE (4)	GP, GW, SW, GC	SM, SC, GM	SP, CL, CH, MH, ML	OL, OH	Pt
DEPTH TO HARD ROCK (5)	More than 100 cm	100 cm to 75 cm	75 cm to 40 cm	40 cm to 15 cm	Less than 15 cm
STONES (fragments 75 mm to 250 mm in upper 50 cm of soil profile)	Less than 10%	10% to 20%	20% to 40%	10% to 70%	More than 70%
BOULDERS (Fragments over 250 mm on surface) (6)	Less than 0.1%	0.1% to 0.5%	0.5% to 5%	5% to 30%	More than 30%
ROCK OUTCROP (6)	Less than 0.05%	0.05% to 0.1%	0.1% to 1%	1% to 5%	More than 5%
SHRINK-SWELL POTENTIAL (7)	Less than 4%	4% to 12%	12% to 20%	More than 20%	-

NOTES:

- (1) SLOPE: Reduce slope class limits by half in slope failure hazard areas
- (2) SITE DRAINAGE: Upgrade by one class if concentration is carried out when conditions are dry.
- (3) FLOODING: Upgrade by one class if floods are low velocity, shallow and easily diverted with banks.
- (4) UNIFIED SOIL GROUP: This is determined for the portion of the profile which will underlie the completed road base.
- (5) HARD ROCK: Material which cannot be ripped and would require blasting.
- (6) BOULDERS & ROCK OUTCROP:
- | | |
|--------------------------------------------------|-----------------------------------------------|
| 0.05% is 1m ² per 2000 m ² | 1% is 1 m ² per 100 m ² |
| 0.1% is 1m ² per 1000 m ² | 5% is 1 m ² per 20 m ² |
| 0.5% is 1m ² per 200 m ² | |
- (7) SHRINK-SWELL POTENTIAL: Comments as for unified Soil Group

LAND CAPABILITY RATING FOR SHALLOW EXCAVATIONS: Areas capable of being use for excavation for level construction sites and for trenches to a depth of 2 metres. It is assumed that commonly used earthmoving equipment is available.

LAND FEATURES AFFECTING USE	CAPABILITY CLASS				
	1	2	3	4	5
SLOPE (1)	Less than 2%	2% to 5%	5% to 10%	10% to 25%	More than 25%
SITE DRAINAGE (2)	Excessively well drained, Well drained	Moderately well drained	Imperfectly drained	Poorly drained	Very poorly drained
FLOODING (3)	None	-	-	Less than once in 10 yrs	More than once in 10 yrs
DEPTH TO PERMANENT WATER TABLE (4)	Deeper than 200 cm	150 cm to 200 cm	120 cm to 150 cm	09 cm to 120 cm	Shallower than 90 cm
UNIFIED SOIL GROUP TO DEPTH OF EXCAVATION	CI (PI<15), GC, GM, SC	ML, SM, CL (PI>15), OL	GW, SW	GP, SP, CH, OH	Pt
DEPTH TO HARD ROCK (5)	More than 200 cm	150 cm to 200 cm	120 cm to 150 cm	90 cm to 120 cm	Shallower than 90 cm
STONES (Fragments 75 mm to 250 mm in soil profile)	Less than 10%	10% to 20%	20% to 40%	40% to 70%	More than 70%
BOULDERS (Fragments over 250 mm on surface) (6)	Less than 0.1%	0.1% to 1%	1% to 5%	5% to 30%	More than 30%
ROCK OUTCROP (6)	Less than 0.05%	0.05% to 0.1%	0.1% to 0.2%	0.2% to 1%	More than 1%

NOTES:

- (1) SLOPE: Reduce slope class limits by half in slope failure hazard areas.
- (2) SITE DRAINAGE: Upgrade by one class for seasonal operation if seasonally dry.
- (3) FLOODING: Upgrade one class if floods are low velocity, shallow and easily diverted with banks.
- (4) DEPTH TO WATER TABLE: Upgrade by one class for seasonal operation if seasonally dry.
- (5) DEPTH TO HARD ROCK: Material which cannot be excavation by normal earthmoving equipment.
- (6) BOULDERS & ROCK OUTCROP:
- | | |
|--------------------------------------------------|-----------------------------------------------|
| 0.05% is 1m ² per 2000 m ² | 1% is 1 m ² per 100 m ² |
| 0.1% is 1m ² per 1000 m ² | 5% is 1 m ² per 20 m ² |
| 0.2% is 1m ² per 500 m ² | |
| 0.5% is 1m ² per 200 m ² | |

LAND CAPABILITY RATING FOR EARTHEN DAMS: Areas capable of being used of the construction of small water storages with earthen embankments (1).

