Unlocking the potential of Māori land: A kaupapa Māori approach to using and developing integrated knowledge, models and tools

MPI Link seminar, Wellington, Thursday 4th May, 2017

Garth Harmsworth
(Te Arawa, Ngāti Tūwharetoa, Ngāti Raukawa)

Landcare Research, Private Bag 11-052
Palmerston North,
HarmsworthG@LandcareResearch.co.nz

“Ko ngā mana ko ngā mauri o te whenua kei i raro iho i ngā tikanga a o tatou tupuna”

The prestige and life force of the land is enhanced beneath the mantle of our ancestral traditions

“Whatungarongaro te tangata, toitū te whenua”

People come and go, but the land endures

Treaty of Waitangi

Article the second: Queen of England confirms and guarantees to the Chiefs and Tribes of New Zealand and to the respective families and individuals thereof

"the full exclusive and undisturbed possession of their Lands and Estates, Forests, Fisheries, and other properties which they may collectively or individually posses so long as it is their wish and desire to retain the same in their possession"

The notion of how central land and soil was, and still is to Māori, described superbly by Asher and Naulls: "*To the early Māori, land was everything. Bound up with it was survival, politics, myth, and religion. It was not part of life, but life itself*".

Asher G; Naulls D, 1987: Maori Land. New Zealand Planning Council, Wellington.

Whenua – land

In July 1993, Te Ture Whenua Māori Act came into effect (now under reform/review 2016-2017). Te Ture Whenua Māori Bill gives Māori land owners, trustees and whānau greater decision-making powers and better support for the management of whenua Māori.

<u>The original Act has three principle kaupapa:</u>

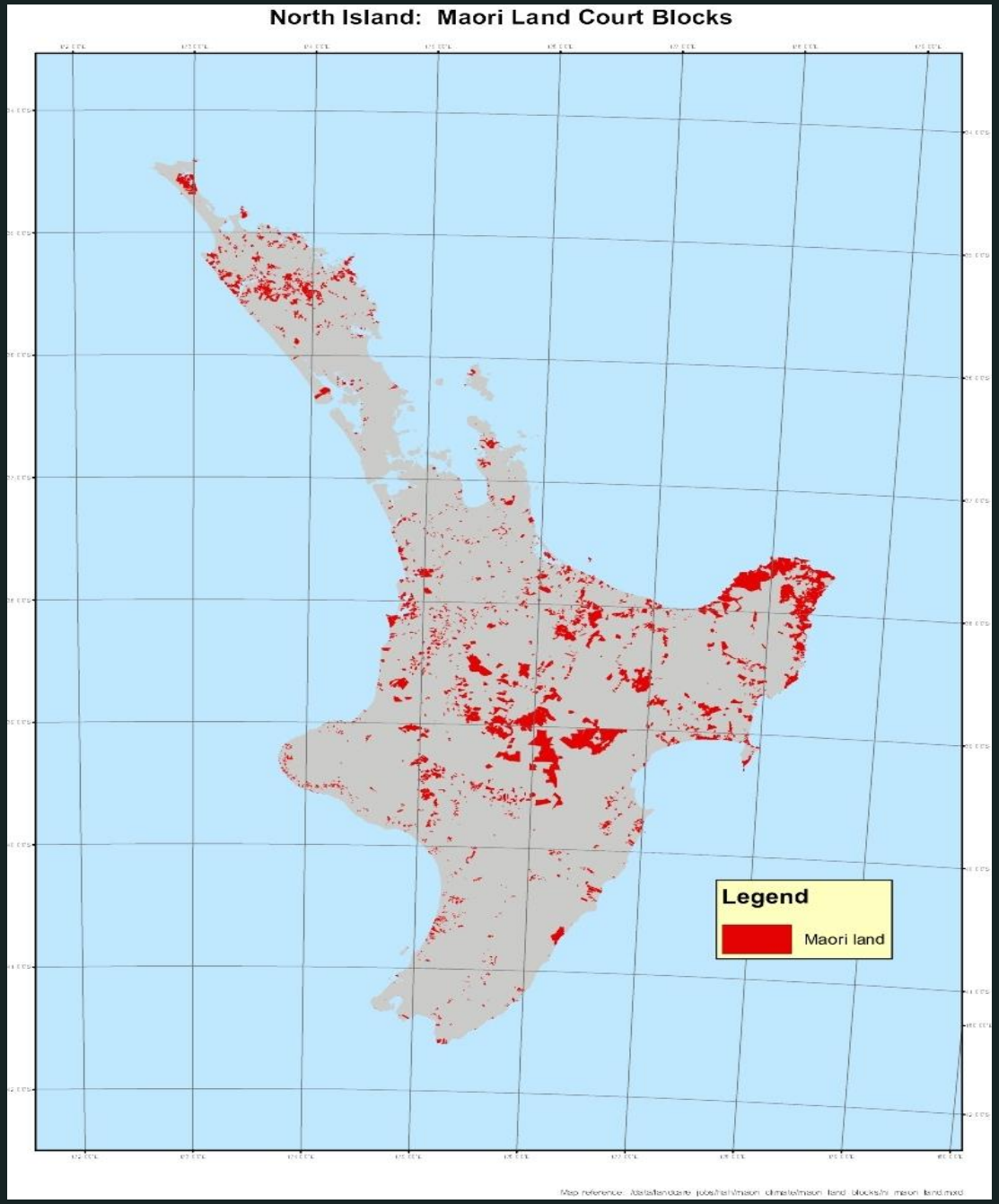
- Recognises that land is taonga tuku iho and of special importance to Māori;
- Promotes protection against alienation, retention of land in the hands of owners, their whanau and hapū;
- Facilitates the occupation, development, and utilisation of that land for the benefit of its owners and descendants.

The Act allows multiple ownership and beneficiaries of title can exercise more control over their land.

Patterns of Māori Land Ownership from 1840 to 1998 (Durie 1998, TPK GIS, LCR GIS)

Year	Acres	Hectares
1840	66 400 000	~27 000 000
1852	34 000 000	15 300 000
1860	21 400 000	9 630 000
1891	11 079 486	4 985 000
1911	7137 205	3 211 000
1920	4 787 686	2 154 000
1939	4 028 903	1 813 000
1975	3 000 000	1 350 000
1986	2 626 091	1 181 740
1998	3 743 689	1 515 071
2011	3 743 689	1 515 071

North Island: Maori Land Court Blocks



South Island: Maori Land Court Blocks

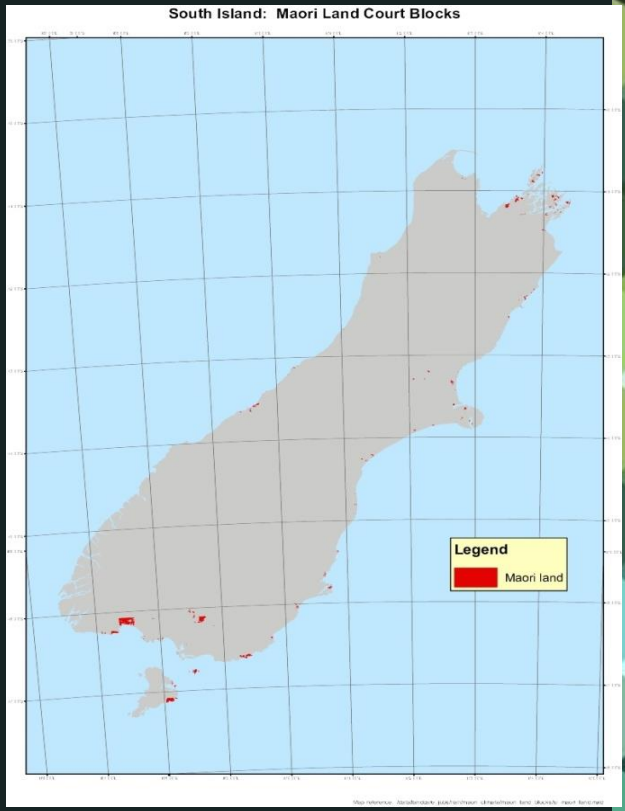
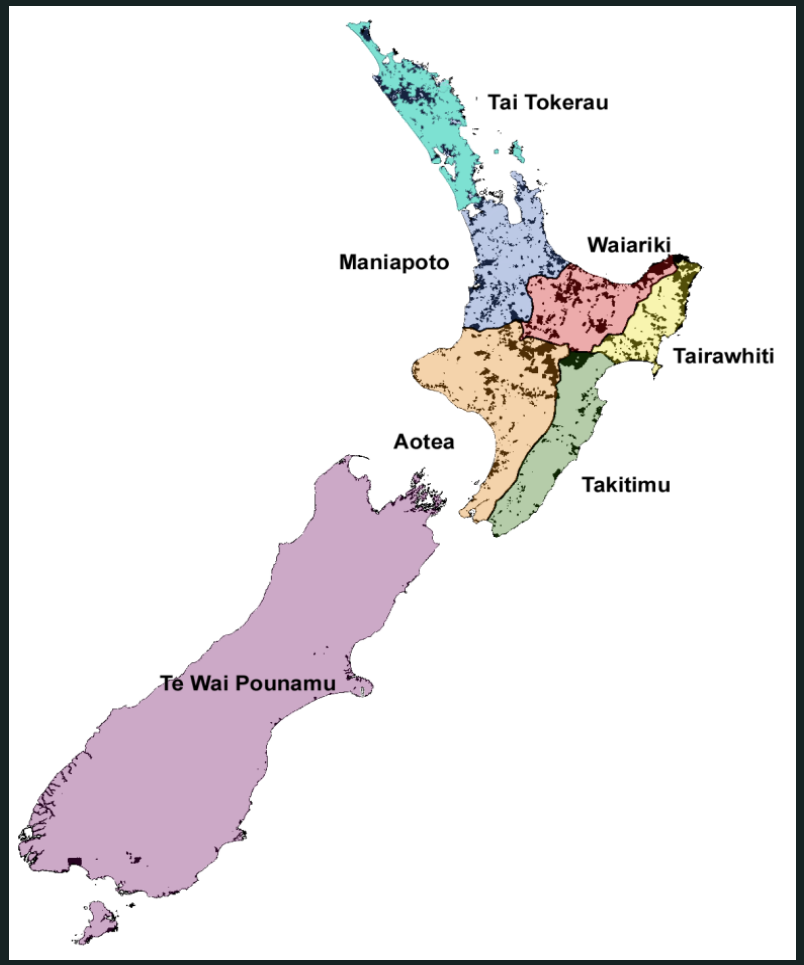


Table 1 Governance structures for Māori Land (under Te Ture Whenua Act) for New Zealand (TPK 1996; Durie 1998; Landcare Research 2001)

Governance Structure	**Number of Land Blocks**	**% Total Area**
Ahu Whenua Trusts (old 438 trusts)	6303	52
Whānau Trusts	108	6
Kaitiaki Trusts	8	0.01
Whenua Topu Trusts	10	2
Putea Trusts	1	0
Incorporations	259	14
Trust Boards	106	6
No Clear Structure	16 405	15
Other	1129	2
Not Described	1307	4
Total	25 636	100

Māori Land Court Districts

- ~27, 000 Māori land block titles
- ~6 % of Total land in NZ (~1.5 million ha – TPK, Māori Land Court)
- ~50% under-utilised/under-developed
- Maori economy – (BERL) @$37.0 – ~42 billion
- ~10% total NZ agricultural outputs ~$1 billion and growing



Māori land – issues

- Land fragmented, many small blocks
- Multiple ownership – Issues of governance on many blocks (difficulties in planning, making decisions)
- Many absentee owners
- Many land blocks have no management
- Type and quality of land (mostly low quality and steep)
- Much land considered underdeveloped, undeveloped, or under-utilised
- Difficulties in gaining access to high quality information on Māori land
- Information often highly technical (e.g. GIS, land evaluation, soil reports) hard to understand

Drivers – the need for relevant and improved data/information/knowledge is being driven by many emerging needs and trends (incl.)

