Land use capability classification of the Marlborough region:

A report to accompany the second edition New Zealand Land Resource Inventory

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Manaaki Whenua - Landcare Research
P.O. Box 69, Lincoln

Landcare Research Science Series No. 12

Manaaki Whenua PRESS

Lincoln, Canterbury, New Zealand
1996

CATALOGUING IN PUBLICATION

LYNN, I.H. (Ian Henry), 1950-

Land use capability classification of the Marlborough Region: a report to accompany the second edition New Zealand land resource inventory / by Ian H. Lynn. - Lincoln, Canterbury, N.Z. : Manaaki Whenua Press, 1996.

(Landcare Research science series, ISSN 1172-269X ; no. 12)

ISBN 0-478-04541-7

I. Title. II. Series

UDC 631.474(931.314)

Cover

View southwest across the Wairau Plains, Blenheim and the foothills to the snow covered peak of Mt. Tapuenuku, 2885 m asl in the top right. In the foreground the floodplain on both sides of the river is classified as land use capability (LUC) class 2w1, and 1w1 between Grovetown and Blenheim adjacent State Highway 1. The Taylor River fan under the southern suburbs of Blenheim, centre left and Omaka aerodrome, centre right are classified as 4s5. The smooth textured loess mantled Wither Hills with their characteristic regular herring bone pattern and tunnel gully erosion, middle left, are classified as 6e14 and 7e17 dependent on slope and degree of erosion. The foothills developed on strongly indurated sedimentary rocks in the middle distance are classified predominantly as 6e13, 6e12, 6e8 with increasing rainfall away from the plains. At higher elevations on the Awatere/Wairau river divide, upper mid right, LUC classes 7e7, 7e24 and 8e11 are mapped, with class 8e13 on the upper slopes of Mt Tapuenuku.

Photograph

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Edited by Anne Austin
Design by Tony Pritchard
Desktop publishing by CAPSCO

Published by Manaaki Whenua Press, Landcare Research
PO Box 40, Lincoln 8152, New Zealand

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Summary

This report describes and presents keys to the recognition of the 154 land use capability units established for the Marlborough Region land use capability extended legend. The Marlborough Region covers approximately 1.3 million hectares in the north east of the South Island, New Zealand. The regional extended legend, accompanying map unit delineations and inventory descriptions at a scale of 1:50 000, form part of the second edition of the New Zealand Land Resource Inventory.

The report provides a detailed description of each land use capability unit outlining its physiography, rock types, soils, erosion status and potential, vegetation, agricultural and forestry productivity, present and potential land use. A decision tree utilizes the framework of the classification to provide keys to recognition of the land use capability units.

Introduction

Purpose

This publication is one of a series documenting the New Zealand Land Resource Inventory (NZLRI). It presents the land use capability classification for 154 land use capability (LUC) units, used in the second edition of the NZLRI, (1:50 000 scale) for the Marlborough Region and includes descriptions and keys to their recognition. For this 1:50 000 coverage of the Marlborough Region, no traditional Land Resource Inventory worksheets will be printed. The policy is to rely on the computer database for the production of spatial output for specific applications.

The New Zealand Land Resource Inventory (NZLRI)

The NZLRI is a national database of physical land resource information. It comprises two sets of data:

1. An inventory of the five physical factors (rock, soil, slope, erosion and vegetation) which are basic to the assessment of land resources. The physical factors are represented by symbols, in a standard layout:

$$\frac{\text{Rock type – Soil unit – Slope group}}{\text{Erosion degree and type – Vegetation cover}}$$

A homogenous unit area approach is used to record the physical resource data (Eyles 1977), with the five factors being mapped simultaneously to an appropriate level of detail in relation to the scale of mapping being undertaken.

2. A land use capability rating of each map unit based on an assessment of the ability of the five physical factors, together with climate and the effects of past land use, to provide sustained agricultural production.

Detailed information on general aspects and interpretation of the NZLRI is available in the "Land Use Capability Survey Handbook" (Soil Conservation and Rivers Control Council 1971) and "Our Land Resources" (National Water and Soil Conservation Organisation 1979), and has been given by Howard and Eyles (1979).

The NZLRI was initially prepared for the National Water and Soil Conservation Organisation (NWASCO), later the National Water and Soil Conservation Authority (NWASCA), by the Water and Soil Division, Ministry of Works and Development, and later by DSIR Land Resources, Palmerston North and Christchurch. Present-day upgrading is carried out by Landcare Research under contract to the Foundation for Research, Science and Technology.

All NZLRI data are stored on a computer geographic information system managed by Landcare Research. This provides the versatility to produce worksheets (maps) of various scales and tables in response to requests.

Application of the NZLRI

The NZLRI data have been widely used by local territorial authorities such as regional councils, government corporations, government departments, private companies, consultants and other agencies involved in planning rural land use or management of natural resources. Examples of the types of information which can be generated for district and regional planning include the location of:

- hazardous areas that are highly erodible or liable to flooding (e.g. land physically unsuited to urban development);
- highly productive land;
- non-arable land;
- areas that can physically sustain pastoral farming;
- areas that cannot physically sustain pastoral farming or have severe limitations for pastoral use;
- areas that can physically sustain production forestry;
- vegetation cover to indicate existing land use;
- land physically suited to urban development.

NZLRI data should be used only at the published or smaller scales. Under no circumstances should the data be used for more detailed land use planning. It should be noted that the NZLRI information is a planning tool, not a plan. It is only one input into district or regional schemes, where it can be used as a physical base on which social and economic implications of land use can be considered.

The Marlborough region

Marlborough is bounded in the west by the Bryant Range, from Cape Soucis southwards to Tophouse, along the St Arnaud, St James, Hanmer and Amuri Ranges to Mt Terako, and then along the northern boundary of the Conway river catchment to Haumuri Bluffs (Figure 1). It encompasses the Marlborough District and the Kaikoura district of the Canterbury Region, and covers approximately 1.3 million hectares.

Figure 1 *Location and main physical features of the Marlborough Region*

Land use capability (LUC) classification

The land use capability system (LUC) of land classification assesses the capability of land for permanent sustained production, taking into account its physical limitations, management requirements and soil conservation needs (SCRCC 1971). The assessment is based on an evaluation of the physical inventory of rock type, soil unit, slope group, erosion severity and type, and vegetation cover, supplemented with information on climate, flood risk, land use practices and the effects of past land use, and erosion history. The LUC classification has three components, LUC class, subclass and unit - each represented by a number or symbol (Figure 2).

Land use capability class

The LUC class is the broadest grouping in the capability classification. It is an assessment of the versatility of land and gives the general degree of limitation to use, taking into account the physical limitations to sustained production. There are eight classes, with limitations to use increasing, and versatility of use decreasing, from class 1 to class 8. Classes 1-4 are suitable for arable, pastoral or forestry use, while classes 5-7 are not suitable for arable use but are suitable for pastoral or forestry use. The limitations reach a maximum with class 8 land which is unsuitable for grazing or production forestry, and is best managed for catchment protection and nature conservation.

Land use capability subclass

The LUC subclass is a subdivision of the LUC class according to the main kind of physical limitation or hazard to use. Four kinds of limitation are recognised: erodibility (e), soil limitations within the rooting zone (s), wetness (w) and climate (c). The initial letter of each limitation is used to identify the subclass (e.g. 2e, 2w, 2s, 2c). Only the dominant limitation is identified in the land use capability code.

Land use capability unit

The LUC unit is the most detailed component of the LUC classification. LUC subclasses are subdivided into a number of LUC units which are identified at the end of the LUC code. Each LUC unit groups together land inventory units which require the same kind of management, the same kind and intensity of conservation treatment and are suitable for the same kind of crops, pasture or forestry species with similar potential yields. LUC units within subclasses are arranged in order of decreasing versatility to use and increasing degree of limitation to use, e.g. 7e5 has a higher use capability than 7e8, but not as high as 7e2.

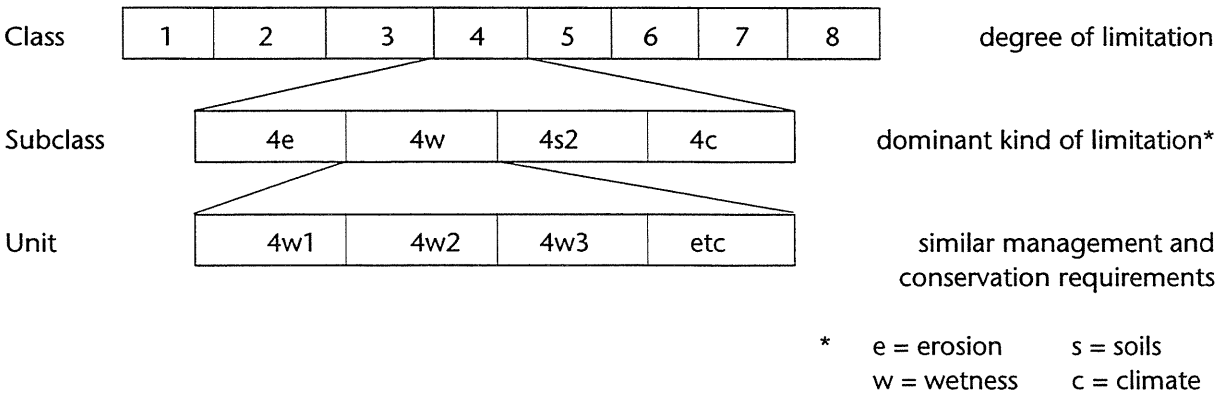

Figure 2 *Components of LUC classification*

An example of the LUC nomenclature is given for LUC unit 6e1: 6 is the class, 6e is the subclass, 6e1 is the unit. The relationship between the three components of the classification is illustrated in Figure 2.

Land use capability suite

LUC units may be grouped to form LUC suites on the basis of shared definitive physical characteristics, as shown in Table 1.

The traditional numerical ranking of LUC units based on decreasing versatility and capability, as shown in the LUC extended legends, gives no direct indication of the relationships between LUC units in their actual landscape setting.

To enable these relationships to be better understood and to aid interpretation of maps and extended legends, related LUC units are arranged into groups, called LUC suites. A LUC suite is defined as, 'LUC units which, although differing in capability, share a definitive physical characteristic which unites them in the landscape'.

These 'definitive physical characteristics' may vary from suite to suite. The use of LUC suites as a tool in landscape assessment is discussed by Blaschke (1985).

Structure of the LUC extended legend for Marlborough

In the Marlborough land use capability extended legend, LUC units distinguish the major climatic - geomorphic - and soil forming environments within the region (Table 3), using the approach of Hunter and Lynn (1987).

Physical attributes

Terminology and primary data sources for the physical attributes described in the LUC unit descriptions and used in Table 3, are given below. Lithology and rock type terminology is from Lynn and Crippen (1991), and terrane and suite terms follow those of Andrews *et al.* (1976). Primary sources for geological information include Beck (1964), Lensen (1962), and Johnston (1982 and 1990), supplemented by field observation. Landform classification and terminology follow that of Whitehouse *et al.* (1990) and Milne *et al.* (1991). Altitudinal zonation reflecting altitude-related bioclimatic zones is that of Wardle (1964). Slope groupings and terminology follow that recommended by the SCRCC (1971), Table 1. Soil group and soil set terminology used is from the New Zealand Soil Bureau (1968a, 1968b), with reference to more detailed soil survey information where available, i.e., Campbell (1987 unpublished), Laffan, Daly and Whitton (1987), Laffan and Vincent (1990). The second edition LUC classification of the Marlborough region was completed before the New Zealand Soil

Table 1: Slope Groupings (from SCRCC 1971)

Description	Symbol	degrees	Typical landforms
Flat to gently undulating	A	0-3	floodplains, terraces
Undulating	B	4-7	fans, gentle slopes
Rolling	C	8-15	downs, steep fans
Strongly rolling	D	16-20	hill country
Moderately steep	E	21-25	hill and mountain lands
Steep	F	26-35	hill and mountain lands
Very steep	G	>35	mountain lands, cliffs

Table 2: Soil Depth Classes

Depth (cm)	Typical LUC class (lowland silt loam textured soils)	Terms used in Legend text	Gross term on Table 1
>90	1	deep	deep
45 to 90	2	moderately deep	
30 to 45	3	moderately shallow	
15 to 30	4	shallow	
<15	6,7,or 8	very shallow	shallow

Table 3: *Land use capability units in relation to rainfall, landform, and environment for the Marlborough Region*

ENVIRONMENT	LANDFORM	RAINFALL ZONE	OTHER FEATURES	LUC SUITE	LAND USE CAPABILITY UNITS
LOWLAND	Flat to gently sloping (0-7°) terraces, floodplains, and fans	Low	Deep soils	L1	1c1, 2c1, 2c2, 2e1, 2e2, 2s2, 2s4
			Shallow soils	L2	3e1, 3s3, 3s5, 3s6, 4s3, 4s5, 6s1, 7s1, 8s1
		Moderate	Deep soils	L3	2s1, 2s3, 3c1, 3c2
			Shallow soils	L4	3e2, 3s1, 3s2, 3s4, 4s1, 4s2, 4s4, 4s7, 5s1, 5s2
	Low lying drainage impeded Non saline	Low	Alluvial soils	L5	1w1, 2w1, 3w1, 4w3, 6w2, 7w1, 8w3
		Moderate	Alluvial soils	L6	3w2, 4w2, 5w1, 6w2, 7w1
	Saline	Low to moderate	Saline gley recent soils	L7	3s7, 4s6, 4w1, 5s4, 6w1, 7w2, 8w1
	Coastal sandflats and dunes	Low to moderate	Yellow-brown sand soils	L8	4e7, 4s8, 6e21, 6s4, 7s2, 7e19, 8e15
	Moderately sloping downland (8-20°)	Low	On loess	L9	3e3, 3s8, 4e6
			On calcareous or basaltic rocks	L10	4e1
		Moderate	On loess	L11	3e4, 3e5, 4e2, 4e4
			On indurated rocks	L12	4e3, 4e5, 6c3
			On calcareous or basaltic rocks	L13	4e11
	Hill and steeplands (>20°)	Low	On loess overlying weakly indurated rocks	L14	6e14, 6e15, 6e16, 7e16, 7e17, 8e3
			On strongly indurated rocks	L15	6c4, 6e12, 6e13, 7e14, 7e15
			On calcareous or basaltic rocks	L16	6e4
		Moderate	On weakly indurated rocks	L17	6e6, 7e6, 7e13, 8e3
			On strongly indurated rocks	L18	6e5, 6e7, 6e8, 6e9, 6e10, 6e11, 7e4, 7e5, 7e7, 7e8, 7e9, 7e10, 7e11, 7e12, 8e2, 8e4
			On calcareous or basaltic rocks	L19	6e1, 6e2, 6e3, 7e1, 7e3, 7s5, 8e1, 8e16
		High	On strongly indurated rocks	L20	6e18, 7e18, 8e5
HIGH COUNTRY	Flat to gently sloping (0-7°) terraces, floodplains and fans	Low	Shallow soils	H1	4e10, (6c1), 6e22, 6s5, 7s4, 8s1
		Moderate	Deep soils	H2	3c3, 4c1, 4e8, 4e9
			Shallow soils	H3	4e10, 4s9, 4s10, 5s3, 6s2, 6s3, 7s3, 8s1
	Low lying drainage impeded	Moderate	Alluvial soils	H4	4w4, 6w3, 7w3, 8w2
			Organic soils		7w4, 8w2
	Moderately sloping (8-20°) moraine and fans Exposed uplands > 950 m asl	Low	Alluvium and colluvium	H5	6c1, 6e22, 7c3
		Moderate	Alluvium and colluvium	H6	6c2, 6e20, 7c1, 7e21, 7s5
		Moderate to high	Colluvium on strongly indurated rocks	H7	7c2, 8e10
	Hill and steeplands (>20°)	Low	On strongly indurated rocks	H8	6e19, 6e23, 7e20, 7e23, 7e26, 8e7, 8e8
			On basaltic rocks	H9	(6e3), 7e2, 8e7, 8e11
		Moderate	On strongly indurated rocks below indigenous treeline	H10	6e17, 7e22, 7e24, 8e4, 8e9, 8e14, 8e16
			On strongly indurated rocks above indigenous treeline	H11	7e25, 8c1, 8e11, 8e13, 8e16
		High	On strongly indurated rocks below indigenous treeline	H12	7e24, 8e5, 8e6, 8e14, 8e16
			On strongly indurated rocks above indigenous	H13	7e25, 8c1, 8e12, 8e13, 8e16

Rainfall: < 800 mm/yr - Low, > 800 < 1600 mm/yr - Moderate, > 1600 mm/yr - High. *Soil depth:* deep > 45 cm, shallow < 45 cm

Classification (NZSC) of Hewitt (1993) was published. Assignment of soil groups and soil sets to their NZSC equivalents can be done through the New Zealand Soil Database which is maintained and developed by Landcare Research. [Details can be obtained by contacting Landcare Research in Lincoln, Canterbury, or Palmerston North]. Soil depth classes are given in Table 2. Grain size terminology for both rock and soil descriptions is that of the Standards Association of New Zealand (1986), Table 4. Degree of salinity criteria, Table 5, and internal drainage, are in terms of Taylor and Pohlen (1979). Erosion type and severity rankings are those of SCRCC (1971) and Eyles (1985), where each erosion type is individually ranked for severity.

Vegetation is described in terms of vegetation associations and follows that of Hunter and Blaschke (1986), with revisions correlated by Page (1987). Rainfall data is drawn from the New Zealand Meteorological Service (1984) and from farmers' records.

Table 4: Grain size terminology (Standards Association of New Zealand 1986)

Grain size (mm)	Term	
<0.002	clay	mud
0.002 - 0.06	silt	
0.06 - 0.2	fine	sand
0.2 - 0.6	medium	
0.6 - 2.0	coarse	
2.0 - 6.0	fine	gravel (stones)
6.0 - 20.0	medium	
20.0 - 60.0	coarse	
60 - 200	very coarse	
>200	boulder	

Table 5: Degree of salinity criteria (from Taylor and Polhen 1979)

Degree of salinity	Criteria
Weakly saline	soils slightly affected by salt or alkali: growth sensitive crops inhibited but salt tolerant crops may not be
Moderately saline	soils moderately affected by salt or alkali: crop growth inhibited and no crop does well
Strongly saline	soils strongly affected by salt or alkali: only a few kinds of plants survive

Environmental framework

Within LUC units, the environment is divided into four levels,Table 3:

• *'Lowland' and 'High Country':* The 'lowland' environment includes coastal plains, downlands and hills extending inland to an elevation of approximately 400 m above sea level. Here the environment grades or changes abruptly into 'high country'. Climate is characterised by relatively mild temperatures, limited diurnal range and a low frequency of spring and summer frosts (Pascoe 1983). Annual rainfall ranges from 600 to 1600 mm.

The 'high country' environment is dominated by mountain ranges, averaging 1500 m above sea level, and enclosed intermontane basins and valleys. Mean annual temperatures are <10°C, and the average diurnal range is large (9-12°). The growing season is short and the incidence of frost is high in all seasons (Pascoe 1983). Annual rainfalls range from 600 to 4000+ mm.

• *Landform:*
- flat to gently sloping terraces, floodplains and fans;
- rolling to strongly rolling downlands and fans;
- hill and steeplands

• *Rainfall:*
- Low less than 800 mm/yr
- Moderate between 800 and 1600 mm/yr
- High greater than 1600 mm/yr

Low rainfall districts have moderate to severe seasonal soil moisture deficits which limit production and management options. In moderate rainfall districts, soils generally have adequate soil moisture for seasonal plant growth. However, in areas toward the lower rainfall limit, and in free draining soils, there may be a slight to moderate summer moisture deficit. Soils in high rainfall districts (>1600 mm) are strongly leached, with moderately low to very low natural fertility.

• *A Range of Factors:* On flat to gently sloping (generally arable) land, soil depth and degree of stoniness criteria are used. On lowland downs, hills and steeplands, the presence or absence of loess and/or underlying lithology is used as a basis to distinguish LUC units. High country steepland LUC units are primarily distinguished by rainfall and temperature zones related to elevation.

Key criteria characterising the LUC suites are given in Appendix 1.

Land use capability classes were assigned to mapping units following the guidelines outlined in Lynn *et al.* (1987) and Hunter (1992). However, elevation related guidelines were extended upslope to reflect the more favourable temperature gradients in Marlborough. For example, on favourable sites in inland Marlborough, class seven extends up elevations of 1650 m, and class six extends up to 1100 m above sea level.

In assigning LUC subclasses, the traditional concept of nominating one dominant limitation, and the priority convention, i.e., e, w, s, c, as outlined in SCRCC (1971), Lynn *et al.* (1987) and Hunter (1992), have been adhered to. In practice more than one limitation may affect each land unit. Identification of the dominant limitation in these cases is far from clear.

To restrict the number of units specified at a scale of 1:50 000, some LUC units mapped over small areas encompass a wider range of physical criteria than desirable. For example, 7s5 has an elevation range extending from 20 to 700 m; 6e20 has a slope range from 8 to 20°; and 4e8 and 8e2 have rainfall ranges of 500 to 2000 mm/yr and 800 to 2000 mm/yr respectively.

Productivity Data

The productive capacity of LUC units are shown using estimates of stock-carrying capacity, and the site index for *Pinus radiata.*

Stock carrying capacity

Estimates of stock carrying capacity for each LUC unit were made by Agriculture New Zealand Ltd consultants and New Zealand Pastoral Agriculture Research Institute Ltd regional scientists in discussion with the author. Estimates from a number of representative sites were correlated with available stock-carrying capacity data and/

or dry matter production yields if available. For estimates of stock carrying capacity, the following assumptions were made:

- the land was managed exclusively for livestock production
- only on-farm feed cropping was considered
- stock were carried all year (i.e., winter carrying capacity, in most instances). In the high country where stock can be carried for only part of the year, seasonal figures were converted to an annual stocking rate
- each land use capability unit is managed as a discrete entity.

Stock carrying capacity information was compiled for three levels of management:

- Present Average - the number of stock units per hectare which the average farmer is typically carrying on that LUC unit
- Top Farmer - the number of stock units per hectare which the farmer, with the highest level of stocking, but at least average stock performance, is carrying on that LUC unit
- Attainable Physical Potential - sustainable carrying capacity assessed within the limits of present technology and given favourable social and economic conditions.

Where appropriate and feasible, estimates are given for irrigated, as well as rainfeed production.

Pinus radiata site index

Site index is a measure of mean tree height at age 20 years. *Pinus radiata* site index values were estimated for each LUC unit by local forestry consultants and Ministry of Forestry scientists in discussion with the author. *Pinus radiata* was chosen as the indicator species due to its importance and widespread use as a production species. Estimates from representative sites were correlated to measured plots where available. Good silvicultural practice was assumed. The site index is recorded as a range to encompass the variability in growth within an LUC unit, particularly in relation to rainfall and temperature. The predominance of production forest plot information in the hill country results in site index data of higher reliability for classes 6 and 7 hill country than for classes 1 to 5. Site index is not a measure of timber volume, as top height to volume, relationships vary regionally. The site index value for *Pinus radiata* does not take into account that other species may be better suited to some sites. For example, in high country areas above the accepted upper elevation limit for *Pinus radiata* production forestry, or in inland frost prone areas, longer rotation conifers such as Douglas fir, Corsican pine and Ponderosa pine have good production potential.

Development of the legend

The extended legend has been developed and field tested between 1988 and March 1993. Over that period, the Wairau catchment, Molesworth Station, the Awatere valley and coastal Marlborough down to the Clarence River mouth were resurveyed. The remainder of the Marlborough region (the Marlborough Sounds and Pelorus catchment, the middle Clarence catchment, and the Kaikoura coast to Haumuri Bluffs) has yet to be studied in the same detail. Although the 154 LUC units cover all the terrain types in Marlborough, addition, deletion or modification of existing units may be needed when the remaining areas are resurveyed.

Authorship, fieldwork and compilation dates for maps resurveyed are summarized in Appendix 2.1, Figure 3, and background information sourced from the former Nelson Marlborough Regional Council or its predecessors is shown in Appendix 2.2, Figure 4.

Keys to recognising LUC units

To help with the recognition of LUC units, key physical attributes and unique associations of attributes are isolated within decision trees. This technique utilizes the framework of the classification and identifies those factors which are unique to the LUC unit.

To use the key to identify the LUC unit answer yes (Y) or no (N) to the questions below. A 'yes' answer may either lead the enquirer to an appropriate solution (i.e., a LUC unit), or give an instruction to proceed to another numbered question. A 'no' answer (N) is followed by a number, e.g. N 8. The number identifies the question that the enquirer should proceed to. Some questions do not have a 'no' answer option. If the enquirer wishes to answer 'no' to one of these questions, this would indicate that the wrong decision path is being pursued (or that the land under enquiry is not catered for in the classification).

Marlborough Region Land Use Capability extended legend decision trees

Is the land situated within the Lowland Environment (go to page 18), or the High Country Environment (go to page 31)?

Lowland Environment

1. Is the land on flat to gently sloping (0 to 7°) terraces, floodplains or fans with relatively free draining soils? (This excludes coastal sand flats and dunes).

   Y → go to 2 N → go to 46

2. Is the annual rainfall less than 800 mm?

   Y → go to 3 N → go to 26

3. Are the soils greater than 45 cm deep?

   Y → go to 4 N → go to 14

4. Are the soils recent soils?

   Y → go to 5 N → go to 10

5. Are the recent soil depths greater than 90 cm?

   Y → **LUC unit 1c1** N → go to 6

6. Are the recent soil depths less than 90 cm?

   Y → go to 7

7. Are the recent soils susceptible to wind erosion when cultivated?

   Y → **LUC unit 2e1** N → go to 8

8. Do the recent soils exhibit any, or combinations of the following characteristics, limited soil water storage capacity; poor structure; sand sized fine earth texture?

   Y → **LUC unit 2s2** N → go to 9

9. Is climate the only limiting factor to intensive primary production?

   Y → **LUC unit 2c1**

10. Are the soils yellow-grey earth soils?

    Y → go to 11

11. Are the yellow-grey earth soils moderately well drained and susceptible to wind erosion when cultivated?

    Y → **LUC unit 2e2** N → go to 12

12. Do the yellow-grey earth soils have compact subsoils with moderately slow soil permeability?
Y → **LUC unit 2s4** N → go to 13

13. Is climate the only limiting factor to intensive primary production?
Y → **LUC unit 2c2**

14. Are the soils recent soils?
Y → go to 15 N → go to 22

15. Is the soil depth to gravels greater than 30 cm?
Y → go to 16 N → go to 18

16. Is the land on a floodplain?
Y → **LUC unit 3s3** N → go to 17

17. Is the land on a low terrace?
Y → **LUC unit 3s5**

18. Is the soil depth to gravels greater than 15 cm?
Y → **LUC unit 4s3** N → go to 19

19. Is the soil depth to gravels less than 15 cm, with gravel and/or stones on the surface?
Y → **LUC unit 6s1** N → go to 20

20. Is the soil depth to gravels less than 15 cm, with boulders to the surface?
Y → go to 21

21. Is the surface prone to inundation with flood waters and deposition of sediment?
Y → **LUC unit 8s1** N → **LUC unit 7s1**

22. Are the soils yellow-brown stony soils associated with yellow-grey earths?
Y → go to 23

23. Is the soil depth to gravels greater than 30 cm?
Y → go to 24 N → go to 25

24. Are the soils significantly susceptible to wind erosion when cultivated (due to aspect or exposure to NW winds)?
Y → **LUC unit 3e1** N → **LUC unit 3s6**

25. Is the soil depth to gravel greater than 15 cm?
Y → **LUC unit 4s5**

26. Is the annual rainfall between 800 and 1600 mm?

Y → go to 27

27. Are the soils greater than 45 cm deep?

Y → go to 28 N → go to 32

28. Are the soils recent soils?

Y → go to 29 N → go to 30

29. Does the high summer rainfall limit the variety of crops?

Y → **LUC unit 3c1** N → **LUC unit 2s1**

30. Are the soils lowland yellow-brown earth soils?

Y → go to 31

31. Does the high summer rainfall limit the variety of crops?

Y → **LUC unit 3c2** N → **LUC unit 2s3**

32. Are the soils recent soils?

Y → go to 33 N → go to 38

33. Is the soil depth to gravels greater than 30 cm?

Y → **LUC unit 3s1** N → go to 34

34. Is the soil depth to gravels greater than 15 cm?

Y → go to 35 N → go to 37

35. Is the land in a 'mild' coastal location in the Marlborough Sounds?

Y → **LUC unit 4s1** N → go to 36

36. Is the land in a 'cool' location on the Kaikoura coast?

Y → **LUC unit 4s2**

37. Is the soil depth to gravels less than 15 cm with boulders to the surface?

Y → **LUC unit 5s1**

38. Are the soils yellow-grey to yellow-brown earth intergrade soils?

Y → go to 39 N → go to 42

39. Is the soil depth to gravels greater than 30 cm?

Y → go to 40 N → go to 41

40. Are the yellow-grey to yellow-brown earth intergrade soils significantly susceptible to wind erosion when cultivated (due to the aspect or exposure to NW winds)?

Y → **LUC unit 3e2** N → **LUC unit 3s2**

41. Is the soil depth to gravels greater than 15 cm?

Y → **LUC unit 4s4**

42. Are the soils lowland yellow-brown earth soils?

Y → go to 43

43. Is the soil depth to gravels greater than 30 cm?

Y → **LUC unit 3s4** N → go to 44

44. Is the soil depth to gravels greater than 15 cm?

Y → **LUC unit 4s7** N → go to 45

45. Is the soil depth to gravels less than 15 cm, with boulders to the surface?

Y → **LUC unit 5s2**

46. Is the land on flat to gently sloping (0-7°) terraces, floodplains or fans which are low lying with impeded drainage?

Y → go to 47 N → go to 74

47. Is the land saline?

Y → go to 64 N → go to 48

48. Is the annual rainfall less than 800 mm?

Y → go to 49 N → go to 58

49. Is the soil a recent soil, and the depth to low chroma colours, (moist chroma 2 or less, or moist chroma 3 with value 6 or more) gleying or mottling greater than 90 cm?

Y → **LUC unit 1w1** N → go to 50

50. Is the soil depth to low chroma colours, gleying or mottling, greater than 45 cm?

Y → go to 51 N → go to 53

51. Is the water table fluctuating or seasonally high (within 45 cm of surface)?

Y → **LUC unit 2w1** N → go to 52

52. Is the water table at, or within 45 cm of the soil surface for more than half the year?

Y → **LUC unit 3w1**

53. Is the soil depth to low chroma colours, gleying or mottling, less than 45 cm and the land arable?

Y → **LUC unit 4w3** N → go to 54

54. Is the land non-arable?

Y → go to 55

55. Does the land have good domestic grazing potential and limited standing water?

Y → **LUC unit 6w2** N → go to 56

56. Does the land have limited domestic grazing potential and significant standing water?

Y → **LUC unit 7w1** N → go to 57

57. Does the land have little or no domestic grazing potential and extensive standing water?

Y → **LUC unit 8w3**

58. Is the annual rainfall between 800 and 1600 mm?

Y → go to 59

59. Is the soil depth to low chroma colours, gleying or mottling, greater than 45 cm and the land arable?

Y → **LUC unit 3w2** N → go to 60

60. Is the soil depth to low chroma colours, gleying or mottling, less than 45 cm and the land arable?

Y → **LUC unit 4w2** N → go to 61

61. Is the soil depth to low chroma colours, gleying or mottling, less than 45 cm and the land non arable?

Y → go to 62

62. Does the land provide good domestic grazing potential and have limited or no standing water?

Y → **LUC unit 5w1** N → go to 63

63. Does the land provide limited domestic grazing potential and have significant standing water?

Y → **LUC unit 7w1** N → **LUC unit 6w2**

64. Does the land have saline gley recent soils and an annual rainfall of less than 1600 mm?

Y → go to 65

65. Is the land arable?

Y → go to 66 N → go to 69

66. Is the land weakly saline?

Y → **LUC unit 3s7** N → go to 67

67. Is the land moderately saline with a low water table (> 45 cm)?

Y → **LUC unit 4s6** N → go to 68

68. Is the land moderately saline with a high water table (< 45 cm)?

Y → **LUC unit 4w1**

69. Is the land non-arable?

Y → go to 70

70. Is the land moderately to strongly saline with a low water table (>45 cm)?

Y → **LUC unit 5s4** N → go to 71

71. Is the land moderately to strongly saline with a high water table (<45 cm) and good domestic grazing potential?

Y → **LUC unit 6w1** N → go to 72

72. Is the land strongly saline with limited domestic grazing potential (tidal marsh)?

Y → **LUC unit 7w2** N → go to 73

73. Is the land strongly saline with little or no domestic grazing potential (tidal marsh)?

Y → **LUC unit 8w1**

74. Is the land on flat to gently sloping (0-7°) coastal sand flats and dunes with annual rainfalls of less than 1600 mm?

