Manaaki Whenua
Landcare Research

Land Use Capability back in the spotlight

and the new Land Resources Portal

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Outline

1. Introduction to the NZ Land Use Capability system
2. The new Land Resources Portal
3. NZLRI & LUC towards the future

The NZ Land Use Capability system - Intro

- What is LUC?
  - An 8 class classification of land for sustainable use & production
  - Initially developed as a rapid system of appraising land for farm planning (LRI = facts & data, LUC = classification)
  - National spatial database for policy & planning (NZLRI)
  - National standards & methods (Land Use Capability Survey Handbook, 3rd Ed., revised & reprinted 2021)

- A considerable legacy
  - US development origins 1930s dustbowl & watershed mgt
  - NZ adoption 1950s soil & water conservation
  - Enormous period of application and development over the 1960s, 70s, and 80s, and into the 1990s. Golden period of progress.
  - 1989 reforms

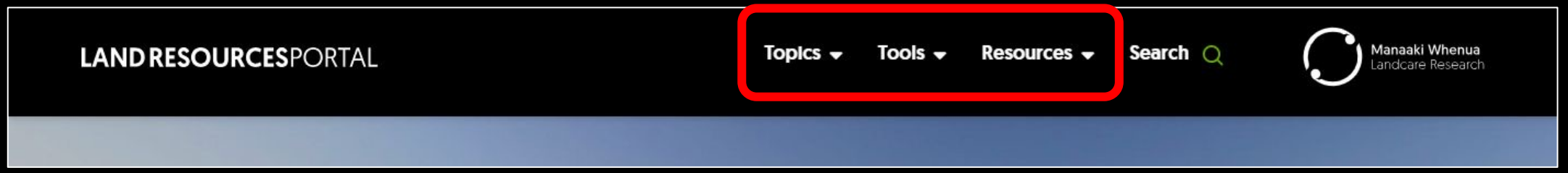
The NZ Land Use Capability system - Intro

- Back in the spotlight
  - Never really went away - continued uses espc. policy & farm planning by councils. NZLRI derivative products.
  - New wave of policies - NES Commercial Forestry, NPS Freshwater Mgt, NPS Highly Productive Land
  - Multitude of spatial applications to match the demand for spatial data – **still NZ's #1 land resource spatial dataset**.

- Manaaki Whenua Landcare Research's role
  - Custodian of the NZLRI (part of LRIS)
  - Shared responsibility for promoting national uniformity of application through standards & methods
  - Improvement and facilitation through the LUC Governance Group (industry, councils, ministries, researchers, users)
  - MWLR is the post-1989 organisation that inherited much of the expertise and resources regarding LUC
  - Sharing/distributing our data and resources…

The new Land Resources Portal

What's on the new portal?