- The New Zealand and the Māori economy is growing. Māori development aspirations and needs have emerged with strong linkages to relevant sector groups, including industry and government.
- Māori have a significant asset base primarily in land based industries and agribusiness and are increasingly exploring private and crown partnerships to generate commercial and social returns.
- The Crown – Māori economic growth partnership *He Kai Kei Aku Ringa* (2012) has central goals to lift Māori land performance and productivity, and strengthen links between innovation and Māori enterprises and collectives

But there are many more drivers for data/information/knowledge:

- Māori aspirations – cultural advancement, outcomes, scenarios for the future – *often multiple domains/goals/aspirations – multiple goals (cultural, social, environmental, economic)*
- Māori land development, improved utilisation, productivity of Maori land, land use suitability, options, opportunities
- Māori issues, complexity of questions (e.g. across land, resources, water, climate change, biodiversity, social, environmental, people, cultural goals, economic)
- Natural Resource management, Decision-Making, kaitiakitanga, co-governance (iwi/hapū)
- Treaty settlements/post-Treaty settlement entities, new forms of governance
- Kaupapa Māori research, VM, innovation, creativity, mātauranga Māori, science

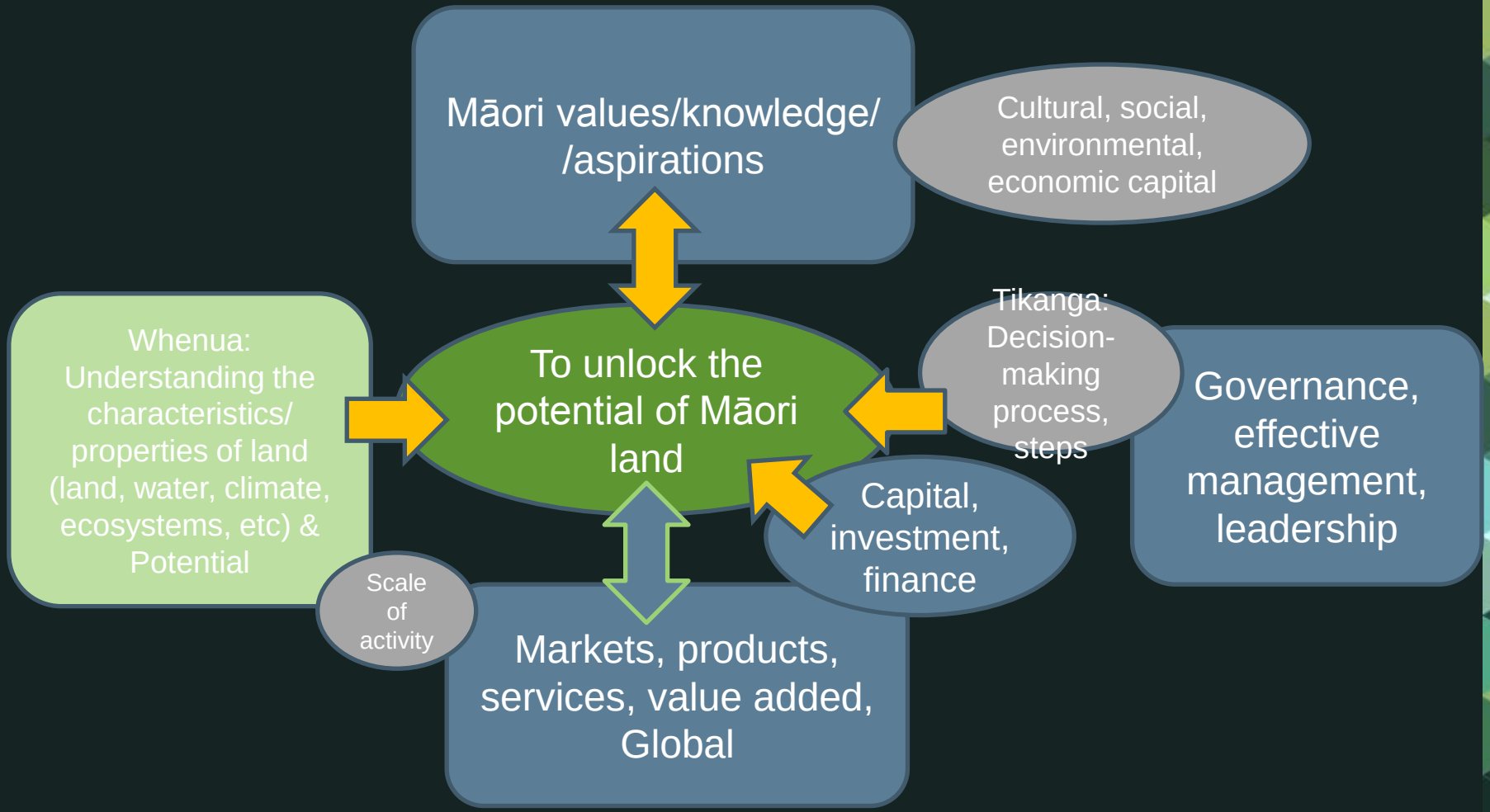
Māori values/aspirations for advancement and cultural identity

Unlocking the potential of Māori land requires and understanding of key components of Māori knowledge/values, assets/taonga, Māori governance and decision-making

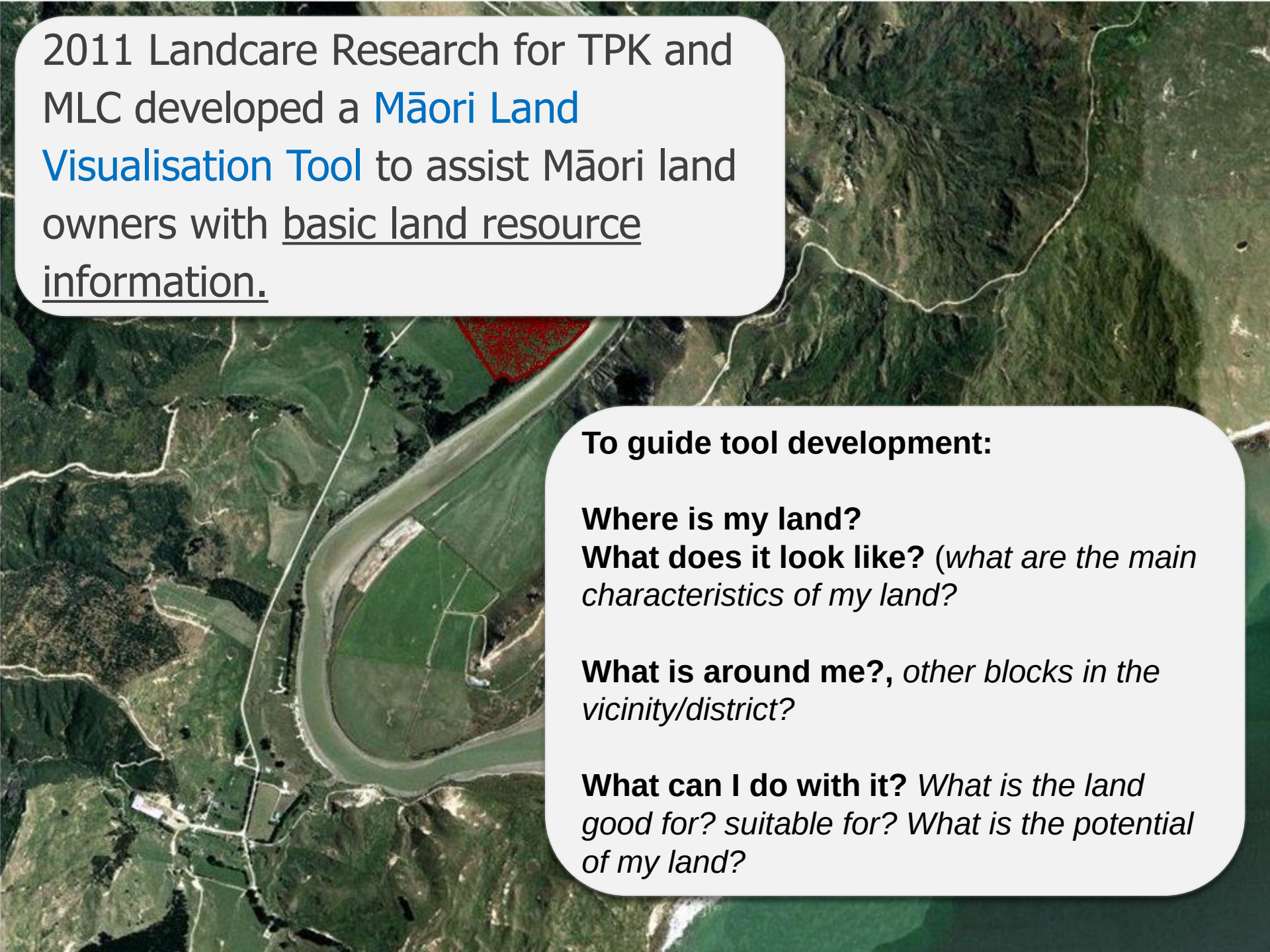
Complex: Need for **integrated knowledge, models and tools**

e.g., decision-support tools and models

So what's needed? (to make decisions and unlock potential)?



Stress the importance of understanding the full characteristics and properties of whenua/Māori land, and the constraints we work in, before embarking on decisions and opportunities



2011 Landcare Research for TPK and MLC developed a Māori Land Visualisation Tool to assist Māori land owners with basic land resource information.