LAND FEATURES AFFECTING USE	CAPABILITY CLASS				
	1	2	3	4	5
SLOPE (2) Gully Dams Hillside Tank	2% to 4% 2% to 5%	4% to 8% 5% to 10%	0-2% or 8-12% 0-2% or 10-15%	12% to 15% 15% to 20%	More than 15% More than 20%
FLOODING (3)	None	-	-	Less than once in 25 yrs	More than once in 25 yrs
UNIFIED SOIL GROUP (4)	GC, GM, SC	SM, CL (PI<15)	CL (PI>15) ML, CH	OL, MH, CH	SP, SW, GP, GW, Pt
THICKNESS OF CONSTRUCTION MATERIAL	More than 200 cm	200 cm to 100 cm	100 cm to 75 cm	75 cm to 30 cm	Less than 30 cm
STONES (Fragments 75 mm – 250 mm in construction material)	Less than 5%	5% to 20%	20% to 50%	50% to 75%	More than 75%
BOULDERS (Fragments over 250 mm on surface)	Less than 0.05%	0.05% to 0.1%	0.1% to 1%	1% to 5%	More than 5%
ROCK OUTCROP (5)	Less than 0.02%	0.02% to 0.05%	0.05% to 0.5%	0.5% to 2%	More than 2%
PERMEABILITY (6)	Slower than 0.1 1/m ² day	0.1 to 1 1/m ² day	1 to 5 1/m ² day	5 to 10 1/m ² day	Faster than 10 1/m ² day
SHRINK-SWELL POTENTIAL (7)	Less than 4%	4% to 12%	12% to 20%	More than 20%	-
DEPTH TO HARD ROCK (8)	More than 300 cm	300 cm to 200 cm	200 cm to 150 cm	150 cm to 80 cm	Less than 80 cm
DISPERSIBLE CLAY (9)	2% to 6%	6% to 10%	10% to 16%	More than 16% or less than 2%	-
DEPTH TO TOPSOIL (10)	10 cm to 25 cm	25 cm to 50 cm	50 cm to 100 cm 0 to 10 cm	100 cm to 200 cm	More than 200cm

NOTES:

(1) This rating table does not consider catchment conditions, expected yield or spillway requirements

(2) SLOPE: Reduce slope class limits by half in slope failure hazard areas.

(3) FLOODING: Upgrade by one class if floods are low velocity, shallow.

(4) UNIFIED SOIL GROUP: Determined for material to be used for bank construction.

(5) BOULDERS & ROCK OUTCROP:

0.02% is 1 m ² per 5000 m ²	1% is 1 m ² per 100 m ²
0.05% is 1m ² per 2000 m ²	2% is 1 m ² per 50 m ²
0.1% is 1m ² per 1000 m ²	5% is 1 m ² per 20 m ²
0.5% is 1m ² per 200 m ²	

(6) PERMABILITY: This test is carried out in material at the expected depth of the base of the excavation. A rate of 10 l/m² day is approximately 0.5 cm drop in head per hour in a 10 cm diameter test hole after thorough wetting.

(7) SHRINK-SWELL POTENTIAL: Determined for material to be used for bank construction.

(8) DEPTH TO HARD ROCK: Material which cannot be ripped and would require blasting.

(9) DISPERSIBLE CLAY: Determined for material to be used for bank construction.

(10) DEPTH TO TOPSOIL: Material to be stockpiled for re-spreading.

LAND CAPABILITY RATING FOR ON-SITE EFFLUENT DISPOSAL: Areas of being used for on-site absorption of all-waste septic tank effluent from a single family dwellings.