Topics: Content-heavy pages, explainers, help

Tools: MWLR platforms and services providing LUC information

Resources: LUC-related documentation

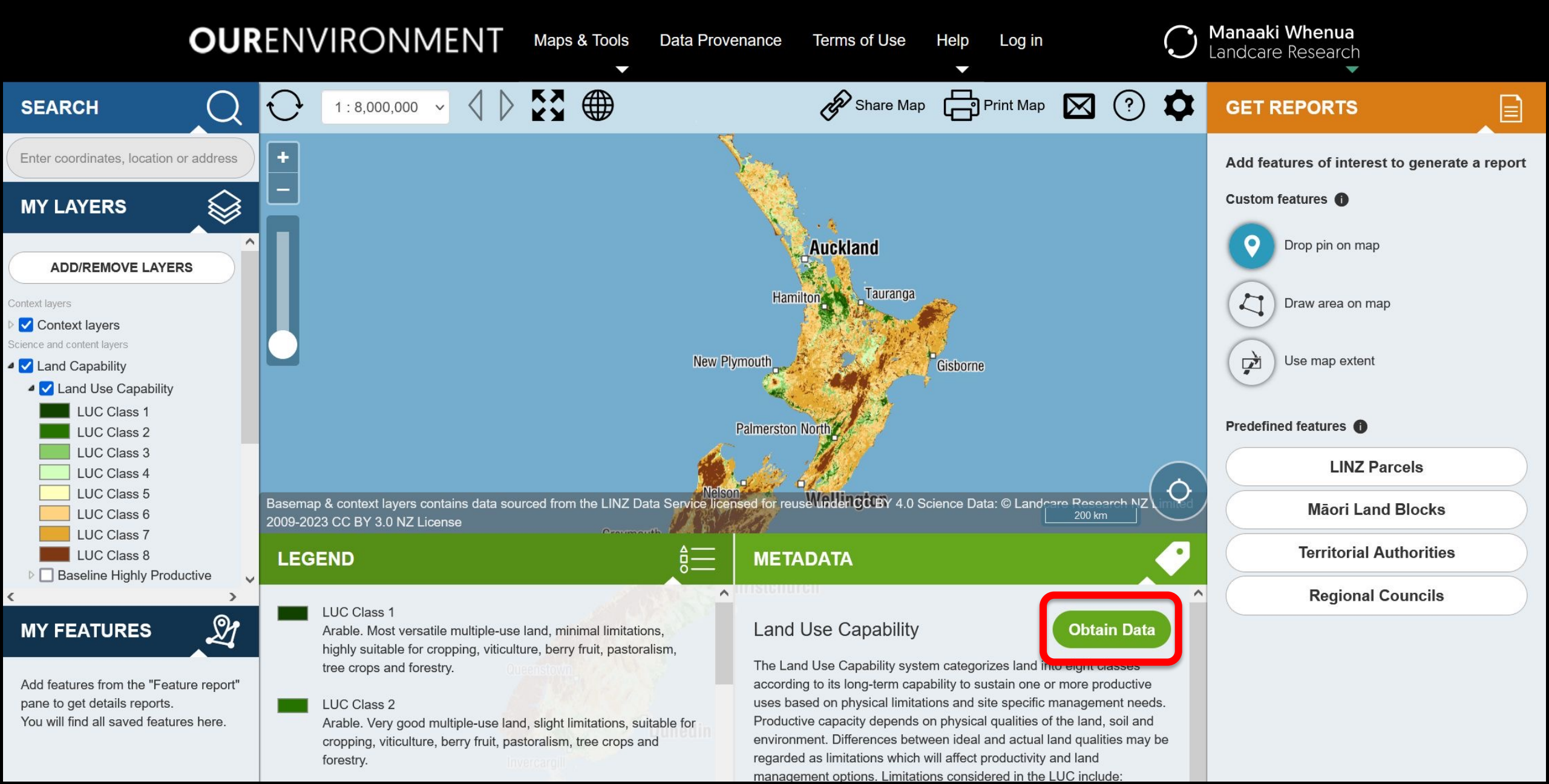
Topics

- Understanding LUC and NZLRI
- Applications at local and regional scale
- LUC surveys
- LUC governance

Watch this space – more topics to come…

Tools

- Links to existing tools providing LUC data
  - OurEnvironment
  - LRIS Portal
  - Whenua Maori Visualisation Tool
- Other land-related tools



https://ourenvironment.scinfo.org.nz/

LRISPORTAL Manaaki Whenua Landcare Research More information services Data Map Help Log in

https://lris.scinfo.org.nz/layer/48076-nzlri-land-use-capabilit... Landcare Research via LRIS Portal

NZLRI Land Use Capability 2021

Map ×

Info History Services and APIs

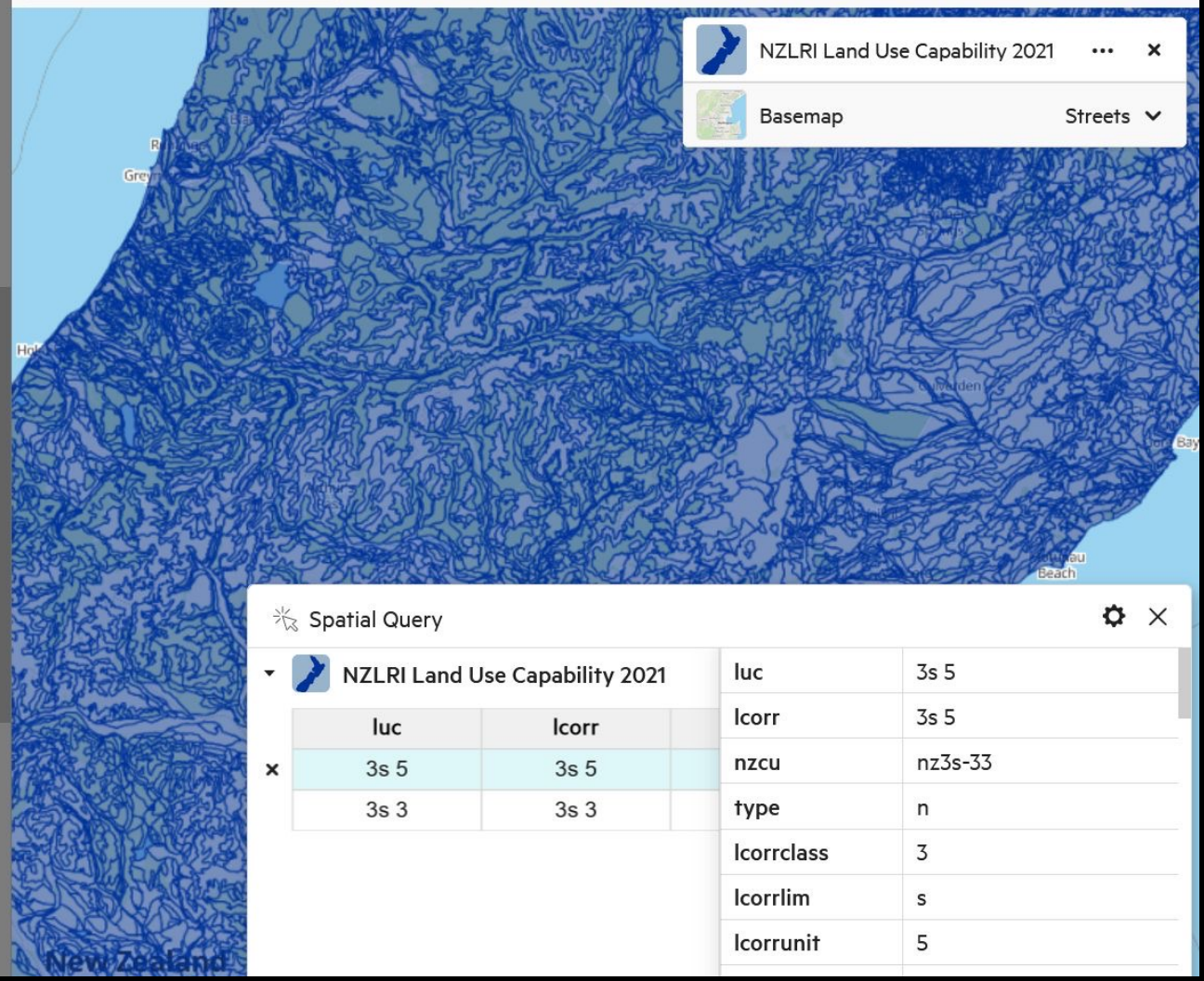
Data Type
Polygon Layer, 107.3K Polygons