Y → go to 75 N → go to 83

75. Is the land arable?

Y → go to 76 N → go to 77

76. Is the land susceptible to significant wind erosion when cultivated?

Y → **LUC unit 4e7** N → **LUC unit 4s8**

77. Is the land non-arable?

Y → go to 78

78. Is the land predominantly undulating (4 to 7°) sand country with a moderate susceptibility to wind erosion?

Y → **LUC unit 6e21** N → go to 79

79. Is the land predominantly undulating (4 to 7°) sand and gravel country with a low erosion potential?

Y → **LUC unit 6s4** N → go to 80

80. Is the land predominantly undulating (4 to 7°) stones and boulders with a low erosion potential?

Y → **LUC unit 7s2** N → go to 81

81. Is the land predominantly rolling to strongly rolling (8 to 20°) dunes with a severe erosion potential?

Y → **LUC unit 7e19** N → go to 82

82. Is the land predominantly rolling to strongly rolling (8 to 20°) foredunes with an extreme erosion potential?

Y → **LUC unit 8e15**

83. Is the land moderately sloping (8 to 20°) downland?

Y → go to 84 N → go to 103

84. Is the annual rainfall less than 800 mm?

Y → go to 85 N → go to 90

85. Are the soils developed in loess?

Y → go to 86 N → go to 89

86. Are the slopes undulating to rolling (4 to 15°)?

Y → go to 87 N → go to 88

87. Is subsurface drainage impeded due to the development of a fragipan?

Y → **LUC unit 3s8** N → **LUC unit 3e3**

88. Are the slopes rolling to strongly rolling (8 to 20°)?

Y → **LUC unit 4e6**

89. Are the soils developed on calcareous or basaltic rocks and/or colluvium?

Y → **LUC unit 4e1**

90. Is the annual rainfall between 800 and 1600 mm?

Y → go to 91

91. Are the soils developed in loess?

Y → go to 92 N → go to 97

92. Are the soils lowland yellow brown earths?

Y → **LUC unit 3e5** N → go to 93

93. Are the soils yellow-grey to yellow-brown earth intergrade soils?

Y → go to 94

94. Are the slopes undulating to rolling (4 to 15°)?

Y → **LUC unit 3e4** N → go to 95

95. Are the slopes rolling to strongly rolling (8 to 20°) in mild to cool lowland environments?

Y → **LUC 4e2** N → go to 96

96. Are the slopes rolling to strongly rolling (8 to 20°) in cool lowland or lower montane environments?

Y **LUC unit 4e4**

97. Are the soils developed in colluvium from indurated non-calcareous or basaltic rocks?

Y → go to 98 N → go to 102

98. Are the soils lowland yellow-brown earth soils?

Y → go to 100

99. Is the land exposed to strong salt laden winds?

Y → **LUC unit 6c3** N → go to 100

100. Is the land generally less than 100 m above sea level and experiences a slight summer moisture deficit?

Y → **LUC unit 4e3** N → go to 101

101. Is the land generally greater than 100 m above sea level and has no significant summer moisture deficit?

Y → **LUC unit 4e5**

102. Are the soils developed on calcareous or basaltic rocks?

Y → **LUC unit 4e11**

103. Is the land hill and/or steepland with slopes greater than 20°?

Y → go to 104

104. Is the annual rainfall less than 800 mm?

Y → go to 105 N → go to 122

105. Are the soils developed in loess and/or mixed loess colluvium overlying weakly indurated rocks?

Y → go to 106 N → go to 114

106. Are the slopes strongly rolling to moderately steep (16-25°)?

Y → go to 107 N → go to 110

107. Do the slopes have a deep (>1 m) loess mantle susceptible to tunnel gully erosion?

Y → **LUC unit 6e14** N → go to 108

108. Are the slopes formed on mixed loess colluvium overlying weakly indurated conglomerate?

Y → **LUC unit 6e15** N → go to 109

109. Are the slopes formed in a variable (<1 m) loess mantle overlying weakly indurated mudstone and/or sandstone?

Y → **LUC unit 6e16**

110. Are the slopes steep to very steep (26-35°)?

Y → go to 111 N → go to 113

111. Do the slopes have a deep (>1 m) loess mantle, or mixed loess colluvium susceptible to tunnel gully erosion?

Y → **LUC unit 7e17** N → go to 112

112. Are the slopes formed on mixed loess colluvium overlying weakly indurated conglomerate?

Y → **LUC unit 7e16**

113. Are the slopes very steep (>35°)?

Y → **LUC unit 8e3**

114. Are the soils developed in colluvium overlying strongly indurated non-calcareous or basaltic rocks?

Y → go to 115 N → go to 121

115. Are the soils yellow-grey earths?

Y → go to 116

116. Are the slopes strongly rolling to moderately steep (16-25°) with a negligible to slight erosion hazard?

Y → **LUC unit 6c4** N → go to 117

117. Are the slopes strongly rolling to steep (16-35°) with an annual rainfall of less than 650 mm?

Y → **LUC unit 6e13** N → go to 118

118. Are the slopes strongly rolling to steep (16-35°) with an annual rainfall of greater than 650 mm?

Y → **LUC unit 6e12** N → go to 119

119. Are the slopes steep to very steep (26-35°) with an annual rainfall of less than 650 mm?

Y → **LUC unit 7e15** N → go to 120

120. Are the slopes steep to very steep (26-35°) with an annual rainfall of greater than 650 mm?

Y → **LUC unit 7e14**

121. Are the soils developed from calcareous and/or basaltic rocks?

Y → **LUC unit 6e4**

122. Is the annual rainfall between 800 and 1600 mm?

Y → go to 123 N → go to 165

123. Are the soils developed in colluvium overlying weakly indurated rocks?

Y → go to 124 N → go to 129

124. Are the slopes strongly rolling to moderately steep (16-25°)?

Y → **LUC unit 6e6** N → go to 125

125. Are the slopes steep to very steep (26-35°)?

Y → go to 126 N → go to 128

126. Are the soils yellow-grey to yellow-brown earth intergrade soils?

Y → **LUC unit 7e6** N → go to 127

127. Are the soils yellow-grey earths?

Y → **LUC unit 7e13**

128. Are the slopes very steep (>35°)?

Y → **LUC unit 8e3**

129. Are the soils developed in colluvium overlying strongly indurated non-calcareous or basaltic rocks?

Y → go to 130 N → go to 153

130. Are the slopes strongly rolling to steep (16-30°)?

Y → go to 131 N → go to 139

131. Are the soils yellow-grey to yellow-brown earth intergrade soils?

Y → go to 132 N → go to 134

132. Is the annual rainfall generally greater than 1000 mm?

Y → **LUC unit 6e5** N → go to 133

133. Is the annual rainfall generally less than 1000 mm, the climate mild and do the soils have low natural fertility?

Y → **LUC unit 6e7**

134. Are the soils lowland yellow-brown earth soils?

Y → go to 135

135. Is the land in the Marlborough Sounds with an annual rainfall of less than 1200 mm, and a slight summer moisture deficit?

Y → **LUC unit 6e10** N → go to 136

136. Is the land in the Marlborough Sounds with an annual rainfall between 1000 and 1500 mm, a mild climate and a slight summer moisture deficit?

Y → **LUC unit 6e9** N → go to 137

137. Is the land some distance from the coast with an annual rainfall generally less than 1100 mm and a slight summer moisture deficit?

Y → **LUC unit 6e8** N → go to 138

138. Is the land on the North bank of the Wairau River or the inner Marlborough Sounds with annual rainfalls of up to 2200 mm and soils with low natural fertility?

Y → **LUC unit 6e11**

139. Are the slopes steep to very steep (26-35°)?

Y → go to 140 N → go to 150

140. Are the soils yellow-grey to yellow-brown earth intergrade soils?

Y → go to 141 N → go to 143

141. Is the annual rainfall generally greater than 1000 mm?

Y → **LUC unit 7e4** N → go to 142

142. Is the annual rainfall generally less than 1000 mm, the climate mild and the soils have low natural fertility?

Y → **LUC unit 7e5**

143. Are the soils lowland yellow-brown earth soils?

Y → go to 144

144. Is the land in the Marlborough Sounds with an annual rainfall of less than 1200 mm and a slight summer moisture deficit?

Y → **LUC unit 7e8** N → go to 145

145. Is the land in the Marlborough Sounds with an annual rainfall between 1000 and 1500 mm, a mild climate and a slight summer moisture deficit?

Y → **LUC unit 7e9** N → go to 146

146. Is the land in the Marlborough Sounds with annual rainfalls of up to 2200 mm, a mild climate and no appreciable summer moisture deficit?

Y → **LUC unit 7e11** N → go to 147

147. Is the land some distance from the coast with an annual rainfall generally less than 1100 mm and a slight summer moisture deficit?

Y → **LUC unit 7e7** N → go to 148

148. Is the land adjacent to the Kaikoura coast with an annual rainfall between 1000 and 1300 mm?

Y → **LUC unit 7e10** N → go to 149

149. Is the land on the North bank of the Wairau River or inner Marlborough Sounds margins with annual rainfalls generally below 2250 mm?

Y → **LUC unit 7e12**

150. Are the slopes very steep (>35°)?

Y → go to 151

151. Is the land active gullies and/or sea cliffs with skeletal soils related to lowland yellow-brown earths?

Y → **LUC unit 8e2** N → go to 152

152. Is the land steep to very steep (26 to >35°) hill or mountain land below the timber line with lowland yellow-brown earth or upland and high country podzolised yellow-brown earth soils?

Y → **LUC unit 8e4**

153. Are the soils developed from calcareous and/or basaltic rocks?

Y → go to 154

154. Are the slopes strongly rolling to moderately steep (16 to 25°)?

Y → go to 155 N → go to 159

155. Are the soils developed on basaltic materials in a mild climate with no appreciable summer moisture deficit?

Y → **LUC unit 6e1** N → go to 156

156. Are the soils developed on basaltic materials in environments with a marked summer moisture deficit?

Y → **LUC unit 6e3** N → go to 157

157. Are the soils developed on indurated limestone and/or calcareous sandstone?

Y → **LUC unit 6e2** N → go to 158

158. Are the soils developed on ultramafic colluvium?

Y → **LUC unit 7s5**

159. Are the slopes steep to very steep (26 to 35°)?

Y → go to 160 N → go to 162

160. Are the soils developed on basaltic materials in a mild climate with no appreciable summer moisture deficit?

Y → **LUC unit 7e1** N → go to 161

161. Are the soils developed on indurated limestone and/or calcareous sandstone?

Y → **LUC unit 7e3**

162. Are the slopes very steep (>35°)?

Y → go to 163

163. Are the soils developed on indurated limestone?

Y → **LUC unit 8e1** N → go to 164

164. Are the soils developed on ultramafic rocks?

Y → **LUC unit 8e16**

165. Is the annual rainfall greater than 1600 mm and the land developed on strongly indurated rocks with predominantly upland and high country podzolised yellow-brown earth soils?

Y → go to 166

166. Are the slopes strongly rolling to steep (16 to 35°)?

Y → **LUC unit 6e18** N → go to 167

167. Are the slopes moderately steep to steep (21 to 35°)?

Y → **LUC unit 7e18** N → go to 168

168. Are the slopes steep to very steep (26 to >35°) with limited or no primary production potential?

Y → **LUC unit 8e5**

High Country Environment

1. Is the land on flat to gently sloping (0 to 7°) terraces, floodplains or fans, with relatively free draining soils?

Y → go to 2 N → go to 30

2. Is the annual rainfall less than 800 mm?

Y → go to 3 N → go to 11

3. Is the soil depth less than 45 cm to gravels?

Y → go to 4

4. Are the soils predominantly upland and high country yellow-brown earths (minor occurrences of recent soils are included)?

Y → go to 5

5. Is the soil depth to gravels greater than 15 cm?

Y → go to 6 N → go to 9

6. Is the soil depth to gravels generally greater than 30 cm, the land arable, below 1100 m asl, and susceptible to wind erosion when cultivated?

Y → **LUC unit 4e10** N → go to 7

7. Is the soil depth to gravels generally greater than 30 cm, and the land in a sheltered aspect with minimum exposure to NW winds but marginal for arable cropping due to elevation?

Y → **LUC unit 6c1** N → go to 8

8. Is the soil depth to gravels generally less than 30 cm, susceptible to wind erosion and the land exposed to the NW wind?

Y → **LUC unit 6e22**

9. Is the soil depth to gravels less than 15 cm and relatively boulder free?

Y → **LUC unit 6s5** N → go to 10

10. Is the soil depth to gravels less than 15 cm with stones and boulders to the surface and prone to extensive inundation and/or sediment deposition?

Y → **LUC unit 8s1** N → **LUC unit 7s4** (minor inundation and/or deposition)

11. Is the annual rainfall between 800 and 1600 mm?

Y → go to 12

12. Are the soil depths to gravels greater than 45 cm?

Y → go to 13 N → go to 18

13. Are the soils recent soils?

Y → go to 14 N → go to 16

14. Is the land arable yet subjected to erosion and/or occasional flooding and/or deposition (> once every 10 yr)?

Y → **LUC unit 4e8** N → go to 15

15. Is the land arable, sheltered from the NW wind, with fine textured soils with a negligible susceptibility to erosion?

Y → **LUC unit 4c1**

16. Are the soils lowland yellow-brown earth soils?

Y → **LUC unit 3c3** N → go to 17

17. Are the soils upland and high country yellow-brown earth soils susceptible to frost lift initiated wind erosion?

Y → **LUC unit 4e9**

18. Are the soil depths to gravels less than 45 cm?

Y → go to 19

19. Are the soils recent soils?

Y → go to 20 N → go to 24

20. Are the soil depths to gravels greater than 15 cm?

Y → **LUC unit 4s10** N → go to 21

21. Is the soil depth to gravels less than 15 cm and relatively boulder free?

Y → **LUC unit 6s2** N → go to 22

22. Is the soil depth to gravels less than 15 cm with stones and boulders to the surface, free from inundation and/or sediment deposition?

Y → **LUC unit 5s3** N → go to 23

23. Is the soil depth to gravels less than 15 cm with stones and boulders to the surface and the land prone to extensive inundation and/or sediment deposition?

Y → **LUC unit 8s1** N → **LUC unit 7s3**
(minor inundation and/or deposition)

24. Are the soils upland and high country yellow-brown earths?

Y → go to 25

25. Are the soil depths to gravels greater than 15 cm?

Y → go to 26 N → go to 28

26. Is the soil depth to gravels generally greater than 30 cm, the land arable and susceptible to wind erosion?

Y → **LUC unit 4e10** N → go to 27

27. Is the soil depth to gravels generally less than 30 cm, with stones, (up to 35%) through the profile?

Y → **LUC unit 4s9**

28. Is the depth to gravels less than 15 cm?

Y → **LUC unit 6s3**

30. Is the land on flat to gently sloping (0 to 7°) terraces, floodplains or fans which are low lying with impeded drainage?

Y → go to 31 N → go to 39

31. Is the annual rainfall between 800 and 1600 mm?

Y → go to 32

32. Are the soils predominantly gley recent alluvial soils with or without minor peat?

Y → go to 33 N → go to 37

33. Is the soil depth to low chroma colours, gleying or mottling less than 45 cm and the land arable?

Y → **LUC unit 4w4** N → go to 34

34. Does the land have very little or no domestic grazing potential, and have extensive standing water?

Y → **LUC unit 8w2** N → go to 35

35. Does the land have limited domestic grazing potential and have significant standing water?
Y → **LUC unit 7w3** N → go to 36

36. Does the land have good domestic grazing potential and limited standing water?
Y → **LUC unit 6w3**

37. Are the soils predominantly organic soils with or without minor alluvial soils?
Y → go to 38

38. Does the land have very little or no domestic grazing potential and extensive standing water?
Y → **LUC unit 8w2** N → **LUC unit 7w4**

39. Is the land moderately sloping (8 to 20°) moraine, fans or exposed uplands above 950 m asl?
Y → go to 40 N → go to 56

40. Is the annual rainfall less than 800 mm?
Y → go to 41 N → go to 45

41. Is the land below 1100 m asl?
Y → go to 42 N → go to 44

42. Is the land undulating to rolling (4 to 15°), stable, and has a sheltered aspect?
Y → **LUC unit 6c1** N → go to 43

43. Is the land undulating to rolling (4 to 15°), with loessial soils susceptible to wind erosion?
Y → **LUC unit 6e22**

44. Is the land undulating to rolling (4 to 15°), stable, and above 1000 m asl?
Y → **LUC unit 7c3**

45. Is the annual rainfall between 800 and 1600 mm, and the landform moraine, fan or colluvial foot slope?
Y → go to 46 N → go to 53

46. Is the land developed on ultramafic colluvium?
Y → **LUC unit 7s5** N → go to 47

47. Is the land generally below 1100 m asl?
Y → go to 48 N → go to 50

48. Is the land undulating to rolling (4 to 15°), stable, and of a sheltered exposure?
Y → **LUC unit 6c2** N → go to 49

49. Is the land rolling to strongly rolling (8 to 20°) with a loess mantle, exposed to the NW winds, and susceptible to wind erosion?

Y → **LUC unit 6e20**

50. Is the land generally above 1100 m asl?

Y → go to 51

51. Is the land undulating to rolling (4 to 15°), stable, and of a sheltered exposure?

Y → **LUC unit 7c1** N → go to 52

52. Is the land rolling to strongly rolling (8 to 20°) with a loess mantle, and exposed to the NW winds?

Y → **LUC unit 7e21**

53. Is the annual rainfall above 1200 mm and the land comprised of undulating to strongly rolling exposed spurs, shoulder slopes or summits?

Y → go to 54

54. Is the land within the tussock zone with a severe erosion hazard and little or no domestic grazing potential?

Y → **LUC unit 8e10** N → go to 55

55. Is the land within the tussock zone with limited domestic grazing potential?

Y → **LUC unit 7c2**

56. Is the land hill and/or steeplands with slopes greater than 20°?

Y → go to 57

57. Is the annual rainfall less than 800 mm?

Y → go to 58 N → go to 74

58. Does the land have upland and high country yellow-brown earth soils developed on indurated rocks?

Y → go to 67 N → go to 59

59. Is the land developed on basalt and/or associated basaltic sedimentary rocks with soils related to brown granular loams and clays and associated soils?

Y → go to 60 N → go to 64

60. Is the land rolling to steep (8-25°) hill country generally below 1200 m asl with a present erosion severity of 1 or 2?

Y → **LUC unit 6e3** N → go to 61

61. Is the land steep to very steep (26 to >35°) hill country generally above 1000 m asl with a present erosion severity of 1, 2 or (3)?

Y → **LUC unit 7e2** N → go to 62

62. Is the land steep to very steep (26 to >35°) montane to subalpine mountain land with a present erosion severity of 3 or greater?

Y → **LUC unit 8e7** N → go to 63

63. Is the land steep to very steep (26 to >35°) subalpine to alpine mountain land below the limit of semi-continuous vegetation with a present erosion severity of (2), 3 or greater?

Y → **LUC unit 8e11**

64. Is the land developed on moderately to strongly indurated Cretaceous sandstones and conglomerates with yellow-grey to yellow-brown earth intergrade soils?

Y → go to 65

65. Is the land strongly rolling to steep (16-35°) hill country with a present erosion severity of 1 or 2?

Y → **LUC unit 6e23** N → go to 66

66. Is the land moderately steep to very steep (21 to >35°) hill country with a present erosion severity of 2 or 3?

Y → **LUC unit 7e26**

67. Is the land in the short tussock zone, generally below 1300 m asl (although may extend to 1500 m in some locations)?

Y → go to 68 N → go to 71

68. Is the land moderately steep to steep (21 to 35°) hill country with a present erosion severity of 1 or 2?

Y → **LUC unit 6e19** N → go to 69

69. Is the land moderately steep to steep (21 to 35°) hill and mountain land with a present erosion severity of 2 or 3?

Y → **LUC unit 7e20** N → go to 70

70. Is the land steep to very steep (26 to >35°) with a present erosion severity of 3, 4 or 5?

Y → **LUC unit 8e7**

71. Is the land in the snow tussock zone generally above 1000 m asl (although may be as high as 1500 m in some locations)?

Y → go to 72

72. Is the land moderately steep to steep (21 to 35°) with a present erosion severity of 2 or 3?
Y → **LUC unit 7e23** N → go to 73

73. Is the land steep to very steep (26 to >35°) with a present erosion severity of 3, 4 or 5?
Y → **LUC unit 8e8**

74. Is the annual rainfall between 800 and 1600 mm?
Y → go to 75 N → go to 92

75. Is the land below the indigenous tree line?
Y → go to 76 N → go to 85

76. Is the land developed on strongly indurated rocks?
Y → go to 77

77. Is the land developed on ultramafic rocks?
Y → **LUC unit 8e16** N → go to 78

78. Is the land steep to very steep (26 to >35°) with lowland yellow-brown earth soils?
Y → **LUC unit 8e4** N → go to 79

79. Are the soils upland and high country yellow-brown earths?
Y → go to 81 N → go to 80

80. Is the land moderately steep to steep (21 to 35°) mid-elevation (12-1700 m asl) talus sheets or cones with skeletal soils?
Y → **LUC unit 8e14**

81. Is the land strongly rolling to steep (16 to 35°) montane hill country with a present erosion severity of 1 or 2?
Y → **LUC unit 6e17** N → go to 82

82. Is the land strongly rolling to moderately steep (16 to 35°) upper montane hill country with a present erosion severity of 2 or 3?
Y → **LUC unit 7e22** N → go to 83

83. Is the land steep (26 to 35°) mountain slopes with limited sustainable productive capacity and a present erosion severity of 2 or 3?
Y → **LUC unit 7e24** N → go to 84

84. Is the land steep to very steep (26 to >35°) mountain slopes between 1000 m asl and the timber line, with a nil sustainable productive capacity, and present erosion severity of 2, 3 or 4?

Y → **LUC unit 8e9**

85. Is the land above the indigenous tree line?

Y → go to 86

86. Are the soils predominantly upland and high country yellow-brown earths?

Y → go to 87 N → go to 90

87. Is the land a rolling to strongly rolling (8 to 20°) cirque basin above 1600 m asl?

Y → **LUC unit 8c1** N → go to 88

88. Is the land moderately steep to steep (21 to 35°) subalpine mountain slopes with a present erosion severity of 1, 2 (or 3)?

Y → **LUC unit 7e25** N → go to 89

89. Is the land steep to very steep (26 to >35°) subalpine to alpine, mountain slopes and/or summits below the limit of semi-continuous vegetation with a present erosion severity of (2), 3 or greater?

Y → **LUC unit 8e11**

90. Are the soils predominantly Alpine soils?

Y → **LUC unit 8e13** N → go to 91

91. Is the land developed on ultramafic rocks?

Y → **LUC unit 8e16**

92. Is the annual rainfall greater than 1600 mm?

Y → go to 93

93. Is the land below the indigenous tree line?

Y → go to 94 N → go to 101

94. Is the land developed on strongly indurated rocks?

Y → go to 95

95. Is the land developed on ultramafic rocks?

Y → LUC unit 8e16 N → go to 96

96. Are the soils upland and high country yellow-brown earths?

Y → go to 97 N → go to 99

97. Is the land steep to very steep (26 to >35°) mountain slopes, generally above 1000 m asl, with a present erosion severity of 2, 3 or 4?

Y → **LUC unit 8e6** N → go to 98

98. Is the land steep (26 to 35°) mountain slopes with a present erosion severity of 2 or 3?

Y → **LUC unit 7e24**

99. Are the soils upland and high country podzolised yellow-brown earth and podzol soils?

Y → **LUC unit 8e5** N → go to 100

100. Are the soils skeletal soils on moderately steep to steep (21 to 35°) mid-elevation (12 to 1700 m asl) talus sheets or cones?

Y → **LUC unit 8e14**

101. Is the land above the indigenous tree line?

Y → go to 102

102. Is the land developed on strongly indurated rocks?

Y → go to 103

103. Is the land developed on ultramafic rocks?

Y → **LUC unit 8e16** N → go to 104

104. Are the soils predominantly upland and high country yellow-brown earth soils?

Y → go to 105 N → go to 108

105. Is the land a rolling to strongly rolling (8-20°) cirque basin above 1600 m asl?

Y → **LUC unit 8c1** N → go to 106

106. Is the land moderately steep to steep (21 to 35°) subalpine mountain slopes with a present erosion severity of 1, 2 or (3)?

Y → **LUC unit 7e25** N → go to 107

107. Is the land steep to very steep (26 to >35°) subalpine to alpine mountain slopes and summits below the limit of semi-continuous vegetation with a present erosion severity of (2) 3 or greater?

Y → **LUC unit 8e12**

108. Are the soils predominantly alpine soils?

Y → **LUC unit 8e13**

A summary of the decision tree logic by LUC suite is given in Appendix 1.

Land use capability unit descriptions

This section provides descriptions of each of the 154 LUC units in the second edition NZLRI of the Marlborough region. Each description consists of a brief summary of the LUC unit, a list of the physical factors affecting land use, and a section on land use and land management.

Table 6: *Summary criteria for land use capability classes one and two*

CLASS	Rainfall[1] (mm)	Altitude	Soils	APP[2]	S.I[3] (m)	NZLRI[4]
1c1	Low to Mod (500-900)	Lowland	R[5] (95, 96a)	20	26	1c1
1w1	Low (625-750)	Lowland	R (95b)	26	27	1w1
2c1	Low to Mod (550-900)	Lowland	R (96a)	17	25	2c1
2c2	Low (500-750)	Lowland	yge (11)	17	20-22	pt.[6] 2c1
2e1	Low to Mod (500-900)	Lowland	R (95)	20	20-22	pt. 2e1
2e2	Low (500-650)	Lowland	yge (11)	17	20-22	pt. 2e1
2s1	Mod (1025-1525)	Lowland	R (98b)	24	28-32	pt. 3c2
2s2	Low to Mod (500-900)	Lowland	R (96a, 95)	18	22-24	2s2
2s3	Mod (1000-1500)	Lowland	lybe (34c, 34, 34a, 34e)	23	28-32	pt. 3c2
2s4	Low (500-750)	Lowland	yge (15b, 20c)	18	20-22	2s3
2w1	Low to Mod (650-900)	Lowland	gR (90) Gley (89)	22	27	pt. 2w1

1 Indicative rainfall range for LUC unit
2 Attainable Physical Potential stock carrying capacity
3 *Pinus radiata* site index
4 Most appropriate correlation to 1st Edition New Zealand Land Resource Inventory, South Island extended legend land use capability unit (NWASCO 1975-79)
5 New Zealand Genetic Soil Classification soil group (New Zealand Soil Bureau 1968a,b, Taylor and Pohlen 1968). For code abbreviations see page 222. Representative soil set code numbers in brackets.
6 Unit is also part of another unit

Land use capability class one

LUC Unit 1c1

LUC Suite: L1

Description: Flat to undulating terraces and floodplains with deep (>90 cm) silt loam or sandy loam textured, recent soils in low to moderate rainfall areas, with a marked summer moisture deficit.

Typical location: P28/865676*

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Canterbury Suite alluvium and loess

Soils: Recent soils, e.g. 95 Waimakariri, 96a Templeton

Erosion:
Present: Negligible
Potential: Negligible to slight wind

Vegetation: Improved pasture, cereal and fodder crops, horticulture, orchards and vineyards

Land use:
Present: Intensive grazing, cereal cropping, horticulture, orchards and vineyards
Potential: Intensive cropping, orcharding, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 10 (15 irr) - Top farmer 15 (20 irr) - Attainable physical potential 20 (24 irr)
P. radiata Site Index	- 26 m

Soil conservation management:

Comments: Windbreaks and irrigation required for intensive horticulture.

* Infomap 260 grid reference, within typical map unit delineations. Where a LUC unit has not been mapped in this survey, the grid reference or location of a site where it is anticipated the unit would be mapped at a larger scale is given.

LUC Unit: 1w1

LUC Suite: L5

Description: Flat to undulating recent floodplains with deep (>90 cm) slightly wet, silt loam to sandy loam textured recent soils where the depth to low chroma colours, gleying or mottling is greater than 90 cm, in low rainfall areas.

Typical location: P28/890690

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Canterbury Suite alluvium

Soils: Recent soils, e.g. 95b Kaiapoi

Erosion: *Present:* Negligible
Potential: Negligible

Vegetation: Improved pasture, cereal crops, horticulture and orchards

Land use: *Present:* Intensive grazing, cereal cropping, horticulture, orchards
Potential: Intensive cropping, orcharding, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 15 (20 irr) - Top farmer 22 (30 irr) - Attainable physical potential 26 (30 irr)
P. radiata Site Index	- 27 m

Soil conservation management:

Comments: Windbreaks and irrigation required for intensive horticulture.

Land use capability class two

LUC Unit: 2c1

LUC Suite: L1

Description: Flat to undulating terraces and floodplains with moderately deep (45-90 cm), silt loam textured recent soils in low to moderate rainfall areas, with a marked summer moisture deficit.

Typical location: P28/810660

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium with loess in places

Soils: Recent soils, e.g. 96a Templeton

Erosion: *Present:* Negligible to slight wind
Potential: Negligible to slight wind when cultivated

Vegetation: Improved pasture, cereal crops, orchards

Land use: *Present:* Intensive grazing, cereal cropping, orchards
Potential: Intensive cropping, orcharding, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 9 (15 irr) - Top farmer 15 (20 irr) - Attainable physical potential 17 (24 irr)
P. radiata Site Index	- 25 m

Soil conservation management: Windbreaks

Comments: Irrigation required for intensive use.

LUC Unit: 2c2

LUC Suites: L1

Description: Flat to undulating terraces with moderately deep (45-90 cm), silt loam textured yellow-grey earth soils in low rainfall areas, with a marked summer moisture deficit.

Typical location: Not mapped at scale of this survey but similar terrain to 2e2 at P28/050525

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium and loess

Soils: Yellow-grey earth soils, e.g. 11 Seddon

Erosion: *Present:* Negligible to slight wind
Potential: Negligible to slight wind when cultivated

Vegetation: Improved pasture, cereal crops, orchards

Land use: *Present:* Intensive grazing, cereal cropping, orchards
Potential: Intensive cropping, orcharding, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 9 (12 irr)
	-	Top farmer 15 (18 irr)
	-	Attainable physical potential 17 (20 irr)
P. radiata Site Index	-	20-22 m

Soil conservation management: Windbreaks

Comments: Irrigation required for intensive use. Subclass priority convention dictates balance of this terrain classified as 2e2.

LUC Unit: 2e1

LUC Suite: L1

Description: Flat to undulating terraces and floodplains with moderately deep (45-90 cm), silt loam or sandy loam textured recent soils, susceptible to wind erosion in low to moderate rainfall areas, with a marked summer moisture deficit.

Typical locations: P28/053543, P29/950470

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium with some loess

Soils: Recent soils, e.g. 95 Waimakariri

Erosion: *Present:* Negligible to slight wind
Potential: Slight wind when cultivated

Vegetation: Improved pasture, cereal crops, orchards

Land use: *Present:* Intensive grazing, cereal cropping, orchards
Potential: Intensive cropping, orcharding, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 10 (12 irr) - Top farmer 16 (18 irr) - Attainable physical potential 20 (24 irr)
P. radiata Site Index	- 20-22 m

Soil conservation management: Windbreaks, flood protection

Comments: Irrigation required for intensive use.

LUC Unit: 2e2

LUC Suite: L1

Description: Flat to undulating terraces with moderately deep (45-90 cm), silt loam textured, moderately well drained yellow-grey earth soils, susceptible to wind erosion in low rainfall areas, with a marked summer moisture deficit.

Typical location: P28/050520

Altitude zone: Lowland

Slope: 0-3° A

4-7° B

Lithology: Loess and alluvium from Canterbury Suite rocks

Soils: Yellow-grey earth soils, e.g. 11 Seddon

Erosion:
Present: Negligible to slight wind
Potential: Slight wind when cultivated

Vegetation: Improved pasture, cereal crops, orchards

Land use:
Present: Intensive grazing, cereal cropping, orcharding
Potential: Intensive cropping, orcharding, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 10 (12 irr) - Top farmer 15 (18 irr) - Attainable physical potential 17 (20 irr)
P. radiata Site Index	- 20-22 m

Soil conservation management: Windbreaks

Comments: Irrigation required for intensive use.