LAND FEATURES AFFECTING USE	CAPABILITY CLASS				
	1	2	3	4	5
SLOPE (1)	0 to 5%	5% to 8%	8% to 15%	15% to 30%	More than 30%
SITE DRAINAGE	Excessively well drained, Well drained	Moderately well drained	Imperfectly drained	Poorly drained	Very poorly drained
FLOODING (2)	None	-	-	Less than once in 25 years	More than once in 25 years
DEPTH TO SEASONAL WATER TABLE	More than 150 cm	150 cm to 120 cm	120 cm to 90 cm	90 cm to 60 cm	Less than 60 cm
PERMEABILITY (3)	Faster than 1.0m/day	1.0m/day to 0.3m/day	0.3m/day to 0.1m/day	0.1m/day to 0.02m/day	Slower than 0.02m/day
DEPTH TO ROCK OR IMPERVIOUS LAYER	More than 200 cm	200 cm to 150 cm	150 cm to 100 cm	100cm to 75 cm	Less than 75 cm
GRAVEL (Fragments 75 mm to 250 mm in soil profile)	Less than 5%	5% to 20%	20% to 40%	40% to 75%	More than 75%
STONES (Fragments over 250 mm in soil profile)	Less than 2%	2% to 10%	10% to 30%	30% to 60%	More than 60%
BOULDERS (Fragments over 250 mm on surface)	Less than 0.02%	0.02% to 0.2%	0.2% to 2%	2% to 10%	More than 10%
ROCK OUTCROP	Less than 0.01%	0.01% to 0.1%	0.1% to 1%	1% to 5%	More than 5%
SHRINK SWELL POTENTIAL	Less than 4%	4% to 12%	12% to 20%	More than 20%	-

NOTES:

(1) SLOPE: Reduce class limits by half in slope failure hazard areas.

(2) FLOODING: Upgrade one class if floods are low velocity shallow and easily diverted with banks.

(3) PERMEABILITY: Based on determination of hydraulic conductivity, "K". Where K exceeds 6.0m/day, risk of polluting water bodies must be considered.

LAND CAPABILITY RATING FOR INTENSIVE CROPPING: Areas capable of being used for intensive production of crops such as potatoes, berry crops and crucifers. It is assumed that commonly used management techniques will be applied including adequate fertilizer applications, clean cultivation for weed controls, and that supplementary water is available.

LAND FEATURES AFFECTING USE	CAPABILITY CLASS				
	1	2	3	4	5
GRADIENT SOIL STRUCTURE Apedal-weak Moderate, S.G. Strong	0 – 4%	4% to 8%	8% to 15%	15% to 20%	More than 20%
	0 – 8%	8% to 15%	15% to 20%	20% to 35%	More than 35%
	0 – 15%	15% to 20%	20% to 35%	35% to 50%	More than 50%
FLOODING RETURN PERIOD	More than 20 yrs	20 yrs to 10 yrs	10 yrs to 5 yrs	5 yrs to 1 yr	Several times per year
SOIL RAINAGE CLASS	Well drained, Moderately well drained	Excessively well drained	Imperfectly drained	Poorly drained	Very poorly drained
ROOTING DEPTH	More than 50 cm	50 cm to 30 cm	30 cm to 20 cm	20 cm to 15 cm	Less than 15 cm
TEXTURE OF A HORIZON	L, SL, CL	SCL, LS, S	Lmc, hC	-	-
AGGREGATE STABILITY OF A HORIZON	1 (Stable)	2	3	4,5 (dispersing)	-
GRAVELS & STONES	Less than 4%	4% to 10%	10% to 20%	20% to 30%	More than 30%
BOULDERS & ROCK OUTCROP	Less than 0.01%	0.01% to 0.05%	0.05% to 1%	1% to 10%	More than 10%

MAJOR LAND USE – GRAZING

LAND UTILIZATION TYPE: Rainfall Zone 750 mm p.a.

Grazing cattle (including dairy cattle) and sheep, on largely unimproved pastures which may include volunteer improved grass and clover species, both annual and perennials: occasional topdressing with superphosphates: fencing for stock control: control of rabbits by 1080 poisoning.

	Capability Class				
Land features	1	2	3	4	5
Slope %	10	10-19	20-34	35-50	50
Aspect	E.N.E	S.E.N.W.W	N.S.W.S	-	-
Soil Group (Northcote p. p. f)	Gradational soils; Um soils	Duplex soils with A horizon thickness 15-60 cm	Other duplex soils: Uf, Ug soils: Uc soils with impeding layer within 100 cm	Uc soils with no impeding layer with in 100 cm	
Average soil depth m.	1.0	0.6-1.0	0.3-0.59	0.1-0.29	0.1
Site drainage	Well drained	Moderately or Excessively well drained	Imperfectly or poorly drained	Very poorly drained	
Surface rock %	2	2-14	15-24	25-40	40