Date Added	Last Updated	Views	Exports	Layer ID
+ 25 May 2010	28 Aug 2023	144.5K	7.5K	48076

The New Zealand Land Resource Inventory (NZLRI) is a national database of physical land resource information. It comprises two sets of data compiled using stereo aerial photography, published and unpublished reference material, and extensive field work:

NZLRI Land Use Capability 2021 File View Tools Export

Find location Contents



https://lris.scinfo.org.nz/layer/48076-nzlri-land-use-capability-2021/

Resources

- Key LUC documents
- LUC documentation per NZ region
- MWLR publications
- Digital LUC survey

Resources: Key documents

Land Use Capability Survey Handbook (3rd Edition)
2009 / 2021

Land Use Capability Survey Handbood (2nd Edition)
1971

Introductory guide to farm soil mapping
2007

Urban Land Use Capability Survey Handbook
1987

Correlation of North Island regional LUC units from the NZLRI
1985

A manual of land characteristics for evaluation of rural land
1995

Guidelines for assessing LUC in South Island pastoral high country lands
1992

Our Land Resources
1979

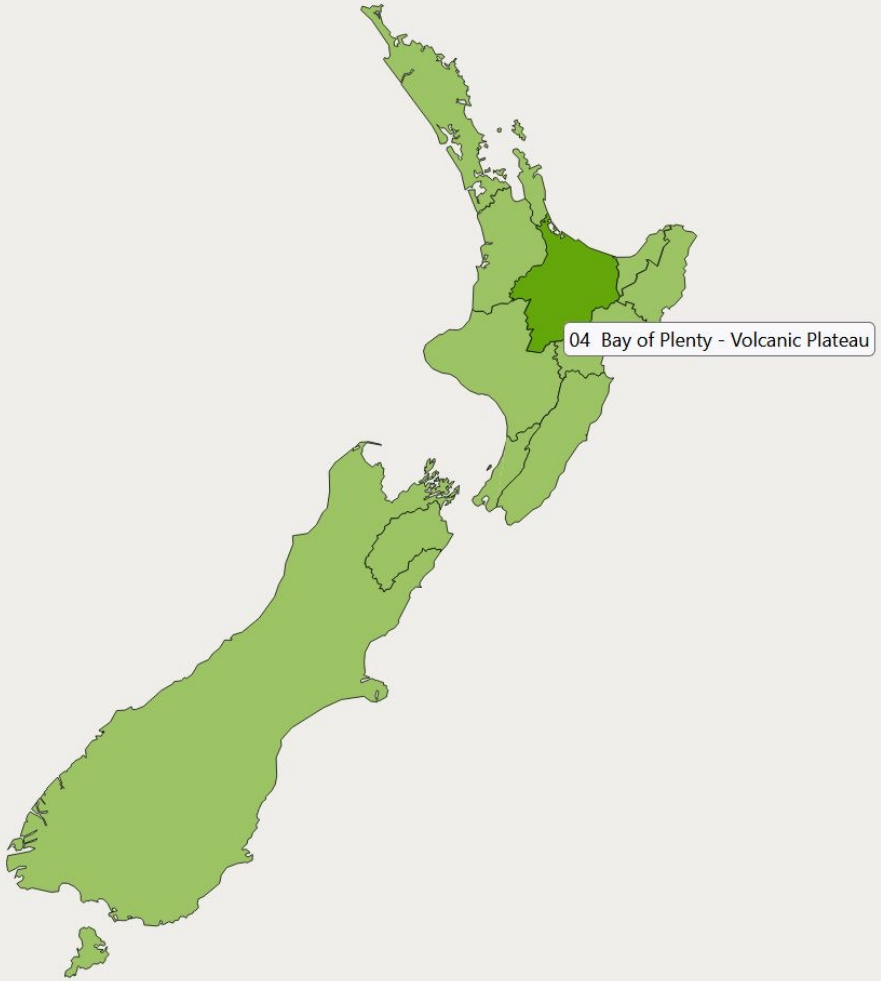
NZ legislation
Summary of New Zealand's resource management system

Resources by region

Select a region

Click on the map, or select a region from the list below.