LUC Unit: 2s1

LUC Suite: L3

Description: Flat to undulating floodplains, low terraces and easy rolling fans, with moderately deep (45-90 cm) silt loam textured, stony, recent soils in mild, moderate rainfall areas.

Typical location: Pelorus River floodplain

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury and Wakatipu Suite alluvium

Soils: Recent soils, e.g. 98b Ronga

Erosion: *Present:* Slight streambank
Potential: Slight streambank

Vegetation: Improved pasture, minor horticulture

Land use: *Present:* Intensive grazing, fodder cropping, horticulture
Potential: Horticulture, intensive grazing, fodder cropping, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 13 - Top farmer 18 - Attainable physical potential 24
P. radiata Site Index	- 28-32 m

Soil conservation management: Streambank protection, flood protection

Comments: Summer rainfall limits crop types, cereals often require artificial drying.

LUC Unit: 2s2

LUC Suite: L1

Description: Flat to undulating low terraces and floodplains with moderately deep (45-90 cm), silt loam or sandy loam textured recent soils in low to moderate rainfall areas, with a marked summer moisture deficit.

Typical locations: P28/860670, P28/050550

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Canterbury Suite alluvium

Soils: Recent soils, e.g. 96a Templeton, 95 Waimakariri

Erosion:
Present: Negligible to slight wind
Potential: Negligible to slight wind when cultivated

Vegetation: Improved pasture, cereal crops, orcharding

Land use:
Present: Intensive grazing, cereal cropping, orcharding
Potential: Intensive cropping, orcharding, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 9 (15 irr) - Top farmer 14 (20 irr) - Attainable physical potential 18 (24 irr)
P. radiata Site Index	- 22-24 m

Soil conservation management: Windbreaks

Comments: Irrigation required for intensive use.

LUC Unit: 2s3

LUC Suite: L3

Description: Flat to undulating terraces and fans with moderately deep (45-90 cm) silt loam textured lowland yellow-brown earth soils in mild, moderate rainfall areas.

Typical location: North bank of Wairau River, Kaituna valley

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury and Wakatipu Suite alluvium and colluvium

Soils: Lowland yellow-brown earth soils, e.g. 34c Manaroa, 34 Rai, 34a Kaituna, 34e Koromiko

Erosion: *Present:* Negligible
Potential: Negligible to slight streambank

Vegetation: Improved pasture, fodder crops, horticulture

Land use: *Present:* Intensive grazing, fodder cropping, horticulture
Potential: Horticulture, intensive grazing, fodder cropping, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 12 - Top farmer 17 - Attainable physical potential 23
P. radiata Site Index	- 28-32 m

Soil conservation management: Streambank and flood protection

Comments: Summer rainfall restricts crop types.

LUC Unit: 2s4

LUC Suite: L1

Description: Flat to undulating terraces with moderately deep (45-90 cm) silt loam textured yellow-grey earth soils, with compact moderately slow permeability subsoils in low rainfall areas, with a marked summer moisture deficit.

Typical locations: P29/950464, P28/965504

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Loess over alluvium from Canterbury Suite rocks.

Soils: Yellow-grey earth soils, e.g. 15b Seaview, 20c Sedgemere

Erosion:
Present: Negligible to slight wind
Potential: Negligible to slight wind when cultivated.

Vegetation: Improved pasture, cereal crops, orchards, horticulture

Land use:
Present: Intensive grazing, cereal cropping, orcharding, horticulture
Potential: Intensive cropping, orcharding, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 10 - Top farmer 15 - Attainable physical potential 18 (20 irr)
P. radiata Site Index	- 20-22 m

Soil conservation management: Windbreaks

Comments: Mole drainage and irrigation required for intensive use.

LUC Unit: 2w1

LUC Suite: L5

Description: Flat to undulating floodplains and low terraces with predominantly recent sandy loam to clay loam textured soils where the depth to low chroma colours, gleying or mottling is greater than 45 cm, and seasonally high and/or fluctuating water tables (to within 45 cm of the surface), in low to moderate rainfall areas.

Typical locations: P28/900700, P28/015535

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Canterbury Suite alluvium

Soils: Gley recent soils, e.g. 90 Taitapu
Gley soils, e.g. 89 Temuka

Erosion: *Present*: Negligible
Potential: Negligible

Vegetation: Improved pasture, cereal crops, orchards

Land use: *Present*: Intensive grazing, cereal cropping, orcharding
Potential: Intensive cropping, orcharding, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 15 (20 irr) - Top farmer 18 (25 irr) - Attainable physical potential 22 (26 irr)
P. radiata Site Index	- 27 m

Soil conservation management: Drainage, flood control

Comments:

Table 7: Summary criteria for land use capability class three

CLASS	Rainfall (mm)	Altitude	Soils	APP	S.I.(m)	NZLRI
3c1	Mod (1000-1500)	Lowland	R (98b)	24	28-32	pt. 3c2
3c2	Mod (1000-1500)	Lowland	lybe (34c, 34, 34a, 34e)	23	28-32	pt. 3c2
3c3	Mod (1275)	Lower Montane	lybe (35b)	20	24-26	pt. 3c1
3e1	Low (575-750)	Lowland	ybe assoc. yge (13c, 14c)	15	20-22	3e5
3e2	Mod (750-1050)	Lowland - Low. Mont.	yg/yb (27e)	15	24-26	3e7
3e3	Low (500-750)	Lowland	yge (15b, 20c, 16d)	15	20-22	3e8
3e4	Mod (1000-1150)	Lowland	yg/yb (26b, 25)	15	26-30	3e12
3e5	Mod (1250-1300)	Lowland - Low. Mont.	lybe (35b)	20	24	3e5
3s1	Mod (1000-1500)	Lowland	R (98b)	24	28-32	pt. 3c2
3s2	Mod (750-1275)	Lowland - Low. Mont.	yg/yb (27e, 25)	15	24-26	3s3
3s3	Low to Mod (500-900)	Lowland	R (95)	17	20-22	3s9
3s4	Mod (1000-1500)	Lowland	lybe (34c, 34, 34a, 34e)	23	28-32	pt. 3c2
3s5	Low to Mod (500-900)	Lowland	R (96a, 96c)	17	22-24	pt. 3s5
3s6	Low (575-750)	Lowland	ybe assoc. yge (13c, 14c)	17	20-22	pt. 3s5
3s7	Low (625-750)	Lowland	Saline gR (92)	17	25-27	pt. 3s11
3s8	Low to Mod (600-900)	Lowland	yge (20c) yg/ yb int (25)	18	22-24	pt. 3s3
3w1	Low (675-750)	Lowland	gR (90), Gley (89)	18	22-24	3w1
3w2	Mod (1000-1500)	Lowland	lybe (34e)	23	28-32	pt. 3c2

Land use capability class three

LUC Unit: 3c1

LUC Suite: L3

Description: Flat to undulating plains and easy rolling fans with moderately shallow to moderately deep (30-90 cm), silt loam textured recent soil in mild moderate rainfall areas.

Typical location: Pelorus River valley floor

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury and Wakatipu Suite alluvium

Soils: Recent soils, e.g. 98b Ronga

Erosion: *Present*: Slight to moderate streambank
Potential: Slight to moderate streambank

Vegetation: Improved pasture, forage crops, cereal crops

Land use: *Present*: Intensive grazing, forage and cereal cropping
Potential: Cropping, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 13 - Top farmer 18 - Attainable physical potential 24
P. radiata Site Index	- 28-32 m

Soil conservation management Streambank and flood protection

Comments: Summer rainfall limits crop types, cereals often require artificial drying.

LUC Unit: 3c2

LUC Suite: L3

Description: Undulating terraces and downs with moderately shallow to moderately deep (30-90 cm) silt loam textured lowland yellow-brown earth soils in mild moderate rainfall areas.

Typical location: P28/750740

Altitude zone: Lowland

Slope: 4-7° B
0-3° A

Lithology: Alluvium and loess from Canterbury and Wakatipu Suite rocks

Soils: Lowland yellow-brown earth soils, e.g. 34 Rai, 34a Kaituna, 34c Manaroa, 34e Koromiko

Erosion:
Present: Negligible to slight streambank
Potential: Negligible to slight streambank

Vegetation: Improved pasture, forage crops, cereal crops, mixed scrub

Land use:
Present: Intensive grazing, forage and cereal cropping, unimproved land
Potential: Cropping, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present Average 12 - Top Farmer 17 - Attainable Physical Potential 23
P. radiata Site Index	- 28-32 m

Soil conservation management: Streambank and flood protection

Comments: High summer rainfall limits crop types, cereals usually require artificial drying.

LUC Unit: 3c3

LUC Suite: H2

Description: Undulating terraces and fans will moderately shallow to moderately deep (30-90 cm) silt loam textured lowland yellow-brown earth soils in cool moderate rainfall areas.

Typical location: O31/472697

Altitude zone: Lower Montane

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium and colluvium

Soils: Lowland yellow-brown earth soils, e.g. 35b Charwell

Erosion: *Present*: Negligible to slight wind and streambank
Potential: Negligible to slight streambank and wind when cultivated

Vegetation: Improved and semi-improved pasture, forage and cereal crops

Land use: *Present*: Intensive grazing, forage and cereal cropping
Potential: Cropping, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 15 - Attainable physical potential 20
P. radiata Site Index	- 24-26 m

Soil conservation management: Windbreaks

Comments: Short growing season.

LUC Unit: 3e1

LUC Suite: L2

Description: Flat to undulating terraces adjacent major rivers and streams in low rainfall areas with a marked summer moisture deficit, with moderately shallow (30-45 cm) and/or stony silt loam textured yellow-brown earth soils susceptible to wind erosion when cultivated.

Typical location: Not mapped at scale of this survey but similar terrain to 3s6 at P28/870640, P28/026543

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Canterbury Suite alluvium with thin discontinuous loess

Soils: Yellow-brown shallow and stony soils associated with yellow-grey earths, e.g. 13c Renwick, 14c Dashwood

Erosion:
Present: Slight to moderate wind
Potential: Slight wind, moderate wind when cultivated

Vegetation: Improved pasture, forage and cereal crops

Land use:
Present: Intensive grazing, forage and cereal cropping
Potential: Cropping, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 10 - Attainable physical potential 15 (22 irr)
P. radiata Site Index	- 20-22 m

Soil conservation management: Windbreaks, irrigation, minimum tillage techniques

Comments: North westerly winds aggravate seasonal moisture deficit. Similar terrain to 3s6 but with higher erosion potential.

LUC Unit: 3e2

LUC Suite: L4

Description: Flat to undulating terraces in cool moderate rainfall inland areas, with moderately shallow (30-45 cm) and/or stony, silt loam textured yellow-grey to yellow-brown earth intergrade soils susceptible to wind erosion.

Typical location: O28/510580

Altitude zone: Lowland to lower montane

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium with intermittent loess

Soils: Yellow-grey to yellow-brown earth intergrade soils, e.g. 27e Hororata

Erosion: *Present:* Slight wind
Potential: Slight wind, moderate wind when cultivated

Vegetation: Improved and semi-improved pasture, forage crops

Land use: *Present:* Intensive grazing, forage cropping, semi-developed land
Potential: Cropping, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 12 - Attainable physical potential 15 (20 irr)
P. radiata Site Index	- 24-26 m

Soil conservation management: Windbreaks, minimum tillage techniques

Comments:

LUC Unit: 3e3

LUC Suite: L9

Description: Undulating to rolling loess mantled terraces and downlands in low rainfall areas with a marked summer moisture deficit. Silt loam textured yellow grey earth soils are susceptible to sheet and rill erosion when cultivated.

Typical locations: P28/040510, P29/900455

Altitude zone: Lowland

Slope: 8-15° C
4-7° B

Lithology: Loess (> 50 cm), over Canterbury Suite alluvium or Tertiary mudstones and sandstones

Soils: Yellow-grey earth soils, e.g. 15b Seaview, 20c Sedgemere, 16d Ward

Erosion: *Present*: Slight sheet and wind
Potential: Slight sheet and wind, moderate sheet, rill and wind when cultivated

Vegetation: Improved and semi-improved pasture, cereal and forage crops

Land use: *Present*: Intensive grazing, cereal and forage cropping
Potential: Cropping, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 7
	-	Top farmer 12
	-	Attainable physical potential 15 (20 irr)
P. radiata Site Index	-	20-22 m

Soil conservation management: Contour cultivation, minimum tillage techniques, windbreaks

Comments: Profiles developed in loess frequently also have impeded drainage

LUC Unit: 3e4

LUC Suite: L11

Description: Undulating to rolling loess mantled downlands in moderate rainfall districts. Subsurface impeded drainage limits cropping. Silt loam textured soils are susceptible to sheet and rill erosion when cultivated.

Typical location: 032/502484

Altitude zone: Lowland

Slope: 4-7° B
8-15° C

Lithology: Loess (> 50 cm), over Canterbury Suite alluvium and bedrock

Soils: Yellow-grey to yellow-brown earth intergrade soils, e.g. 26b Medina, 25 Jordan

Erosion: *Present:* Negligible to slight sheet and wind
Potential: Slight sheet and wind, moderate sheet rill and wind when cultivated

Vegetation: Improved and semi-improved pasture, forage and cereal crops, short tussock grassland

Land use: *Present:* Intensive grazing, forage and cereal cropping
Potential: Cropping, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 10
	-	Top farmer 12
	-	Attainable physical potential 15
P. radiata Site Index	-	26-30 m

Soil conservation management: Contour cultivation, minimum tillage techniques, deep ripping, mole drainage

Comments: Profiles developed in loess also have impeded drainage due to the presence of a fragipan.

LUC Unit: 3e5

LUC Suite: L11

Description: Rolling, predominantly loess mantled downlands in moderate rainfall areas with cool winters and leached low fertility silt loam textured soils, susceptible to sheet and rill erosion when cultivated.

Typical location: 031/435677

Altitude zone: Lowland - Lower Montane

Slope: 8-15° C
4-7° B

Lithology: Intermittent loess over Canterbury Suite alluvium or Tertiary mudstone

Soils: Lowland yellow-brown earth soils, e.g. 35b Charwell

Erosion: *Present:* Slight sheet and wind
Potential: Slight sheet and wind, moderate sheet, rill and wind when cultivated

Vegetation: Improved and semi-improved pasture, fodder and cereal crops, short tussock grassland

Land use: *Present:* Semi-intensive grazing, cereal cropping
Potential: Cropping, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 15 - Attainable physical potential 20
P. radiata Site Index	- 24 m

Soil conservation management: Contour cultivation, minimum tillage techniques, windbreaks

Comments: Unit occurs in higher and cooler situations than 3e4.

LUC Unit: 3s1

LUC Suite: L4

Description: Flat to undulating floodplains with moderately shallow (30-45 cm) and stony silt loam textured recent soils, in mild moderate rainfall areas.

Typical location: Pelorus River valley floor

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury and Wakatipu Suite alluvium

Soils: Recent soils, e.g. 98b Ronga

Erosion: *Present*: Slight to moderate streambank
Potential: Slight to moderate streambank

Vegetation: Improved and semi-improved pasture

Land use: *Present*: Intensive grazing, fodder cropping
Potential: Cropping, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 13 - Top farmer 18 - Attainable physical potential 24
P. radiata Site Index	- 28-32 m

Soil conservation management: Streambank and flood protection

Comments: Summer rainfall and stoniness limits some crops.

LUC Unit: 3s2

LUC Suite: L4

Description: Flat to undulating terraces in cool, moderate rainfall areas with moderately shallow (30-45 cm) and/or stony silt loam textured yellow-grey to yellow-brown earth intergrade soils.

Typical location: O28/545605

Altitude zone: Lowland - lower montane

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium, loess in places

Soils: Yellow-grey to yellow-brown earth intergrade soils, e.g. 27e Hororata, 25 Jordon

Erosion: *Present:* Negligible to slight wind
Potential: Slight to moderate wind when cultivated

Vegetation: Improved and semi-improved pasture, cereal and fodder crops

Land use: *Present:* Intensive grazing, cereal and fodder cropping
Potential: Cropping, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 7
	-	Top farmer 12
	-	Attainable physical potential 15 (20 irr)
P. radiata Site Index	-	24-26 m

Soil conservation management: Windbreaks, minimum tillage techniques

Comments: Similar to 3e2 but with shallower and more stony soils.

LUC Unit: 3s3

LUC Suite: L2

Description: Flat to undulating recent floodplains with moderately shallow (30-45 cm) and/or stony silt loam to sandy loam textured soils in low to moderate rainfall areas with a marked summer moisture deficit.

Typical location: P28/857687

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium, loess in places

Soils: Recent soils, e.g. 95 Waimakariri

Erosion: *Present*: Negligible to slight wind and streambank
Potential: Slight streambank and wind, slight to moderate wind when cultivated

Vegetation: Improved and semi-improved pasture, cereal and fodder crops

Land use: *Present*: Intensive to semi-intensive grazing, cereal and fodder cropping
Potential: Cropping, intensive grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 8 (14 irr) - Top farmer 13 (19 irr) - Attainable physical potential 17 (23 irr)
P. radiata Site Index	- 20-22 m

Soil conservation management: Windbreaks, minimum tillage techniques, streambank protection

Comments: Liable to occasional surface flooding and deposition. Irrigation required for intensive use.

LUC Unit: 3s4

LUC Suite: L4

Description: Flat to undulating terraces in mild, moderate rainfall areas with moderately shallow (30-45 cm) and/or stony silt loam textured lowland yellow-brown earth soils.

Typical location: P28/780710

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Canterbury and Wakatipu Suite alluvium

Soils: Lowland yellow-brown earth soils, e.g. 34 Rai, 34a Kaituna, 34c Manaroa, 34e Koromiko

Erosion:
Present: Negligible to slight streambank
Potential: Negligible to slight streambank

Vegetation: Improved and semi-improved pasture

Land use:
Present: Intensive grazing, fodder cropping
Potential: Cropping, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 12 - Top farmer 17 - Attainable physical potential 23
P. radiata Site Index	- 28-32 m

Soil conservation management: Streambank protection

Comments: High summer rainfall and stony soils limit crop types.

LUC Unit: 3s5

LUC Suite: L2

Description: Flat to undulating low terraces in low to moderate rainfall areas with a marked summer moisture deficit and moderately shallow (30-45 cm) and/or stony, silt loam or sandy loam textured recent soils with limited water storage capacity.

Typical location: P28/780650

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Canterbury Suite alluvium

Soils: Recent soils, e.g. 96a Templeton, 96c Eyre-Paparua

Erosion:
Present: Negligible to slight wind
Potential: Slight wind, slight to moderate wind when cultivated

Vegetation: Improved pasture, cereal and fodder crops

Land use:
Present: Intensive grazing, cereal and fodder cropping
Potential: Cropping, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 14 - Attainable physical potential 17
P. radiata Site Index	- 22-24 m

Soil conservation management: Windbreaks, minimum tillage techniques

Comments: Irrigation required for intensive use.

LUC Unit: 3s6

LUC Suite: L2

Description: Flat to undulating terraces in low rainfall areas with a marked summer moisture deficit and moderately shallow (30-45 cm) and/or stony, silt loam textured yellow-brown earth soils.

Typical locations: P28/870640, P28/026543

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Alluvium from Canterbury Suite and Tertiary rocks

Soils: Yellow-brown shallow and stony soils associated with yellow-grey earths, e.g. 13c Renwick, 14c Dashwood

Erosion:
Present: Negligible to slight wind
Potential: Slight wind, slight to moderate wind when cultivated

Vegetation: Improved pasture, cereal and fodder crops

Land use:
Present: Intensive grazing, cereal and fodder cropping
Potential: Cropping, intensive grazing, viticulture, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 10 - Attainable physical potential 15 (22 irr)
P. radiata Site Index	- 20-22 m

Soil conservation management: Windbreaks, minimum tillage techniques

Comments: Similar terrain to that specified for 3e1 but with reduced erosion potential. Irrigation required for intensive use.

LUC Unit: 3s7

LUC Suite: L7

Description: Flat to gently sloping coastal lake and lagoon margins, weak to moderately saline sandy loam to clay loam textured soils in low rainfall, summer moisture deficient areas.

Typical location: P28/950635

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Fine textured (sand sized or smaller) Canterbury Suite alluvium

Soils: Saline gley recent soils, e.g. 92 Motukarara

Erosion:
Present: Negligible
Potential: Negligible to slight wind when cultivated

Vegetation: Improved and semi-improved pasture, cereal and fodder crops

Land use:
Present: Intensive grazing, cereal and fodder cropping
Potential: Cropping, intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 9 - Top farmer 14 - Attainable physical potential 17 (22 irr)
P. radiata Site Index	- 15-27 m

Soil conservation management: Windbreaks, minimum tillage techniques, flood control

Comments: Susceptible to surface flooding in "wet" seasons.

LUC Unit: 3s8

LUC Suite: L9

Description: Undulating to rolling loess-mantled terraces and downlands, in low to moderate rainfall areas with a marked summer moisture deficit, and silt loam textured soils with impeded drainage due to a strongly developed fragipan.

Typical location: P28/733603

Altitude zone: Lowland

Slope: 4-7° B
0-3° A

Lithology: Loess (>50 cm) over Canterbury Suite alluvium

Soils: Yellow-grey earth soils, e.g. 20c Sedgemere
Yellow-grey to yellow-brown earth intergrade soils, e.g. 25 Jordon

Erosion: *Present:* Negligible to slight wind
Potential: Slight wind, rill and sheet when cultivated

Vegetation: Improved pasture, cereal and forage cropping, minor horticulture

Land use: *Present:* Intensive grazing, cereal and fodder cropping, minor horticulture
Potential: Cropping, intensive grazing, minor horticulture, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 14 - Attainable physical potential 18
P. radiata Site Index	- 22-24 m

Soil conservation management: Minimum tillage, deep ripping, mole drainage

Comments: The persistence of improved drainage through fragipan fracturing is unknown. Closely spaced artificial drains would be necessary to counter the slow permeability through heavy subsoils.

LUC Unit: 3w1

LUC Suite: L5

Description: Flat to undulating floodplains and low terraces with moderately deep sandy loam to clay loam textured soils where the depth to low chroma colours, gleying or mottling is greater than 45 cm, and/or a moderately high water table at or within 45 cm of the surface for up to half the year, in low rainfall areas.

Typical location: P28/950710

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Fine textured Canterbury Suite alluvium

Soils: Gley recent soils, e.g. 90 Taitapu

Gley soils, e.g. 89 Temuka

Erosion: *Present*: Negligible to slight streambank
Potential: Negligible to slight streambank

Vegetation: Improved and semi-improved pasture, cereal and fodder crops, rushes and sedges

Land use: *Present*: Intensive grazing, cereal and fodder cropping
Potential: Cropping, intensive grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 8 dry (20 irr) - Top farmer 15 dry (20 irr) - Attainable physical potential 18 dry (22 irr)
P. radiata Site Index	- 22-24 m

Soil conservation management: Drainage control, windbreaks

Comments:

LUC Unit: 3w2

LUC Suite: L6

Description: Low lying terraces and floodplains in cut off valleys behind major river levees. Moderately deep silt loam textured soils where the depth to low chroma colours, gleying or mottling is greater than 45 cm, in moderate rainfall areas.

Typical location: P28/895755

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium and overbank deposits

Soils: Mottled or gleyed lowland yellow-brown earths, e.g. 34e Koromiko

Erosion:
Present: Negligible to slight deposition
Potential: Negligible to slight deposition

Vegetation: Improved pasture with rushes

Land use:
Present: Intensive grazing
Potential: Cropping, intensive grazing

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 12
	-	Top farmer 17
	-	Attainable physical potential 23
P. radiata Site Index	-	28-32 m

Soil conservation management: Drainage, flood control

Comments: High water tables in winter and spring. Gravity drainage not possible because areas are depressions.

Table 8: Summary criteria for land use capability class four

CLASS	Rainfall (mm)	Altitude	Soils	APP	S.I.(m)	NZLRI
4c1	Low to High (500-2000)	Montane	R (99)	7	22-24	4e8
4e1	Low (575-775)	Lowland	Rend. (71a)	15	18-20	4e1
4e2	Mod (900-1275)	Lowland	yg/yb (26b, 25)	17	24-26	4e3
4e3	Mod (1300-1500)	Lowland	lybe (34c)	15	28-32	pt. 3c2
4e4	Mod (900-1300)	Lowland - Low. Mont.	yg/yb (25, 30dH)	14	22-26	4e6
4e5	Mod (1000-1500)	Lowland	lybe (42H, 41H, 42aH)	10	28-32	–
4e6	Low (500-650)	Lowland	yge (15d), yg/yb (25)	15	20-22	4e4
4e7	Low (650-775)	Lowland	ybs (68c)	15	15-24	4e18
4e8	Mod to High (500-2000)	Montane	R (99)	7	22-24	4e8
4e9	Mod (900-1525)	Montane	uhcybe (52, 53)	7	23-25	4e16
4e10	Low to Mod (500-900)	Montane	uhcybe (49a)	8	<16-20	4e12
4e11	Mod (1300-1500)	Lowland	bglc (77cH), lybe (42H)	10	26-30	
4s1	Mod (1000-1500)	Lowland	R (98b)	12	28-32	pt. 3c2
4s2	Mod (1025-1275)	Lowland - Low. Mont.	R (98d)	12	26 4s1	–
4s3	Low to Mod (500-900)	Lowland	R (95)	14	18-20	4s6
4s4	Mod (750-1025)	Lowland - Low Mont.	yg/yb (27e)	15	24-26	4s3
4s5	Low (650-750)	Lowland	yge (13c)	15	17-20	4s7
4s6	Low (625-750)	Lowland	Saline gR (92)	16	16-18	4s8
4s7	Mod (1000-1500)	Lowland	lybe (34, 34a, 34c, 34e)	15	28-32	pt. 3c2
4s8	Low (625-750)	Lowland	ybs (68c)	14	20-23	4s11
4s9	Mod (900-1525)	Lower Montane	uhcybe (52)	7	23-25	4s14
4s10	Low to High (500-2000)	Montane	R (99)	7	22-24	4s12
4w1	Mod(1000-1500)	Lowland	Saline gR (92)	13	16-18	–
4w2	Mod(1000-1500)	Lowland	lybe (34a, 34e) drainage impeded	12	US, 24	–
4w3	Low to Mod (500-900)	Lowland	gR (90) Gley 89	17	24-26	–
4w4	Low to High (700-2000)	Montane	gR (90d)	9	US	–

Land use capability class four

LUC Unit: 4c1

LUC Suite: H2

Description: Floodplains and recent fans with moderately deep (45-90 cm), fertile silt loam to sandy loam textured recent soils in cool, low to high rainfall inland areas.

Typical location: not mapped at scale of this survey

Altitude zone: Montane

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium

Soils: Recent soils, e.g. 99 Tasman

Erosion:
Present: Slight to moderate wind, streambank and deposition
Potential: Slight to moderate wind, moderate wind when cultivated streambank and deposition

Vegetation: Semi-improved and improved pasture, short tussock grassland with matagouri scrub

Land use:
Present: Grazing
Potential: Intensive grazing, occasional cropping, woodlots and small plantation forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 5 - Top farmer 6 - Attainable physical potential 7
P. radiata Site Index	- 22-24 m

Soil conservation management: Windbreaks, streambank and flood protection

Comments: More frost tolerant species than *P. radiata* have good growth rates.

LUC Unit: 4e1

LUC Suite: L10

Description: Rolling to strongly rolling downlands on calcareous rocks in low rainfall areas with a moderate summer moisture deficit and clay loam textured, well structured soils.

Typical location: Q29/112385

Altitude zone: Lowland

Slope: 8-15° C
16-20° D

Lithology: Limestone, calcareous mudstone, and sandstone

Soils: Rendzina and related soils, e.g. 71a Waikari

Erosion:
Present: Negligible to slight sheet and soil slip
Potential: Slight sheet and soil slip, slight to moderate sheet, rill and wind when cultivated

Vegetation: Improved pasture, fodder crops

Land use:
Present: Intensive grazing, fodder cropping
Potential: Intensive grazing, occasional cropping, woodlots and small plantation forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 11 - Attainable physical potential 15
P. radiata Site Index	- 18-20 m

Soil conservation management: Contour cultivation, minimum tillage techniques

Comments:

LUC Unit: 4e2

LUC Suite: L11

Description: Rolling to strongly rolling loess-mantled downlands in moderate rainfall areas. Subsurface impeded drainage limits cropping. Silt loam textured soils are susceptible to sheet and rill erosion when cultivated.

Typical location: P29/835400

Altitude zone: Lowland

Slope: 8-15° C
16-20° D

Lithology: Loess on Canterbury Suite gravels and various rock types

Soils: Yellow-grey to yellow-brown earth intergrade soils, e.g. 26b Medina, 25 Jordon

Erosion:
Present: Negligible to slight sheet and soil slip
Potential: Slight sheet and wind moderate sheet, rill and wind when cultivated

Vegetation: Improved and semi-improved pasture, fodder crops, short tussock grassland, scrub

Land use:
Present: Intensive grazing, fodder cropping
Potential: Intensive grazing, occasional cropping, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 9 - Top farmer 14 - Attainable physical potential 17
P. radiata Site Index	- 24-26 m

Soil conservation management: Contour cultivation, minimum tillage techniques, deep ripping, mole drainage

Comments: Fragipan development impedes drainage.

LUC Unit: 4e3

LUC Suite: L12

Description: Rolling to strongly rolling downs and fans with silt loam textured lowland yellow brown earth soils susceptible to sheet and rill erosion when cultivated, in mild moderate rainfall areas with a slight summer moisture deficit.

Typical location: P27/935080

Altitude zone: Lowland

Slope: 8-15° C
16-20° D

Lithology: Canterbury and Wakatipu Suite colluvium and alluvium

Soils: Lowland yellow-brown earth soils, e.g. 34c Manaroa

Erosion:
Present: Slight to moderate sheet and soil slip
Potential: Moderate sheet and soil slip, moderate to severe sheet and rill when cultivated

Vegetation: Improved and semi-improved pasture with rushes, bracken fern, gorse and manuka scrub

Land use:
Present: Intensive grazing, undeveloped land
Potential: Intensive grazing, fodder cropping, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 12 - Attainable physical potential 15
P. radiata Site Index	- 28-32 m

Soil conservation management: Contour cultivation, contour works

Comments:

LUC Unit: 4e4

LUC Suite: L11

Description: Rolling to strongly rolling downs in moderate rainfall areas with cool winters. Low fertility silt loam textured yellow-grey/yellow-brown earth intergrade soils susceptible to sheet and rill erosion when cultivated.

Typical location: N29/280485

Altitude zone: Lowland-lower montane

Slope: 8-15° C
16-20° D

Lithology: Intermittent loess on Canterbury Suite gravels
Tertiary mudstones and/or conglomerates

Soils: Yellow-grey to yellow-brown earth intergrade soils, e.g. 25 Jordan, 30dH Kahutara hill

Erosion:
Present: Slight to moderate sheet and soil slip
Potential: Moderate sheet and soil slip, moderate to severe sheet, and rill when cultivated

Vegetation: Improved and semi-improved pasture, manuka and mixed native scrub

Land use:
Present: Intensive grazing, undeveloped land
Potential: Intensive grazing, occasional cropping, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 5 - Top farmer 10 - Attainable physical potential 14
P. radiata Site Index	- 22-26 m

Soil conservation management: Contour cultivation, minimum tillage techniques, contour works

Comments: Restricted permeability through heavy subsoils. Boron deficiency evident in *P. radiata*.

LUC Unit: 4e5

LUC Suite: L12

Description: Rolling to strongly rolling hill slopes developed on strongly indurated sedimentary and schistose rocks in mild, moderate rainfall areas. Silt loam textured lowland yellow brown earth soils susceptible to sheet and rill erosion when cultivated.

Typical location: P27/936075

Altitude zone: Lowland to montane

Slope: 8-15° C
16-20° D

Lithology: Canterbury and Wakatipu Suite colluvium deeply weathered in places, with loess

Soils: Lowland yellow-brown earths, hill phases of steepland soils, e.g. 42H Ketu, 41H Arapawa, 42aH Anakoha

Erosion: *Present:* Slight to moderate soil slip and sheet
Potential: Moderate soil slip and sheet, severe sheet and rill when cultivated

Vegetation: Improved and semi-improved pasture, gorse and manuka scrub

Land use: *Present:* Intensive and semi-intensive grazing, undeveloped land
Potential: Intensive grazing, fodder cropping, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 4 - Top farmer 6 - Attainable physical potential 10
P. radiata Site Index	- 28-32 m

Soil conservation management: Contour cultivation, contour works, space planting

Comments: Limited areas delineated.

