

Map Your Land Resources

The Land Use Capability Approach

Understanding the physical resources of your farm is essential to managing your farm business.

The Land Resource Inventory technique maps your farm based on a field assessment. The resulting information is presented as a Land Use Capability map, which helps you understand the land's capability for long term sustainable land use.

Beef + Lamb New Zealand uses Land Use Capability maps to assess the physical characteristics of the land to aid management of a variety of land management issues.

What's the goal?

The goal is a mapped paddock-scale inventory describing the land resource according to published standards for Land Use Capability (LUC).

The inventory is displayed as:

1. A Land Resource Map showing soils or LUC map at the paddock scale (1:5,000 to 1:30,000 depending on farm size and land use intensity). 1:10,000 is a well-recognised scale suitable for farm management. (Do not use regional or national scale maps overlaid onto the farm, as the scale is not accurate enough.)
2. An Extended Legend describes characteristics of the mapped physical resources and other useful information. Why? Without an underlying description, the Land Resource Map would be little more than a pretty picture. This information is used as a basis for the strengths, weaknesses, opportunities and threats analysis in your plan.



Definitions:

Land Resource Inventory (LRI)

Inventory of five physical factors (rock, soil, slope, erosion type and severity, and vegetation). The inventory is the basis of assessing land resources.

Land Use Capability classification (LUC)

Systematic arrangement of different kinds of land, according to those properties that determine its capacity for long-term sustained production. "Capability" is used in the sense of suitability for productive use or uses after taking into account the physical limitations of the land.

The inventory is prepared according to standards or guidelines set out in:

- Beef + Lamb New Zealand Land and Environment Plan Guidelines: Level 2, Resource Guide booklet
- Land Use Capability Survey Handbook: A New Zealand handbook for the classification of land (3rd edition).

These two publications provide mapping and description procedures for achieving a standard of survey suitable for Level 3 Land and Environment Planning (see Resources).

Developing your Land Resource Inventory & Land Use Capability Map

At least three options are available:

1. Many erosion-affected farms have had paddock scale LUC mapping undertaken by the old Catchment Boards and, more recently, by some regional councils. Contact your local regional council if LUC mapping has been done for your farm.
2. Have a professional undertake new mapping. Qualified soil surveyors can be difficult to find, but there are LUC surveyors available. Likewise, some regional councils may be prepared to undertake a LUC survey on your behalf if it falls within their environmental programmes.
3. Do it yourself. LUC mapping is simply an advance on the steps outlined in the Level 2 LEP Guidelines (landform mapping—see link in 'Resources'). The following mapping standards and guidelines are designed to be practical and simple:
 - Land Use Capability Survey Handbook
 - Introductory Guide to Farm Soil Mapping, designed especially for farming (see Resources).

Land Use Capability (LUC) system

The LUC system ranks land according to its capability to sustain a productive land use over time. It was originally developed for early types of Land and Environment Planning.

What does it involve?

This system involves two parts:

1. Land Resource Inventory (LRI) mapping, followed by
2. LUC classification.

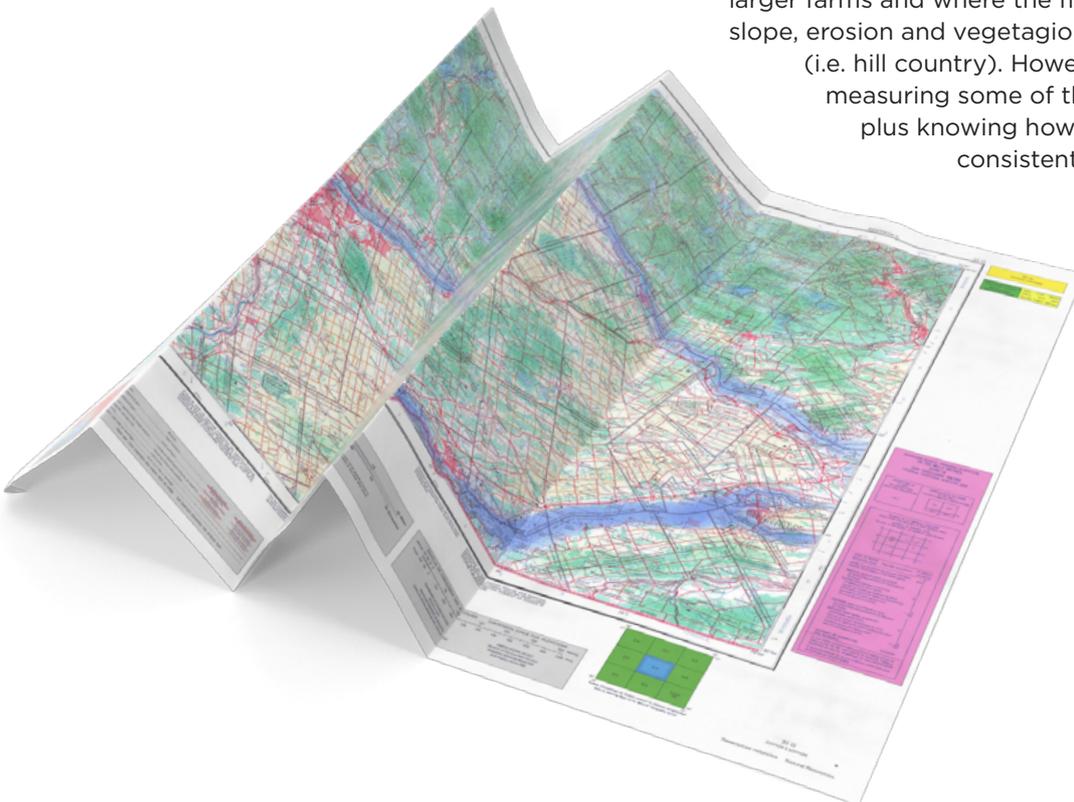
LRI records rock type, soil unit, slope, erosion type and severity, and vegetation cover as codes. A new LRI unit is mapped when there is a change in any one factor.

LRI is classified into LUC using:

- 8 x LUC Classes—rank land from the highest to lowest capability
- 4 x LUC subclasses—indicate the most limiting factor to production (climate, soil, wetness, erodibility)
- 1 x LUC unit—a more detailed ranking that can also link into regional classifications for more information.

When to use the LUC system

LUC was designed to be relatively quick to apply across extensive areas. It is therefore most useful on larger farms and where the five LRI factors (rock, soil, slope, erosion and vegetation) are easy to recognise (i.e. hill country). However, identifying or measuring some of the LRI factors correctly, plus knowing how to apply the classification consistently, requires a degree of self-calibration.



Interpreting map codes

Both Land Resource Inventory (LRI) and Land Use Capability (LUC) are recorded using codes to maximise information content.

LRI code

LRI code is recorded using a standard five-factor format of:

Rock type > Soil unit > Slope class

Erosion type and severity > Vegetation

Rock type

Directly influences the soil type, surface stability and land use of any site.

Rock type examples:

Mb= Bedded mudstone

Si= Siltone

LO= Loess

SM= Sandstone

Gr= Gravel

Us= Unconsolidated sand and silt

AL= River alluvium

Soil unit

See your local Regional Council and/or Landcare Research S-map (an online tool) for details about soil properties, potential uses and productive potential. NB: Beware of map scale. High-scale maps do not provide sufficient accuracy for farm- scale mapping.

Soil unit examples:

1= Takapau silt loam

2= Takapau sandy loam

3= Matapiro silt loam deep

4= Matapiro silt loam shallow

5= Waituna sandy loam

6= Puketapu steepland soils

BR= bare rock

Slope class

Slope is estimated visually in the field and/or from aerial photographs. The dominant slope is recorded for each map unit. Sometimes two slope classes are recorded, if they cannot be split in the mapped polygon.

Slope class are:

A= 0-3 degrees

B= 4-7 degrees

C= 8-15 degrees

D=16- 20 degrees

E= 21-25 degrees

F= 26-35 degrees

G= >35 degrees

Erosion type

Erosion type and severity are assessed by field work or from aerial photographs, aided by knowledge of rock, soil, slope and climate factors which directly affect erosion and land use patterns.

Examples are:

W= Wind erosion

Sh= Sheet erosion

Ss= Soil slip

G= Gully erosion

Ef= Earthflow

Erosion severity

Erosion severity is recorded:

- As a percentage of bare ground (e.g. if wind or sheet erosion), or

- According to a scale (e.g. if soil slip and gully erosion is negligible to extreme).