01 Northland	02 Waikato
03 Coromandel	**04 Bay of Plenty - Volcanic Plateau →**
05 Eastern Bay of Plenty	06 Gisborne - East Coast
07 Northern Hawkes Bay	08 Southern Hawkes Bay - Wairarapa
09 Wellington	10 Taranaki - Manawatū
11 Marlborough	12 South Island



Resources by region

Unit	Unit Description	Present Land Use				Potential land use			Pasture fertiliser requirements for sheep and cattle grazing				Slope	Rock Type		Typical Soils			Erosion		Vegetation	Type Locality	Soil conservation & water management measures	Additional Comments
			Grazing su/ha			Cropping	Forestry	*P. rad* SI	initial	Maintenance						Name	Symbol	Survey	Present	Potential				
			PA	TF	APP					at PA	at APP	Trace elements												
1w1	Flat to gently undulating river terraces and levees near sea level with recent, fertile soils and only a very slight wetness limitation remaining after drainage.	Dairying. Cereal cropping. Citrus orcharding.	15	24	29	Cereals. Citrus and sub-tropical fruits orchards. Orchards. Root and green fodder crops. Horticulture.	Production.	35-36	600-800 kg/ha superphosphate.	350 kg/ha superphosphate. 100-150kg/ha muriate of potash.	400 kg/ha superphosphate. 200 kg/ha muriate of potash.	Cobalt. Copper.	A	Volcanic alluvium.	Tp	Gley recent and recent soils: Awakaponga silt loam. Opouriao fine sandy loam. Paroa silt loam.	Ak, Op, Pa.	2, 2, 2.	Nil.	Nil.	High producing pasture. Cereal crops. Citrus orchards.	N69/400235 Selwyn Road.		Shelter from prevailing winds is required for the growing of citrus and subtropical fruits.
2e1	Flat to gently undulating terraces near sea level. Soils are free-draining, fertile yellow-brown loams. The unit has a moderately high versatility and is especially suited to citrus and subtropical fruit orcharding. There is potential for slight wind and rill erosion when cultivated.	Dairying. Intensive grazing. Citrus and subtropical fruit orcharding.	17	23	26	Cereals. Citrus and sub-tropical fruits orchards. Orchards. Root and green fodder crops. Horticulture.	Production.	40-41	1250 kg/ha cobalised superphosphate.	350 kg/ha superphosphate. 150 kg/ha muriate of potash.	400 kg/ha superphosphate. 180 kg/ha muriate of potash.	Cobalt.	A, A/B	Ashes older than Taupo ash over unconsolidated silts and sands.	Mo/Us	Central yellow-brown loams: Katikati black sandy loam.	54a.	1	Nil.	Slight wind and rill when cultivated.	High producing pasture. Citrus and subtropical fruit orchards.	N57/420755 Beach Road Katikati	Establish windbreaks.	Shelter from prevailing winds is required for the growing of citrus and subtropical fruits.
2w1	Flat river terraces near sea level with recent, gley recent and organic soils. Occasional surface flooding and moderately high winter water table levels limit versatility.	Dairying. Cereal cropping.	18	22	27	Cereals. Root and green fodder crops. Horticulture.	Production.	30-31	600-800 kg/ha superphosphate.	350 kg/ha superphosphate. 100 kg/ha muriate of potash.	400 kg/ha superphosphate. 200 kg/ha muriate of potash.	Cobalt. Copper.	A	Volcanic alluvium. Volcanic alluvium and peat.	Tp, Tp+Pt	Recent and gley recent soils: Pongakawa peaty loam. Pongakawa peaty shallow loam. Awakaponga silt loam. Paroa silt loam. Paroa silt loam on peat. Rewatu silt loam.	107f, 107g, Ak, Pa, Pap, Re.	1, 1, 2, 2, 2, 2.	Nil.	Nil.	High producing pasture. Cereal crops.	N68/280290 Greig Road.		Cropping versatility is restricted by a wetness limitation which delays planting dates and limits access at harvesting.
2s1	Gently undulating the undulating terraces near sea level with coarsely textured soils which are especially suited to citrus and subtropical fruit orcharding.	Intensive grazing. Citrus and subtropical orcharding.	16	21	26	Cereals. Citrus and sub-tropical fruits orchards. Orchards. Root and green fodder crops. Horticulture.	Production.	35-41	1000 kg/ha superphosphate.	250 kg/ha superphosphate. 100 kg/ha muriate of potash.	350 kg/ha superphosphate. 150 kg/ha muriate of potash.	Cobalt.	A, B	Ashes older than Taupo ash over unconsolidated silts, ashes, sands, tuffs and breccias. Ashes older than Taupo ash over welded volcanic rocks. Ashes older than Taupo ash over volcanic alluvium. Ashes older than Taupo ash over lapilli.	Mo/Us, Mo/Vo, Mo/Tp, Mo/Lp	Intergrades between central yellow-brown loams and yellow-brown pumice soils: Paengaroa shallow sand. Paengaroa sand on gravelly sand. Ohinepanea sand. Oropi sand. Oropi shallow sand.	14a, 14b, 14c, 16, 16a.	1, 1, 1, 4, 4.	Nil.	Slight wind when cultivated.	High producing pasture. Citrus and subtropical fruit orchards.	N67/865400 P.S.H.83 Paengaroa.		Shelter from prevailing winds is required for the growing of citrus and subtropical fruits. Pasture establishment can be affected by the weed competition and nitrogen depletion after cropping. Summer drought may limit production.