To guide tool development:

Where is my land?
What does it look like? (*what are the main characteristics of my land?*

What is around me?, *other blocks in the vicinity/district?*

What can I do with it? *What is the land good for? suitable for? What is the potential of my land?*

Māori Land Visualisation Tool (MLVT)

https://whenuaviz.landcareresearch.co.nz/

Table 2 Increasing limitations to use and decreasing versatility of use from LUC class 1 to LUC class 8

Increasing limitations to use ↓

LUC Class	Arable cropping suitability†	Pastoral grazing suitability	Production forestry suitability *	General suitability
1	High ↓ Low	High ↓ Low	High ↓ Low	Multiple use land
2				
3				
4				
5	Unsuitable			Pastoral or forestry land
6				
7				
8		Unsuitable	Unsuitable	Protection or Conservation land

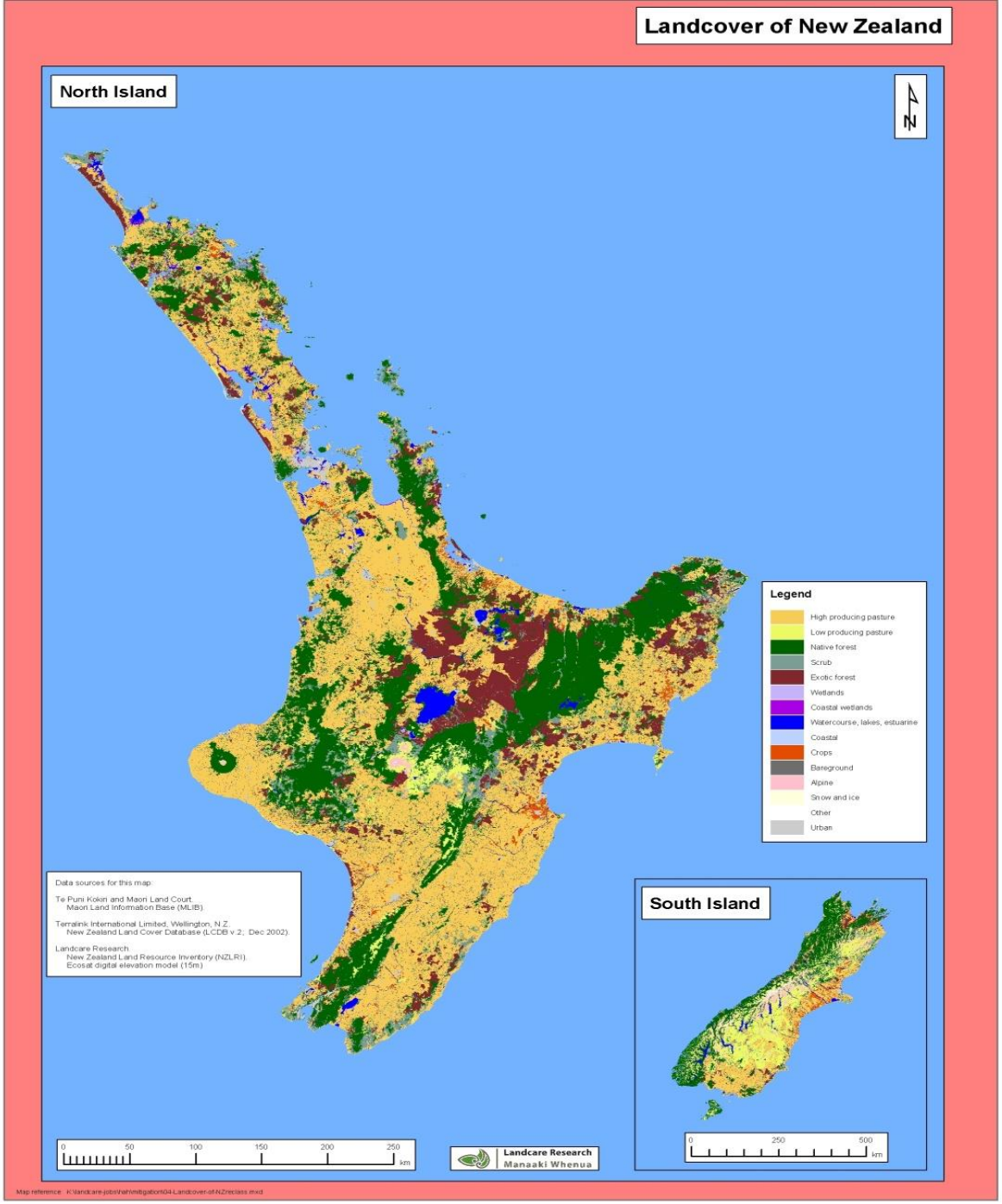
Decreasing versatility of use ↓


The NZLRI is made up of ~100,000 landform based map units at 1:50,000.
VIIIe 9
VIIIe 11
Gw - 65 - F
1ShdaF - N4
VIIIe 5
Gw - 57a - F
4ScdaFSh - P3p4m5
VIIIe
VIIe 23
Gw - 57a - F
3ScShdaF - P3m5m11
Al - 53 - C
1shW - P3p2
VIs 12
Mo - 53 - C + D
1ShW - P3p2m11
VIe 27
IVs 12
IVe 8
VIIw 1
(Pt)/Al - 90d - A
0 - H1
VIe 29
Al - 99 - B
1W - P2p3m11
VIs 11
Gw - 53 - C + D
1Sh - P3m11

Land Use Capability (LUC) for Māori land (MLIB) compared with New Zealand LUC statistics (MLIB 2002–TPK & NZLRI–Landcare Research New Zealand)

Garth Harmsworth
Landcare Research NZ Ltd GIS 2011

LUC Class	% of Total NZ	Māori Land area (ha)	% of Māori Land	Description of Land Use Capability
1	0.7%	7514.76	0.50%	Most versatile multiple-use land – virtually no limitations to arable use
2	4.55%	43 733.59	2.89%	Good land with slight limitations to arable use
3	9.22%	85 534.33	5.65%	Moderate limitations to arable use restricting crops able to be grown
4	10.5%	153 972.29	10.16%	Severe limitations to arable use. More suitable to pastoral and forestry
5	0.8%	6883.47	0.45%	Unsuitable for cropping – pastoral or forestry
6	28.1%	507 706.36	33.51%	Non-arable land. Moderate limitations and hazards when under a perennial vegetation cover.
7	21.4%	469 830.47	31.01%	With few exceptions can only support extensive grazing or erosion control forestry
8	21.8%	230 142.75	15.19%	Very severe limitations or hazards for any agricultural use
Other	3.0%	9752.96	0.64%	Non-arable land. Moderate limitations and hazards when under a perennial vegetation cover.
TOTAL	100.00% (26 930 100 ha)	1 515 071.00	100.00%	


Landcover of New Zealand
North Island
N
Legend
High producing pasture
Low producing pasture
Native forest
Scrub
Exotic forest
Wetlands
Coastal wetlands
Watercourse, lakes, estuarine
Coastal
Crops
Bareground
Alpine
Snow and ice
Other
Urban
Data sources for this map:
Te Puni Kokiri and Maori Land Court.
Maori Land Information Base (MLIB).
Terralink International Limited, Wellington, N.Z.
New Zealand Land Cover Database (LCDB v.2; Dec 2002).
Landcare Research.
New Zealand Land Resource Inventory (NZLRI).
Ecosat digital elevation model (15m).
South Island
0 50 100 150 200 250 km
0 250 500 km
Landcare Research
Manaaki Whenua

Landcover class (LCDBv2) comparisons for Māori land and New Zealand land

Garth Harmsworth Landcare Research 2011

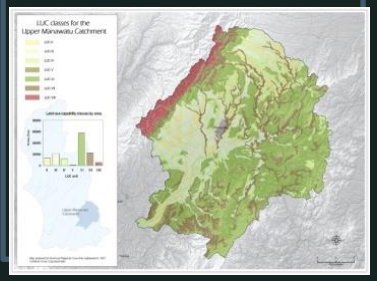
Landcover	New Zealand (LCDBv2)		Māori land (MLIB & LCDBv2)	
Landcover class	**Area(ha)**	**Area(%)**	**Area(ha)**	**Area(%)**
Indigenous Forest	7 109 546.4	26.4	586 332.5	**38.7**
Scrub	1 804 316.7	6.7	212 109.9	**14.0**
Planted exotic forest	1 965 897.3	7.3	206 049.6	**13.6**
Pastoral (grassland)	10 583 529.3	39.3	401 493.8	**26.5**
Horticultural	430 881.6	1.6	12 120.6	**0.8**
Inland water and wetlands	807 903.0	3.0	31 816.5	**2.1**
Other (e.g., mines, tussock, bareground)	4 228 025.7	15.7	65 148.1	**4.3**
Total	**26 930 100**	**100**	**1 515 071.00**	**100**

Land & resource evaluation module

Māori landowners

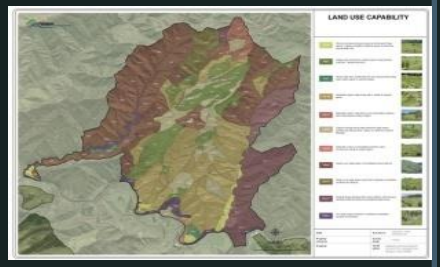
A. Base information

- Base maps and reference maps
- Aerial photographs, satellite imagery
- Legal boundaries,
- Infrastructure (houses, roads, settlements)



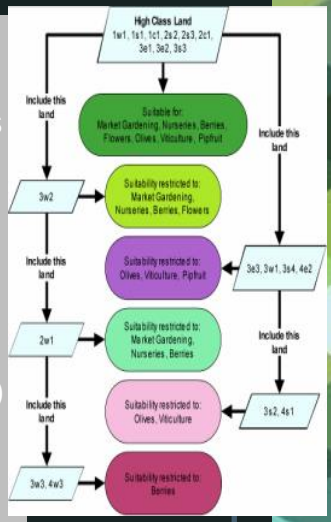
B. Physical Resource Information

- Land resources
- LUC, rock, soil, vegetation, climate
- Land use /existing vegetative cover
- Local knowledge
- Historical land use
- Sites of cultural significance.