Erosion severity scale is:

0= Negligible

1= Slight

2= Moderate

3= Severe

4= Very severe

5= Extreme

Vegetation

Vegetation type is derived from fieldwork and aerial photographs, published maps and descriptions for forest areas. Vegetative cover for each map unit is recorded as one of five major groups:

1. Grassland
2. Cropland
3. Scrub land
4. Forest, or
5. Miscellaneous weeds, herbs etc.

Examples are:

gl= Improved pasture

gS= Semi- improved pasture

hR= Rushes and sedges

fF= Exotic conifer forestry

fO= Bush

sM= Manuka/kanuka

This land resource inventory is then described in a simple code that helps the mapper record the information to develop the LUC units.

For example, this code

Lo/Sm- 5- E+F

2Ss- glgShRfO

becomes **Vle12**

Vle12 would be read as:

- Loss over sandstone
- Waituna sandy loam soil
- Slopes ranging from 21-35 degrees (moderately steep to steep)
- Moderate soil slip erosion
- A mix of improved and semi-improved pasture, together with rushes and some bush.

The LUC code is represented by three parts:

VI	e	12
Class	Subclass	Unit

The Class indicates the general capability of land for productive use under common land uses. Eight Roman numeral classes are used, with LUC Class I representing the best land with elite soils, through to LUC Class VIII land which is generally unsuitable for production (e.g. gorges, bluffs, river beds).

The subclass indicates the major limitation that constrains land use in some manner. Limitations include:

- wetness (e.g. poor drainage)—w
- soil rooting zone (e.g. stoniness)—s
- climate—c
- erosion—e.

The unit groups classifications according to similarities for management. For example, LUC Vle11 in the map is slightly different than LUC Vle12 because it requires different soil conservation management. These units can be created especially for an individual farm (e.g. Vle 1, 2, 3...) or taken from a regional classification (like the map).