2s2	Plains near sea level with coarsely textured but fertile soils formed from water sorted ashes. Summer drought generally tends to limit production.	Dairying. Intensive grazing. Cereal cropping.	19	27	32	Cereals. Orchards. Root and green fodder crops. Horticulture.	Production.	40-41	600-800 kg/ha superphosphate.	400-450 kg/ha superphosphate. 100-150 kg/ha muriate of potash.	500 kg/ha superphosphate. 150 kg/ha muriate of potash.	Cobalt.	A	Volcanic alluvium.	Tp	Recent, gley and gley recent soils: Awaiti loamy sand. Awakeri loamy sand. Te Teko sand. Opouriao fine sandy loam.	A, Aw, Tt, Op.	2, 2, 2, 2.	Nil.	Slight wind when cultivated.	High producing pasture. Cereal crops.	N68/302217 Intersection of Western Drain Road and Edgecumbe-Awakeri Road.	Establish windbreaks.	Shelter from prevailing winds is required for the growing of citrus and subtropical fruits.
2s3	Flat to gently undulating terraces adjacent to Lake Rotorua mantled with Rotomahana mud with fertile but weakly structured soils.	Intensive grazing. Orcharding.	15	18	24	Orchards. Root and green fodder crops. Horticulture.	Production.	31-32	1000 kg/ha superphosphate.	250 kg/ha sulphur fortified superphosphate.	400 kg/ha superphosphate. 250 kg/ha muriate of potash. 20 kg/ha calcined magnesite.	Copper. Cobalt.	A	Rotomahana mud over Kaharoa ash. Rotomahana ash over volcanic alluvium.	Rm/Kt, Rm/Tp	Composite recent soils on yellow-brown pumice soils, composite yellow-brown loam soils, and recent soils: Rotomahana shallow sandy loam. Rotoiti loamy sand. Whakarewarewa sandy loam. Te Ngae loamy sand.	Rs, Rt, Wh, Te.	3, 3, 3, 3.	Nil.	Nil.	High producing pasture. Orchards.	N76/780060 1km south of Rotorua Airport.		Stock trampling causes pugging during wet periods. Summer drought may limit production.
3e1	Undulating to gently rolling slopes near sea level with free-draining, fertile yellow-brown loams. There is potential for slight to moderate wind, rill and sheet erosion when cultivated.	Dairying. Intensive grazing. Citrus and subtropical fruit orcharding.	15	20	23	Cereals. Citrus and sub-tropical fruits orchards. Orchards. Root and green fodder crops. Horticulture.	Production.	38-41	1250 kg/ha cobalised superphosphate.	300 kg/ha superphosphate. 130 kg/ha muriate of potash.	350 kg/ha superphosphate. 150 kg/ha muriate of potash.	Cobalt.	B, B+C	Ashes older than Taupo ash over unconsolidated silts and sands. Ashes older than Taupo ash over welded volcanic rocks.	Mo/Us, Mo/Vo	Central yellow-brown loams: Katikati sandy loam. Katikati black sandy loam. Whakamarama sandy loam.	54, 54a, 55b.	1, 1, 1.	Nil.	Slight to moderate sheet rill and wind when cultivated.	High producing pasture. Citrus and subtropical fruit orchards.	N58/499618 Omokoroa Point Road.	Cultivate on contour.	Shelter from prevailing winds is required for the growing of citrus and subtropical fruits.
3e2	Undulating to gently rolling slopes near sea level with coarsely textured soils formed from a thin mantle of Kaharoa ash over more weathered ashes. There is a potential for moderate rill erosion when cultivated.	Dairying. Intensive grazing. Citrus and subtropical fruit orcharding.	15	19	21	Cereals. Citrus and sub-tropical fruits orchards. Orchards. Root and green fodder crops. Horticulture.	Production.	34-40	1000 kg/ha superphosphate.	250 kg/ha superphosphate. 100-150 kg/ha muriate of potash.	300 kg/ha superphosphate. 150 kg/ha muriate of potash.	Cobalt.	B, B+C	Ashes older than Taupo ash over unconsolidated silts, ashes, sands, tuffs and breccias. Ashes older than Taupo ash over welded volcanic rocks. Ashes older than Taupo ash over volcanic alluvium. Ashes older than Taupo ash over lapilli.	Mo/Us, Mo/Vo, Mo/Lp	Intergrades between central yellow-brown loams and yellow-brown pumice soils: Paengaroa sand. Paengaroa shallow sand. Paengaroa sand on gravelly sand. Ohinepanea sand. Oropi sand. Oropi shallow sand. Oturoa sand.	14, 14a, 14b, 14c, 16, 16a, Ot.	1, 1, 1, 1, 1, 1, 3.	Nil.	Moderate rill, and slight sheet and wind when cultivated.	High producing pasture. Citrus and subtropical fruit orchards.	N58/600520 1km south of Tauranga Racecourse.	Cultivate on contour.	Shelter from prevailing winds is required for the growing of citrus and subtropical fruits. Pasture establishment after cropping may be limited by drought and insect damage.