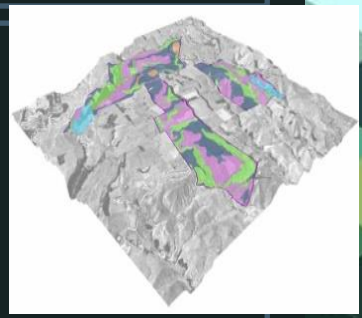
C. Opportunities - decision making

- Landowner aspirations
- Land use options,
- Natural resources (soils, climate, location, geothermal, quarry, springs, water)
- Values, cultural and social (Decision trees)
- Recreational use (fishing, hunting, lifestyle, amenity)
- Economics, markets



D. Modelling scenarios

- Feasibility studies
- Economics
- Futures modelling
- Scenarios
- Environmental impacts
- Cultural values



Building a knowledge base for Māori land blocks

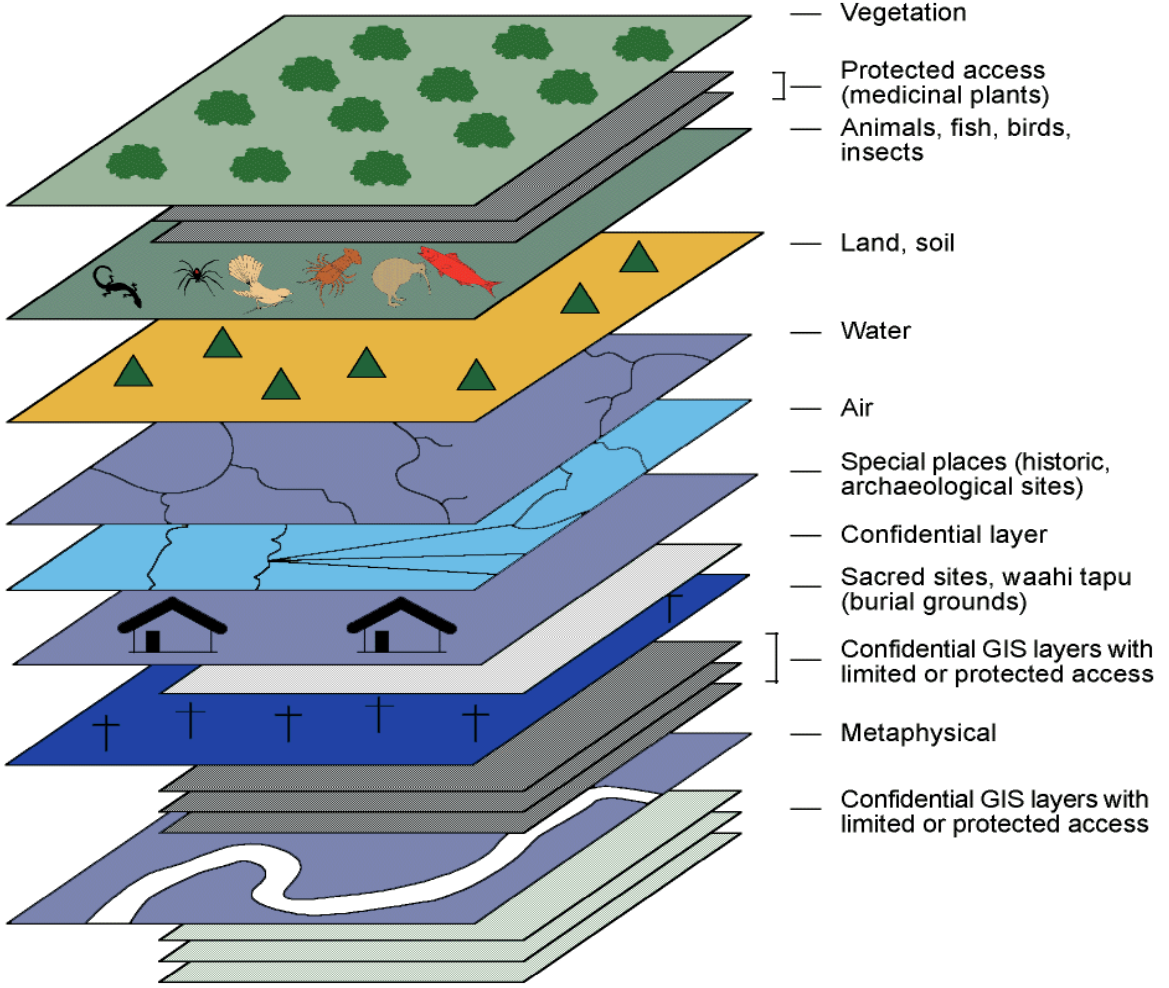


Figure 1: GIS layers and confidential sub-layers

National datasets

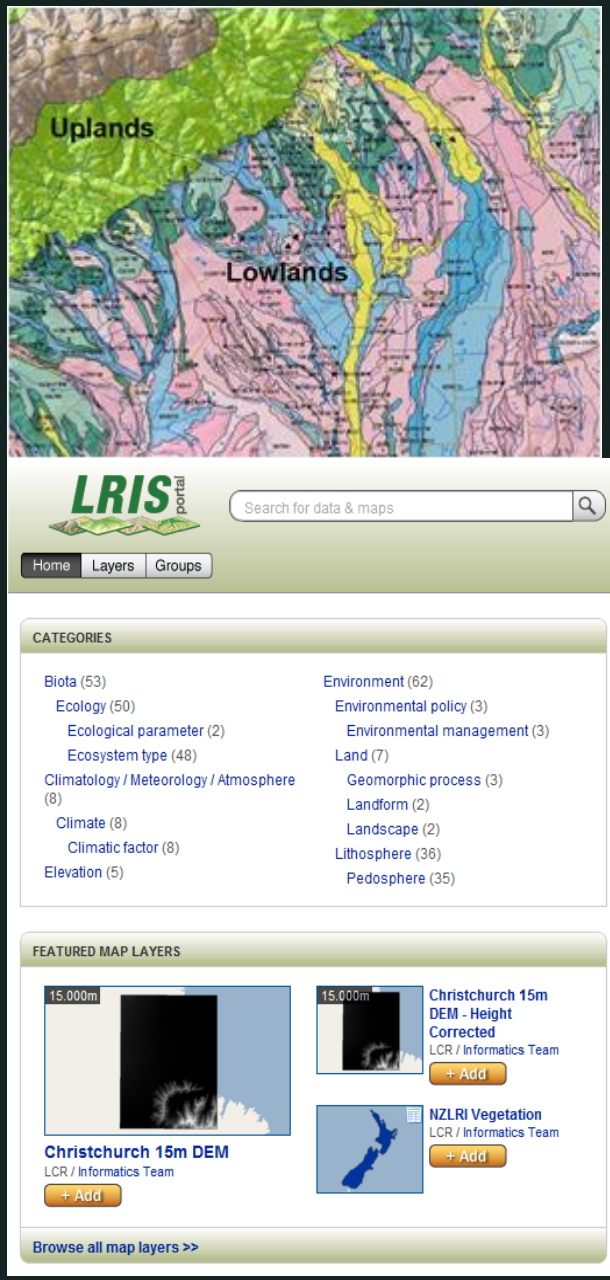
Land Resource Information System (LRIS)
http://lris.scinfo.org.nz

The New Zealand Land Resource Inventory (NZLRI)
http://www.landcareresearch.co.nz/databases/nzlri.asp

The National Soils Database
http://www.landcareresearch.co.nz/databases/nsd.asp

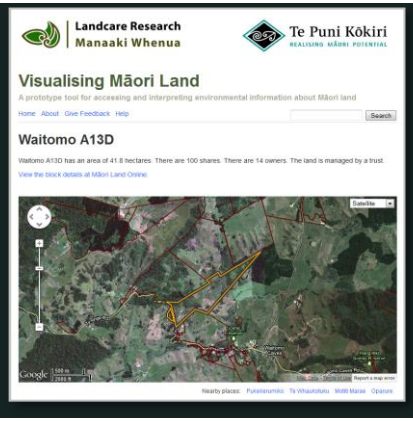
S-map – a seamless digital soil information system for New Zealand nominally at 1:50 000 scale.
http://smap.landcareresearch.co.nz/home

The Land Cover Database (LCDB)
http://www.mfe.govt.nz/issues/land/land-cover-dbase/http://www.mfe.govt.nz/issues/land/land-cover-dbase/
http://koordinates.com/



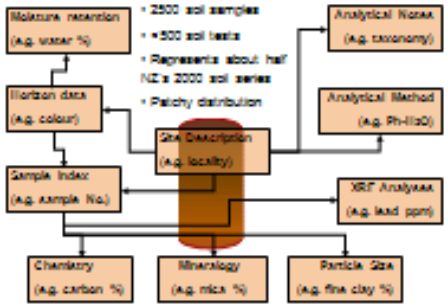
LAND & SOILS RESOURCES

Maori Land Visualisation Tool (MLVT)
http://whenuaviz.landcareresearch.co.nz

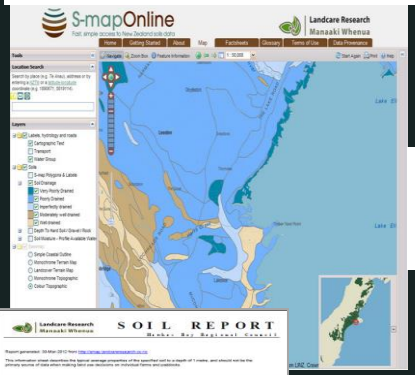


- **Provide on-line tools and technologies**
- **Desktop examination of existing information:**
- **Soil and land resource mapping:**
- **Farm scale land resource evaluations:**
- **Specialised soil mapping and analyses:**
- **Land use scenario modelling:**

The National Soils Database
http://www.landcareresearch.co.nz/databases/nsd.asp

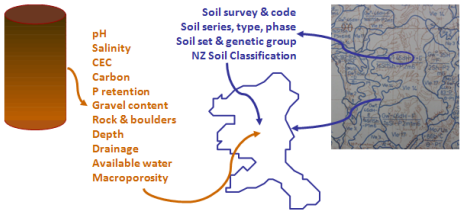


http://smap.landcareresearch.co.nz/home

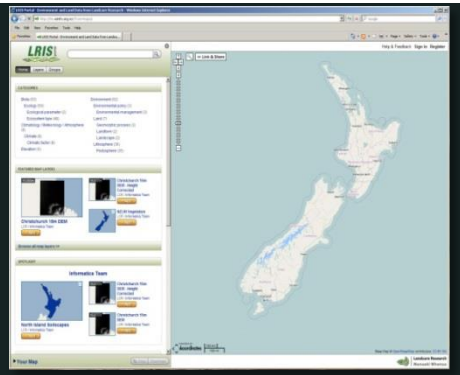


NZ Fundamental Soil Layer

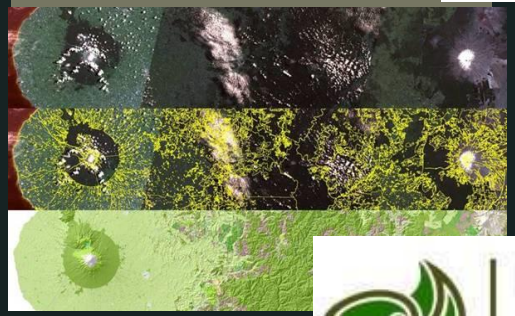
Hybrid of the NZLRI and NZNSD that combines:
- The best spatial delineation of soils, with
- The most comprehensive analytical database of soils