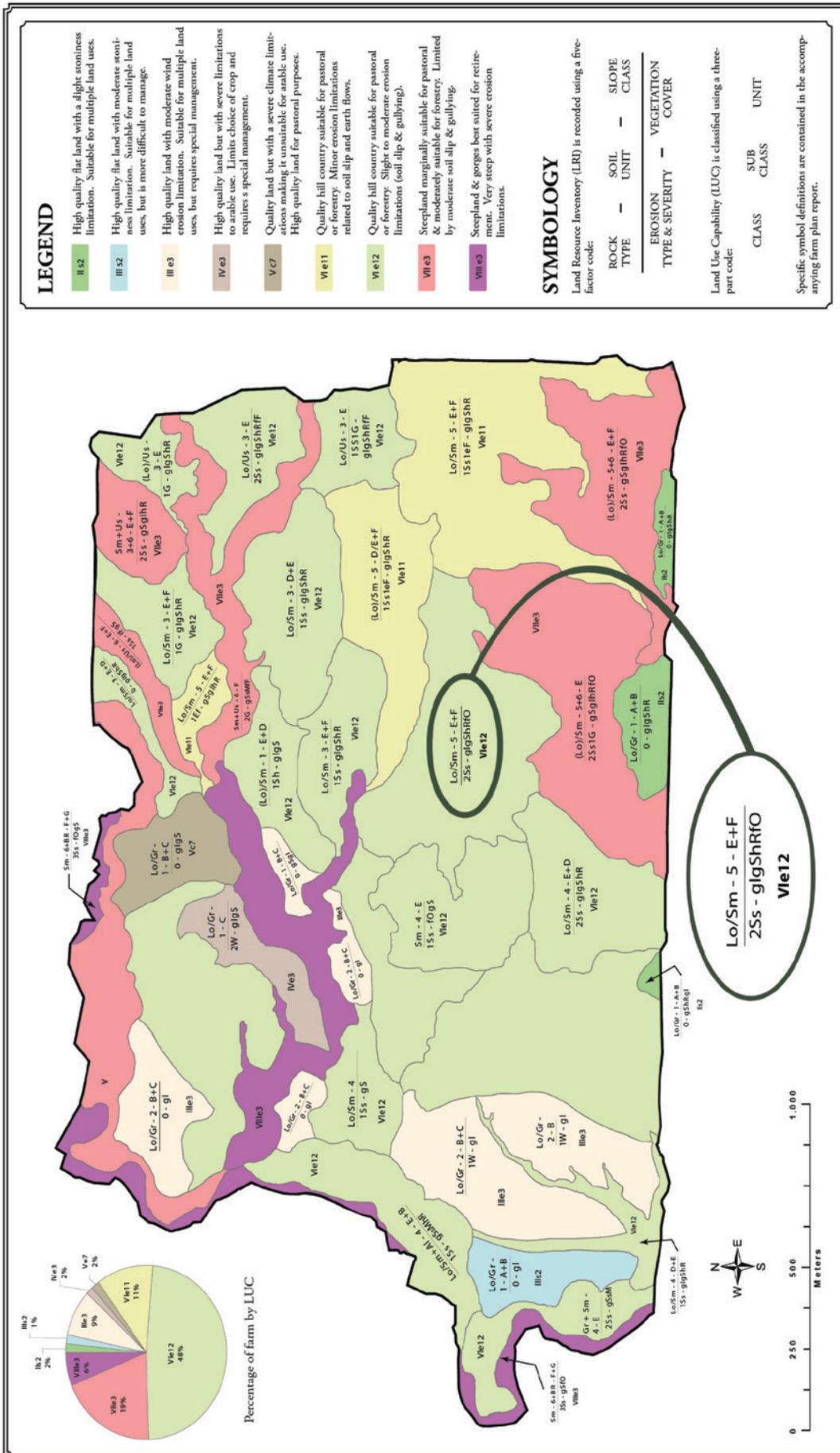
Extended Legend

Users do not need an expert understanding of LRI and LUC codes, because each LUC classification is summarised in an extended legend.

The extended legend is exactly that—extended detail on each LUC code. So, once you have established the LUC codes relevant to your property, you need to go to the extended legend and find out further detail, such as stock carrying capacity, plantation forestry site index and conservation measures. There are also regional classification publications, which give you similar and even deeper information. See Resources.



Example of finished product



EXTENDED LEGEND (Land use capacity), Gleniliad Farm, Puketapu

LUC	Ha	Description	Rock type	Soil	Slope	Vegetation
IIs2	9.0	Flat terraces with minor undulations	Deep wind-blown loess over gravels	Takapau silt loam	Flat (0-3°) & some undulating (4-7°)	Pasture with some rushes
IIs2	7.7	Flat terrace with minor undulations	Loess over gravels	Takapau silt loam	Flat (0-3°) & some undulating (4-7°)	Well developed pasture
IIIe3	44.5	Uneven terraces	Loess over gravels	Takapau sandy loam	Undulating (4-7°) & rolling (8-15°)	Well developed pasture
IVe3	7.8	High terrace from flat to rolling	Loess over gravels	Takapau silt loam	Rolling (8-15°)	Pasture
Vc7	9.2	High terrace exposed to prevailing wind	Loess over gravels	Takapau silt loam	Rolling (8-15°) to strongly rolling (16- 20°)	Mostly old browntop pasture
VIe11	58.4	Most productive hill country	Loess over sandstone	Waituna sandy loam	Strongly rolling (16- 20°) & moderately steep (21-25°)	Developed pastures with rushes
VIe12	248.2	Hill country and steepland	Loess over sandstone or unconsolidated sands/silts	Matapiro silt loam, deep & shallow phases	Strongly rolling (16- 20°) & moderately steep (21-25°)	Pasture & forestry with scattered bush, scrub & rushes.
VIIe3	100.6	Hard steepland and easier gorges	Various combinations of loess over sandstone or unconsolidated sands/silt	Waituna sandy loam & Puketapu steepland soils	Moderately steep (21-25°) & steep (26- 35°)	Pasture with scattered bush, scrub & rushes.
VIIIe3	31.6	Steep gorges and river scarps	Sandstone & unconsolidated sand/silt	Puketapu steepland soils & bare rock	Steep (26-35°) & very steep (>35°)	Pasture with scattered bush, scrub & some forestry.