Resources: National LUC legend

What is the national LUC legend?

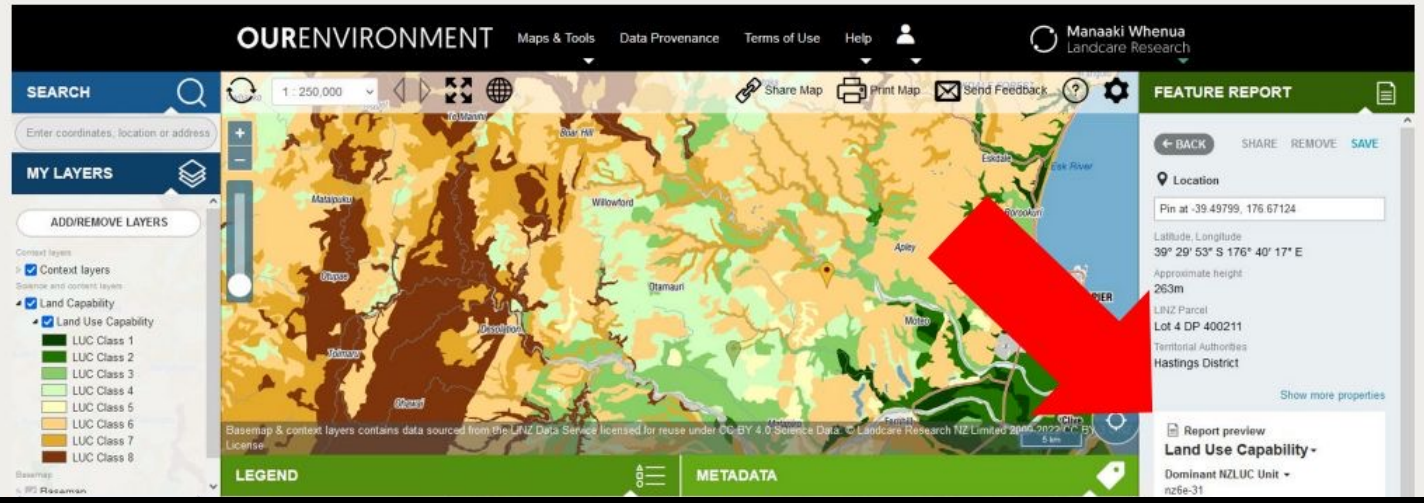
Should I use the national rather than a regional LUC legend?

How has the national legend been compiled?

How can I access the national LUC legend?

The easiest way to explore the national vs. regional LUC units is through OurEnvironment. Once logged on, select the data layer for Topic 'What is the land capable of being used for?', then click button 'Explore Map'.

In map view, click the parcel of interest and a LUC report review will appear in the bottom right corner of the application (see image below). This lists the nationally correlate LUC unit, as well as historical regional units.



Good to know

- URL: **LRP.landcareresearch.co.nz**
- Not static, but work in progress
- We are open to suggestions on how to improve the portal
- There is a helpdesk! lrp@landcareresearch.co.nz

Big thanks to:

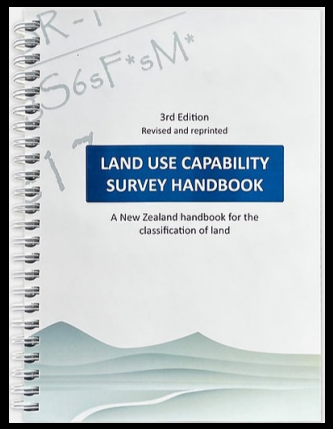
- LUC Governance Group
- Simon Stokes Consulting LTD
- Bartonk Solutions (Kerry Barton)
- MWLR staff: James Barringer, Sam Carrick, Nicolette Faville, Maya Greet, Garth Harmsworth, Martin Herran, Ursula Jewell, Ian Lynn, Christine Martelletti, Amy Milnes, David Medyckyj-Scott
- Mint Design Christchurch