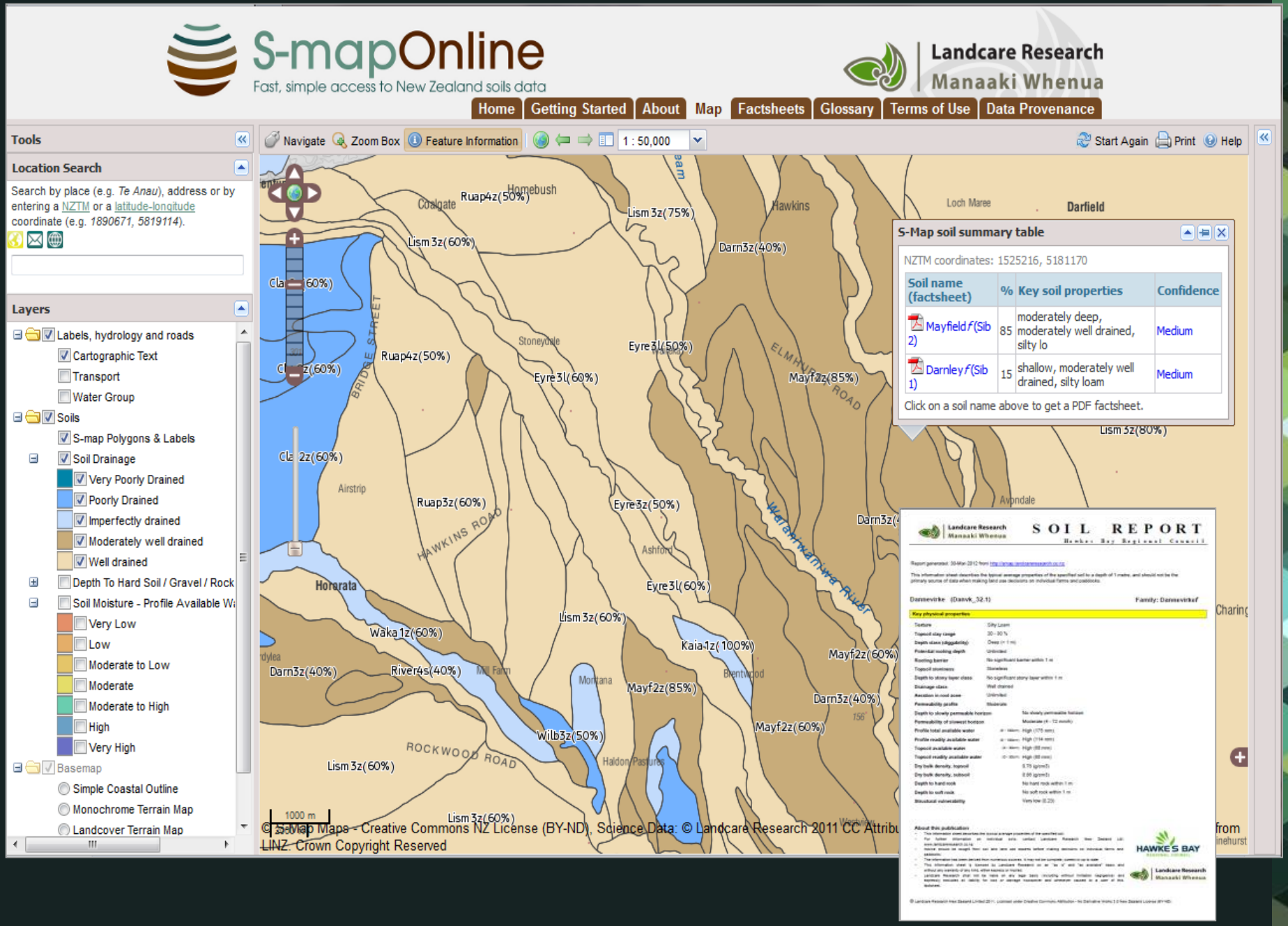
Land Resource Information System (LRIS)
http://lris.scinfo.org.nz



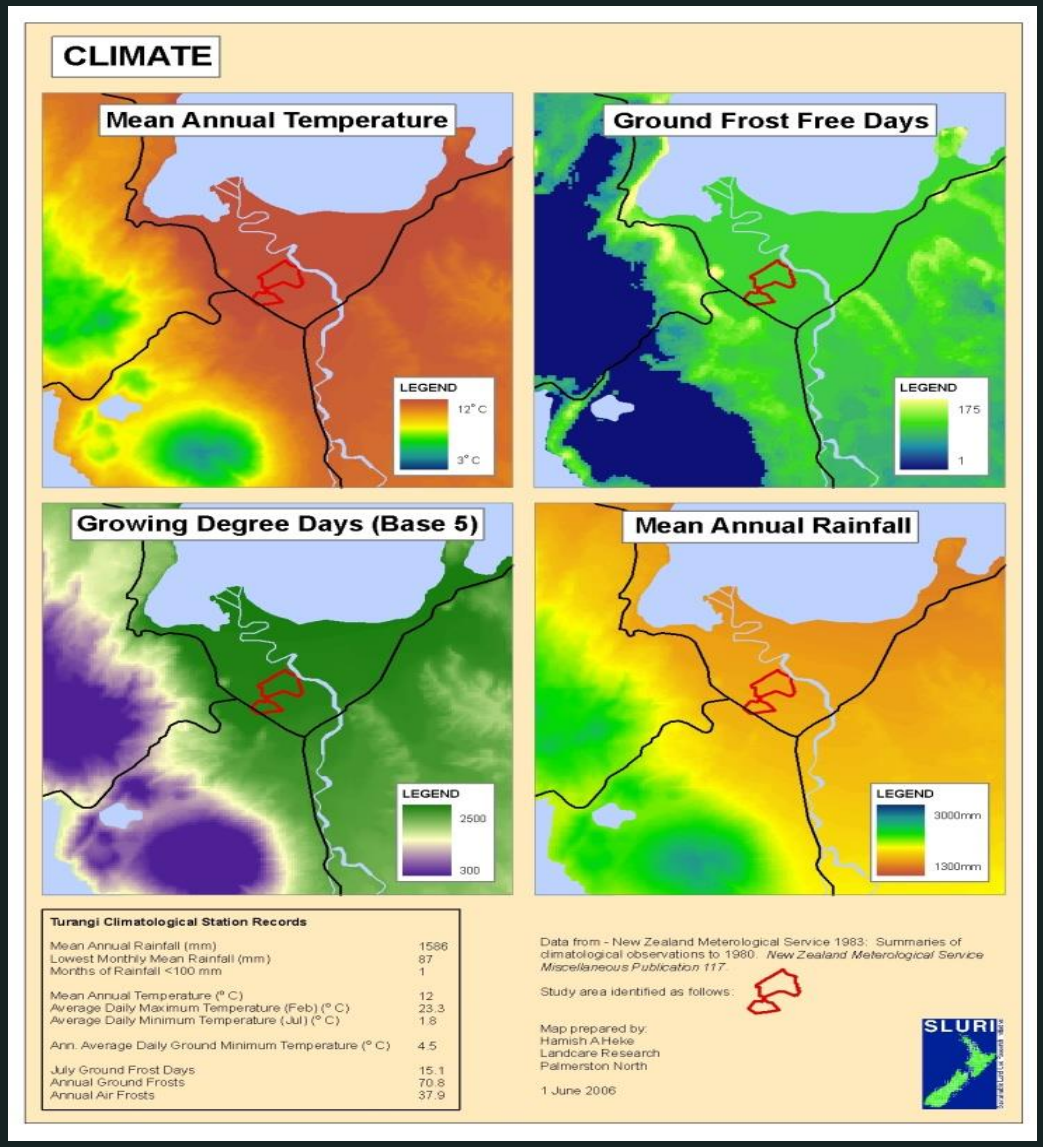
The Land Cover Database (LCDB)
http://www.mfe.govt.nz/

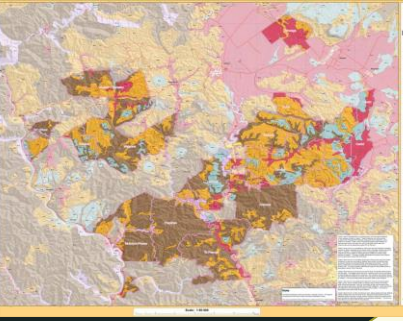
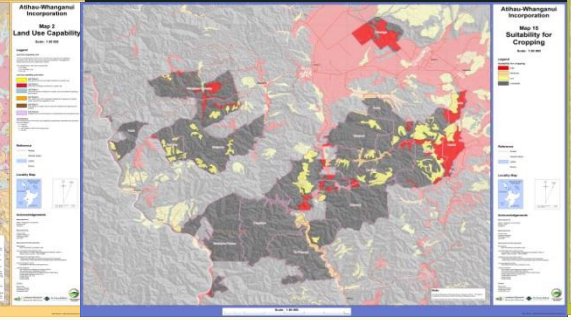
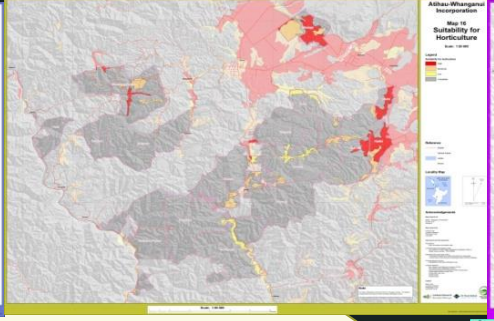
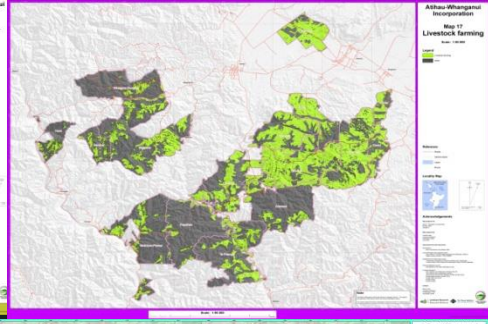