LUC Unit: 4e6

LUC Suite: L9

Description: Rolling to strongly rolling loess mantled downlands in low rainfall areas with a marked summer moisture deficit. Silt loam textured predominantly yellow grey earth soils are susceptible to tunnel gully erosion, and sheet and rill erosion when cultivated.

Typical location: P28/990595

Altitude zone: Lowland

Slope: 8-15° C
16-20° D

Lithology: Loess on Tertiary mudstones, sandstones conglomerates and Canterbury Suite gravels

Soils: Yellow-grey earth soils, e.g. 15d Wither
Yellow-grey to yellow-brown earth intergrade soils, e.g. 25 Jordon

Erosion: *Present:* Slight to moderate sheet, wind, and rill, slight tunnel gully
Potential: Slight to moderate sheet and tunnel gully, moderate to severe sheet, wind and rill when cultivated

Vegetation: Improved and semi-improved pasture, fodder crops, scrub

Land use: *Present:* Intensive grazing, fodder cropping
Potential: Intensive grazing, occasional cropping, woodlots and small plantation forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 6 - Top farmer 9 - Attainable physical potential 15
P. radiata Site Index	- 20-22 m

Soil conservation management: Contour cultivation, minimum tillage techniques, contour works

Comments: Profiles developed in loess also have impeded drainage due to the presence of a fragipan.

LUC Unit: 4e7

LUC Suite: L8

Description: Undulating sand flats and sand dunes, excessively drained and susceptible to wind erosion, in low to moderate rainfall areas.

Typical location: P30/998188

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Sand, predominantly from Canterbury Suite rocks

Soils: Yellow-brown sand soils, e.g. 68c Tahunanui

Erosion: *Present:* Slight wind
Potential: Moderate to severe wind when cultivated

Vegetation: Improved and semi-improved pasture, scrub, exotic forest, sand dune associations

Land use: *Present:* Grazing, production forestry
Potential: Erosion control forestry, grazing, occasional cropping

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 8 - Top farmer 10 - Attainable physical potential 15
P. radiata Site Index	- 15-24 m

Soil conservation management: Windbreaks, minimum tillage techniques, maintenance of vegetation cover

Comments: Growth rates affected by degree of coastal exposure.

LUC Unit: 4e8

LUC Suite: H2

Description: Floodplains and recent fans with fertile, moderately deep, (45-90 cm), silt loam to sandy loam textured recent soils in cool, moderate to high rainfall inland areas. Unit is subject to occasional flooding and deposition.

Typical location: not mapped at scale of this survey

Altitude zone: Montane

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium

Soils: Recent soils, e.g. 99 Tasman

Erosion:
Present: Slight to moderate wind, slight to moderate streambank and deposition
Potential: Slight to moderate wind, moderate to severe wind when cultivated, slight to moderate streambank and deposition

Vegetation: Semi-improved and improved pasture, short tussock grassland with matagouri and/or sweet brier scrub

Land use:
Present: Grazing
Potential: Intensive grazing, occasional cropping, woodlots and small plantation forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 5 - Top farmer 6 - Attainable physical potential 7
P. radiata Site Index	- 22-24 m

Soil conservation management: Windbreaks, streambank planting, channel control

Comments: More frost/snow tolerant species than *P. radiata* have 'good' growth rates.

LUC Unit: 4e9

LUC Suite: H2

Description: Gently undulating to rolling terraces and fans with moderately shallow to moderately deep (30-90 cm), low fertility, silt loam to sandy loam textured soils in moderate rainfall high country areas. Soils are susceptible to frost lift initiated wind erosion.

Typical locations: N29/060370, N29/040370

Altitude zone: Montane

Slope: 4-7° B
0-3° A
8-15° C

Lithology: Canterbury Suite alluvium with variable loess

Soils: Upland and high country yellow-brown earth soils,
e.g. 52 Craigieburn, 53 Cass

Erosion: *Present*: Slight to moderate wind and sheet
Potential: Moderate wind and sheet, moderate to severe wind and sheet when cultivated

Vegetation: Short tussock grassland, some red and snow tussock, matagouri scrub, semi-improved pasture, fodder crops, beech forest

Land use: *Present*: Grazing, fodder cropping, indigenous forest
Potential: Grazing, occasional cropping, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 3
	-	Top farmer 4
	-	Attainable physical potential 7
P. radiata Site Index	-	23-25 m

Soil conservation management: Windbreaks, minimum tillage techniques

Comments: Frost lift on bare ground can be severe, alternative species than frost-tender *P. radiata* have potential.

LUC Unit: 4e10

LUC Suite: H1, H3

Description: Flat to gently rolling fans and terraces in low to moderate rainfall high country areas with moderately shallow (30-45 cm), sandy loam to gravelly sandy loam textured soils liable to severe wind erosion.

Typical location: 030/550184

Altitude zone: Lower montane

Slope: 4-7° B
0-3° A
8-15° C

Lithology: Canterbury Suite alluvium overlain by a variable thin loess mantle

Soils: Upland and high country yellow-brown earth soils, e.g. 49a Acheron

Erosion:
Present: Slight to moderate wind and sheet
Potential: Slight to moderate wind and sheet, severe wind when cultivated

Vegetation: Short tussock grassland with matagouri scrub, semi-improved and improved pasture

Land use:
Present: Grazing
Potential: Grazing, occasional fodder cropping, erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 3 - Top farmer 3 - Attainable physical potential 3 (12 irr)
P. radiata Site Index	- <16-20 m

Soil conservation management: Windbreaks, minimum tillage techniques

Comments: Frost hardy tree species are more appropriate.

LUC Unit: 4e11

LUC Suite: L13

Description: Rolling to strongly rolling slopes on basic igneous or calcareous rich sedimentary rocks in mild moderate rainfall areas. Well structured clay loam to silt loam textured soils are susceptible to rill erosion when cultivated.

Typical location: P25/835524

Altitude zone: Lowland

Slope: 8-15° C
16-20° D

Lithology: Brook Street Volcanics and calcareous rich Wakatipu Suite sediments

Soils: Brown granular loams and clays, e.g. 77cH Atawhai Hill, lowland yellow-brown earth soils, eg. 42H Ketu Hill

Erosion: *Present:* Slight to moderate soil slip, moderate rill erosion when cultivated
Potential: Slight to moderate soil slip

Vegetation: Improved and semi-improved pasture, manuka and cassinia scrub

Land use: *Present:* Semi-intensive grazing, undeveloped land
Potential: Intensive grazing, fodder cropping, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 4 - Top farmer 6 - Attainable physical potential 10
P. radiata Site Index	- 26-30 m

Soil conservation management: Contour cultivation

Comments: Limited areas.

LUC Unit: 4s1

LUC Suite: L4

Description: Flat to undulating floodplains, low terraces and fans with shallow (15-30 cm) and stony silt loam textured recent soils in mild, moderate rainfall areas.

Typical location: Pelorus River floodplain

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury and Wakatipu Suite alluvium

Soils: Recent soils, e.g. 98b Ronga

Erosion: *Present:* Slight to moderate streambank and deposition
Potential: Slight to moderate streambank and deposition

Vegetation: Improved and semi-improved pasture, gorse and manuka scrub

Land use: *Present:* Semi-intensive grazing, undeveloped land
Potential: Intensive grazing, occasional cropping, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 10 - Attainable physical potential 16
P. radiata Site Index	- 28-32 m

Soil conservation management: Streambank protection, channel control

Comments: Summer rainfall and degree of stoniness limits some crops.

LUC Unit: 4s2

LUC Suite: L4

Description: Flat to undulating floodplains with shallow (15-30 cm) and stony silt loam textured recent soils in cool, moderate rainfall areas.

Typical location: O32/510545

Altitude zone: Lowland to Lower Montane

Slope: 0-3° A

Lithology: Canterbury Suite alluvium

Soils: Recent soils, e.g. 98d Waimangarara

Erosion:
Present: Negligible to slight wind and streambank
Potential: Negligible to slight wind and streambank

Vegetation: Improved and semi-improved pasture, fodder and cereal crops, matagouri, manuka and gorse

Land use:
Present: Intensive grazing, fodder cropping, cereal cropping
Potential: Intensive grazing, occasional cropping, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 5 - Top farmer 7 - Attainable physical potential 12
P. radiata Site Index	- 26 m

Soil conservation management: Streambank protection, windbreaks

Comments:

LUC Unit: 4s3

LUC Suite: L2

Description: Flat to undulating floodplains, low terraces and fans with shallow (15-30 cm) and stony silt loam to sandy loam textured recent soils in low to moderate rainfall areas, with a marked summer moisture deficit.

Typical location: O28/610640

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium

Soils: Recent soils, e.g. 95, 95a Waimakariri

Erosion: *Present:* Slight wind and streambank
Potential: Slight wind and streambank, slight to moderate wind when cultivated

Vegetation: Improved and semi-improved pasture, fodder crops, short tussock grassland, matagouri scrub

Land use: *Present:* Semi-intensive grazing, fodder cropping, cereal cropping
Potential: Intensive grazing, occasional cropping, viticulture

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 10 - Attainable physical potential 14 (21 irr)
P. radiata Site Index	- 18-20 m

Soil conservation management: Windbreaks, minimum tillage techniques

Comments: Some surface flooding and deposition, irrigation necessary for acceptable crop yields.

LUC Unit: 4s4

LUC Suite: L4

Description: Flat to undulating terraces and fans with shallow (15-30 cm) and/or stony, silt loam textured yellow-grey to yellow-brown earth intergrade soils in moderate rainfall areas.

Typical location: O28/410540

Altitude zone: Lowland to lower montane

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium with variable loess

Soils: Yellow-grey to yellow-brown earth intergrade soils, e.g. 27e Hororata

Erosion:
Present: Negligible to slight wind, slight to moderate streambank
Potential: Slight to moderate wind when cultivated, slight to moderate streambank

Vegetation: Improved and semi-improved pasture, fodder crops, exotic forest, scrub.

Land use:
Present: Intensive grazing, fodder cropping, production forestry
Potential: Intensive grazing, occasional cropping, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 6 - Top farmer 10 - Attainable physical potential 15
P. radiata Site Index	- 24-26 m

Soil conservation management: Windbreaks, minimum tillage techniques, streambank protection.

Comments:

LUC Unit: 4s5

LUC Suite: L2

Description: Flat to undulating terraces and fans with shallow (15-30 cm) and/or stony silt loam textured yellow brown earth soils associated with yellow-grey earths, in low rainfall areas with a marked summer moisture deficit.

Typical location: P28/720590

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Canterbury Suite alluvium, loess in places

Soils: Yellow-brown shallow and stony soils associated with yellow-grey earths, e.g. 13c Renwick

Erosion: *Present:* Slight wind
Potential: Slight wind, moderate wind when cultivated

Vegetation: Improved and semi-improved pasture, fodder and cereal crops

Land use: *Present:* Intensive grazing, fodder and cereal cropping
Potential: Intensive grazing, occasional cropping, viticulture

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 10 - Attainable physical potential 15 (22 irr)
P. radiata Site Index	- 17-20 m

Soil conservation management: Windbreaks, minimum tillage techniques

Comments: Soils dry out more readily and are more susceptible to wind erosion than 4s3. Irrigation required for intensive use.

LUC Unit: 4s6

LUC Suite: L7

Description: Flat to gently sloping coastal lake and lagoon margins with moderate to strongly saline sandy loam to clay loam textured soils, in low rainfall summer moisture deficient areas.

Typical location: P28/965635

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Fine textured Canterbury Suite alluvium and eolian sand.

Soils: Saline gley recent soils, e.g. 92 Motukarara

Erosion:
Present: Negligible
Potential: Negligible to slight wind when cultivated

Vegetation: Semi-improved and improved pasture, salt tolerant vegetation

Land use:
Present: Semi-intensive grazing
Potential: Intensive grazing, occasional cropping

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 12 - Attainable physical potential 16
P. radiata Site Index	- 16-18 m

Soil conservation management: Desalination by irrigation and drainage, windbreaks

Comments: Soils are more saline than those of 3s4.

LUC Unit: 4s7

LUC Suite: L4

Description: Flat to undulating terraces and fans with shallow (15-30 cm) and/or stony silt loam textured lowland yellow-brown earth soils in mild, moderate rainfall areas.

Typical location: Upper Pelorus River valley

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury and Wakatipu Suite alluvium

Soils: Lowland yellow-brown earth soils, e.g. Rai 34, Kaituna 34a, Manoroa 34c, Koromiko 34e

Erosion: *Present:* Slight to negligible streambank
Potential: Slight to negligible streambank

Vegetation: Improved and semi-improved pasture, scrub

Land use: *Present:* Semi-intensive grazing, undeveloped land
Potential: Intensive grazing, occasional cropping, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 10 - Attainable physical potential 15
P. radiata Site Index	- 28-32 m

Soil conservation management: Streambank protection, channel control

Comments:

LUC Unit: 4s8

LUC Suite: L8

Description: Flat to undulating coastal sand flats, sand dunes and old gravel beach ridges with low fertility excessively drained, weakly structured soils with low soil water holding capacities in low to moderate rainfall areas.

Typical location: P28/960760

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Eolian sand and alluvium from Canterbury Suite rocks

Soils: Yellow-brown sand soils, e.g. 68c Tahunanui, 68b Taumutu

Erosion: *Present:* Negligible to slight wind
Potential: Slight to moderate wind when cultivated

Vegetation: Improved and semi-improved pasture, fodder crops, sand dune vegetation

Land use: *Present:* Grazing, fodder cropping, undeveloped land
Potential: Intensive grazing, occasional cropping, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 10 - Attainable physical potential 14
P. radiata Site Index	- 20-23 m

Soil conservation management: Windbreaks, minimum tillage techniques

Comments: Growth rates affected by degree of coastal exposure.

LUC Unit: 4s9

LUC Suite: H3

Description: Flat to rolling terraces and moraine with moderately shallow to shallow, (15-45 cm) stony, low fertility silt loam textured soils in moderate rainfall high country areas.

Typical locations: N29/075378, 029/575220

Altitude zone: Lower montane

Slope:
0-3° A
4-7° B
8-15° C

Lithology: Canterbury Suite alluvium and glacial till with a variable loess mantle

Soils: Upland and high country yellow-brown earth soils,
e.g. 52 Craigieburn

Erosion:
Present: Negligible to slight wind and sheet
Potential: Moderate wind and sheet when cultivated

Vegetation: Semi-improved pasture, short tussock grassland with matagouri scrub

Land use:
Present: Grazing
Potential: Grazing, occasional cropping, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 3 - Top farmer 4 - Attainable physical potential 7
P. radiata Site Index	- 23-25 m

Soil conservation management: Windbreaks, minimum tillage techniques

Comments: Frost tolerant species are more appropriate.

LUC Unit: 4s10

LUC Suite: H3

Description: Floodplains and recent fans with moderately shallow to shallow (15-45 cm) and stony silt loam to sandy loam textured recent soils in cool, low to high rainfall inland areas.

Typical location: N29/079370

Altitude zone: Montane

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium

Soils: Recent soils, e.g. 99 Tasman

Erosion: *Present:* Negligible to slight wind and sheet
Potential: Moderate wind and sheet when cultivated

Vegetation: Semi-improved pasture, short tussock grassland with matagouri scrub, and sweet brier

Land use: *Present:* Grazing
Potential: Grazing, occasional cropping, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 3 - Top farmer 5 - Attainable physical potential 7
P. radiata Site Index	- 22-24 m

Soil conservation management: Windbreaks, minimum tillage techniques, channel control

Comments: More frost/snow tolerant species than *P. radiata* have 'good' growth rates.

LUC Unit: 4w1

LUC Suite: L7

Description: Floodplains and sound-head deltas with high, often saline water tables in mild, moderate rainfall areas with clay loam to silt loam textured soils.

Typical location: P27/745903

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Fine grained Canterbury and Wakatipu Suite alluvium, some peat

Soils: Saline gley recent soils, e.g. 92 Motukarara

Erosion:
Present: Negligible, flooding and deposition
Potential: Negligible, flooding and deposition

Vegetation: Semi-improved pasture, salt tolerant vegetation

Land use:
Present: Semi-intensive grazing
Potential: Intensive grazing, occasional cropping

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 5 - Top farmer 8 - Attainable physical potential 13
P. radiata Site Index	- US, 16-18 m with drainage

Soil conservation management: Flood protection and drainage

Comments:

LUC Unit: 4w2

LUC Suite: L6

Description: Low lying floodplains and terraces with impeded drainage and moderately high water tables in cut off valleys behind major river levee systems. Soil depth to low chroma colours, gleying or mottling is less than 45 cm, in moderate rainfall areas.

Typical location: North bank between SH 6 and SH 1 bridges, e.g. P28/866736, area too small to depict at 1:50 000 scale

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Fine grained alluvium from Canterbury and Wakatipu Suite rocks

Soils: Lowland yellow-brown earth soils, e.g. 34a Kaituna, 34e Koromiko

Erosion:
Present: Negligible to slight streambank and deposition
Potential: Negligible to slight streambank and deposition

Vegetation: Semi-improved pasture, rushes

Land use:
Present: Semi-intensive grazing
Potential: Intensive grazing, occasional cropping

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 5 - Top farmer 9 - Attainable physical potential 12
P. radiata Site Index	- US, up to 24 m with drainage

Soil conservation management: Drainage

Comments: Drainage is difficult as areas are depressions. Unsuitable site index estimate applies to poorly drained sites, trees may survive but be very unthrifty.

LUC Unit: 4w3

LUC Suite: L5

Description: Flat to undulating floodplains and low terraces with predominantly sandy loam to clay loam textured recent soils where the depth to low chroma colours, gleying or mottling is less than 45 cm. Moderately high, or seasonally high water table at, or within less than, 45 cm, in low to moderate rainfall areas.

Typical location: O28/697637

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Fine textured Canterbury Suite alluvium

Soils: Gley recent soils, e.g. 90 Taitapu
Gley soils, e.g. 89 Temuka

Erosion: *Present:* Negligible to slight streambank
Potential: Negligible to slight streambank

Vegetation: Improved and semi-improved pasture, rushes and sedges

Land use: *Present:* Semi-intensive grazing
Potential: Intensive grazing, occasional cropping

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 8
	-	Top farmer 14
	-	Attainable physical potential 17
P. radiata Site Index	-	24-26 m

Soil conservation management: Drainage, flood protection

Comments:

LUC Unit: 4w4

LUC Suite: H4

Description: Montane valley floor wetlands with gley recent soils where the depth to low chroma colours, gleying or mottling is less than 45 cm. Moderately high, or seasonally high water table at or within less than 45 cm in low to high rainfall inland areas.

Typical location: O29/615250

Altitude zone: Montane

Slope: 0-3° A

Lithology: Fine textured Canterbury Suite alluvium

Soils: Gley recent soils, e.g. 90d Dobson

Erosion:
Present: Negligible, slight streambank and/or deposition
Potential: Slight to moderate wind and streambank

Vegetation: Improved and semi-improved pasture, rushes and sedges

Land use:
Present: Semi-intensive grazing
Potential: Intensive grazing, occasional cropping

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 4 - Top farmer 6 - Attainable physical potential 9
P. radiata Site Index	- US

Soil conservation management: Drainage, flood protection

Comments: Limited areas.

Table 9: Summary criteria for land use capability class five

CLASS	Rainfall (mm)	Altitude	Soils	APP	S.I(m)	NZLRI
5s1	Mod (800-1600)	Lowland	R (98d, 95a)	17	22-26	pt. 5s3
5s2	Mod (800-1000)	Lowland	lybe (34d)	17	24-26	pt. 5s3
5s3	Mod to High (800-2000)	Montane	R (99)	6	20-24	5s5
5s4	Low (625-750)	Lowland	Saline gR (92)	13	US	5s6
5w1	Mod (625-750)	Lowland	gR (90)	10	US	5w1

Land use capability class five

LUC Unit: 5s1

LUC Suite: L4

Description: Flat to gently rolling floodplains and fans with recent silt loam to sandy loam textured soils. Too bouldery for cultivation, in mild, moderate rainfall lowland areas.

Typical location: O31/587718, P30/831958

Altitude zone: Lowland

Slope: 4-7° B
0-3° A

Lithology: Canterbury Suite alluvium

Soils: Recent soils, e.g. 98d Waimangarara, 95a Waimakariri

Erosion: *Present:* Slight to moderate deposition, and streambank
Potential: Moderate to severe deposition

Vegetation: Semi-improved and improved pasture, manuka scrub

Land use: *Present:* Grazing
Potential: Intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 11 - Attainable physical potential 17
P. radiata Site Index	- 22-26 m

Soil conservation management: Flood protection, channel control

Comments: Boulder size generally too large for standard agricultural stonepicking techniques.

LUC Unit: 5s2

LUC Suite: L4

Description: Flat to gently rolling fans and terraces with stony loam to silt loam textured lowland yellow-brown earth soils too bouldery for cultivation, in mild moderate rainfall lowland areas.

Typical locations: P31/715767, O31/680765

Altitude zone: Lowland

Slope: 4-7° B
0-3° A

Lithology: Canterbury Suite alluvium

Soils: Lowland yellow-brown earth soils, e.g. 34d Hapuku

Erosion: *Present:* Negligible to slight deposition
Potential: Negligible to slight deposition

Vegetation: Semi-improved and improved pasture, manuka scrub

Land use: *Present:* Grazing
Potential: Intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 7
	-	Top farmer 13
	-	Attainable physical potential 17
P. radiata Site Index	-	24-26 m

Soil conservation management: Flood protection, channel control

Comments: Boulder size generally too large for standard agricultural stone picking techniques.

LUC Unit: 5s3

LUC Suite: H3

Description: Flat to undulating montane floodplains and fans with shallow, bouldery, sandy loam to silt loam textured soils, in moderate to high rainfall areas.

Typical location: Not mapped at scale of this survey

Altitude zone: Montane

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium

Soils: Recent soils, e.g. 99 Tasman

Erosion: *Present:* Negligible to slight streambank
Potential: Negligible to slight streambank

Vegetation: Semi-improved pasture short tussock grassland with matagouri scrub, beech forest, manuka scrub

Land use: *Present:* Grazing, undeveloped land
Potential: Intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 4 - Top farmer 4 - Attainable physical potential 6
P. radiata Site Index	- 20-24 m

Soil conservation management: Flood protection, channel control

Comments: Frost tolerant tree species are more appropriate. Boulder size generally too large for standard agricultural stone picking techniques.

LUC Unit: 5s4

LUC Suite: L7

Description: Flat to gently sloping coastal lake and lagoon margins with strongly saline sandy loam to clay loam textured soils unsuitable for cropping, in low rainfall summer moisture deficient districts.

Typical location: P27/710923

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Fine textured Canterbury Suite alluvium and eolian sand

Soils: Saline gley recent soils, e.g. 92 Motukarara

Erosion:
Present: Negligible
Potential: Negligible to slight wind

Vegetation: Improved and semi-improved pasture, salt tolerant vegetation

Land use:
Present: Grazing, undeveloped land
Potential: Intensive grazing

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 5
	-	Top farmer 8
	-	Attainable physical potential 13
P. radiata Site Index	-	US

Soil conservation management: Drainage, windbreaks

Comments:

LUC Unit: 5w1

LUC Suite: L6

Description: Flat to undulating floodplains with high water tables at or within 45 cm of the surface, limited standing water, and sandy loam to clay loam textured soils, in mild, moderate rainfall areas.

Typical location: N29/290485

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium

Soils: Gley recent soils, e.g. 90 Taitapu

Erosion: *Present:* Negligible
Potential: Negligible

Vegetation: Improved and semi-improved pasture, rushes and sedges

Land use: *Present:* Intensive grazing, undeveloped land
Potential: Intensive grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 5 - Top farmer 5 - Attainable physical potential 10
P. radiata Site Index	- US

Soil conservation management: Drainage

Comments:

Table 10: Summary criteria for land use capability class six

CLASS	Rainfall (mm)	Altitude	Soils	APP	S.I(m)	NZLRI
6c1	Low (600-800)	Montane	uhcybe (50a)	6	16-18	pt 6c1
6c2	Mod (1000-1500)	Montane	uhcybe (53)	3	16-18	pt 6c1
6c3	Mod (1000-1500)	Lowland	lybe (41)	10	20-22	pt 6c2
6c4	Low to Mod (500-1000)	Montane	yge (17a, 24)	10	20-24	pt 6e14
6e1	Mod (1025-1525)	Lowland	bgl (77c)	14	26-30	pt. 6e5
6e2	Mod (1300)	Lowland-Montane	rend. (74a)	12	27-30	pt. 6e5
6e3	Mod (775-1275)	Lower Montane	bgl (77eH)	12	22-24	pt. 6e5
6e4	Low (575-750)	Lowland-Montane	rend.(71aH)	11	16-18	6e1
6e5	Mod (900-1300)	Lowland-Low Mont.	yg/yb(30dH, 30eH)	15	23-27	6e15
6e6	Mod (1000-1300)	Lowland - Low Mont.	yg/yb (31aH)	13	26-29	6e16
6e7	Mod (1000)	Lowland - Low Mont.	yg/yb (32aH)	12	28-30	pt. 6e21
6e8	Mod (700-1150)	Montane	lybe (41a)	10	24-28	pt. 6e11
6e9	Mod (1000-1500)	Lowland - Low Mont.	lybe (42,42a)	7	26-30	pt. 6e11
6e10	Mod (1000-1150)	Lowland - Low Mont.	lybe (41)	10	22-28	pt. 6e11
6e11	Mod to High (1300-2000)	Lowland - Low Mont.	lybe (47aH, b, c)	9	27-30	pt. 6e21
6e12	Low to Mod (650-900)	Montane	yge (24)	10	20-24	pt. 6e14
6e13	Low (500-650)	Montane	yge (17a)	9	20-22	pt. 6e14
6e14	Low (500-600)	Lowland - Low Mont.	yge (15dH)	10	20	6e13
6e15	Low to Mod (750-1000)	Lowland	yge (17b)	10	22-26	pt. 6e8
6e16	Low (500-650)	Lowland - Low Mont.	yge (16eH)	9	20-24	pt. 6e8
6e17	Mod (900-1400)	Montane	uhcybe (57aH, 57a)	3	22-26	pt. 6e29
6e18	High (1500-2500)	Lowland - Low Mont.	uhcpod.ybe (65c)	8	27-31	pt. 6e21
6e19	Low (500-750)	Montane	uhcybe (51)	3	<15	6e22
6e20	Mod (900-1525)	Montane	uhcybe (52, 53b, 53)	3	16-18	6e27
6e21	Low to Mod (650-1275)	Lowland	ybs (68b)	5	20-23	6e24
6e22	Low to Mod (500-900)	Montane	uhcybe (49a, 50a)	4	<15	6e26
6e23	Low (700-900)	Montane	yg/yb (30eH)	10	16-18	pt. 6e15

Table 10: Summary criteria for land use capability class six (continued)

CLASS	Rainfall (mm)	Altitude	Soils	APP	S.I(m)	NZLRI
6s1	Low to Mod (500-900)	Lowland	R (95a, 96c)	7	18-22	6s8
6s2	Low to Mod (510-2000)	Montane	R (99)	5	<15	6s11
6s3	Mod (900-1525)	Montane	uhcybe (52, 53, 53b)	15	15-24	6s12
6s4	Low (650-750)	Lowland	ybs (68b)	5	18-22	6s10
6s5	Low (500-900)	Montane	uhcybe (49a, 50a)	3	<15	6s7
6w1	Low to Mod (650-1000)	Lowland	Saline gR (92)	4	US	6w4
6w2	Low to Mod (650-1000)	Lowland	gR (90) Gley (89)	12	US	-
6w3	Mod to High (700-2000)	Montane	gR (90d)	5	US	-

Land use capability class six

LUC Unit: 6c1

LUC Suite: H1, H5

Description: Undulating to rolling stable terraces, fans and uplands below 1100 m asl, in low rainfall inland montane areas with a favourable sheltered aspect and silt loam to stony sandy loam textured medium fertility soils.

Typical locations: O30/320030, N30/290010

Altitude zone: Montane

Slope: 8-15° C
4-7° B

Lithology: Canterbury Suite alluvium and colluvium with localised loess

Soils: Upland and high country yellow brown earth soils, e.g. 50a Molesworth

Erosion:
Present: Slight to moderate wind and sheet
Potential: Slight to moderate wind and sheet

Vegetation: Short tussock and unimproved grassland with matagouri and sweet brier scrub. Limited semi-improved and improved pasture

Land use:
Present: Grazing
Potential: Grazing, woodlots and small plantation forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 1 - Top farmer 1 - Attainable physical potential 6
P. radiata Site Index	- 16-18 m

Soil conservation management: Oversowing and topdressing, maintenance of a complete vegetative cover to prevent frost induced sheet and wind erosion

Comments: Altitude makes cropping marginal; frost tolerant tree species are more appropriate.

LUC Unit: 6c2

LUC Suite: H6

Description: Undulating to rolling stable terraces, fans and uplands generally below 1100 m, in moderate rainfall inland montane areas, with silt loam textured low fertility soils.

Typical locations: N30/090995, N30/050905

Altitude zone: Montane

Slope: 8-15° C
4-7° B

Lithology: Canterbury Suite alluvium and colluvium with localised loess

Soils: Upland and high country yellow brown earth soils, e.g. 53 Cass, 53b Katrine

Erosion: *Present:* Slight to moderate wind and sheet
Potential: Slight to moderate wind and sheet

Vegetation: Short tussock grassland with matagouri scrub

Land use: *Present:* Grazing
Potential: Grazing, woodlots and small plantation forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .5 - Top farmer .5 - Attainable physical potential 3
P. radiata Site Index	- 16-18 m

Soil conservation management: Maintenance of a complete vegetative cover to prevent frost-induced sheet and wind erosion

Comments: Altitude makes cropping marginal, frost tolerant tree species are more appropriate. Higher rainfall and more leached, poorer fertility soils than 6cl. Unit mapped up to 1200 m on Molesworth.

LUC Unit: 6c3

LUC Suite: L12

Description: Undulating to strongly rolling coastal spurs and ridge crests exposed to strong salt laden winds which preclude cropping and retard pasture growth, in mild moderate rainfall areas.

Typical location: Q26/199206

Altitude zone: Lowland

Slope: 8-15° C
4-7° B

Lithology: Colluvium from Canterbury Suite schistose and sedimentary rocks

Soils: Lowland yellow brown earths, rolling phases in 41 Arapawa steepland

Erosion: *Present:* Slight wind and sheet
Potential: Moderate wind and sheet

Vegetation: Semi improved pasture, manuka, native and introduced scrub

Land use: *Present:* Grazing, undeveloped and reverted scrubland
Potential: Grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 3 - Top farmer 4 - Attainable physical potential 10
P. radiata Site Index	- 20-22 m

Soil conservation management: Windbreaks

Comments: Growth rates affected by degree of coastal exposure.

LUC Unit: 6c4

LUC Suite: L15

Description: Strongly rolling to moderately steep, stable hill country developed on strongly indurated sedimentary rocks with shallow, medium to high natural fertility soils, in low to moderate rainfall areas with a marked or moderate summer moisture deficit.

Typical location: O28/485545

Altitude zone: Lowland to Montane

Slope: 21-25° E
16-20° D
26-35° F

Lithology: Canterbury Suite bedrock and colluvium with loess in places

Soils: Yellow-grey earth soils (subhygrous), e.g. 17a Weld steepland, (dry-hygrous), e.g. 24 Haldon steepland.

Erosion: *Present:* Slight sheet and soil slip
Potential: Slight sheet and soil slip

Vegetation: Short tussock grassland with bracken fern and matagouri scrub, semi-improved pasture

Land use: *Present:* Grazing
Potential: Semi-intensive grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 3 - Top farmer 5 - Attainable physical potential 10
P. radiata Site Index	- 20-24 m

Soil conservation management: Conservation fencing, oversowing and topdressing

Comments: Similar to 6e12 and 6e13 but on easier slopes. Shallow profiles restrict soil water storage and enhance summer moisture deficit.