NZLRI & LUC towards the future

- Nationally consistent LUC classification – national legend – nationally consistent application… completed and available
- Actively exploring opportunities arising from lidar… and from new data… and developing techniques including but certainly not limited to AI & machine learning.
- Continue to promote the development of standards (handbook), LUCGG, and making available the data and resources that we hold
- New revised draft national layer of HPL (LUC class 1,2,3 & 4) from S-map

HPL from S-map

- There is a strong argument for using S-map:
  - The classification of LUC 1-4 is primarily determined by the soil factor. Therefore, S-map in being a spatial database of soil pattern and properties is both a logical and solid foundation for a new classification of LUC 1-4.
  - S-map is the only contemporary and active source of new soil & land data obtained through measurement and observation
- Acknowledgements: Ian Lynn & Linda Lilburne 2013 (Canterbury) then Linda Lilburne, Ian Lynn, Sharn Hainsworth, Scott Fraser, Shirley Vickers in 2019
- What are we doing (method overview):



LUC Class 2

General Concept: Very good land with slight physical limitations to arable use which are readily controlled by management and soil conservation measures. LUC Class 2 is suitable for many cultivated crops, vineyards and berry fields, pasture, tree crops or production forestry. Valid subclasses include 'e' erosion; 'w' wetness; 's' soil; 'c' climate (Lynn et al 2021).

Guideline criteria:

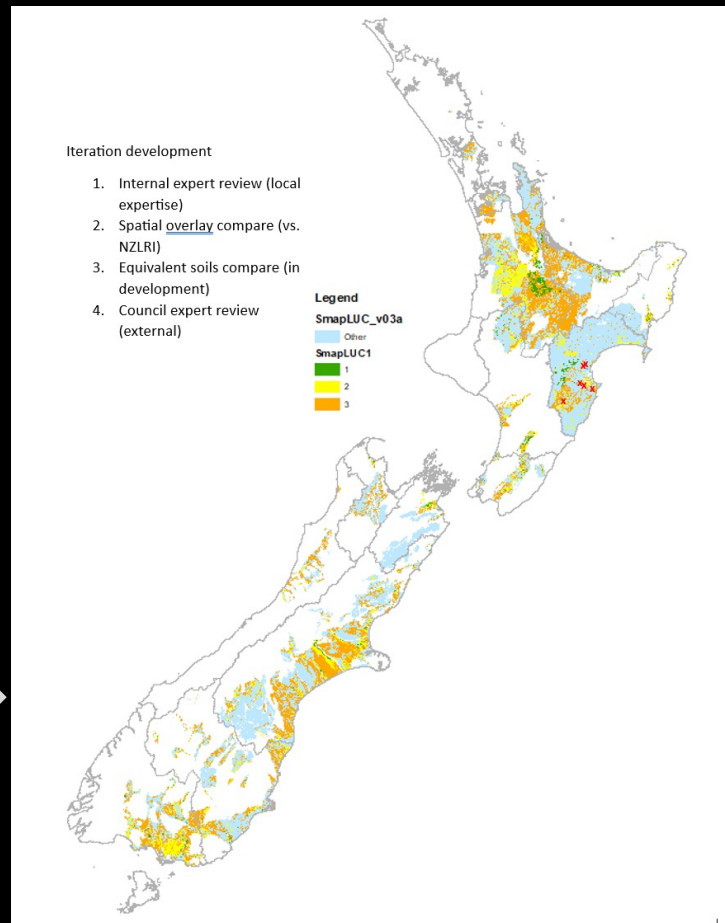
- Flat to undulating 0–≤7°
- Moderately deep soils >45–100 cm
- Fine earth textures (silt loam, loamy silt, silt, sandy loam, clay loam, sandy clay loam, loamy clay) OR silty clay/loamy clay texture and with a Structural Vulnerability Index value of [<0.4 very low (or <0.5 low? see comment above)].
- Well, moderately well or imperfectly drained (and poorly drained where permanent drainage has been installed as part of an approved community-based scheme)
- Depth to hydromorphic features [low chroma colours, gleying or mottling] (if present) 45–100 cm. [update LUC survey handbook to reflect the McLeod revisions of Milne et al 1995 that should relate to drainage classes in S-map]
- Depth to subsurface pan ≥45 cm
- Common limitations include.
  Slight wetness after drainage
  Occasional flood overflow
  Very weak to weak salinity (if present)
  Unfavourable soil structure and difficulty in working.
- Elevation / Rainfall:
  South Island - <400m, <1500 mm annual rainfall
  North Island - <600m, 800–2000 mm annual rainfall

Table 3. *S-Map attribute limiting criteria for LUC Class 2 mineral soils.*

S-map attribute	Acceptable range
Slope	A or B (<7°)
Profile Material Class	Md or Ms or Mt or Mg or Mm
Soil depth	md or d (>45 cm)
Rooting depth	>45 cm
Permeability	m, or r or r/m or m/r or m/s
Primary Texture	l or z or c
Secondary Texture	null or l or z or s or c
Drainage[5]	w or mw or j [or p for the GRT & GOT (and other?) soils that are 'readily drainable']
Topsoil stones	1 or 2 (<5%)
Salinity	N or W (not saline to weakly saline)
~~Depth to slow layer~~	~~>45 cm~~
Profile Available Water	>120 mm
NZSC	Not (M*W or M**W or MO* or MO** or MPT)