Landcare Research
Manaaki Whenua


S-mapOnline
Fast, simple access to New Zealand soils data
Landcare Research
Manaaki Whenua
Home
Getting Started
About
Map
Factsheets
Glossary
Terms of Use
Data Provenance
Tools
Location Search
Search by place (e.g. Te Anau), address or by entering a NZTM or a latitude-longitude coordinate (e.g. 1890671, 5819114).
Layers
Labels, hydrology and roads
Cartographic Text
Transport
Water Group
Soils
S-map Polygons & Labels
Soil Drainage
Very Poorly Drained
Poorly Drained
Imperfectly drained
Moderately well drained
Well drained
Depth To Hard Soil / Gravel / Rock
Soil Moisture - Profile Available Wa
Very Low
Low
Moderate to Low
Moderate
Moderate to High
High
Very High
Basemap
Simple Coastal Outline
Monochrome Terrain Map
Landcover Terrain Map
Navigate
Zoom Box
Feature Information
1 : 50,000
Start Again
Print
Help
S-Map soil summary table
NZTM coordinates: 1525216, 5181170
Soil name (factsheet)
%
Key soil properties
Confidence
Mayfield f (Sib 2)
85
moderately deep, moderately well drained, silty lo
Medium
Darnley f (Sib 1)
15
shallow, moderately well drained, silty loam
Medium
Click on a soil name above to get a PDF factsheet.
SOIL REPORT
Hawke's Bay Regional Council
Darnevirke (Darnvk_32.1)
Family: Darnevirke f
Key physical properties
Texture
Silty Loam
Topsoil clay range
30 - 90 %
Depth class (piggability)
Deep (> 1 m)
Potential rooting depth
Unlimited
Rooting barrier
No significant barrier within 1 m
Topsoil stoniness
Stoneless
Depth to stony layer class
No significant stony layer within 1 m
Drainage class
Well drained
Aeration in root zone
Unlimited
Permeability profile
Moderate
Depth to slowly permeable horizon
No slowly permeable horizon
Permeability of slowest horizon
Moderate (4 - 12 mm/h)
Profile total available water
High (175 mm)
Profile readily available water
High (114 mm)
Topsoil available water
High (80 mm)
Topsoil readily available water
High (80 mm)
Dry bulk density, topsoil
0.75 g/cm3
Dry bulk density, subsoil
0.95 g/cm3
Depth to hard rock
No hard rock within 1 m
Depth to soft rock
No soft rock within 1 m
Structural vulnerability
Very low (0.23)
About this publication
HAWKE'S BAY
Landcare Research Manaaki Whenua
Coalgate
Homebush
Ruap4z(50%)
Lism 3z(75%)
Hawkins
Loch Maree
Darfield
Lism 3z(60%)
Darn3z(40%)
Stoneydale
Eyre3l(50%)
Ruap4z(50%)
Eyre3l(60%)
Mayf2z(85%)
ELMHURST ROAD
BRIDGE STREET
Lism 3z(80%)
Airstrip
Ruap3z(60%)
Eyre3z(50%)
Avondale
HAWKINS ROAD
Ashford
Horarata
Eyre3l(60%)
Lism 3z(60%)
Waka1z(60%)
Kaia1z(100%)
Mayf2z(60%)
Darn3z(40%)
River4s(40%)
Montana
Mayf2z(85%)
Darn3z(40%)
Mayf2z(60%)
Wilb3z(50%)
ROCKWOOD ROAD
Haldon/Pasture
Lism 3z(60%)
1000 m
© S-Map Maps - Creative Commons NZ License (BY-ND), Science Data: © Landcare Research 2011 CC Attribu
LINZ: Crown Copyright Reserved

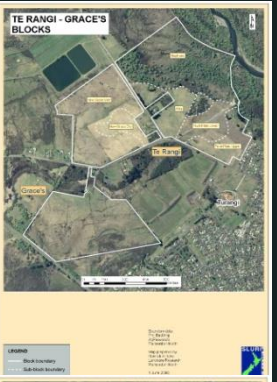
Climate data

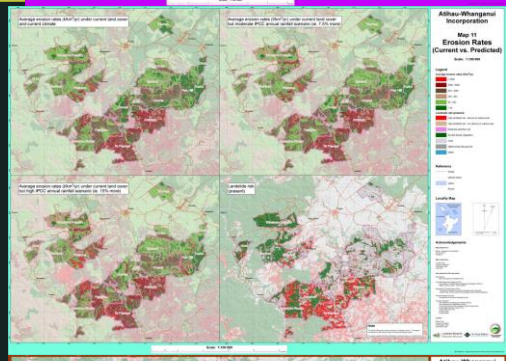
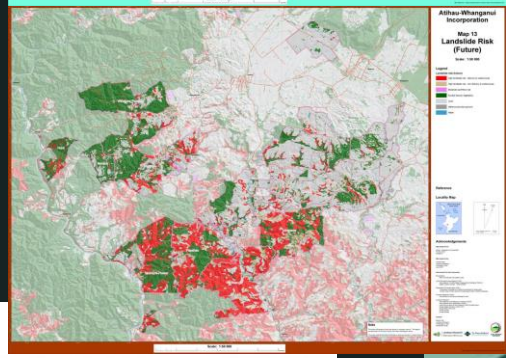


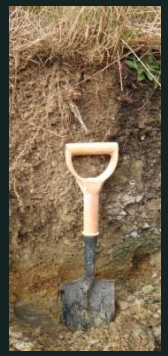
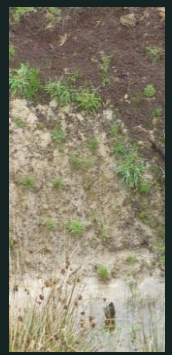





Examples

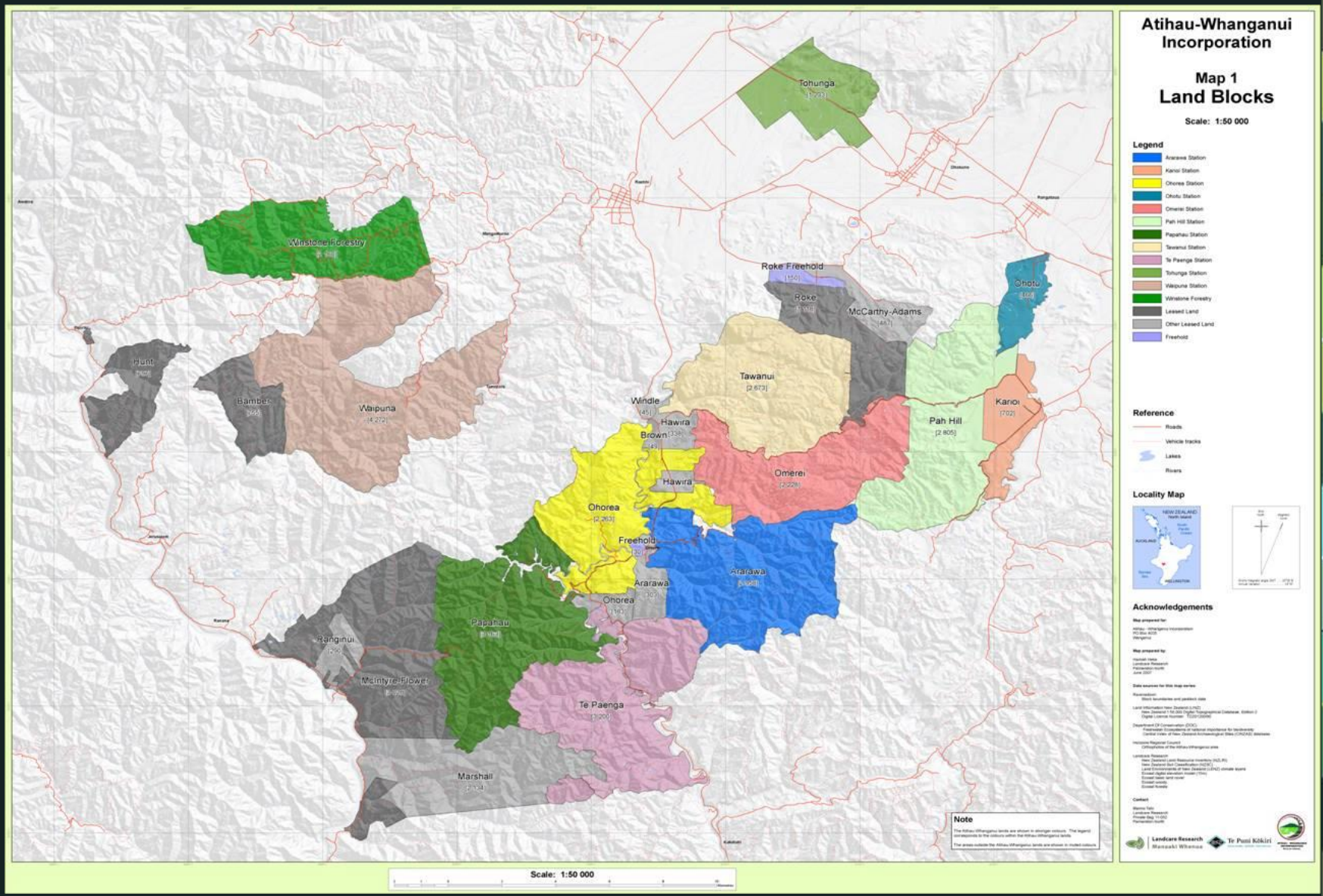
- Catchment and farm scale land resource assessments;
- On-Farm advice, mapping and/or monitoring specific to your land blocks;
- Expert interpretation of soil and land resource information;
- Land use scenario modelling;
- Provide access to on-line data and soils information.