LUC Unit: 6e1

LUC Suite: L19

Description: Strongly rolling to steep hill country developed on extrusive igneous rocks with medium fertility brown granular loams and clay soils in mild, moderate rainfall areas.

Typical location: P25/813490

Altitude zone: Lowland

Slope: 26-35° F
21-25° E
16-20° D

Lithology: Basaltic igneous rocks, tuff and associated tuffaceous sediments [Brook Street Volcanics, Croisilles Volcanics]

Soils: Brown granular loams and clay soils, e.g. 77c Atawhai steepland

Erosion: *Present:* Slight to moderate soil slip and sheet
Potential: Slight to moderate soil slip and sheet

Vegetation: Improved and semi-improved pasture, manuka and mixed native scrub, broadleaf-podocarp forest

Land use: *Present:* Extensive grazing, reverted land, indigenous forest
Potential: Grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 6 - Top farmer 10 - Attainable physical potential 14
P. radiata Site Index	- 26-30 m

Soil conservation management: Space planting

Comments: Growth rates affected by degree of coastal exposure. Site index up to 32 m in sheltered sites.

LUC Unit: 6e2

LUC Suite: L19

Description: Strongly rolling to moderately steep limestone hill country with medium fertility well structured clay loam textured soils in moderate rainfall areas.

Typical locations: P29/870230, P29/930244

Altitude zone: Lowland to lower montane

Slope: 21-25° E
16-20° D
26-35° F

Lithology: Indurated limestone and calcareous sandstone

Soils: Rendzina and related soils, e.g. 74a Kaitoa steepland

Erosion: *Present:* Slight to moderate sheet and soil slip
Potential: Moderate sheet and soil slip

Vegetation: Semi-improved and improved pasture, short tussock grassland with matagouri, manuka and mixed native scrub

Land use: *Present:* Grazing
Potential: Grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 8 - Attainable physical potential 12
P. radiata Site Index	- 27-30 m

Soil conservation management: Space planting

Comments: Minor rock outcrop.

LUC Unit: 6e3

LUC Suite: L19, H9

Description: Strongly rolling to steep hill country developed on extrusive igneous rocks, with medium fertility brown granular loam and clay soils, in moderate to low rainfall areas with a marked summer moisture deficit.

Typical locations: O30/500165, O30/490145, P29/935245

Altitude zone: Lower Montane

Slope: 26-35° F
21-25° E
16-20° D

Lithology: Marine and terrestrial basaltic flows and associated sedimentary rocks [Gridiron Formation, Cookson Volcanics]

Soils: Brown granular loams and clay soils, e.g. 77eH Middlehurst hill

Erosion: *Present:* Slight to moderate sheet and soil slip
Potential: Slight to moderate sheet and soil slip

Vegetation: Short tussock grassland with matagouri and sweet brier, semi-improved and improved pasture

Land use: *Present:* Extensive grazing
Potential: Grazing, production forest

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 5
	-	Top farmer 5
	-	Attainable physical potential 12
P. radiata Site Index	-	22-24 m

Soil conservation management: Conservation fencing

Comments:

LUC Unit: 6e4

LUC Suite: L16

Description: Strongly rolling to moderately steep limestone hill country with medium to high fertility soils, in low rainfall areas with a marked summer moisture deficit.

Typical location: Q29/113395

Altitude zone: Lowland to lower montane

Slope: 21-25° E
16-20° D
26-35° F

Lithology: Indurated limestone, with some loess in places

Soils: Rendzina and related soils, e.g. 71aH Waikari hill

Erosion: *Present:* Slight sheet and soil slip
Potential: Slight to moderate sheet and soil slip, some 'scree'

Vegetation: Improved and semi-improved pasture, short tussock grassland with matagouri, manuka scrub

Land use: *Present:* Intensive and extensive grazing
Potential: Intensive grazing, woodlots and small plantation forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 3 - Top farmer 7 - Attainable physical potential 11
P. radiata Site Index	- 16-18 m

Soil conservation management: Conservation fencing

Comments: Unit includes steep escarpments, sheet erosion is more prevalent on sunny faces.

LUC Unit: 6e5

LUC Suite: L18

Description: Strongly rolling to moderately steep hill country developed on strongly indurated sedimentary rocks in moderate rainfall areas, with yellow grey to yellow brown intergrade soils.

Typical location: O28/375515

Altitude zone: Lowland to lower montane

Slope: 21-25° E
16-20° D

Lithology: Canterbury Suite bedrock and colluvium

Soils: Yellow-grey to yellow-brown earth intergrade soils, e.g. 30dH Kahutara hill, 30eH Kekerengu hill

Erosion: *Present:* Slight to moderate sheet and soil slip
Potential: Moderate sheet and soil slip

Vegetation: Semi-improved and improved pasture, short tussock grassland, manuka scrub, bracken fern, gorse, mixed native scrub

Land use: *Present:* Grazing, reverted land
Potential: Grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 7 - Top farmer 9 - Attainable physical potential 15
P. radiata Site Index	- 23-27 m

Soil conservation management: Conservation fencing, oversowing and topdressing, space planting

Comments: Scrub reversion is a problem. Trees show marked boron deficiency on Kahutara soils.

LUC Unit: 6e6

LUC Suite: L17

Description: Strongly rolling to moderately steep hill country, developed on weakly indurated conglomerates and associated sandstones, in moderate rainfall areas, with yellow grey to yellow brown intergrade soils.

Typical locations: P29/785380, P29/765340

Altitude zone: Lowland to lower montane

Slope: 21-25° E
16-20° D
26-35° F

Lithology: Weakly indurated conglomerate and sandstone

Soils: Yellow-grey to yellow-brown earth intergrade soils, e.g. 31aH Hundalee hill

Erosion:
Present: Slight to moderate sheet, gully, and soil slip
Potential: Moderate sheet, soil slip and gully

Vegetation: Semi-improved and improved pasture, gorse, bracken fern, manuka, mixed native scrub, and exotic forest

Land use:
Present: Grazing, reverted and undeveloped land, production forestry
Potential: Grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 5 - Top farmer 7 - Attainable physical potential 13
P. radiata Site Index	- 26-29 m

Soil conservation management: Conservation fencing, oversowing and topdressing, gully protection works

Comments: Scrub reversion is a problem.

LUC Unit: 6e7

LUC Suite: L18

Description: Strongly rolling to steep hill country developed on strongly indurated schistose and sedimentary rocks, in mild moderate rainfall areas, with low to very low natural fertility, yellow grey to yellow brown earth intergrade soils, with a potential for moderate to severe sheet and soil slip erosion.

Typical locations: P28/855745, O28/330535, P28/915755

Altitude zone: Lowland to lower montane

Slope: 21-25° E
16-20° D
26-35° F

Lithology: Canterbury Suite sedimentary and schistose bedrock, colluvium, and some loess, deeply weathered in places

Soils: Yellow-grey to yellow-brown earth intergrade soils, e.g. 32aH Tuamarina hill

Erosion: *Present:* Slight to moderate sheet and soil slip
Potential: Moderate to severe sheet and soil slip

Vegetation: Semi-improved pasture, bracken fern, manuka, gorse and mixed native scrub, podocarp-beech-hardwood forest, exotic forest

Land use: *Present:* Grazing, indigenous forest, reverted land, production forestry
Potential: Production forestry, grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 4 - Top farmer 7 - Attainable physical potential 12
P. radiata Site Index	- 28-30 m

Soil conservation management: Oversowing and topdressing, conservation fencing, care with siting of forestry tracks and loading pads

Comments: Scrub reversion is a problem, imperfectly drained heavy subsoils accentuate surface erosion hazard. Site index close to 32 m on more favourable sites.

LUC Unit: 6e8

LUC Suite: L18

Description: Strongly rolling to steep hill country developed on strongly indurated sedimentary rocks with lowland yellow brown earth soils, in moderate rainfall areas with a slight summer dry season.

Typical locations: O29/495400, P29/780470

Altitude zone: Montane

Slope: 26-35° F
21-25° E

Lithology: Canterbury Suite bedrock and colluvium, some loess in places

Soils: Lowland yellow brown earth soils, e.g. 41a Hununui steepland (and hill)

Erosion: *Present:* Slight to moderate sheet and soil slip
Potential: Moderate sheet, soil slip and scree

Vegetation: Short tussock grassland, semi-improved and improved pasture, bracken fern, matagouri and manuka scrub

Land use: *Present:* Grazing, reverted land, beech and production forest
Potential: Grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 3 - Top farmer 5 - Attainable physical potential 10
P. radiata Site Index	- 24-28 m

Soil conservation management: Conservation fencing, oversowing and topdressing

Comments: Scrub reversion is a problem.

LUC Unit: 6e9

LUC Suite: L18

Description: Moderately steep to steep hill country developed on strongly indurated sedimentary and schistose rocks, in mild, moderate rainfall areas, with lowland yellow brown earth soils.

Typical location: Q27/258080

Altitude zone: Lowland to lower montane

Slope: 26-35° F
21-25° E

Lithology: Colluvium from Canterbury and Wakatipu Suite sedimentary and metamorphosed rocks, deeply weathered in places

Soils: Lowland yellow-brown earth soils, e.g. 42 Ketu steepland, 42a Anakoha steepland

Erosion: *Present:* Slight to moderate soil slip and sheet
Potential: Moderate sheet, soil slip and scree

Vegetation: Semi-improved pasture, bracken fern, gorse, mixed native scrub, exotic forest, hardwood forest

Land use: *Present:* Reverted land, grazing, exotic forestry, indigenous forest
Potential: Production forest, grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 2 - Top farmer 4 - Attainable physical potential 7
P. radiata Site Index	- 26-30 m

Soil conservation management: Conservation fencing, oversowing and topdressing, careful siting and maintenance of forest tracks and loading pads; leave buffer strip along water channels

Comments: Scrub reversion is a continuing problem. Growth rates affected by degree of coastal exposure.

LUC Unit: 6e10

LUC Suite: L18

Description: Moderately steep to steep hill country developed on strongly indurated schistose and sedimentary rocks, with lowland yellow brown earth soils in exposed coastal areas. A moderate rainfall and summer moisture deficit.

Typical location: Q27/175995

Altitude zone: Lowland to lower montane

Slope: 26-35° F
21-25° E

Lithology: Colluvium from Canterbury Suite schistose and sedimentary rocks, deeply weathered in places

Soils: Lowland yellow-brown earth soils, e.g. 41 Arapawa steepland

Erosion: *Present:* Slight to moderate sheet and soil slip
Potential: Moderate sheet, soil slip and scree

Vegetation: Semi-improved pasture, bracken fern, gorse, mixed native scrub, exotic forest, hardwood forest

Land use: *Present:* Reverted land, grazing, exotic forestry, indigenous forest
Potential: Production forestry, grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 2 - Top farmer 4 - Attainable physical potential 7
P. radiata Site Index	- 22-28 m

Soil conservation management: Conservation fencing, oversowing and topdressing, careful siting of forest tracks and loading pads, with appropriate maintenance; leave buffer strip along water channels

Comments: Scrub reversion is rapid. Coastal exposure severe in places.

LUC Unit: 6e11

LUC Suite: L18

Description: Strongly rolling to steep hill country developed on strongly indurated sedimentary and schistose rocks in mild moderate to high rainfall areas. Low fertility lowland yellow-brown earth soils with a potential for moderate to severe sheet and soil slip erosion.

Typical locations: P28/810765, O28/518632

Altitude zone: Lowland to lower montane

Slope: 21-25° E
26-35° F

Lithology: Canterbury and Wakatipu Suite sedimentary and schistose bedrock and colluvium

Soils: Lowland yellow-brown earth soils, e.g. 47aH Kenepuru hill, 47b Opouri steepland, 47c Onamalutu steepland

Erosion: *Present:* Slight to moderate sheet and soil slip
Potential: Moderate to severe sheet and soil slip

Vegetation: Podocarp-beech hardwood forest, exotic forest, bracken fern, mixed native scrub, gorse and manuka, semi-improved pasture

Land use: *Present:* Indigenous forest, reverted land, grazing, production forestry
Potential: Production forestry, grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 3 - Top farmer 5 - Attainable physical potential 9
P. radiata Site Index	- 27-30 m

Soil conservation management: Conservation fencing, oversowing and topdressing, careful siting of forest tracks and loading pads, with appropriate maintenance; leave buffer strip along water channels

Comments: Scrub reversion a problem.

LUC Unit: 6e12

LUC Suite: L15

Description: Strongly rolling to steep hill country developed on strongly indurated sedimentary rocks. Yellow grey earth soils in low to moderate rainfall areas, with a moderate summer moisture deficit.

Typical locations: P28/905532, P29/890495

Altitude zone: Montane

Slope: 26-35° F
21-25° E
16-20° D

Lithology: Canterbury Suite bedrock and colluvium with loess in places

Soils: Yellow-grey earth soils, (dry-hygrous), e.g. 24 Haldon steepland

Erosion: *Present:* Slight to moderate sheet and soil slip
Potential: Moderate sheet and soil slip

Vegetation: Short tussock grassland with matagouri scrub and bracken fern, semi-improved pasture

Land use: *Present:* Grazing
Potential: Grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 2 - Top farmer 5 - Attainable physical potential 10
P. radiata Site Index	- 20-24 m

Soil conservation management: Conservation fencing, oversowing and topdressing

Comments: Terrain is wetter than 6e13 and drier than 6e8.

LUC Unit: 6e13

LUC Suite: L15

Description: Strongly rolling to steep hill country developed on strongly indurated sedimentary rocks. Yellow grey earth soils in low rainfall areas with a marked summer moisture deficit.

Typical locations: P28/925565, P29/085370

Altitude zone: Montane

Slope:
26-35° F
21-25° E
16-20° D

Lithology: Canterbury Suite bedrock and colluvium with pockets of loess

Soils: Yellow-grey earth soils (subhygrous), e.g. 17a Weld steepland

Erosion:
Present: Slight to moderate sheet and soil slip
Potential: Moderate sheet and soil slip

Vegetation: Short tussock grassland with bracken fern and matagouri scrub, semi-improved pasture

Land use:
Present: Grazing
Potential: Grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 2 - Top farmer 5 - Attainable physical potential 9
P. radiata Site Index	- 20-22 m

Soil conservation management: Conservation fencing, oversowing and topdressing

Comments: Terrain similar to 6e12 but drier, some tunnel gully erosion occurs within the loess. Southerly aspects have higher site index.

LUC Unit: 6e14

LUC Suite: L14

Description: Strongly rolling to moderately steep, deep loess (>1 m) mantled hill slopes with yellow grey earth soils susceptible to tunnel gully erosion, developed on weakly indurated rocks. Low rainfall areas with a marked summer moisture deficit.

Typical location: P28/860610

Altitude zone: Lowland to lower montane

Slope: 21-25° E
16-20° D
26-35° F

Lithology: Loess and loess colluvium over weakly indurated conglomerate, sandstone and mudstone

Soils: Yellow-grey earth soils, e.g. 15dH Wither hill

Erosion: *Present:* Slight to moderate tunnel gully, sheet and soil slip
Potential: Moderate tunnel gully and sheet, slight soil slip

Vegetation: Semi-improved and improved pasture, short tussock grassland with matagouri, gorse and manuka scrub

Land use: *Present:* Grazing
Potential: Grazing, erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 4 - Top farmer 5 - Attainable physical potential 10
P. radiata Site Index	- 20 m

Soil conservation management: Conservation fencing, oversowing and topdressing, tunnel gully dozing and recontouring, although the long term persistence of such measures is unknown

Comments: Encourage cattle grazing and introduction of drought tolerant legumes and shrubs.

LUC Unit: 6e15

LUC Suite: L14

Description: Strongly rolling to steep hill country developed on weakly indurated conglomerate with yellow grey earth soils in low to moderate rainfall areas with a marked summer rainfall deficit.

Typical locations: P28/025600, O28/680620

Altitude zone: Lowland

Slope: 21-25° E
16-20° D
26-35° F

Lithology: Weakly indurated conglomerate with loess in places

Soils: Yellow-grey earth soils, e.g. 17b Waihopai steepland

Erosion: *Present:* Slight to moderate sheet, and soil slip, moderate gully
Potential: Moderate sheet, and soil slip, moderate gully

Vegetation: Short tussock grassland with manuka scrub, semi-improved pasture

Land use: *Present:* Grazing
Potential: Grazing, erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 4 - Top farmer 7 - Attainable physical potential 10
P. radiata Site Index	- 20-26 m

Soil conservation management: Oversowing and topdressing eroded areas, block plant gullies

Comments: Site index near top of range on southerly aspects.

LUC Unit: 6e16

LUC Suite: L14

Description: Strongly rolling to moderately steep loessial hill country developed on weakly indurated rocks in low rainfall areas with a marked summer moisture deficit.

Typical locations: P29/836400, P29/805355

Altitude zone: Lowland to lower montane

Slope: 21-25° E
16-20° D

Lithology: Weakly indurated mudstone, sandstone and conglomerate, with loess, significant in places

Soils: Yellow-grey earth soils, e.g. 16eH Flaxbourne hill

Erosion: *Present:* Slight to moderate sheet, soil slip and tunnel gully
Potential: Moderate sheet, soil slip, and tunnel gully

Vegetation: Improved and semi-improved pasture, short tussock grassland with matagouri, gorse and manuka scrub

Land use: *Present:* Grazing, reverted land
Potential: Grazing, woodlots and small plantation forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 4 - Top farmer 6 - Attainable physical potential 9
P. radiata Site Index	- 20-24 m

Soil conservation management: Oversowing and topdressing of eroded areas

Comments: Ephemeral water courses rapidly incise.

LUC Unit: 6e17

LUC Suite: H10

Description: Strongly rolling to steep lower hill slopes developed on strongly indurated sedimentary rocks with low fertility upland and high country yellow brown earth soils in moderate rainfall inland areas.

Typical locations: O29/427380, O29/340240, O29/570240

Altitude zone: Montane

Slope: 26-35° F
21-25° E
16-20° D

Lithology: Canterbury Suite bedrock and colluvium, loess in places

Soils: Upland, and high country yellow brown earth soils, e.g. 57aH Tekoa hill, 57a Tekoa steepland

Erosion: *Present:* Slight to moderate sheet, soil slip, wind and gully
Potential: Moderate sheet, soil slip, wind and gully

Vegetation: Short tussock grassland with matagouri, bracken fern and manuka scrub, semi-improved pasture, beech forest

Land use: *Present:* Extensive grazing, indigenous forest
Potential: Grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 0.5 - Top farmer 1 - Attainable physical potential 3
P. radiata Site Index	- 22-26 m

Soil conservation management: Conservation fencing, oversowing and topdressing

Comments: Unit mapped up to 1200 m on Molesworth.

LUC Unit: 6e18

LUC Suite: L20

Description: Strongly rolling to steep hill country developed on strongly indurated sedimentary and schistose rocks, in mild, high rainfall areas with low fertility podzolised yellow-brown earth soils.

Typical location: 027/522925

Altitude zone: Lowland to lower montane

Slope: 21-25° E
26-35° F

Lithology: Wakatipu Suite volcaniclastic sedimentary bedrock and colluvium

Soils: Upland and high country podzolised yellow-brown earth soils, e.g. 65c Pelorus steepland

Erosion: *Present:* Slight to moderate sheet and soil slip
Potential: Moderate to severe sheet and soil slip

Vegetation: Podocarp-beech-hardwood forest, exotic forest, bracken fern, gorse and mixed native scrub, semi-improved pasture

Land use: *Present:* Indigenous forest, reverted land, exotic forestry, grazing
Potential: Production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 3 - Top farmer 4 - Attainable physical potential 8
P. radiata Site Index	- 27-31 m

Soil conservation management: Forest roads and loading pads need careful siting and maintenance, leave buffer strips along water channels

Comments:

LUC Unit: 6e19

LUC Suite: H8

Description: Moderately steep to steep hill country developed on strongly indurated sedimentary rocks, including colluvial foot slopes, in low rainfall inland areas with a marked summer moisture deficit.

Typical locations: O30/420090, O30/365050, N30/270040

Altitude zone: Montane

Slope: 26-35° F
21-25° E

Lithology: Canterbury Suite bedrock and colluvium, thin loess in places

Soils: Upland and high country yellow brown earth soils, e.g. 51 Muller steepland

Erosion: *Present:* Slight to moderate sheet, scree, wind and gully
Potential: Moderate sheet, scree, wind and gully

Vegetation: Short tussock and unimproved grassland with matagouri and sweet brier scrub, bracken fern, semi-improved pasture, and hieracium

Land use: *Present:* Grazing
Potential: Grazing, erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .4 - Top farmer .4 - Attainable physical potential 3
P. radiata Site Index	- <15 m

Soil conservation management: Conservation fencing, oversowing and topdressing, gully control

Comments: Frost tolerant tree species are more appropriate.

LUC Unit: 6e20

LUC Suite: H6

Description: Rolling to strongly rolling terraces, fans and moraines with loess mantled silt loam to sandy loam textured soils susceptible to wind erosion in moderate rainfall inland areas.

Typical location: N30/045975

Altitude zone: Montane

Slope: 8-15° C
4-7° B
16-20° D

Lithology: Canterbury Suite alluvium and glacial till with a variable loess mantle

Soils: Upland and high country yellow-brown earth soils, e.g. 53 Cass, 53b Katrine, 52 Craigieburn

Erosion: *Present:* Slight to moderate sheet and wind
Potential: Moderate sheet and wind

Vegetation: Short tussock grassland with matagouri and sweet brier, semi-improved pasture, beech forest

Land use: *Present:* Grazing, indigenous forest
Potential: Grazing, woodlots and small plantation forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 2 - Top farmer 2 - Attainable physical potential 3
P. radiata Site Index	- 16-18 m

Soil conservation management: Windbreaks, oversowing and topdressing

Comments: Short summer growing season. Frost/snow hardy tree species are more appropriate. Unit mapped to 1200 m on Molesworth.

LUC Unit: 6e21

LUC Suite: L8

Description: Undulating to rolling coastal sand dunes, sand flats, and old gravel beach ridges, with excessively drained soils susceptible to wind erosion. Low to moderate rainfall areas.

Typical location: P30/990170

Altitude zone: Lowland

Slope: 4-7° B
8-15° C
16-20° D

Lithology: Canterbury Suite eolian sands and gravels

Soils: Yellow-brown sand soils, e.g. 68b Taumutu

Erosion: *Present:* Slight to moderate wind
Potential: Moderate wind

Vegetation: Sand dune vegetation, semi-improved pasture, exotic forest

Land use: *Present:* Grazing, production forestry
Potential: Grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 3
	-	Top farmer 3
	-	Attainable physical potential 5
P. radiata Site Index	-	20-23 m

Soil conservation management: Maintenance of a complete vegetative cover is desirable

Comments: Growth rates affected by degree of coast exposure.

LUC Unit: 6e22

LUC Suite: H1, H5

Description: Undulating to rolling terraces and fans with shallow (15-30 cm) loess mantled soils susceptible to wind erosion. Low to moderate rainfall inland areas.

Typical locations: N30/230015, O30/400070

Altitude zone: Montane

Slope: 4-7° B
8-15° C

Lithology: Canterbury Suite alluvium with loess

Soils: Upland and high country yellow brown earths, e.g. 49a Acheron, 50a Molesworth

Erosion: *Present:* Slight to moderate wind
Potential: Moderate to severe wind

Vegetation: Short tussock and unimproved grassland with matagouri and sweet brier. Some semi-improved and improved pasture

Land use: *Present:* Grazing
Potential: Grazing, erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .3 - Top farmer .3 - Attainable physical potential 4
P. radiata Site Index	- <15 m

Soil conservation management: Windbreaks

Comments: Similar to 6c1 but erosion subclass. Frost tolerant tree species are more appropriate.

LUC Unit: 6e23

LUC Suite: H8

Description: Strongly rolling to steep hill country developed on moderately to strongly indurated sedimentary rocks in low to moderate rainfall inland areas with a moderate summer dry season.

Typical location: O30/545155

Altitude zone: Montane

Slope: 26-35° F
21-25° E
16-20° D

Lithology: Canterbury Suite, Cretaceous aged sandstones and conglomerates, with significant intrusive basaltic dykes

Soils: Yellow-grey to yellow brown earth intergrade soils, e.g. 30eH Kekerengu hill

Erosion: *Present:* Slight to moderate sheet, and gully, minor scree and soil slip
Potential: Moderate to severe sheet and gully

Vegetation: Short tussock and unimproved grassland with sweet brier and matagouri scrub, and extensive hieracium; semi-improved pasture

Land use: *Present:* Semi-intensive grazing
Potential: Grazing, semi-intensive grazing, erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 2 - Top farmer 5 - Attainable physical potential 10
P. radiata Site Index	- 16-18 m

Soil conservation management: Conservation fencing, oversowing and topdressing, scrub control

Comments: Hieracium infestation is extensive in middle Awatere, adjacent and within highly developed and managed country. The Kekerengu soil set mapped in the middle Awatere by NZSB (1968) and this survey lies outside its stated rainfall and elevation ranges. Such terrain and soil is identified by units 6e23 and 7e26.

LUC Unit: 6s1

LUC Suite: L2

Description: Flat to undulating floodplains, low terraces and fans with very shallow (<15 cm) and stony silt loam textured, recent soils in low to moderate rainfall areas, with a marked summer moisture deficit.

Typical location: P28/820720

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium

Soils: Recent soils, e.g. 95a Waimakariri shallow, 96c Eyre - Paparua

Erosion:
Present: Slight to moderate wind, streambank and deposition
Potential: Slight to moderate wind, streambank and deposition

Vegetation: Improved and semi-improved pasture, short tussock grassland, gorse, broom and exotic forest

Land use:
Present: Grazing, undeveloped land, production forestry
Potential: Grazing, production forestry, viticulture

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 4 - Top farmer 4 - Attainable physical potential 7 (14 irr)
P. radiata Site Index	- 18-22 m

Soil conservation management: Windbreaks, flood protection

Comments: Subject to periodic inundation during large floods.

LUC Unit: 6s2

LUC Suite: H3

Description: Flat to undulating floodplains, low terraces and fans with very shallow (<15 cm) and stony silt loam to sandy loam textured recent soils in low to moderate rainfall inland areas.

Typical locations: N30/055910, N29/105398, O30/355040

Altitude zone: Montane

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium

Soils: Recent soils, e.g. 99 Tasman

Erosion: *Present:* Slight to moderate wind, streambank and deposition
Potential: Slight to moderate wind, streambank and deposition

Vegetation: Short tussock and unimproved grassland with matagouri and sweet brier

Land use: *Present:* Grazing, indigenous forest
Potential: Grazing, woodlots and small plantation forestry

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 2
	-	Top farmer 3
	-	Attainable physical potential 5
P. radiata Site Index	-	<15 m

Soil conservation management: Streambank protection, windbreaks

Comments: Land above 950 m also has a major climatic limitation. Unit covers wide climatic range. Site index will be greater that 15 m in favourable areas. Frost tolerant tree species are more appropriate.

LUC Unit: 6s3

LUC Suite: H3

Description: Undulating to rolling terraces and fans with very shallow (<15 cm) and stony silt loam textured soils, in moderate rainfall inland areas.

Typical location: N30/055903

Altitude zone: Montane

Slope: 4-7° B
0-3° A
8-15° C

Lithology: Canterbury Suite alluvium, with loess in places

Soils: Upland and high country yellow-brown earth soils, e.g. 52 Craigieburn, 53 Cass, 53b Katrine

Erosion: *Present:* Slight to moderate wind, sheet and streambank
Potential: Slight to moderate wind, sheet and streambank

Vegetation: Beech forest, short tussock with matagouri, sweet brier, and manuka scrub, semi-improved pasture

Land use: *Present:* Indigenous forest, extensive grazing, undeveloped land
Potential: Grazing, woodlots and small plantation forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 2 - Top farmer 2 - Attainable physical potential 4
P. radiata Site Index	- 15-24 m

Soil conservation management: Oversowing and topdressing

Comments: Land above 950 m also has a major climatic limitation. Unit covers wide climatic range. Site index varies from 24 at Washbridge to <15 at Tarndale. Frost tolerant tree species more appropriate.

LUC Unit: 6s4

LUC Suite: L8

Description: Undulating to rolling sand flats, subdued sand dunes, and old gravel beach ridges with weakly developed, low fertility soils with low water holding capacity in low to moderate rainfall coastal areas.

Typical location: P28/960760

Altitude zone: Lowland

Slope: 4-7° B
0-3° A

Lithology: Canterbury Suite eolian sands, fine alluvium and gravel

Soils: Yellow brown sands and associated saline gley recents, e.g. 68c Tahunanui, 68b Taumutu; in the interdune hollows small areas of 92 Motukarara, 89 Temuka

Erosion: *Present:* Slight wind
Potential: Slight wind

Vegetation: Semi-improved and improved pasture, sand dune vegetation, exotic forest

Land use: *Present:* Grazing, undeveloped land, exotic forest
Potential: Grazing, woodlots and small plantation forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 2 - Top farmer 2 - Attainable physical potential 5
P. radiata Site Index	- 18-22 m

Soil conservation management: Windbreaks, maintenance of a complete vegetative cover

Comments: Growth rates affected by degree of coastal exposure.

LUC Unit: 6s5

LUC Suite: H1

Description: Flat to undulating terraces and fans with very shallow (<15 cm) and stony silt loam to sandy loam textured soils, in low rainfall inland areas.

Typical locations: N30/240025, N31/150685, N31/011608

Altitude zone: Montane

Slope:
0-3° A
4-7° B
8-15° C

Lithology: Canterbury Suite alluvium with thin loess, and shallow alluvium over bedrock

Soils: Upland and high country yellow brown earth soils, e.g. 49a Acheron, 50a Molesworth

Erosion:
Present: Slight to moderate wind
Potential: Slight to moderate wind

Vegetation: Short tussock grassland, unimproved and semi-improved pasture with sweet brier and matagouri scrub, and hieracium

Land use:
Present: Grazing
Potential: Grazing, woodlots and small plantation forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .5 - Top farmer .5 - Attainable physical potential 3
P. radiata Site Index	- <15 m

Soil conservation management: Windbreaks, maintenance of a complete vegetative cover

Comments: Land above 950 m also has a major climatic limitation. Frost tolerant tree species are more appropriate.

LUC Unit: 6w1

LUC Suite: L7

Description: Flat to gently sloping coastal lake and lagoon margins subject to high brackish or saline watertables in low to moderate rainfall areas, with clay loam to sandy loam textured soils.

Typical location: P28/980610

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Canterbury Suite alluvium

Soils: Saline gley recent soils, e.g. 92 Motukarara

Erosion: *Present:* Negligible
Potential: Negligible

Vegetation: Semi-improved pasture with rushes and sedges, salt tolerant vegetation

Land use: *Present:* Grazing, wetland
Potential: Grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 2 - Top farmer 2 - Attainable physical potential 4
P. radiata Site Index	- US

Soil conservation management: Drainage and desalination

Comments: Shelter trees able to be established on 'high' spots.

LUC Unit: 6w2

LUC Suite: L5, L6

Description: Flat to undulating floodplains and low terraces with predominantly sandy loam to clay loam textured recent soils and a moderately high, or seasonally high water table at or within less than 30 cm of the surface, in low to moderate rainfall areas, often close to sea level.

Typical location: P28/760650

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Fine textured Canterbury Suite alluvium, some minor peat

Soils: Gley recent soils, e.g. 90 Taitapu
Gley soils, e.g. 89 Temuka

Erosion:
Present: Negligible to slight streambank
Potential: Negligible to slight streambank

Vegetation: Improved and semi-improved pasture, rushes and sedges

Land use:
Present: Semi-intensive grazing
Potential: Intensive grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 4 - Top farmer 4 - Attainable physical potential 12
P. radiata Site Index	- US

Soil conservation management: Drainage, flood protection

Comments:

LUC Unit: 6w3

LUC Suite: H4

Description: Montane valley floor wetlands with Gley Recent soils where the depth to low chroma colours, gleying or mottling is less than 30 cm with a moderately high, or seasonably high water table at or within less than 30 cm of the surface, in low to high rainfall inland areas.

Typical location: O30/520185, mapped in association with 6s2 in this survey

Altitude zone: Montane

Slope: 0-3° A
4-7° B

Lithology: Alluvium from Canterbury Suite rocks, some minor peat

Soils: Gley recent soils, e.g. 90d Dobson

Erosion: *Present:* Negligible, slight deposition
Potential: Slight to moderate streambank and deposition

Vegetation: Wetland vegetation, short tussock grassland

Land use: *Present:* Extensive grazing, wetland
Potential: Semi-intensive grazing

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 2
	-	Top farmer 2
	-	Attainable physical potential 5
P. radiata Site Index	-	US

Soil conservation management: Drainage, flood protection

Comments: Limited areas.