Erosion	Land use suitability	Considerations
Nil	<ul style="list-style-type: none"> • Intensive cropping • Intensive pastoral • Viticulture & horticulture 	<ul style="list-style-type: none"> • Shelter recommended • Care with cultivation to avoid wind erosion
Nil	<ul style="list-style-type: none"> • Intensive cropping • Intensive pastoral • Viticulture & horticulture 	<ul style="list-style-type: none"> • Shelter needed • Vary careful cultivating to avoid wind erosion
Minor wind in places	<ul style="list-style-type: none"> • Cropping (with care) • Finishing 	<ul style="list-style-type: none"> • Shelter needed • Vary careful cultivation to avoid wind erosion
Moderate wind	<ul style="list-style-type: none"> • Fodder cropping (with care) • Pastoral 	<ul style="list-style-type: none"> • Only cultivate after shelter planted & then with extreme care
Nil	<ul style="list-style-type: none"> • Pastoral • Forestry in places 	<ul style="list-style-type: none"> • Requires more shelter • No cultivation • Could develop with water retention
Slight soil slip & earth flow	<ul style="list-style-type: none"> • Pastoral (with conservation practices) • Forestry in places 	<ul style="list-style-type: none"> • Strategic pole planting • Avoid heavy winter stock
Slight gully & soil slip erosion (moderate in places)	<ul style="list-style-type: none"> • Pastoral (with conservation practices) • Forestry in places 	<ul style="list-style-type: none"> • The large bush are could be covenanted • Strategic pole planting
Moderate and slight gully & soil slip erosion	<ul style="list-style-type: none"> • Forestry • Pastoral (with conservation practices) 	<ul style="list-style-type: none"> • Gorges particularly suitable for Blackwoods • Strategic pole planting
Severe soil slip	<ul style="list-style-type: none"> • Carbon farming • Retirement • Some forestry in places 	<ul style="list-style-type: none"> • Possums & weed control • Fences require upgrading in places



Resources

Beef + Lamb New Zealand Land and Environment Plan Guidelines: Level 2 (contains guidelines on landform mapping)

Beef + Lamb New Zealand Land and Environment Plan Guidelines: Level 3

Land Use Capability Survey Handbook: A New Zealand handbook for the classification of land. 3rd Edition

New Zealand Soil Mapping Protocols and Guidelines

Landcare Research's S-map

Soil Description Handbook—Revised Edition. Manaki Whenua Press, Lincoln, Canterbury, NZ Authors: J D G Milne, B Clayden, P L Singleton, & A D Wilson (1995)

Land Use Capability Regional Classification and Land Resources

NORTH ISLAND

Land Use Capability Classification of the Northland region: A report to accompany the second edition New Zealand Land Resource Inventory. Landcare Research Science Series No. 9

Land Use Capability Classification and Land Resources of the Coromandel and Gt Barrier Island Region: a bulletin to accompany the New Zealand Land Resource Inventory Worksheets

Land Use Capability Regional Classification and Land Resources of the Bay of Plenty Volcanic Plateau Region: a bulletin to accompany the New Zealand Land Resource Inventory Worksheets Water and Soil Miscellaneous Publication No. 89

Land Use Capability Classification of the Waikato region 1st Ed: A report to accompany the first edition New Zealand Land Resource Inventory. Contact Landcare Research or the Waikato Regional Council to access a copy.

Land Use Capability Regional Classification of the Gisborne-East Coast region: a report to accompany the second-edition, New Zealand land resource. Landcare Research Science Series No. 21

Land Use Capability Regional Classification of the Northern Hawke's Bay Region: a bulletin to accompany the New Zealand Land Resource Inventory Worksheets. Water and Soil Miscellaneous Publication No. 109

Land Use Capability Regional Classification of the Southern Hawke's Bay Wairarapa Region: a bulletin to accompany the New Zealand Land Resource Inventory Worksheets. Water and Soil Miscellaneous Publication No. 74

Land Use Capability Regional Classification and Land Resources of the Manawatu Rangitikei Region: a bulletin to accompany the New Zealand Land Resource Inventory Worksheets. Water and Soil Miscellaneous Publication No. 110

Land Use Capability Classification of the Wellington region. Landcare Research Science Series No.6

SOUTH ISLAND

South Island Land Use Capability extended legend for the New Zealand Land Resource Inventory

Land Use Capability Classification of the Marlborough region: A report to accompany the second edition New Zealand Land Resource Inventory. Landcare Research Science Series No. 12