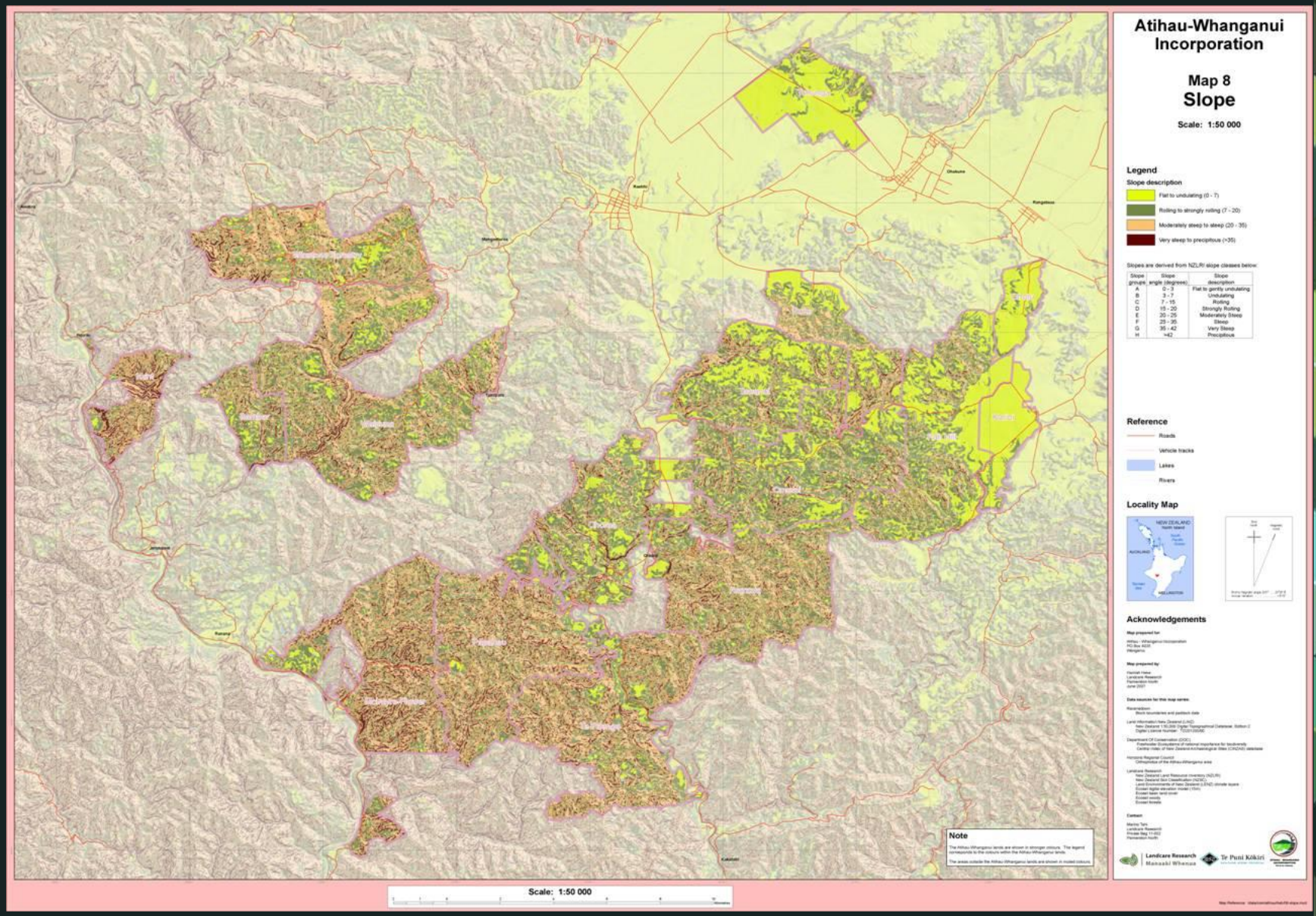



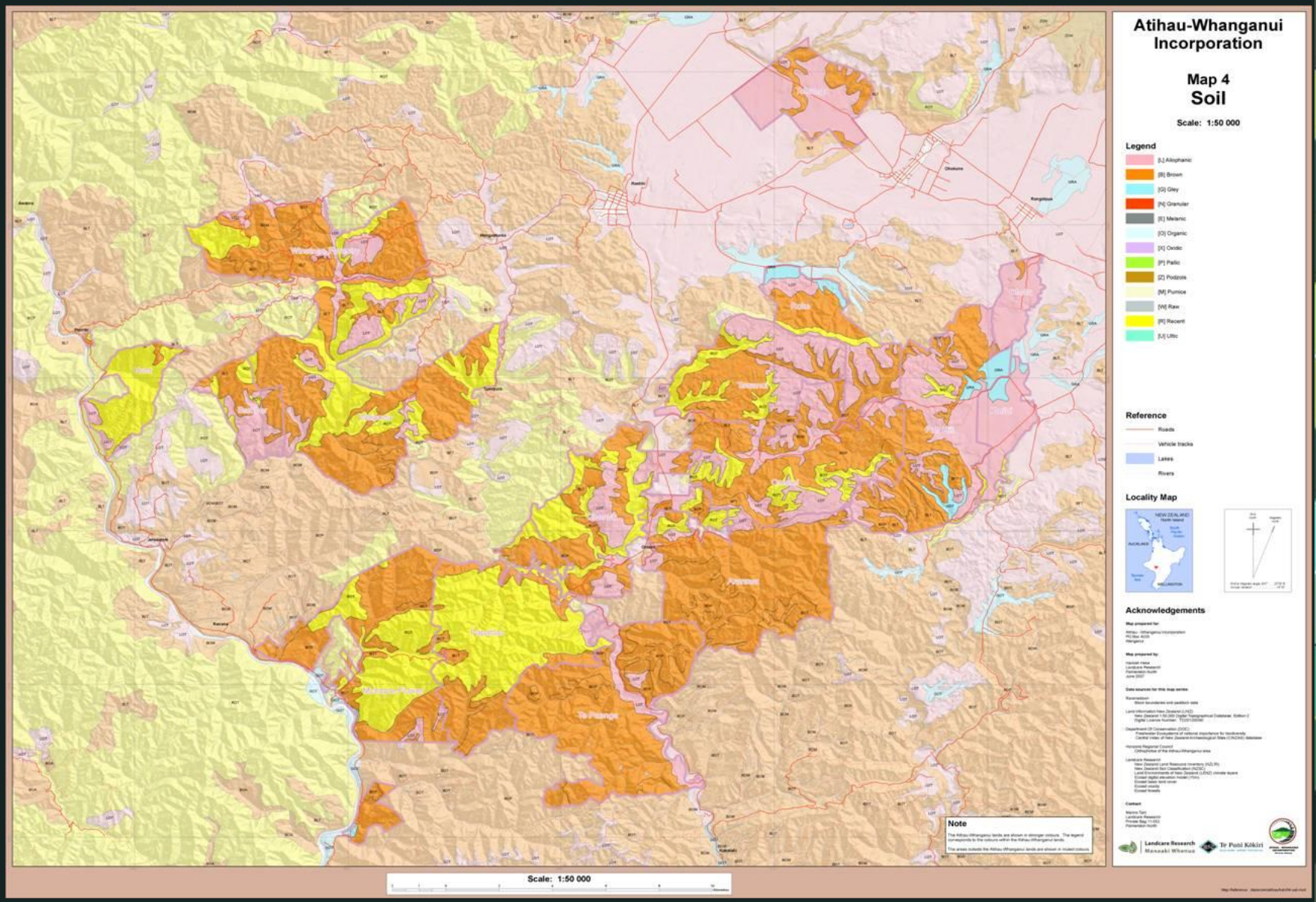

Atihau-Whanganui Land-blocks



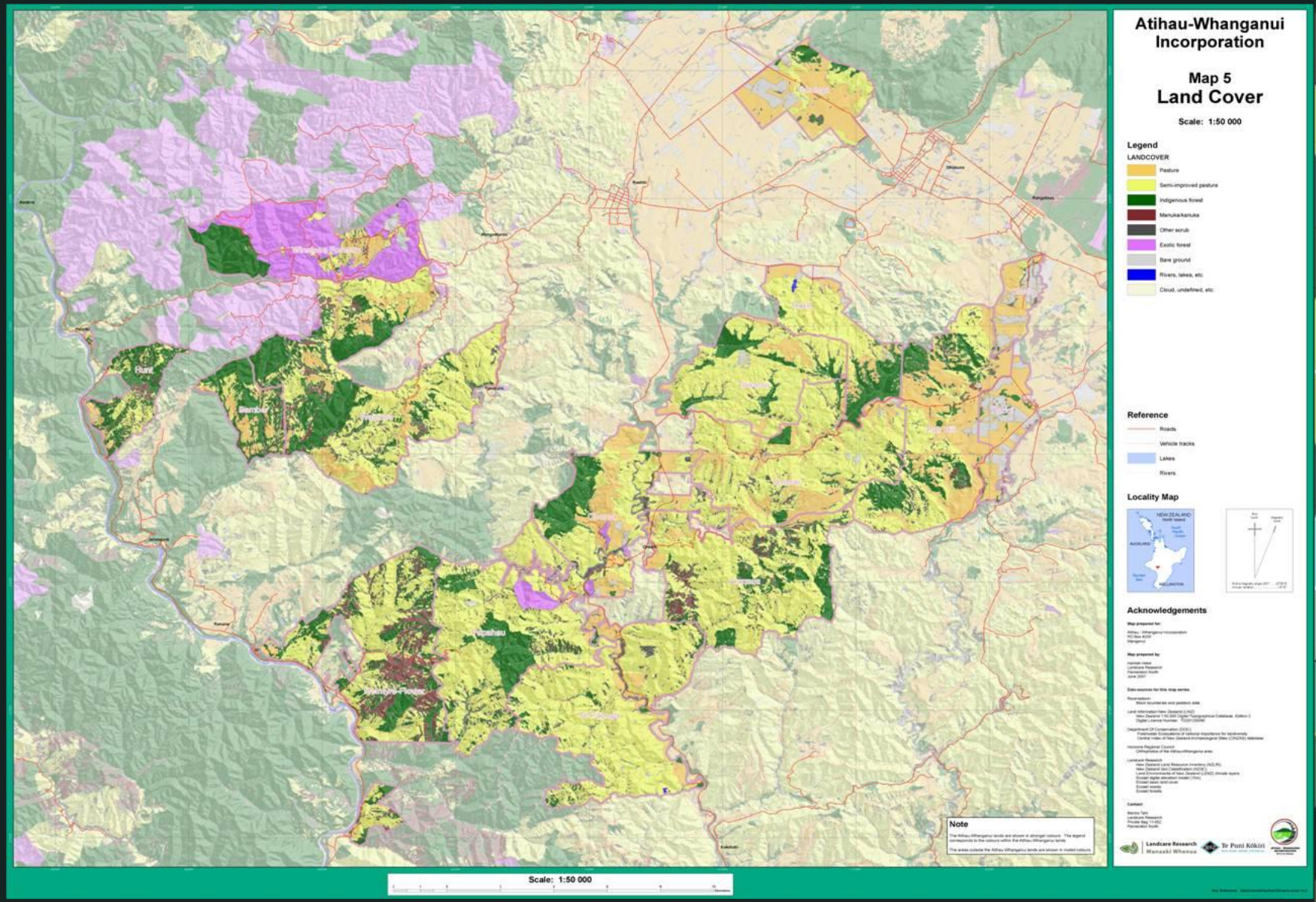
Land Characteristics



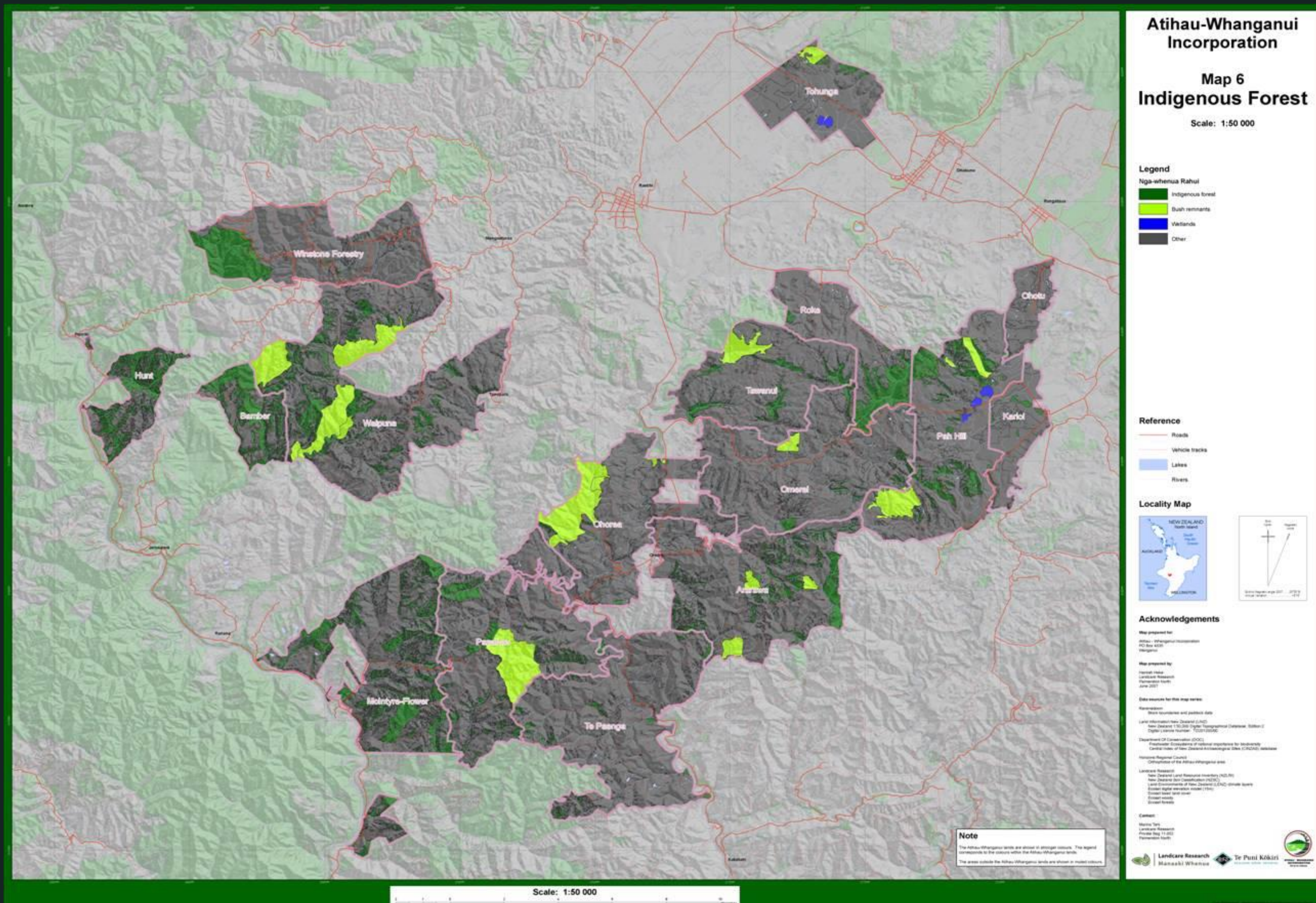
Land Characteristics



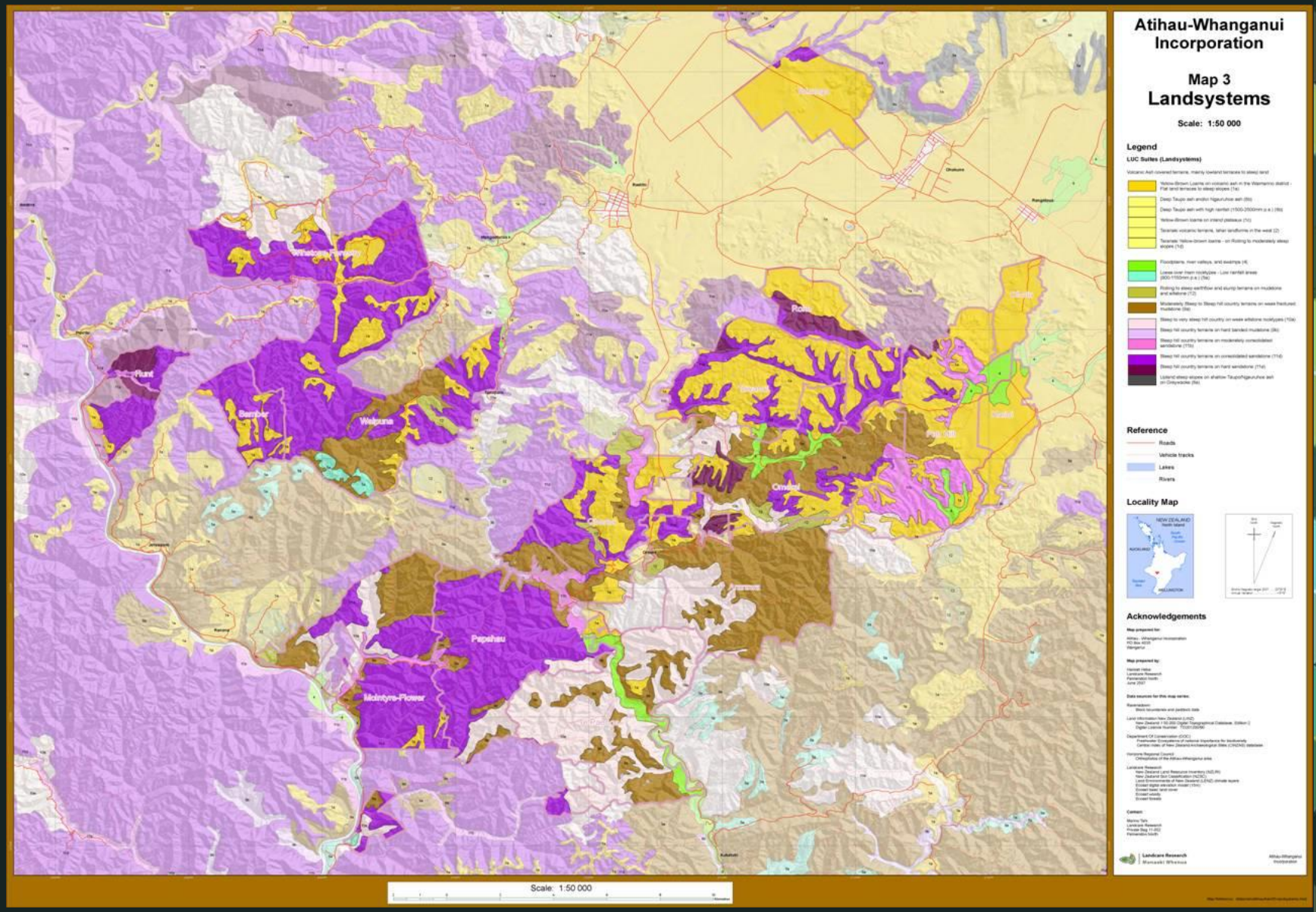
Land Cover


Atihau-Whanganui Incorporation
Map 5
Land Cover
Scale: 1:50 000
Legend
LANDCOVER
Pasture
Semi-improved pasture
Indigenous forest
Manuka/kanuka
Other scrub
Exotic forest
Bare ground
Rivers, lakes, etc.
Cloud, undefined, etc.