Table 11: Summary criteria for land use capability class seven

CLASS	Rainfall (mm)	Altitude	Soils	APP	S.I(m)	NZLRI
7c1	Mod to High (650-2000)	Montane - Subalpine	uhcybe (53, 53b)	4	<15	pt 7c3
7c2	Mod (750-1200)	Subalpine	uhcybe (55b)	2	US	7c4
7c3	Low (650-750)	Montane - Subalpine	uhcybe (50a, 49a)	3	<15	pt 7c3
7e1	Mod (1000-1500)	Lowland-Low. Montane	bglc (77c)	3	25-28	pt. 7e1
7e2	Mod (750-1300)	Lower Montane	bglc (77e)	4	17-18	pt. 7e1
7e3	Mod (750-1250)	Lowland-Low. Montane	Rend. (74,74a)	8	19-24	pt. 7e8
7e4	Mod (900-1250)	Lowland-Low. Montane	yg/yb (30dH, 30eH)	5	20-24	pt. 7e7
7e5	Mod (1020)	Lowland-Low. Montane	yg/yb (32aH)	6	26-28	pt. 7e9
7e6	Mod (1000-1300)	Lowland-Montane	yg/yb (31aH)	9	22-26	pt./7e7 7e11
7e7	Mod (700-1150)	Montane	lybe (41a)	5	22-26	pt. 7e3
7e8	Mod (1000-1150)	Lowland-Low. Montane	lybe (41)	5	22-27	pt. 7e3
7e9	Mod (1000-1550)	Lowland-Low. Montane	lybe (42, 42a)	5	22-28	pt. 7e3
7e10	Mod (1000-1300)	Lowland-Low. Montane	lybe (47)	4	22-28	pt. 7e3
7e11	Mod to High(1275-2250)	Lowland-Low. Montane	lybe (47a,b,)	5	26-29	pt. 7e9
7e12	Mod to High(1275-2250)	Lowland-Low. Montane	lybe (47c)	4	25-29	pt. 7e9
7e13	Mod (700-1150)	Lowland-Low. Montane	yge (22dH, 22eH)	5	20-24	pt. 7e7
7e14	Low to Mod (600-900)	Lower Montane	yge (24)	3	18-22	pt. 7e2
7e15	Low (500-650)	Lower Montane	yge (17a)	3	18	pt. 7e2
7e16	Low to Mod (700-1000)	Lowland	yge (17b)	6	15-17	pt. 7e14

Table 11: Summary criteria for land use capability class seven (continued)

CLASS	Rainfall (mm)	Altitude	Soils	APP	S.I(m)	NZLRI
7e17	Low (500-650)	Lowland	yge (15dH)	6	15-17	pt. 7e14
7e18	High (1500-2250)	Lowland-Montane	uhcpybe&p (65c, 57g)	2	26-28	7e22
7e19	Low (650-800)	Lowland	ybs (68b, 68c)	US	<15	7e15
7e20	Low (650-750)	Montane-Subalpine	uhcybe (51)	2	<15	7e16
7e21	Mod (900-1500)	Montane-Subalpine	uhcybe (53, 53b)	<2	<15	7e18
7e22	Mod to High (900-2000)	Montane-Subalpine	uhcybe (57aH 57bH)	1	18-23	7e17
7e23	Low to Mod (600-900)	Montane-Subalpine	uhcybe (51a)	<1	US	7e21
7e24	Mod to High (900-1800)	Montane-Subalpine	uhcybe (57a, 57b)	<.5	15	7e23
7e25	Mod to High(1000-2000)	Subalpine-alpine	uhcybe (57, 58)	.2	US	7e26
7e26	Low to Mod (700-1000)	Montane	yg/yb (30eH)	3	<15	pt 7e7
7s1	Low to Mod ((510-900)	LowlandR (95a)	3	17-18	7s2	
7s2	Low (650-750)	Lowland	ybs (68b)	1	18-22	7s11
7s3	Mod to High (500-2000)	Montane	R (99)	.5	<15	7s3
7s4	Low to Mod (500-900)	Montane	uhcybe (49a)	.3	<15	7s12
7s5	Mod to High(1000-2000)	Montane	bglc (in 79)	US	US	-
7w1	Mod (650-1000)	Lowland	organics (86, 86a) Gleys (89) gR (90)	5	US	pt. 7w1
7w2	Low to Mod (650-1000)	Lowland	saline gR (92)	<2	US	7w3
7w3	Mod to High (700-2000)	Montane	gR (90d)	1	US	-
7w4	Mod to High (700-2000)	Montane	organics (88)	.3	US	7w4

Land use capability class seven

LUC Unit: 7c1

LUC Suite: H6

Description: Undulating to rolling stable terraces, fans and moraine above 1000 m asl in cool, moderate to high rainfall inland areas with silt loam to sandy loam textured low fertility soils.

Typical location: N30/915905

Altitude zone: Montane to subalpine

Slope:
8-15° C
4-7° B
0-3° A

Lithology: Canterbury Suite alluvium, some loess

Soils: Upland and high country yellow-brown earth soils, e.g. 53 Cass, 53b Katrine

Erosion:
Present: Slight to moderate sheet and wind
Potential: Moderate to severe sheet and wind

Vegetation: Short tussock grassland with sweet brier and matagouri, snow tussock grassland, beech forest

Land use:
Present: Extensive grazing
Potential: Extensive grazing, erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .5 - Top farmer 1 - Attainable physical potential 4
P. radiata Site Index	- <15 m

Soil conservation management: Maintenance of complete vegetative cover to prevent frost lift induced sheet and wind erosion

Comments: Frost tolerant tree species more appropriate.

LUC Unit: 7c2

LUC Suite: H7

Description: Undulating to strongly rolling exposed broad upland spurs, shoulder slopes and summits above 950 asl in moderate rainfall inland areas.

Typical locations: N30/288030, N30/276097

Altitude zone: Subalpine

Slope: 8-15° C
4-7° B
16-20° D

Lithology: Canterbury Suite colluvium, and till with loess in places

Soils: Upland and high country yellow-brown earth soils e.g. 55b Puketeraki

Erosion: *Present:* Slight to moderate wind and sheet
Potential: Moderate wind and sheet

Vegetation: Snow and short tussock grassland, subalpine herb fields and scrub in places

Land use: *Present:* Extensive grazing
Potential: Extensive grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .2 - Top farmer .5 - Attainable physical potential 2
P. radiata Site Index	- US

Soil conservation management: Conservation fencing

Comments: Spurs run to 1700 m in places.

LUC Unit: 7c3

LUC Suite: H5

Description: Undulating to rolling stable terraces, fans and moraine above 1000 m asl in cool, low rainfall inland areas.

Typical location: Not mapped at scale of this survey

Altitude zone: Montane to subalpine

Slope:
8-15° C
4-7° B
0-3° A

Lithology: Canterbury Suite alluvium, some loess

Soils: Upland and high country yellow-brown earth soils, e.g. 50a Molesworth, 49a Acheron

Erosion:
Present: Slight to moderate sheet and wind
Potential: Moderate to severe sheet and wind

Vegetation: Short tussock grassland with sweet brier and matagouri scrub, snow tussock grassland

Land use:
Present: Extensive grazing
Potential: Extensive grazing, erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .5 - Top farmer 1 - Attainable physical potential 3
P. radiata Site Index	- <15 m

Soil conservation management: Maintenance of complete vegetative cover to prevent frost lift induced sheet and wind erosion

Comments: Frost tolerant tree species more applicable

LUC Unit: 7e1

LUC Suite: L19

Description: Steep to very steep hill country developed on extrusive igneous rocks, with medium fertility, brown granular loams and clay soils in mild moderate rainfall areas.

Typical location: P25/824500

Altitude zone: Lowland to lower montane

Slope:
26-35° F
21-25° E
>35° G

Lithology: Basaltic igneous rocks, tuff and associated tuffaceous sediments [Brook Street Volcanics, Crosilles Volcanics]

Soils: Brown granular loams and clay soils, e.g. 77c Atawhai steepland

Erosion:
Present: Slight to severe sheet, soil slip and scree
Potential: Moderate to severe sheet, soil slip and scree

Vegetation: Semi-improved pasture, mixed native scrub, fern, manuka, indigenous forest

Land use:
Present: Extensive grazing, indigenous forest, reverted land
Potential: Grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .5 - Top farmer 1 - Attainable physical potential 3
P. radiata Site Index	- 25-28 m

Soil conservation management: Oversowing and topdressing, space planting

Comments: Growth rates affected by degree of coastal exposure.

LUC Unit: 7e2

LUC Suite: H9

Description: Steep to very steep inland hill country developed on extrusive igneous rocks, with medium fertility brown granular loams and clay soils. Moderate rainfall areas with a marked summer moisture deficit.

Typical locations: O30/490120, O30/500135, P29/930255

Altitude zone: Lower montane

Slope: 26-35° F
21-25° E
>35° G

Lithology: Marine and terrestrial basaltic flows and associated sedimentary rocks [Gridiron Formation]

Soils: Brown granular loams and clay soils, e.g. 77e Middlehurst steepland

Erosion: *Present:* Slight to severe sheet, wind, soil slip and scree
Potential: Moderate to severe sheet, wind, soil slip and scree

Vegetation: Short tussock grassland with matagouri and sweet brier, semi-improved pasture

Land use: *Present:* Extensive grazing
Potential: Grazing, woodlots and small plantation forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 2 - Top farmer 2 - Attainable physical potential 4
P. radiata Site Index	- 17-18 m

Soil conservation management: Conservation fencing, oversowing and top dressing

Comments: This unit is generally steeper and more severely eroded than 6e3.

LUC Unit: 7e3

LUC Suite: L19

Description: Moderately steep to very steep limestone hill country with medium fertility well structured clay loam textured soils and extensive rock outcrop in moderate rainfall areas.

Typical locations: P29/880224, P29/933238

Altitude zone: Lowland to lower montane

Slope: 26-35° F
21-25° E
>35° G

Lithology: Indurated limestone and calcareous sandstone

Soils: Rendzina and related soils, e.g. 74 Amuri steepland, 74a Kaitoa steepland

Erosion: *Present:* Slight to severe sheet and soil slip
Potential: Moderate to severe soil slip, sheet

Vegetation: Short tussock grassland with matagouri scrub, semi-improved pasture, manuka and mixed native scrub

Land use: *Present:* Extensive grazing
Potential: Grazing, production forestry

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 3
	-	Top farmer 4
	-	Attainable physical potential 8
P. radiata Site Index	-	19-24 m

Soil conservation management: Close planting of severely eroded areas

Comments:

LUC Unit: 7e4

LUC Suite: L18

Description: Moderately steep to steep mid altitude hill country developed on strongly indurated sedimentary rocks in moderate rainfall areas, with yellow grey to yellow brown earth intergrade soils susceptible to moderate to severe sheet soil slip and gully erosion.

Typical location: P30/890185

Altitude zone: Lowland-lower montane

Slope: 21-25° E
26-35° F

Lithology: Canterbury Suite bedrock and colluvium

Soils: Yellow-grey to yellow-brown earth intergrade soils, e.g. 30dH Kahutara hill, 30eH Kekerengu hill

Erosion: *Present:* Moderate to severe sheet, soil slip and gully
Potential: Moderate to severe sheet, soil slip and gully

Vegetation: Semi-improved pasture, manuka scrub, bracken fern, gorse, short tussock grassland

Land use: *Present:* Extensive grazing, reverted land
Potential: Production forestry, grazing

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 2
	-	Top farmer 2
	-	Attainable physical potential 5
P. radiata Site Index	-	20-24 m

Soil conservation management: Close planting of severely eroded areas. Forest and grazing management requires careful application of soil conservation techniques

Comments:

LUC Unit: 7e5

LUC Suite: L18

Description: Moderately steep to steep hill country developed on strongly indurated schistose and sedimentary rocks in mild, moderate rainfall areas with a moderate summer moisture deficit and low to very low fertility yellow grey to yellow brown earth intergrade soils susceptible to severe sheet and soil slip erosion.

Typical location: O28/325535

Altitude zone: Lowland to lower montane

Slope: 26-35° F
21-25° E

Lithology: Canterbury Suite bedrock and colluvium, deeply weathered in places

Soils: Yellow-grey to yellow-brown earth intergrade soils, e.g. 32aH Tuamarina hill

Erosion: *Present:* Slight to severe sheet and soil slip
Potential: Severe sheet and soil slip

Vegetation: Bracken fern, gorse, broom and mixed native scrub, exotic forest, semi-improved pasture, indigenous forest

Land use: *Present:* Reverted land, production forestry, extensive grazing
Potential: Production forestry

Productivity indices:

Stock carrying capacity (su/ha)
- Present average 1
- Top farmer 2
- Attainable physical potential 6

P. radiata Site Index
- 26-28 m

Soil conservation management: Careful siting and maintenance of forest roads and loading pads, leave buffer strip along water courses

Comments: Scrub reversion is rapid. Site index increases towards coast.

LUC Unit: 7e6

LUC Suite: L17

Description: Moderately steep to steep hill country developed on weakly indurated conglomerate, associated sandstones and gravels, in moderate rainfall areas, with yellow grey to yellow brown earth intergrade soils, susceptible to sheet, soil slip and gully erosion.

Typical location: P29/790370

Altitude zone: Lowland to montane

Slope: 26-35° F
21-25° E

Lithology: Weakly indurated conglomerate

Soils: Yellow-grey to yellow-brown earth intergrade soils, e.g. 31aH Hundalee hill

Erosion:
Present: Slight to severe sheet, soil slip and gully
Potential: Moderate to severe sheet, soil slip and gully

Vegetation: Semi-improved pasture, mixed native and manuka scrub, indigenous forest

Land use:
Present: Reverted land, extensive grazing, indigenous forest
Potential: Production forestry, grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 3 - Top farmer 6 - Attainable physical potential 9
P. radiata Site Index	- 22-26 m

Soil conservation management: Close planting of severely eroded areas, gully protection works

Comments: Scrub reversion is rapid.

LUC Unit: 7e7

LUC Suite: L18

Description: Steep to very steep hill country developed on strongly indurated sedimentary rocks with lowland yellow brown earth soils with moderate to severe sheet, soil slip and/or scree erosion in mild, moderate rainfall areas with a slight summer moisture deficit.

Typical locations: O29/690450, P29/800477

Altitude zone: Montane

Slope: 26-35° F

Lithology: Canterbury Suite bedrock and colluvium, with loess in patches

Soils: Lowland yellow-brown earth soils, e.g. 41a Hurunui steepland

Erosion: *Present:* Moderate to severe sheet, soil slip and scree, (some rock outcrop)
Potential: Moderate to severe sheet, soil slip and scree

Vegetation: Short tussock grassland with matagouri scrub, semi-improved pasture, beech forest, manuka, bracken fern and gorse

Land use: *Present:* Extensive grazing, indigenous forest, reverted land
Potential: Grazing, production and erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .5 - Top farmer 3 - Attainable physical potential 5
P. radiata Site Index	- 22-26 m

Soil conservation management: Conservation fencing, oversowing and topdressing

Comments: Unit is steeper and/or more eroded than 6e8.

LUC Unit: 7e8

LUC Suite: L18

Description: Steep to very steep hill country developed on strongly indurated schistose and sedimentary rocks with lowland yellow brown earth soils with moderate to severe sheet, soil slip and/or scree erosion in exposed coastal areas with a moderate rainfall and summer moisture deficit.

Typical location: Q27/200010

Altitude zone: Lowland to lower montane

Slope: 26-35° F

Lithology: Canterbury Suite bedrock and colluvium, deeply weathered in places

Soils: Lowland yellow-brown earth soils, e.g. 41 Arapawa steepland

Erosion:
Present: Moderate to severe sheet, soil slip and scree
Potential: Moderate to severe sheet, soil slip and scree

Vegetation: Semi-improved pasture, fern, mixed native scrub, gorse, exotic forest and indigenous coastal forest

Land use:
Present: Reverted land, extensive grazing, production forestry
Potential: Production forestry, grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .5 - Top farmer 3 - Attainable physical potential 5
P. radiata Site Index	- 22-27 m

Soil conservation management: Oversowing and topdressing, careful siting of forest tracks, and loading pads, with appropriate maintenance. Leave buffer strips along watercourses

Comments: Induced pasture reverts rapidly to scrub. Coastal exposure is severe in places.

LUC Unit: 7e9

LUC Suite: L18

Description: Steep to very steep hill country developed on indurated schistose and sedimentary rocks with lowland yellow brown earth soils with moderate to severe sheet, soil slip and/or scree erosion in mild, moderate rainfall areas with a slight summer moisture deficit.

Typical location: Q27/225075

Altitude zone: Lowland to lower montane

Slope: 26-35° F

Lithology: Canterbury and Wakatipu Suite rock and colluvium, deeply weathered in places

Soils: Lowland yellow-brown earth soils, e.g. 42 Ketu steepland, 42a Anakoha steepland

Erosion:
Present: Moderate to severe sheet, soil slip and scree
Potential: Moderate to severe sheet, soil slip and scree

Vegetation: Indigenous forest, exotic forest, semi-improved pasture, mixed native scrub, fern and gorse

Land use:
Present: Reverted land, production forestry, extensive grazing, indigenous forest
Potential: Production forestry, grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .5 - Top farmer 3 - Attainable physical potential 5
P. radiata Site Index	- 22-28 m

Soil conservation management: Oversowing and topdressing, careful siting and maintenance of forest tracks and loading pads, leave buffer strips along water courses

Comments: Induced pasture reverts rapidly to scrub.

LUC Unit: 7e10

LUC Suite: L18

Description: Steep to very steep hill country developed on strongly indurated sedimentary rocks with lowland yellow brown earth soils with moderate to severe soil slip, sheet and/or scree erosion in exposed, moderate rainfall areas adjacent the Kaikoura coast.

Typical location: P31/755835

Altitude zone: Lowland to lower montane

Slope: 26-35° F

Lithology: Canterbury Suite bedrock and colluvium

Soils: Lowland yellow-brown earth soils, e.g. 47 Patutu steepland

Erosion:
Present: Moderate to severe soil slip, sheet, and scree
Potential: Moderate to severe soil slip, sheet, and scree

Vegetation: Broadleaf, beech and coastal forest, mixed native scrub, fern, manuka and broom, semi-improved pasture

Land use:
Present: Reverted land, indigenous forest, extensive grazing
Potential: Production forestry, grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 1 - Top farmer 2 - Attainable physical potential 4
P. radiata Site Index	- 22-28 m

Soil conservation management: Oversowing and topdressing of slip scars, conservation fencing, careful siting and maintenance of tracks and loading pads

Comments: Induced pasture reverts rapidly to scrub.

LUC Unit: 7e11

LUC Suite: L18

Description: Moderately steep to steep coastal hill country developed on strongly indurated schistose and sedimentary rocks, in mild, moderate to high rainfall areas. Low to very low fertility lowland yellow brown earth soils with slight to severe sheet and/or soil slip erosion.

Typical locations: P27/875840, P27/920890

Altitude zone: Lowland to lower montane

Slope: 26-35° F
21-25° E

Lithology: Canterbury and Wakatipu Suite bedrock and colluvium, deeply weathered in places

Soils: Lowland yellow-brown earth soils, e.g. 47a Kenepuru steepland, 47b Opouri steepland

Erosion: *Present:* Slight to severe sheet and soil slip
Potential: Severe sheet and soil slip

Vegetation: Beech, podocarp and hardwood forest, bracken fern, gorse, broom, mixed native scrub, exotic forest, semi-improved pasture

Land use: *Present:* Indigenous forest, reverted land, production forestry
Potential: Erosion control and production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .5 - Top farmer 2 - Attainable physical potential 5
P. radiata Site Index	- 26-29 m

Soil conservation management: Careful siting and maintenance of forest roads and loading pads. Leave buffer-zones along water courses

Comments: Scrub reversion is rapid. Unit includes small areas of 8e2. Site index is lower for exposed coastal sites.

LUC Unit: 7e12

LUC Suite: L18

Description: Moderately steep to steep hill country developed on strongly indurated schistose and sedimentary rocks, in mild, moderate to high rainfall areas, with low to very low fertility lowland yellow brown earth soils with slight to severe sheet and/or soil slip erosion.

Typical locations: P28/820755, P28/795715, O28/560650

Altitude zone: Lowland to lower montane

Slope: 26-35° F
21-25° E
> 35° G

Lithology: Canterbury and Wakatipu Suite bedrock and colluvium, deeply weathered in places

Soils: Lowland yellow-brown earth soils, e.g. 47c Onamalutu steepland

Erosion: *Present:* Slight to severe sheet and soil slip
Potential: Severe sheet and soil slip

Vegetation: Beech, podocarp and hardwood forest, bracken fern, gorse, broom, mixed native scrub, exotic forest, semi-improved pasture

Land use: *Present:* Indigenous forest, reverted land, production forestry
Potential: Erosion control and production forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 1 - Top farmer 1 - Attainable physical potential 4
P. radiata Site Index	- 25-29 m

Soil conservation management: Careful siting and maintenance of forest roads and loading pads. Leave buffer-zones along water courses

Comments: Scrub reversion is rapid. Unit includes small areas of 8e4.

LUC 7e13

LUC Suite: L17

Description: Moderately steep to very steep dissected hill country developed on weakly indurated rocks with yellow grey earth soils with moderate to severe sheet, soil slip and/or gully erosion, in moderate rainfall areas with a slight summer moisture deficit.

Typical location: P29/780310

Altitude zone: Lowland to lower montane

Slope: 21-25° E
26-35° F

Lithology: Weakly indurated mudstone, sandstone and conglomerate, some loess in places

Soils: Yellow-grey earth soils, e.g. 22dH Medway hill, 22eH Woodbank hill

Erosion: *Present:* Moderate to severe sheet, soil slip and gully
Potential: Moderate to severe sheet, soil slip and gully

Vegetation: Semi-improved pasture, manuka, gorse and fern, short tussock grassland

Land use: *Present:* Extensive grazing, reverted land
Potential: Erosion control forestry, grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 3 - Top farmer 3 - Attainable physical potential 5
P. radiata Site Index	- 20-24 m

Soil conservation management: Close planting of severely eroded areas, gully control

Comments:

LUC Unit: 7e14

LUC Suite: L15

Description: Steep to very steep hill country developed on strongly indurated sedimentary rocks with yellow grey earth soils with moderate to severe sheet, soil slip, and/or scree erosion, in low to moderate rainfall areas with a moderate summer moisture deficit.

Typical locations: P28/840540, P29/800260

Altitude zone: Montane

Slope: 26-35° F

Lithology: Canterbury Suite bedrock and colluvium with pockets of loess

Soils: Yellow-grey earth soils (dry-hygrous), e.g. 24 Haldon steepland

Erosion:
Present: Moderate to severe sheet, wind and soil slip, slight to moderate scree
Potential: Moderate to severe sheet, wind and soil slip, slight to moderate scree

Vegetation: Short tussock grassland, with matagouri and manuka scrub, semi-improved pasture

Land use:
Present: Extensive grazing
Potential: Grazing, woodlots and small plantation forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 2 - Top farmer 2 - Attainable physical potential 3
P. radiata Site Index	- 18-22 m

Soil conservation management: Conservation fencing, oversowing and topdressing

Comments: Generally steeper and more eroded than 6e12.

LUC Unit: 7e15

LUC Suite: L15

Description: Steep to very steep hill country developed on strongly indurated sedimentary rocks with yellow grey earth soils with moderate to severe sheet and/or soil slip erosion, in low rainfall areas with a marked summer moisture deficit.

Typical location: Not mapped at scale of this survey

Altitude zone: Montane

Slope: 26-35° F

Lithology: Canterbury Suite bedrock and colluvium with pockets of loess

Soils: Yellow-grey earth soils (sub-hygrous), e.g. 17a Weld steepland

Erosion:
Present: Moderate to severe sheet, wind and soil slip
Potential: Moderate to severe sheet, wind and soil slip

Vegetation: Short tussock grassland with matagouri, fern and manuka scrub, semi-improved pasture

Land use:
Present: Extensive grazing
Potential: Grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 2 - Top farmer 2 - Attainable physical potential 3
P. radiata Site Index	- 18 m

Soil conservation management: Conservation fencing, oversowing and topdressing

Comments: This unit is generally steeper and more eroded than 6e13, especially on sunny aspects.

LUC Unit: 7e16

LUC Suite: L14

Description: Steep to very steep hill country developed on weakly indurated conglomerate with yellow grey earth soils with slight to severe sheet, gully and/or soil slip erosion, in low to moderate rainfall areas with a marked summer moisture deficit.

Typical location: P28/045605

Altitude zone: Lowland

Slope: 26-35° F

Lithology: Weakly indurated conglomerate and mixed loessial colluvium

Soils: Yellow-grey earth soils, e.g. 17b Waihopai steepland

Erosion:
Present: Slight to severe sheet, wind, gully and soil slip
Potential: Slight to severe sheet, wind, gully and soil slip

Vegetation: Short tussock grassland with manuka scrub, semi-improved pasture

Land use:
Present: Extensive grazing
Potential: Grazing, erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 2 - Top farmer 3 - Attainable physical potential 6
P. radiata Site Index	- 15-17 m

Soil conservation management: Conservation fencing, oversowing and topdressing, gully control

Comments:

LUC Unit: 7e17

LUC Suite: L14

Description: Steep to very steep loessial hill slopes with yellow grey earth soils susceptible to tunnel gully erosion developed on weakly indurated rocks, in low rainfall areas, with a marked summer moisture deficit.

Typical location: P28/970600

Altitude zone: Lowland

Slope: 21-25° E
26-35° F

Lithology: Loess and loessial colluvium on weakly indurated conglomerate, sandstone and mudstone

Soils: Yellow-grey earth soils, e.g. 15dH Wither hill

Erosion: *Present:* Moderate to severe tunnel gully, sheet, wind and soil slip
Potential: Moderate to severe tunnel gully, sheet wind and soil slip

Vegetation: Short tussock grassland, semi-improved pasture, manuka scrub

Land use: *Present:* Extensive grazing
Potential: Grazing, erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 2 - Top farmer 3 - Attainable physical potential 6
P. radiata Site Index	- 15-17 m

Soil conservation management: Conservation fencing, oversowing and topdressing, tunnel gully dozing and recontouring, promote cattle, introduce drought tolerant legumes and shrubs

Comments: Steeper and more eroded than 6e14.

LUC Unit: 7e18

LUC Suite: L20

Description: Moderately steep to steep hill country developed on strongly indurated sedimentary and schistose rocks in high rainfall areas, with low to very low fertility soils susceptible to severe sheet and soil slip erosion.

Typical location: O28/570335

Altitude zone: Lowland to montane

Slope: 26-35° F
21-25° E

Lithology: Wakatipu Suite bedrock and colluvium

Soils: Upland and high country podzolised yellow-brown earths and podzols, e.g. 65c Pelorous steepland; upland and high country yellow-brown earth soils, e.g. 57g Patriarch steepland

Erosion: *Present:* Slight to severe sheet and soil slip
Potential: Severe sheet, soil slip and debris avalanche

Vegetation: Beech, podocarp and hardwood forest, mixed native scrub, semi-improved pasture

Land use: *Present:* Indigenous forest, reverted land
Potential: Erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 1
	-	Top farmer 1
	-	Attainable physical potential 2
P. radiata Site Index	-	26-28 m

Soil conservation management: Careful siting and maintenance of forest roads, and loading pads. Leave buffer zones along water courses

Comments:

LUC Unit: 7e19

LUC Suite: L8

Description: Rolling to strongly rolling sand dunes in low to moderate rainfall areas with a severe wind erosion potential.

Typical location: P28/966760

Altitude zone: Lowland

Slope: 4-7° B
8-15° C
16-20° D

Lithology: Canterbury Suite eolian sands

Soil: Yellow-brown sand soils, e.g. 68c Tahunanui, 68b Taumutu

Erosion: *Present:* Slight to severe wind and deposition
Potential: Severe wind and deposition

Vegetation: Sand dune vegetation, scrub and exotic forest

Land use: *Present:* Erosion control forestry, minor extensive grazing, undeveloped
Potential: Erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- <15 m

Soil conservation management: Maintenance of permanent vegetation cover

Comments: Dune stabilisation is necessary to prevent migration onto adjacent land.

LUC Unit: 7e20

LUC Suite: H8

Description: Moderately steep to steep mountain slopes, below 1340 m developed on strongly indurated sedimentary rocks with upland and high country yellow brown earth soils susceptible to moderate to severe sheet, scree, debris avalanche and/or gully erosion, in low rainfall inland areas with a marked summer moisture deficit.

Typical locations: O30/400064, N30/245940, N30/255020

Altitude zone: Montane to subalpine

Slope: 26-35° F
21-25° E

Lithology: Canterbury Suite bedrock and colluvium, loess in places

Soils: Upland and high country yellow-brown earth soils, e.g. 51 Muller steepland

Erosion: *Present*: Moderate to severe sheet, wind, scree, debris avalanche and gully
Potential: Severe sheet, wind, scree, debris avalanche and gully

Vegetation: Short tussock grassland, and unimproved pasture with sweet brier and matagouri scrub, and hieracium

Land use: *Present*: Extensive grazing
Potential: Extensive grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .2 - Top farmer .2 - Attainable physical potential 2
P. radiata Site Index	- <15 m

Soil conservation management: Conservation fencing, oversowing and topdressing, close planting in gullies, rabbit control

Comments: Soils are of medium to high natural fertility. Frost tolerant tree species species are more appropriate.

LUC Unit:: 7e21

LUC Suite: H6

Description: Rolling to strongly rolling morainic slopes with loessial silt loam to sandy loam textured soils susceptible to moderate to severe wind erosion in moderate rainfall, high country areas.

Typical locations: N30/045940, M31/890880, N31/905665

Altitude zone: Montane to subalpine

Slope:
16-20° D
8-15° C
4-7° B

Lithology: Glacial till, alluvium and colluvium from Canterbury Suite rocks, loess in places

Soils: Upland and high country yellow-brown earth soils, e.g. 53 Cass, 53b Katrine

Erosion:
Present: Moderate to severe wind and sheet
Potential: Severe wind and sheet

Vegetation: Snow tussock and short tussock grassland

Land use:
Present: Extensive grazing
Potential: Extensive grazing, erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .2 - Top farmer 0.2 - Attainable physical potential <2
P. radiata Site Index	- <15 m

Soil conservation management: Conservation fencing, oversowing and topdressing, selective revegetation of severely eroded areas

Comments: Maintain a complete vegetative cover to reduce wind erosion induced by frost lift. Frost tolerant tree species are more appropriate.

LUC Unit: 7e22

LUC Suite: H10

Description: Strongly rolling to moderately steep, lower slopes developed on strongly indurated sedimentary rocks with low fertility upland and high country yellow brown earth soils susceptible to moderate to severe sheet and scree erosion, in moderate to high rainfall high country areas.

Typical location: N29/240204

Altitude zone: Montane to subalpine

Slope: 21-25° E
16-20° D

Lithology: Colluvium from Canterbury Suite rocks, some loess

Soils: Upland and high country yellow-brown earth soils, e.g. 57aH Tekoa hill, 57bH Bealey hill

Erosion: *Present*: Moderate to severe sheet, wind and scree
Potential: Severe sheet, wind and scree

Vegetation: Short tussock grassland with matagouri scrub, snow tussock grassland, subalpine scrub, beech forest

Land use: *Present*: Extensive grazing, indigenous forest
Potential: Extensive grazing, erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average .2
	-	Top farmer .2
	-	Attainable physical potential 1
P. radiata Site Index	-	18-23 m, and US

Soil conservation management: Conservation fencing, oversowing and topdressing, close planting of severely eroded areas

Comments: Soils are of low to very low fertility. Unit is steeper and more severely eroded than 6e17. More frost and snow tolerant species than *P.*

LUC Unit: 7e23

LUC Suite: H8

Description: Moderately steep to steep midslopes developed on strongly indurated sedimentary rocks with upland and high country yellow brown earth soils susceptible to moderate to severe sheet, debris avalanche and/or scree erosion between 900 and 1600 m, in low to moderate rainfall, inland mountain areas.