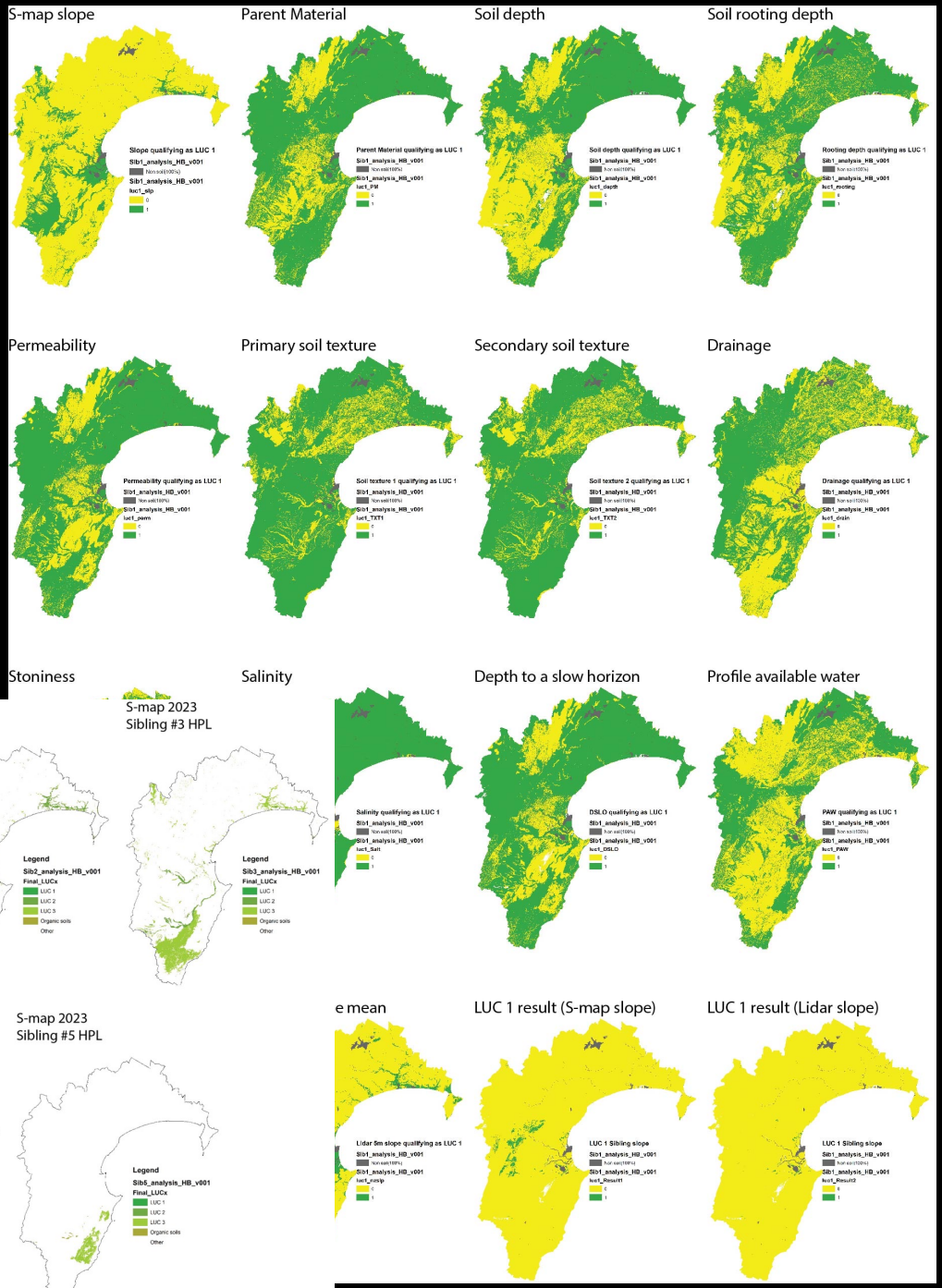
Note: Pumice soils are characterised by low clay contents (<10%), low soil strength, high macroporosity and deep rooting depths, AND extreme erosivity, especially on slopes > 7°. In general, only Allophanic Pumice soils on slopes <7° should be considered for LUC Class 2.

[5] Soils classified as a GRT, GOT have been mapped as LUC Class 2w (in Canterbury) and there are heaps of Glev soils in the North Island LUC Class 2w units.



HPL from S-map

- Reproduced as a model
- Working through the validation process. Target is to have a draft by the end of FY
- Some councils have opted to work with us for an earlier result with a more detailed validation process



Questions?

View across upper Tengawai catchment, Rollesby Range, and Mackenzie Country to Ben Ohau Range and Southern Alps. Source: NZ Soil Bureau Bulletin 27