Typical location: N30/275018

Altitude zone: Montane to subalpine

Slope: 26-35° F
21-25° E

Lithology: Canterbury Suite bedrock and colluvium

Soils: Upland and high country yellow-brown earth soils, e.g. 51a Benmore steepland

Erosion: *Present:* Moderate to severe sheet, wind, and debris avalanche, with scree
Potential: Severe sheet, wind, and debris avalanche, with scree

Vegetation: Snow and short tussock grassland, with matagouri and subalpine scrub

Land use: *Present:* Extensive grazing
Potential: Extensive grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average <.5 - Top farmer <.5 - Attainable physical potential <1
P. radiata Site Index	- US

Soil conservation management: Conservation fencing, oversowing and topdressing

Comments:

LUC Unit: 7e24

LUC Suite: H10, H12

Description: Steep mountain slopes developed on strongly indurated sedimentary rocks below the tree line, in moderate to high rainfall high country areas, with forested or formerly forested soils susceptible to severe erosion under (induced) grassland.

Typical locations: O29/404300, O29/580265, N29/250430

Altitude zone: Montane to subalpine

Slope: 26-35° F

Lithology: Canterbury Suite bedrock and colluvium, loess in places

Soils: Upland and high country yellow-brown earth soils, e.g. 57a Tekoa steepland, 57b Bealey steepland

Erosion:
Present: Moderate to severe sheet, wind, soil slip and debris avalanche, with scree
Potential: Severe to very severe sheet, wind, soil slip and debris avalanche, with scree

Vegetation: Short tussock and snow tussock grassland, with manuka or subalpine scrub, beech forest

Land use:
Present: Extensive grazing, indigenous forest
Potential: Erosion control forestry, extensive grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average <.2 - Top farmer <.2 - Attainable physical potential <.5
P. radiata Site Index	- 15-23 m and US

Soil conservation management: Revegetation of eroded areas, maintenance of an adequate vegetative cover, noxious animal control

Comments: Soils are of extremely low fertility, and climatic conditions are severe. *P. nigra, P. contorta* are more suited for the conditions.

LUC Unit: 7e25

LUC Suite: H11, H13

Description: Moderately steep to steep mountain slopes developed on strongly indurated sedimentary rocks with upland and high country yellow brown earth soils susceptible to moderate to severe sheet, gully, debris avalanche and/or scree erosion above the timber line in moderate to high rainfall high country areas.

Typical locations: O29/424295, P29/780450, P29/725225, N30/075940

Altitude zone: Subalpine to alpine

Slope: 26-35° F

Lithology: Canterbury Suite bedrock and extensive colluvium, with loess

Soils: Upland and high country yellow-brown earth soils, e.g. 57 Kaikoura steepland, 58 Spenser

Erosion: *Present:* Moderate to severe sheet, wind, gully, debris avalanche and scree
Potential: Severe sheet and wind, gully, debris avalanche and scree

Vegetation: Snow and short tussock grassland, with subalpine scrub

Land use: *Present:* Extensive grazing
Potential: Extensive grazing, catchment protection

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .1 - Top farmer .1 - Attainable physical potential .2
P. radiata Site Index	- US

Soil conservation management: Revegetation of severely eroded areas, noxious animal control

Comments: Severe climate with active frost heave. Low fertility soils make revegetation difficult.

LUC Unit: 7e26

LUC Suite: H8

Description: Moderately steep to very steep hill country developed on moderately to strongly indurated sedimentary rocks with yellow grey to yellow brown intergrade soils susceptible to moderate to severe sheet and/or gully erosion, with minor scree, in low to moderate rainfall inland areas with a moderate summer dry season.

Typical location: O30/555130

Altitude zone: Montane

Slope: 26-35° F
21-25° E
>35° G

Lithology: Canterbury Suite, Cretaceous aged sandstones and conglomerates with significant intrusive basaltic dykes

Soils: Yellow-grey to yellow-brown earth intergrade soils, e.g. 30eH Kekerengu hill

Erosion: *Present:* Moderate to severe sheet, moderate gully, some scree
Potential: Severe sheet and gully

Vegetation: Short tussock and unimproved grassland, with sweet brier and matagouri scrub, extensive hieracium; semi-improved pasture

Land use: *Present:* Extensive grazing
Potential: Grazing

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average 1
	-	Top farmer 2
	-	Attainable physical potential 3
P. radiata Site Index	-	<15 m

Soil conservation management: Conversation fencing, oversowing and topdressing, scrub control

Comments: Generally steeper and more eroded than 6e23. Frost tolerant tree species more appropriate. The Kekerengu soil set mapped in the middle Awatere by NZSB (1968) and this survey lies outside its stated rainfall and elevation ranges. Such terrain and soil is identified by units 7e26 and 6e23.

LUC Unit: 7s1

LUC Suite: L2

Description: Flat to undulating floodplains and low terraces with very shallow (<15 cm) and stony silt loam to sandy loam textured soils, in low to moderate rainfall areas with a marked summer moisture deficit.

Typical location: P28/760692

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium

Soils: Recent soils, e.g. 95a Waimakariri shallow

Erosion: *Present:* Slight to moderate deposition, wind and streambank
Potential: Slight to moderate deposition, wind and streambank

Vegetation: Manuka scrub, short tussock grassland with sweet brier and matagouri scrub, semi-improved pasture, gorse and broom

Land use: *Present:* Extensive grazing
Potential: Extensive grazing, erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .1 - Top farmer .4 - Attainable physical potential 3
P. radiata Site Index	- 17-18 m

Soil conservation management: Flood protection

Comments: Subject to periodic inundation during floods.

LUC Unit: 7s2

LUC Suite: L8

Description: Flat to undulating stony and bouldery former beach and storm ridges in low to moderate rainfall areas.

Typical location: P28/965680

Altitude zone: Lowland

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite gravels and sands

Soils: Yellow-brown sand soils, e.g. 68b Taumutu

Erosion: *Present:* Slight to moderate wind
Potential: Slight to moderate wind

Vegetation: Semi-improved pasture, sand dune vegetation, bracken fern, salt tolerant vegetation

Land use: *Present:* Extensive grazing
Potential: Extensive grazing, shelter and erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .1 - Top farmer .1 - Attainable physical potential 1
P. radiata Site Index	- 18-22 m

Soil conservation management: Maintain vegetative cover

Comments:

LUC Unit: 7s3

LUC Suite: H3

Description: Flat to undulating floodplains, low terraces and fans with very shallow and stony silt loam to sandy loam textured recent soils in low to high rainfall inland areas.

Typical locations: N30/935035, N30/150970

Altitude zone: Montane

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium

Soils: Recent soils, e.g. 99 Tasman

Erosion: *Present:* Slight to severe deposition, streambank and wind
Potential: Moderate to severe deposition, streambank and wind

Vegetation: Short tussock and unimproved grassland with matagouri scrub, sweet brier and broom

Land use: *Present:* Extensive grazing
Potential: Extensive grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average <.2
	- Top farmer <.2
	- Attainable physical potential .5
P. radiata Site Index	- <15 m

Soil conservation management: Streambank and flood protection

Comments: Land above 950 m also has a major climatic limitation. Frost tolerant tree species are more appropriate.

LUC Unit: 7s4

LUC Suite: H1

Description: Flat to undulating terraces and fans with very shallow (<15 cm) and stony and/or bouldery silt loam to sandy loam textured upland and high country yellow brown earth soils in low to moderate rainfall inland areas.

Typical location: N30/215010

Altitude zone: Montane

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium, and shallow alluvium over bedrock

Soils: Upland and high country yellow-brown earth soils, e.g. 49a Acheron

Erosion: *Present:* Moderate to severe wind
Potential: Moderate to severe wind

Vegetation: Semi-improved pasture, short tussock grassland with sweet brier and matagouri scrub, semi-arid herbaceous vegetation

Land use: *Present:* Extensive grazing
Potential: Extensive grazing, erosion control forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .1 - Top farmer .1 - Attainable physical potential .3
P. radiata Site Index	- <15 m

Soil conservation management: Oversowing and topdressisng, rabbit control

Comments: Severely affected by over grazing and wind erosion in the past. Land above 950 m also has a major climatic limitation. Frost tolerant tree species are more appropriate.

LUC Unit: 7s5

LUC Suite:: L19, H6

Description: Strongly rolling to moderately steep footslopes and fans with very low fertility soils derived from ultramafic rocks in moderate to high rainfall areas primarily on the southern fringe of Red Hills.

Typical location: N29/150435

Altitude zone: Lowland - Montane

Slope: 16-20° D
21-25° E
8-15° C

Lithology: Colluvium and alluvium from ultramafic rocks, some loess

Soils: Brown granular loams and clays, with an affinity to 79 Dun steepland

Erosion: *Present:* Slight to severe sheet, slight to moderate deposition, streambank
Potential: Severe sheet, moderate deposition, streambank

Vegetation: Kanuka forest and scrub, minor mixed indigenous scrub

Land use: *Present:* Scrub and hardwood forest
Potential: Selective extraction of Kanuka forest

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Retain indigenous vegetative cover

Comments: Unit is characterised by low fertility soils with high levels of exchangeable magnesium. Kanuka scrub is one of the few vegetation types capable of handling the soil conditions.

LUC Unit: 7w1

LUC Suite: L5, L6

Description: Drainage impeded floodplains and wetlands, with sandy loam to clay loam textured soils and significant standing water in moderate rainfall lowland areas.

Typical location: P28/960780

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Canterbury Suite alluvium and peat

Soils: Gley soils, e.g. 89 Temuka
Gley recent soils, e.g. 90 Taitapu
Organic soils, e.g. 86 Waimairi, 86a Windermere

Erosion: *Present:* Negligible
Potential: Negligible

Vegetation: Wetland vegetation, semi-improved pasture

Land use: *Present:* Undeveloped land, extensive grazing
Potential: Wetland reserve, extensive grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average 0 - Top farmer 0 - Attainable physical potential 5
P. radiata Site Index	- US

Soil conservation management: Drainage

Comments:

LUC Unit: 7w2

LUC Suite: L7

Description: Tidal salt marsh with clay loam to sandy loam textured soils in low and moderate rainfall areas.

Typical location: P28/980635

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Canterbury and/or Wakatipu Suite alluvium

Soil: Saline gley recent soils, e.g. 92 Motukarara

Erosion: *Present:* Negligible
Potential: Negligible

Vegetation: Salt tolerant vegetation, semi-improved pasture

Land use: *Present:* Extensive grazing, wetland
Potential: Extensive grazing, wetland reserve

Productivity indices:

Stock carrying capacity (su/ha)	- Present average not grazed - Top farmer - Attainable physical potential <2
P. radiata Site Index	- US

Soil conservation management: Reclamation and drainage/desalination

Comments:

LUC Unit: 7w3

LUC Suite: H4

Description: Montane valley floor wetlands with gley recent sandy loam textured soils and significant standing water in moderate (to high) rainfall inland areas.

Typical locations: N30/053930, N30/040960, M31/895657, N31/920670

Altitude zone: Montane

Slope: 0-3° A
4-7° B

Lithology: Alluvium from Canterbury Suite rocks with some peat

Soils: Gley recent soils, e.g. 90d Dobson

Erosion: *Present*: Negligible, slight deposition
Potential: Slight to moderate wind and streambank if excessively drained

Vegetation: Wetland vegetation, snow and red tussock grassland

Land use: *Present*: Extensive grazing, wetland
Potential: Wetland, water harvesting/storage, extensive grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .2 - Top farmer .2 - Attainable physical potential 1
P. radiata Site Index	- US

Soil conservation management: Minimise disturbance

Comments: Important base flow regulatory areas.

LUC Unit: 7w4

LUC Suite: H4

Description: Easy rolling upland bogs in moderate to high rainfall inland areas.

Typical location: Not mapped in this survey

Altitude zone: Montane

Slope: 0-3° A
4-7° B

Lithology: Upland peat, colluvium from Canterbury Suite rocks

Soils: Organic soils, e.g. 88 Kaherekoau

Erosion: *Present:* Slight to negligible soil slip
Potential: Slight to moderate soil slip and gully

Vegetation: Wetland vegetation, snow and red tussock grassland

Land use: *Present:* Extensive grazing, wetland
Potential: Wetland, water storage (harvesting, wetland/reserve)

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .2 - Top farmer .2 - Attainable physical potential .3
P. radiata Site Index	- US

Soil conservation management: Minimise disturbance

Comments: Important base flow regulatory areas.

Table 12: Summary criteria for land use capability class eight

CLASS	Rainfall (mm)	Altitude	Soils	APP	S.I(m)	NZLRI
8c1	Mod to High (1000-2000)	Alpine	uhcybe (58, 57)	US	US	-
8e1	Low to Mod (600-1300)	Lowland-Montane	Rend. (74, 74a)	US	US	pt. 8e1
8e2	Mod to High (800-2000)	Lowland	lybe. (47a, 41, 47c)	US	US	pt. 8e2
8e3	Low to Mod (650-1000)	Lowland	yge (15dH, 22dH)	US	US	pt. 8e2
8e4	Mod to High (1300-4000)	Lowland-Montane	lybe (47c)	US	US	-
8e5	High (1500-4000)	Montane-Subalpine	uhc pod.ybe p. (65c, 65)	US	US	pt. 8e5
8e6	High (1500-2500)	Montane-Subalpine	uhcybe (57g, 57b), uhc pod.ybe p. (65c)	US	US	pt. 8e8
8e7	Low to Mod (650-1000)	Montane-Subalpine	uhcybe (51)	US	US	pt. 8e4
8e8	Low to Mod (500-1000)	Montane-Subalpine	uhcybe (51a)	US	US	pt. 8e4
8e9	Mod to High (900-2000+)	Montane-Subalpine	uhcybe (57a), uhc pod.ybe p. (65)	US	US	pt. 8e8
8e10	Mod to High (1000-2000+)	Subalpine-Alpine	uhcybe (55b, 58)	US	US	8e6
8e11	Mod to High (1000-2000)	Subalpine-Alpine	uhcybe (57)	US	US	pt. 8e9
8e12	High (2000-4000)	Subalpine-Alpine	uhcybe (58)	US	US	pt. 8e9
8e13	Mod to High (800-4000)	Alpine-subnival	Alpine (100) uhcybe (58, 57)	US	US	pt. 8e11
8e14	Mod to High (800-4000)	Subalpine-Alpine	Skeletal	US	US	-
8e15	Low (600-750)	Lowland	ybs (68b, 68c)	US	US	8e10
8e16	Mod to high (1000-2050)	Montane-Alpine	bglc (79)	US	US	-
8s1	Low to Mod (700-1600)	Lowland-Montane	R. (95a 99)	0.2	<15	-
8w1	Low (650-800)	Lowland	Saline gR (92)	US	US	8w2
8w2	Mod to High (700-2000)	Montane organics(88)	gR (90d)	US	US	-
8w3	Low (650-775)	Lowland organic (86)	gR (90)	US	US	-

Land use capability class eight

LUC Unit: 8c1

LUC Suite: H11

Description: Rolling to strongly rolling, high altitude (>1600 m), stable cirque basins developed on strongly indurated sedimentary rocks within the tussock zone in moderate to high rainfall areas.

Typical locations: N29/980255, N30/070018, M31/860835

Altitude zone: Alpine

Slope: 16-20° D
8-15° C
21-25° E

Lithology: Canterbury Suite bedrock, colluvium and glacial till

Soils: Upland and high country yellow-brown earths, e.g. rolling phases of 58 Spenser steepland, rolling phases of 57 Kaikoura steepland

Erosion: *Present:* Slight to moderate sheet, wind, and deposition
Potential: Moderate sheet, wind

Vegetation: Snow tussock grassland, subalpine scrub, alpine and subalpine herbfield/fellfield

Land use: *Present:* Extensive grazing, retired land
Potential: Catchment protection

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Maintenance of existing vegetative cover. Noxious animal control, fire protection

Comments:

LUC Unit: 8e1

LUC Suite: L19

Description: Steep to very steep limestone scarps and slopes with extensive rock outcrop in low to moderate rainfall areas.

Typical locations: P29/910205, P29/915230

Altitude zone: Lowland to lower montane

Slope: > 35° G
26-35° F

Lithology: Indurated limestone

Soils: Rendzina and related soils, e.g. 74 Amuri steepland, 74a Kaitoa steepland

Erosion: *Present:* Moderate to very severe sheet, soil slip and debris avalanche
Potential: Very severe sheet, soil slip and debris avalanche

Vegetation: Beech and podocarp hardwood forest, short tussock grassland with matagouri, mixed native scrub

Land use: *Present:* Indigenous forest, extensive grazing
Potential: Protection forestry, catchment protection

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Maintenance of present cover

Comments:

LUC Unit: 8e2

LUC Suite: L18

Description: Very steep slopes and cliffs predominantly formed on strongly indurated schistose and sedimentary rock, mainly in mild coastal areas with moderate to high rainfalls.

Typical location: P30/890175

Altitude zone: Lowland

Slope: > 35° G
26-35° F

Lithology: Canterbury and Wakatipu Suite bedrock, minor basaltic and ultrabasic igneous rock

Soils: Skeletal soils related to lowland yellow-brown earth soils, e.g. 47a Kenepuru steepland, 41 Arapawa steepland, 47c Onamalutu steepland; (minor) Brown granular loam and clay soils, e.g. 79 Dun steepland

Erosion: *Present:* Slight to very severe sheet, soil slip and gully
Potential: Extreme sheet, soil slip and gully

Vegetation: Beech hardwood and podocarp forest, manuka and mixed native scrub, bracken fern, unimproved pasture

Land use: *Present:* Reverted land, protection forestry, limited extensive grazing
Potential: Protection forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Protection planting

Comments:

LUC Unit: 8e3

LUC Suite: L14, L17

Description: Very steep slopes, gullies and cliffs formed on weakly indurated rocks, mainly in mild lowland and coastal areas with low to moderate rainfall and a marked summer deficit.

Typical locations: P28/055606, P28/064505

Altitude zone: Lowland

Slope: > 35° G
26-35° F

Lithology: Weakly indurated Tertiary mudstones, sandstones and conglomerates

Soils: Skeletal soils related to yellow-grey earths, e.g. 15dH Wither hill, 22dH Medway hill

Erosion: *Present:* Slight to very severe sheet, soil slip, and gully
Potential: Extreme sheet, soil slip and gully

Vegetation: Scattered manuka, mixed native scrub, coastal forest, unimproved pasture

Land use: *Present:* Limited extensive grazing, reverted land
Potential: Protection forestry, catchment protection

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Fire protection, selective revegetation

Comments:

LUC Unit: 8e4

LUC Suite: L18, H10

Description: Steep to very steep hill and mountain slopes developed on strongly indurated schistose and sedimentary rocks, with lowland yellow brown earth soils susceptible to moderate soil slip and/or sheet erosion below the timber line in moderate to high rainfall districts.

Typical locations: O28/520690, P27/800820

Altitude zone: Lowland to montane

Slope: 26-35° F
> 35° G

Lithology: Canterbury and Wakatipu Suite bedrock and colluvium

Soils: Lowland yellow-brown earths, e.g. 47c Onamalutu steepland; minor upland and high country podzolised yellow-brown earth and podzols, e.g. 65c Pelorus steepland

Erosion: *Present:* Slight to moderate soil slip and sheet
Potential: Severe soil slip, sheet, debris avalanche

Vegetation: Beech forest, mixed native scrub

Land use: *Present:* Protection forestry, reverted land
Potential: Protection forestry, catchment protection

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Noxious animal control, fire protection

Comments:

LUC Unit: 8e5

LUC Suite: L20, H12

Description: Steep to very steep, forested mountain slopes developed on strongly indurated schistose and sedimentary rock with upland and high country podzolised yellow brown earth and podzol soils susceptible to severe soil slip, debris avalanche and/or sheet erosion in high rainfall areas.

Typical location: N29/040340

Altitude zone: Montane to subalpine

Slope: 26-35° F
>35° G

Lithology: Canterbury and Wakatipu Suite sedimentary and schistose bedrock and colluvium, minor ultrabasic rock

Soils: Upland and high country podzolised yellow-brown earth and podzol soils, e.g. 65c Pelorus steepland, 65 Lewis steepland; minor brown granular loam and clay soils, e.g. 79 Dun steepland

Erosion:
Present: Slight to severe soil slip, debris avalanche and sheet
Potential: Severe soil slip, debris avalanche, gully and sheet

Vegetation: Beech forest, podocarp hardwood forest, subalpine scrub

Land use:
Present: Protection forestry
Potential: Protection forestry

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Maintenance of present cover, noxious animal control

Comments:

LUC Unit: 8e6

LUC Suite: H12

Description: Steep mountain slopes developed on strongly indurated schistose and sedimentary rock between 1000 m a.s.l. and the timber line, in high rainfall districts with upland and high country yellow brown earth soils susceptible to extreme erosion.

Typical locations: P27/795830, O28/370589

Altitude zone: Montane to subalpine

Slope: 26-35° F
>35° G

Lithology: Wakitipu and Canterbury Suite sedimentary and schistose bedrock and colluvium

Soils: Upland and high country yellow-brown earths, e.g. 57g Patriarch steepland, 57b Bealey Steepland; (minor) upland and high country podzolized yellow-brown earth and podzol soils, e.g. 65c Pelorus steepland

Erosion:
Present: Moderate to very severe sheet, debris avalanche, soil slip and wind, with scree
Potential: Extreme sheet, debris avalanche soil slip, gully and wind

Vegetation: Beech forest, montane, subalpine and manuka scrub, short tussock and snow tussock grassland

Land use:
Present: Protection forestry, extensive grazing
Potential: Catchment protection

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Noxious animal control, fire protection

Comments: Significant area for water harvesting/discharge regulation in major catchments.

LUC Unit: 8e7

LUC Suite: H8, H9

Description: Steep to very steep, severely eroded tussock slopes developed on strongly indurated sedimentary rocks with upland and high country yellow brown earth soils, in low to moderate rainfall inland areas, up to 1400 m.

Typical locations: N30/240010, O30/345075, O30/570110

Altitude zone: Montane to subalpine

Slope: 26-35° F

Lithology: Canterbury Suite bedrock and colluvium

Soils: Upland and high country yellow-brown earth soils, e.g. 51 Muller steepland; (minor) brown granular loam and clay soils, e.g. 77e Middlehurst steepland

Erosion:
Present: Severe to extreme sheet, scree, gully and wind
Potential: Extreme sheet, scree, gully and wind

Vegetation: Short tussock and snow tussock grassland with subalpine scrub, sweet brier, matagouri and semi-arid herbaceous vegetation

Land use:
Present: Extensive grazing, retired land
Potential: Catchment protection

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Fire protection, noxious animal control, selective revegetation

Comments:

LUC Unit: 8e8

LUC Suite: H8

Description: Steep to very steep, severely eroded tussock slopes developed on strongly indurated sedimentary rocks with upland and high country yellow brown earth soils, in low to moderate rainfall inland areas, above 1300 m.

Typical locations: N30/255007, N30/200930, N30/195900

Altitude zone: Montane to subalpine

Slope: 26-35° F

Lithology: Canterbury Suite bedrock and colluvium

Soils: Upland and high country yellow-brown earth soils, e.g. 51a Benmore steepland

Erosion:
Present: Severe to extreme sheet, scree, gully and wind
Potential: Extreme sheet, scree, gully and wind

Vegetation: Short tussock and snow tussock grassland with subalpine scrub, sweet brier, matagouri and semi-arid herbaceous vegetation

Land use:
Present: Extensive grazing, retired land
Potential: Catchment protection

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Fire protection, noxious animal control, selective revegetation

Comments:

LUC Unit: 8e9

LUC Suite: H10

Description: Steep mountain slopes developed on strongly indurated sedimentary and schistose rock between 1000 m a.s.l. and the timber line, in moderate to high rainfall districts susceptible to extreme erosion.

Typical locations: N29/270330, O29/530240, O30/445165

Altitude zone: Montane to subalpine

Slope: 26-35° F
> 35° G

Lithology: Canterbury Suite sedimentary and schistose bedrock and colluvium

Soils: Upland and high country yellow-brown earths, e.g. 57a Tekoa steepland; (minor) upland and high country podzolized yellow-brown earth and podzol soils, e.g. 65 Lewis steepland

Erosion: *Present*: Moderate to very severe sheet, debris avalanche, soil slip and wind, with scree
Potential: Extreme sheet, debris avalanche, soil slip, gully and wind

Vegetation: Short tussock and snow tussock grassland. Beech forest, montane and manuka scrub

Land use: *Present*: Protection forestry, extensive grazing, retired land
Potential: Catchment protection

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Noxious animal control, fire protection, selective revegetation

Comments: Area of significance for water harvesting/discharge regulation in major catchments.

LUC Unit: 8e10

LUC Suite: H7

Description: Rolling to moderately steep mountain and ridge summits on strongly indurated sedimentary rocks, in moderate (to high) rainfall areas within the tussock zone with a severe erosion hazard.

Typical locations: M30/862903, M31/885860, N30/995945

Altitude zone: Subalpine to alpine

Slope: 21-25° E
8-15° C
16-20° D

Lithology: Canterbury Suite bedrock and colluvium

Soils: Upland and high country yellow-brown earths, e.g. 55b Puketeraki, rolling phases of 58 Spenser steepland

Erosion: *Present:* Moderate to extreme wind and sheet, with extensive scree
Potential: Extreme wind and sheet, with extensive scree

Vegetation: Snow tussock and short tussock grassland, subalpine scrub, alpine and subalpine herbfield/fell field vegetation

Land use: *Present:* Extensive grazing, some retired land
Potential: Catchment protection

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Fire protection, noxious animal control, selective revegetation

Comments: Intense frost heave hinders revegetation. Unit is the easier sloping equivalent of 8e11.

LUC Unit: 8e11

LUC Suite: H9, H11

Description: Steep to very steep mountain slopes and summits on strongly indurated predominantly sedimentary rocks above the timber line, in moderate to high rainfall areas, susceptible to extreme erosion.

Typical locations: O29/490280, O29/640305, O30/380110, O30/510130

Altitude zone: Subalpine to alpine

Slope: 26-35° F
> 35° G

Lithology: Canterbury Suite bedrock and colluvium, minor basaltic igneous rock

Soils: Upland and high country yellow-brown earths, e.g. 57 Kaikoura steepland; (minor) brown granular loam soils, e.g. 77e Middlehurst steepland

Erosion: *Present:* Moderate to severe sheet, debris avalanche, scree, gully and wind
Potential: Very severe to extreme, sheet, debris avalanche, scree, gully and wind

Vegetation: Snow tussock, and short tussock grassland, alpine and subalpine herbfield/fellfield vegetation

Land use: *Present:* Extensive grazing, retired land
Potential: Catchment protection

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Noxious animal control, fire protection, selective revegetation

Comments: Unit typically lies above 8e9.

LUC Unit: 8e12

LUC Suite: H13

Description: Steep to very steep mountain slopes and summits developed on strongly indurated sedimentary and schistose rocks above the timber line, in high rainfall areas, susceptible to extreme erosion.

Typical locations: N29/060235, N30/910920

Altitude zone: Subalpine

Slope: 26-35° F
> 35° G

Lithology: Canterbury and Wakitipu Suite sedimentary and schistose bedrock and colluvium

Soils: Upland and high country yellow-brown earth soils, e.g. 58 Spenser steepland

Erosion: *Present:* Moderate to severe sheet, debris avalanche, scree, gully and wind
Potential: Very severe to extreme, sheet, debris avalanche, scree, gully and wind

Vegetation: Snow tussock, and short tussock grassland, alpine and subalpine herbfield/fellfield vegetation

Land use: *Present:* Extensive grazing, retired land
Potential: Catchment protection

Productivity indices:

Stock carrying capacity (su/ha)	-	Present average US
	-	Top farmer
	-	Attainable physical potential
P. radiata Site Index	-	US

Soil conservation management: Noxious animal control, fire protection, selective revegetation

LUC Unit: 8e13

LUC Suite: H11, H13

Description: Steep to very steep alpine slopes and summits developed on strongly indurated sedimentary rocks in moderate to high rainfall areas, comprising bare rock and scree above the altitudinal limit of semi-continuous vegetation.

Typical locations: N30/215930, O29/370225, O30/350090, O30/600140

Altitude zone: Alpine to nival (generally > 1800 m)

Slope: > 35° G
26-35° F

Lithology: Canterbury Suite bedrock and colluvium

Soils: Alpine steepland soils 100; (minor) upland and high country yellow-brown earth soils, e.g. 58 Spenser steepland, 57 Kaikoura steepland

Erosion: *Present:* Moderate to extreme scree, debris avalanche and wind
Potential: Extreme scree, debris avalanche and wind

Vegetation: Sparse alpine herbfield/fellfield vegetation, snow tussock grassland, unvegetated

Land use: *Present:* Retired land, extensive grazing
Potential: Catchment protection

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Minimise disturbance

Comments:

LUC Unit: 8e14

LUC Suite: H10, H12

Description: Steep to moderately steep, coarse, accumulative debris sheets and/or coalescing scree cones, downslope of extensive mid to high elevation (1200 to 1700 m) rock outcrop, in moderate to high rainfall areas.

Typical location: N30/090130

Altitude zone: Subalpine

Slope: 26-35° F
21-25° E

Lithology: Coarse colluvium from Canterbury Suite rocks

Soils: Skeletal soils. Recent soils associated with upland and high county yellow brown earths

Erosion:
Present: Moderate to severe deposition, debris avalanche and scree
Potential: Moderate to severe deposition, debris avalanche and scree

Vegetation: Sparse alpine and subalpine herbfield/fellfield, subalpine scrub, snow tussock grassland

Land use:
Present: Extensive grazing, retired land
Potential: Catchment protection

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Minimise disturbance

Comments: Natural debris accumulation zones within steep high elevation mountain terrain.

LUC Unit: 8e15

LUC Suite: L8

Description: Exposed coastal fore dunes and gravel beaches in low rainfall areas, susceptible to extreme erosion.

Typical location: P28/000652

Altitude zone: Lowland

Slope: 8-15° C
16-20° D
4-7° B

Lithology: Sand and gravels from Canterbury Suite rocks and various other lithologies

Soils: Yellow-brown sand soils, e.g. 68b Taumutu, 68 Kairaki

Erosion: *Present:* Moderate to extreme wind and deposition
Potential: Extreme wind and deposition

Vegetation: Sand dune vegetation, mixed native and exotic scrub, unvegetated

Land use: *Present:* Coastal protection
Potential: Coastal protection

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Marram planting, coastal protection works

Comments: Minimise disturbance.

LUC Unit: 8e16

LUC Suite: L19, H10, H11, H12, H13

Description: Steep to very steep hill and mountain slopes, and associated rolling crests and spurs, with very low fertility soils developed on ultramafic rocks in moderate to high rainfall areas.

Typical location: N29/140455

Altitude zone: Montane to alpine

Slope: 26-35° F
21-25° E
8-20° C and D

Lithology: Ultramafic bedrock and colluvium, mixed colluvium on the margins of ultramafic bodies

Soils: Brown granular loam and clay soils, e.g. 79 Dun steepland

Erosion: *Present:* Slight to severe sheet, scree, slight to moderate gully
Potential: Severe sheet, scree, gully

Vegetation: Red tussock grassland and associated sedgeland, stunted manuka and subalpine scrub

Land use: *Present:* Nature conservation
Potential: Nature conservation

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Fire and noxious animal control to maintain the indigenous vegetative cover.

Comments: This unit, characterised by low-fertility soils with high levels of exchangeable magnesium, toxic to most plants, is mapped on a range of landforms with varying degrees and types of erosion. Unit may include small areas of associated 7s5.

LUC Unit: 8s1

LUC Suite: L2, H1

Description: Flat to undulating floodplains and low angle fans with very shallow and stony, weakly developed soils prone to extensive deposition and inundation by flood waters, in low to moderate rainfall areas with a marked or moderate summer moisture deficit.

Typical location: O28/400555

Altitude zone: Lowland to montane

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium

Soils: Recent soils, e.g. 95a Waimakariri shallow, 99 Tasman

Erosion: *Present:* Moderate to severe deposition, wind and streambank
Potential: Severe deposition, wind and streambank

Vegetation: Short tussock grassland with matagouri and manuka scrub, gorse and broom.

Land use: *Present:* Extensive grazing
Potential: Extensive grazing

Productivity indices:

Stock carrying capacity (su/ha)	- Present average .2 - Top farmer .2 - Attainable physical potential .2
P. radiata Site Index	- <15 m

Soil conservation management: Flood protection

Comments: Subject to periodic inundation during floods.

LUC Unit: 8w1

LUC Suite: L7

Description: Tidal saltmarsh and mudflats in low rainfall areas.

Typical locations: P27/745910, P27/732928

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Canterbury and Wakatipu Suite alluvium

Soils: Saline gley recent soils, e.g. 92 Motukarara

Erosion: *Present:* Negligible
Potential: Negligible

Vegetation: Salt tolerant vegetation

Land use: *Present:* Wildlife reserve
Potential: Wildlife reserve

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Minimise disturbance

Comments:

LUC Unit: 8w2

LUC Suite: H4

Description: Montane valley floor wetlands with extensive standing water in moderate (to high) rainfall inland areas.

Typical location: Not mapped at scale of this survey

Altitude zone: Montane

Slope: 0-3° A
4-7° B

Lithology: Canterbury Suite alluvium and peat

Soils: Gley recent soils, e.g. 90d Dobson; Organic soils, e.g. 88 Kaherekoau

Erosion: *Present:* Negligible to slight deposition
Potential: Negligible to slight deposition

Vegetation: Wetland vegetation, red tussock grassland

Land use: *Present:* Extensive grazing, wetland
Potential: Wetland reserve

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation Management: Minimise disturbance

Comments: Important base flow regulatory regions.

LUC Unit: 8w3

LUC Suite: L5

Description: Drainage impeded floodplains and/or closed drainage systems in cut off valleys behind major river levee systems, in low rainfall areas.

Typical location: P28/900775

Altitude zone: Lowland

Slope: 0-3° A

Lithology: Canterbury Suite alluvium and peat

Soils: Gley recent and organic soils, e.g. 90 Taitapu, 86 Waimari

Erosion:
Present: Negligible to slight deposition
Potential: Negligible to slight deposition

Vegetation: Wetland vegetation, willows

Land use:
Present: Extensive grazing, wetland
Potential: Wetland reserve

Productivity indices:

Stock carrying capacity (su/ha)	- Present average US - Top farmer - Attainable physical potential
P. radiata Site Index	- US

Soil conservation management: Minimise disturbance

Comments: Often topographic lows in the landscape.

Acknowledgements

The assistance of staff at Landcare Research NZ Ltd is gratefully acknowledged, in particular James Barringer, Les Basher and Grant Hunter for field mapping and legend validation. Staff of the former Nelson-Marlborough Regional Council: Ron Sutherland, Clive Tozer, Mark Bloomberg, Jane Mitchell, Sue Giles and Alaistair Wright provided useful discussion and comment. Murray Turbitt, Forestry Consultant, provided estimates of *Pinus radiata* site index. Ian Blair, Agriculture New Zealand Ltd, and Richard Hunter, New Zealand Pastoral Agriculture Research Institute Ltd, provided estimates of stock carrying capacity.

Funds for this research were provided by the Foundation for Research, Science and Technology under Contract CO9223.

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Appendix 1. Summary of decision tree logic for NZLRI Marlborough Regional Land Use Capability extended legend

LOWLAND ENVIRONMENT

Suite L1 LUC units 1c1, 2c1, 2c2, 2e1, 2e2, 2s2, 2s4

Key Criteria

- Lowland, flat to gently sloping terraces, floodplains and fans (0-7°), excluding coastal sandflats and dunes
- low rainfall <800 mm
- deep soils >45 cm

Recent soils	Yellow grey earth soils
soil depth >90 cm **1c1** soil depth >45 cm susceptible to wind erosion **2e1** sand sized fine earth texture, or limited soil water storage capacity, or poor structure **2s2** climate, combination of lack of rainfall, heat units, soil water storage capacity, frost susceptibility etc **2c1**	soil depth >45 cm moderately well drained and susceptible to wind erosion **2e2** compact subsoils with moderately slow soil permeability **2s4** climate, combination of lack of rainfall, heat units, soil water storage capacity, frost susceptibility etc **2c2**

Suite L2 LUC units 3e1, 3s3, 3s5, 3s6, 4s3, 4s5, 6s1, 7s1, 8s1

Key Criteria

- Lowland, flat to gently sloping terraces, floodplains and fans (0-7°), excluding coastal sandflats and dunes
- low rainfall <800 mm
- shallow soils <45 cm to gravel

Recent soils	Yellow brown shallow and stony soils associated with yellow grey earth soils
depth to gravels 30-45 cm floodplains **3s3** low terraces **3s5** depth of gravels 15-30 cm **4s3** depth to gravels <15 cm **6s1** depth to gravels <15 cm, boulders to surface **7s1** depth to gravels <15cm, boulders to surface and prone to deposition and inundation **8s1**	depth to gravels 30-45 cm susceptible to wind erosion **3e1** NOT significantly susceptible to wind erosion **3s6** depth to gravels 15-30 cm **4s5**

Suite L3 LUC units 2s1, 2s3, 3c1, 3c2

Key Criteria

- Lowland, flat to gently sloping terraces, floodplains and fans (0-7°)
- moderate rainfall >800 <1600 mm
- deep soils >45 cm to gravel

Recent soils	Lowland yellow brown earth soils
high summer rainfall limits variety of crops **3c1**	high summer rainfall limits variety of crops **3c2**
Summer rainfall does not limit variety of crops **2s1**	summer rainfall does not limit variety of crops **2s3**

Suite L4 LUC units 3e2, 3s1, 3s2, 3s4, 4s1, 4s2, 4s4, 4s7, 5s1, 5s2

Key Criteria

- Lowland, flat to gently sloping terraces, floodplains and fans (0-7°)
- moderate rainfall >800 <1600 mm
- shallow soils <45 cm to gravel

Recent soils	Yellow grey/yellow brown earth intergrade soils	Lowland yellow brown earth soils
soil depth 30-45 cm **3s1**	soil depth 30-45 cm significantly susceptible to erosion **Yes 3e2, No 3s2**	soil depth 30-45 cm **3s4**
soil depth 15-30 cm mild climate **4s1** cool climate **4s2**	soil depth 15-30 cm **4s4**	soil depth 15-30 cm **4s7**
soil depth 0-15 cm, boulders to surface **5s1**		soil depth 0-15 cm, boulders to surface **5s2**

Suite L5 LUC units 1w1, 2w1, 3w1, 4w3, 6w2, 7w1, 8w3

Key criteria

- Lowland, flat to gently sloping terraces, floodplains and fans (0-7°)
- low lying drainage impeded
- non saline
- low rainfall <800 mm
- recent alluvial soils
- depth to hydromorphic features

deep >90 cm	moderately deep 45-90 cm	shallow <45 cm
1w1	seasonally high water table**2w1**	seasonally high and/or moderately high water table **4w3**
	moderately high water table **3w1**	non arable with seasonally high and/or moderately high water table, good domestic grazing, little standing water **6w2**
		limited domestic grazing significant standing water **7w1**
		little or no domestic grazing, extensive standing water **8w3**

Suite L6 LUC units 3w2,4w2, 5w1, 6w2, 7w1

Key criteria

- Lowland, flat to gently sloping terraces, floodplains and fans (0-7°)
- low lying drainage impeded
- non saline
- moderate rainfall >800<1600 mm
- alluvial soils

arable	non arable
moderately deep (45-90 cm) to hydromorphic properties **3w2**	depth to hydromorphic properties <45 cm
	good domestic grazing, limited standing water **5w1**
	limited domestic grazing, significant standing water **Yes 7w1, No 6w2**
shallow to moderately deep (<45cm) to hydromorphic properties **4w2**	

Suite L7 LUC units 3s7, 4s6, 4w1, 5s4, 6w1, 7w2, 8w1

Key criteria

- Lowland, flat to gently sloping floodplains (0-7°)
- low lying drainage impeded
- saline
- low to moderate rainfall <1600 mm saline gley recent soils

arable	non arable
weakly saline **3s7**	moderately to strongly saline with water table >45 cm **5s4**
moderately saline with water table >45 cm **4s6**	moderately to strongly saline with water table <45 cm **6w1**
moderately saline with water table above 45 cm **4w1**	strongly saline, limited domestic grazing **7w2**
	strongly saline with no domestic grazing **8w1**

Suite L8 LUC units 4e7, 4s8, 6e12, 6s4, 7s2, 7e19, 8e15

Key criteria

- Lowland, flat to gently sloping coastal sand flats and dunes
- low to moderate rainfall <1600 mm
- Yellow brown sand soils

arable	non arable
flat to undulating susceptible to significant wind erosion **4e7**	flat to undulating susceptible to wind erosion **6e21**
NOT susceptible to significant wind erosion **4s8**	sand and gravel with low erosion susceptibility **6s4**
	stones and boulders with low erosion susceptibility **7s2**
	rolling to strongly rolling dunes with a severe erosion potential **7e19**
	foredunes with an extreme erosion potential **8e15**

Suite L9 LUC units 3e3, 3s8, 4e6

Key criteria

- Lowland, moderately sloping downlands (8-20°)
- low rainfall <800 mm
- developed on loess

Yellow grey and or yellow grey/yellow brown earth intergrade soils	
undulating to rolling (4-15°) **3e3** impeded drainage due to development of a fragipan **3s8**	rolling to strongly rolling (8-20°) **4e6**

Suite L10 LUC unit 4e1

Key criteria

- Lowland, moderately sloping downlands (8-20°)
- low rainfall <800 mm
- developed on calcareous or basaltic rocks

4e1

Suite L11 LUC units 3e4, 3e5, 4e2, 4e4

Key criteria

- Lowland, moderately sloping downlands (8-20°)
- moderate rainfall >800 <1600 mm
- developed on loess,
- Lowland yellow brown or yellow grey/yellow brown earth intergrade soils

Lowland yellow brown earth soils	Yellow grey/yellow brown earth intergrade soils
undulating to rolling (4-15°) **3e3**	undulating to rolling (4-15°) **3e4** rolling to strongly rolling (8-20°) mild to cool lowland environment **4e2** cool lowland / lower montane environment **4e4**

Suite L12 LUC units 4e3, 4e5, 6c3

Key criteria

- Lowland, moderately sloping downlands (8-20°)
- moderate rainfall >800 <1600 mm
- developed on colluvium, from indurated rocks
- Lowland yellow brown earth soils

exposed to strong salt laden winds **6c3**

slight summer moisture deficit and generally <100 asl **4e3**

generally >100 m asl with no significant summer moisture deficit **4e5**

Suite L13 LUC unit 4e11

Key criteria

- Lowland, moderately sloping downlands (8-20°)
- moderate rainfall >800 <1600 mm
- developed on calcareous or basaltic colluvium

4e11

Suite L14 LUC units 6e14, 6e15, 6e16, 7e16, 7e17, 8e3

Key criteria

- Lowland, hill and steeplands (>20°)
- low rainfall <800 mm
- developed on loess overlying weakly indurated rocks

strongly rolling to moderately steep (16-25°)	**steep to very steep (26-35°)**	**very steep >35°**
deep loess susceptible to tunnel gully erosion **6e14** variable loess on weakly indurated conglomerate **6e15** variable loess on weakly indurated mudstone/sandstone **6e16**	deep loess susceptible to tunnel gully erosion **7e17** variable loss on weakly indurated conglomerate **7e16**	on weakly indurated rocks **8e3**

Suite L15 LUC units 6c4, 6e12, 6e13, 7e14, 7e15

Key criteria

- Lowland, hill and steeplands (>20°)
- low rainfall <800 mm
- developed on strongly indurated rocks
- Yellow grey earth soils

strongly rolling to moderately steep (16-25°)	**strongly rolling to steep (16-35°)**	**steep to very steep (26-35°)**
with a negligible erosion hazard **6c4**	rainfall >650 mm **6e12** rainfall <650 mm **6e13**	rainfall <650 mm **7e14** rainfall >650 mm **7e15**

Suite L16 LUC unit 6e4

Key criteria

- Lowland, hill and steepland (>20°)
- low rainfall <800 mm
- on calcareous and/or basaltic rock

6e4

Suite L17 LUC units 6e6, 7e6, 7e13, 8e3

Key criteria

- Lowland, hill and steepland (>20°)
- moderate rainfall >800<1600 mm
- developed on weakly indurated rocks

strongly rolling to moderately steep (16-25°)	**steep to very steep (26-35°)**	**very steep (>35°)**
Yellow grey/yellow brown intergrade soils 6e6	Yellow grey/yellow brown intergrade soils **7e6** Yellow grey earth soils **7e13**	on weakly indurated rocks **8e3**

Suite L18 LUC units 6e5, 6e7, 6e8, 6e9, 6e10, 6e11, 7e4, 7e5, 7e7, 7e8, 7e9, 7e10, 7e11, 7e12, 8e2, 8e4

Key criteria

- Lowland, hill and steeplands (>20°)
- moderate rainfall >800 <1600 mm
- developed on strongly indurated rocks

strongly rolling to moderately steep (16-25°)	steep to very steep (26-35°)	very steep (>35°)
Yellow grey/yellow brown intergrade soils rainfall >1000 mm **6e5**	Yellow grey/yellow brown intergrade soils rainfall >1000 mm **7e4**	skeletal soils related to lowland yellow brown earths, cliffs, and active gullies **8e2**
rainfall <1000 mm in mild climates with low natural fertility soils **6e7**	rainfall <1000 mm in mild climates with low natural fertility soils **7e5**	lowland yellow brown earth or HCYBE soils below the timber line **8e4**
Lowland yellow brown earth soils	Lowland yellow brown earth soils	
rainfall <1100 mm slight summer moisture deficit **6e8**	rainfall <1100 mm slight summer deficit **7e7**	
coastal with rainfall <1200 mm and slight summer moisture deficit **6e10**	coastal with rainfall <1200 mm and slight summer moisture deficit **7e8**	
rainfall between 1000 - 1500 mm, in mild lowlands with a slight summer moisture deficit **6e9**	rainfall between 1000 - 1500 mm, in mild lowlands with a slight summer moisture deficit **7e9**	
rainfall <2200 mm in mild lowlands **6e11**	rainfall <2200 mm in mild lowlands **7e11**	
	rainfall between 1000-1300 mm adjacent Kaikoura coast **7e10**	
	lowland environments **7e12**	

Suite L19 LUC units 6e1, 6e2, 6e3, 7e1, 7e3, 7s5, 8e1, 8e16

Key criteria

- Lowland, hill and steeplands (>20°)
- moderate rainfall >800 <1600 mm
- developed on calcareous, basaltic or ultramafic rocks

strongly rolling to moderately steep (16-25°)	steep to very steep (26-35°)	very steep (>35°)
on basaltic materials in mild environment **6e1** on indurated limestone and/or calcareous sandstones **6e2** on basaltic materials in environments with a marked summer moisture deficit **6e3** on ultramafic colluvium **7s5**	on basaltic materials in mild environment **7e1** on indurated limestone and/or calcareous sandstones **7e3**	on indurated limestone **8e1** on ultramafic rocks **8e16**

Suite L20 LUC units 6e18, 7e18, 8e5

Key criteria

- Lowland, hill and steeplands (>20°)
- high rainfall >1600 mm
- developed on strongly indurated rocks
- Upland and high country podzolised yellow brown earth soils

strongly rolling to moderately steep (16-25°)	moderately steep to steep (21-35°)	steep very steep (26>35°)
6e18	**7e18**	**8e5**

HIGH COUNTRY ENVIRONMENT

Suite H1 LUC units 4e10, 6c1, 6e22, 6s5, 7s4, 8s1

Key criteria

- High country, flat to gently sloping terraces, floodplains and fans (0-7°)
- low rainfall <800 mm
- shallow soils <45 cm to gravel
- Upland and high country yellow brown earth soils

depth to gravels 15-45 cm	**depth to gravels <15 cm**
arable land, with depth to gravels generally >30 cm, and <1100 m asl **4e10**	
non arable land, generally <30 cm, susceptible to wind erosion **6e22**	non arable land relatively boulder free **6s5**
NOT susceptible to significant wind erosion (depth to gravels generally 30+ cm, favourable sites) **6c1**	stones and boulders to the surface **7s4**
	stones and boulders to the surface and prone to inundation and sedimentation **8s1**

Suite H2 LUC units 3c3, 4c1, 4e8, 4e9

Key criteria

- High country, flat to gently sloping terraces, floodplains and fans (0-7°)
- moderate rainfall >800 <1600 mm
- deep soils >45 cm to gravel

fine textured recent soils	**lowland yellow brown earth soils**	**upland and high country yellow brown earth soils**
susceptible to occasional flooding and deposition **4e8**	**3c3**	**4e9**
Non susceptible to erosion **4c1**		

Suite H3 LUC units 4e10, 4s9, 4s10, 5s3, 6s2, 6s3, 7s3, 8s1

Key criteria

- High country, flat to gently sloping terraces, floodplains and fans (0 - 7°)
- moderate rainfall >800 <1600 mm
- shallow soils <45 cm to gravel

recent soils	upland and high country yellow brown earth soils
depth to gravels 15-45 cm **4s10**	depth to gravels 15-45 cm susceptible to wind erosion **4e10** stony and not particularly susceptible to wind erosion **4s9**
depth to gravels <15 cm relatively boulder free **6s2** stones and boulders to surface and free from inundation and deposition **5s3** boulders and stones to surface and prone to minor/ extensive deposition and inundation **7s3/8s1**	depth to gravels <15 cm relatively boulder free **6s3**

Suite H4 LUC units 4w4, 6w3, 7w3, 7w4, 8w2

Key criteria

- High country, flat to gently sloping terraces, floodplains and fans (0-7°)
- low lying drainage impeded
- moderate rainfall >800 <1600 mm

alluvial soils	organic soils
arable land with hydromorphic features at less than 45 cm **4w4**	
non arable land with good domestic grazing potential and limited standing water **6w3**	
non arable land with limited domestic grazing potential and significant standing water **7w3**	non arable land with limited domestic grazing potential and significant standing water **7w4**
non arable land with little or no domestic grazing potential and extensive standing water **8w2**	non arable land with little or no domestic grazing potential and extensive standing water **8w2**

Suite H5 LUC units 6c1, 6e22, 7c3

Key criteria
- High country, moderately sloping (8-20°) moraines, fans
- low rainfall <800 mm

undulating to rolling (4-15°) stable land <1100 m asl with a sheltered aspect **6c1**	undulating to rolling (4-15°) stable slopes >1000 m asl **7c3**
with loess soils susceptible to wind erosion **6e22**	

Suite H6 LUC units 6c2, 6e20, 7c1, 7e21, 7s5

Key criteria
- High country, moderately sloping (8-20°) moraines, fans, footslopes
- moderate rainfall >800<1600 mm

generally below 1100 m	**generally above 1100 m**
susceptible to wind erosion **6e20**	susceptible to wind erosion **7e21**
stable generally not susceptible to wind erosion **6c2**	stable generally not susceptible to wind erosion **7c1**
developed on ultramafic colluvium **7s5**	developed on ultramafic colluvium **7s5**

Suite H7 LUC units 7c2, 8e10

Key criteria
- High country, moderately sloping (8-20°) exposed uplands above 950 m asl
- moderate to high rainfall >1200 mm

with limited domestic grazing potential **7c2**	with very limited or no domestic potential grazing potential **8e10**

Suite H8 LUC units 6e19, 6e23, 7e20, 7e23, 7e26, 8e7, 8e8

Key criteria

- High country, hill and steeplands (>20°)
- low rainfall <800 mm
- Developed on strongly indurated Canterbury suite rocks with upland and high country yellow brown earth soils

generally <1300 m asl	**generally >1200 m asl**
moderately steep to steep (21-35°) hill country with 1 to 2 present erosion severity **6e19**	
moderately steep to steep (21-35°) steeplands with 2 to 3 present erosion **7e20**	moderately steep to steep (21-35°) steeplands with 2 to 3 present erosion severity **7e23**
steep to very steep (26-25°) steeplands with 3 to 5 present erosion severity **8e7**	steepland to very steep (26-35°) steeplands with 3 to 5 present erosion severity **8e8**
Developed on moderately to strongly indurated Cretaceous sedimentary rocks with problematical yellow grey/yellow brown intergrade soils	
strongly rolling to steep hill country (16-35°) with 1 to 2 present erosion severity **6e23**	steep to very steep hill country (21-35°) with 2 to 3 present erosion severity **7e26**

Suite H9 LUC units 6e3, 7e2, 8e7, 8e11

Key criteria

- High country, hill and steeplands (>20°)
- low rainfall <800 mm
- Developed on basalt and associated basaltic sedimentary rocks, brown granular loam and clay and associated soils

rolling to steep hill country (8-35°) generally <1200 m asl with 1 to 2 present erosion severity **6e3**

steep to very steep hill and steeplands (26->35°) generally >1000 m asl with 1 to 3 present erosion severity **7e2**

steep to very steep (26->35°) steeplands with 3 to 5 present erosion severity **8e7**

steep to very steep (26 ->35°) with 2 to 5 present erosion severity, above the altitude of semi continuous vegetation (generally >1800 m) **8e11**

Suite H10 LUC units 6e17, 7e22, 7e24, 8e4, 8e9, 8e14, 8e16

Key criteria

- High country, hill and steeplands (>20°)
- moderate rainfall >800 <1600 mm
- developed on strongly indurated rocks below the indigenous tree line

Upland and high country yellow brown earth	lowland yellow brown earth soils	on ultramafic rocks
Strongly rolling to steep hill country (16-35°) with 1 to 2 present erosion severity **6e17**		**8e16**
with 2 to 3 present erosion severity **7e22**		
steep to very steep (26->35°) with 2 to 3 present erosion severity and limited productive capacity **7e24**	steep to very steep (26->35°) with 1 to 3 present erosion **8e14**	
>1000 m asl with 2 to 4 present erosion severity and nil productive capacity **8e9**		
talus sheets and cones 12-1700 m asl with 2 to 4 erosion severity **8e14**		

Suite H11 LUC units 7e25, 8c1, 8e11, 8e13, 8e16

Key criteria

- High country, hill and steeplands (>20°)
- moderate rainfall >800 <1600 mm
- developed on strongly indurated rocks above the indigenous tree line

Upland and high yellow brown earth soils	on ultramafic rocks
moderately steep to steep (21-35°) with 2 to 3 present erosion severity **7e25**	**8e16**
steep to very steep (26->35°) with 2 to 3 present erosion severity, below the altitude of semi continuous vegetation **8e11**	
steep to very steep (26->35°) with 2 to 5 present erosion severity, above the altitude of semi continuous vegetation (generally >1800 m) **8e13**	
rolling to strongly rolling (8-20°) stable basins above 1600 m with 1 to 2 present erosion severity **8c1**	

Suite H12 LUC units 7e24, 8e5, 8e6, 8e14, 8e16

Key criteria

- High country, hill and steeplands (>20°)
- high rainfall >1600 mm
- developed on strongly indurated rocks below the indigenous tree line

Upland and high country yellow brown earth soils	Upland and high country podzolised yellow brown earth and podzol soils	on ultramafic rocks
steep to very steep slopes (26-35°) with 2 or 3 present erosion severity **7e24**	steep to very steep slopes (26-35°) with 1 to 3 present erosion severity **8e5**	**8e16**
steep to very steep slopes (26-35°) generally >1000 m asl with 2 to 4 erosion severity **8e6**		
talus sheets & cones <1400 m asl with 2 to 4 erosion severity **8e14**	talus sheets & cones <1400 m asl with 2 to 4 erosion severity **8e14**	

Suite H13 LUC units 7e25, 8c1, 8e12, 8e13, 8e16

Key criteria

- High country, hill and steeplands (>20°)
- high rainfall >1600 mm
- developed on strongly indurated rocks above the indigenous tree line

Upland and high country yellow brown earth soils	on ultramafic rocks
moderately steep to steep (21-35°) with 2 to 3 present erosion severity **7e25**	**8e16**
steep to very steep (26->35°) with 2 to 3 present erosion severity **8e12**	
steep to very steep (26->35°) with 2 to 3 present erosion severity above the altitude of semi continuous vegetation **8e13**	
rolling to strongly rolling (8-20°) stable basins above 1600 m with 2 to 3 present erosion severity **8c1**	

Appendix 2.1. Authors and dates of fieldwork and compilation of 2nd Edition, NZLRI data for the Marlborough Region

Infomap 260 Sheet		Author	Date of Fieldwork
prt M 30	Matakitaki	Barringer J.R.; Hunter G.G.	1989/90
prt M 31	Lewis	Hunter G.G.	1989
prt M 32	Boyle	Hunter G.G.	1989
prt N 28	Golden Downs	Hunter G.G.	1990
prt N 29	St Arand	Barringer J.R.; Lynn I.H.; Hunter G.G.	1990
N 30	Tarndale	Hunter G.G.; Barringer J.R.; Lynn I.H.; Basher L.R.	1989-92
N 31	Acheron	Hunter G.G.	1989
prt N 32	Hanmer	Hunter G.G.	1989
prt O 28	Wairau	Lynn I.H.; Hunter G.G.	1990
O 29	Waihopai	Lynn I.H.	1990/91
O 30	Awatere	Basher L.R.; Lynn I.H.; Hunter G.G.	1989-91
O 31	Kaikoura	Hunter G.G.	1989
prt P 27	Picton	Lynn I.H.	1990
P 28	Blenheim	Lynn I.H.	1990/91
P 29/Q 29	Grassmere	Lynn I.H.	1990-93
P 30	Clarence	Lynn I.H.	1992/93

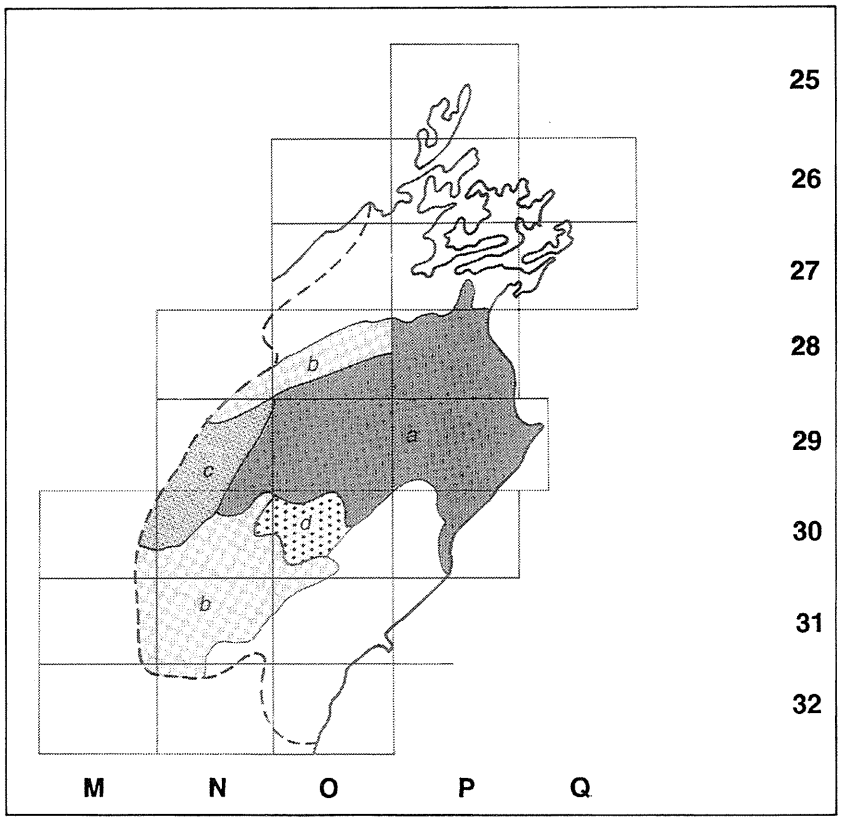

Figure 3 *Authorship of 2nd Ed. NZLRI data for Marlborough Region a, I.H. Lynn; b, G.G. Hunter; c, J.R. Banninger; d, L.R. Basher.*

Appendix 2.2. Background information sourced from the Nelson-Marlborough Regional Council

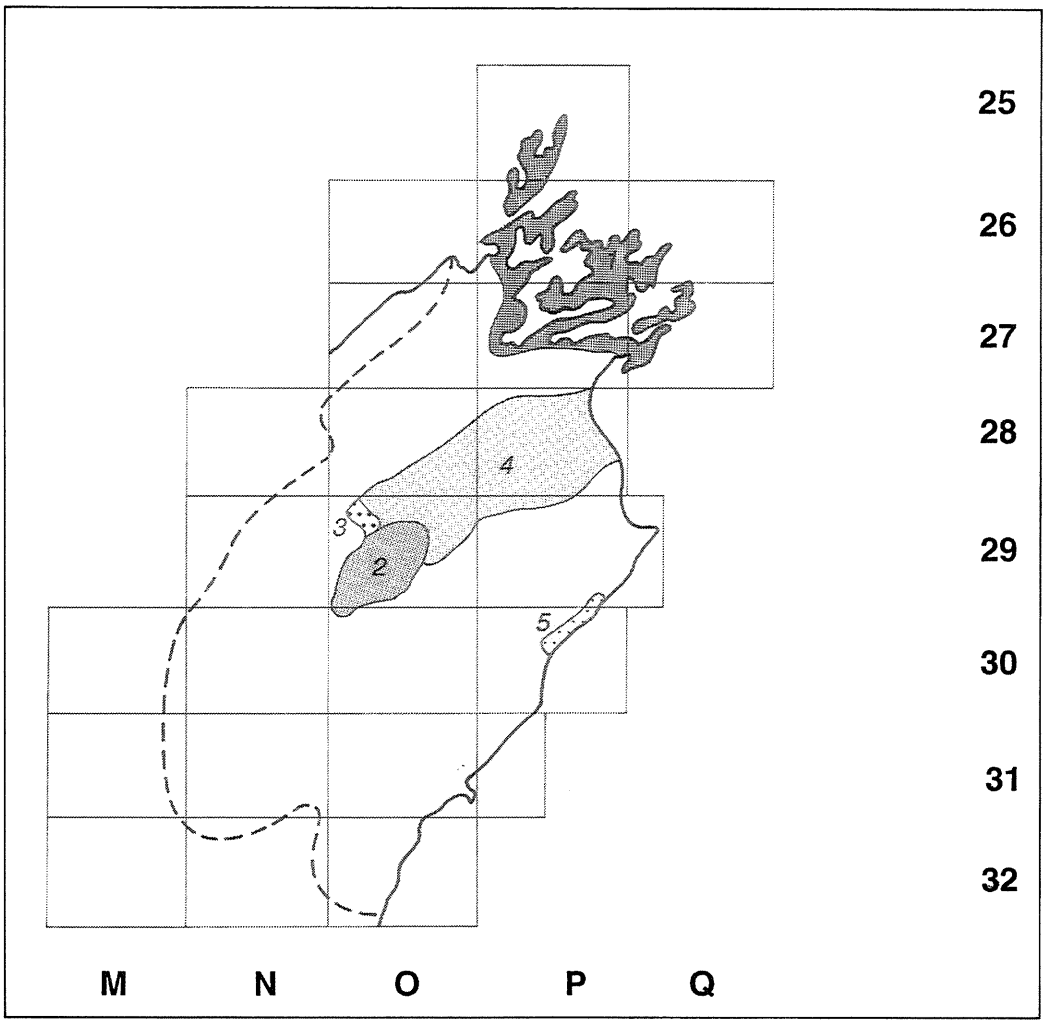

Figure 4 *Background information sourced from the Nelson - Marlborough Regional Council*

1. Marlborough Sounds Survey: Sutherland R.D. 1986
2. Upper Waihopai Catchment Control Scheme: Sutherland R.D.; Gibbs L.J.; Mitchell J.M.; Tozer C.G.; Giles S.M.; McNabb R.D. 1987
3. Wye Catchment Soil Conservation Reserve: Bloomberg M. 1988
4. Lower Wairau Resource Survey: Giles S.M.; Mitchell J.M.; Tozer C.G. 1989
5. East Coast Survey; Browning L.D.; Cunliffe J.J.; Mackay D.A.; Wright A.F. 1978

Appendix 3. Abbreviations used in the Marlborough Region extended legend

General

a.s.l.	above sea level

Soils

bgl	brown granular loam
bglc	brown granular loam and clay
Gley	Gley
Gr	gley recent
lybe	lowland yellow brown earth
organics	organics
R	recent
Rend.	rendzina and related soils
Saline Gr	saline gley recent
uhcybe	upland and high country yellow brown earth
uhc pod. ybe	upland and high country podzolised yellow brown earths
uhc pod. ybe & p.	upland and high country podzolised yellow brown earth and podzols
yge	yellow grey earth
yg/yb	yellow grey/yellow brown earth intergrade
ybe assoc. yge	yellow brown earths associated with yellow grey earths
ybs	yellow brown sands

Productivity indices

irr	irrigated
US	unsuitable