Reference
Roads
Vehicle tracks
Lakes
Rivers
Locality Map
Acknowledgements
Note
Scale: 1:50 000

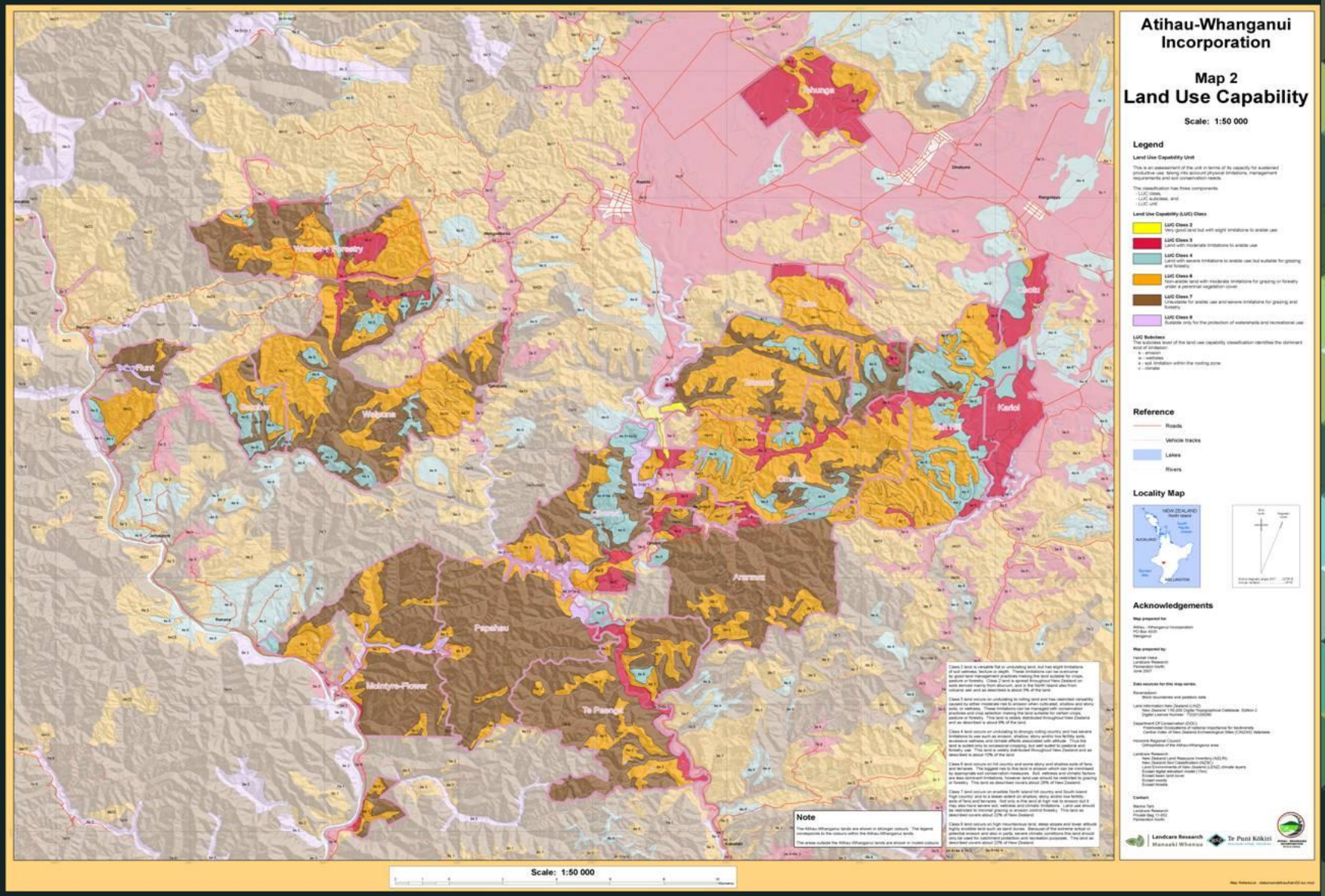
Land Cover


Atihau-Whanganui
Incorporation
Map 6
Indigenous Forest
Scale: 1:50 000
Legend
Nga-whenua Rahui
Indigenous forest
Bush remnants
Wetlands
Other
Reference
Roads
Vehicle tracks
Lakes
Rivers
Locality Map
Acknowledgements
Note
Tohunga
Winstone Forestry
Hunt
Bamber
Waipuna
Roka
Ohotu
Tawanui
Karioi
Pah Hill
Omorei
Ohorea
Ararawa
McIntyre-Flower
Te Paenga
Scale: 1:50 000

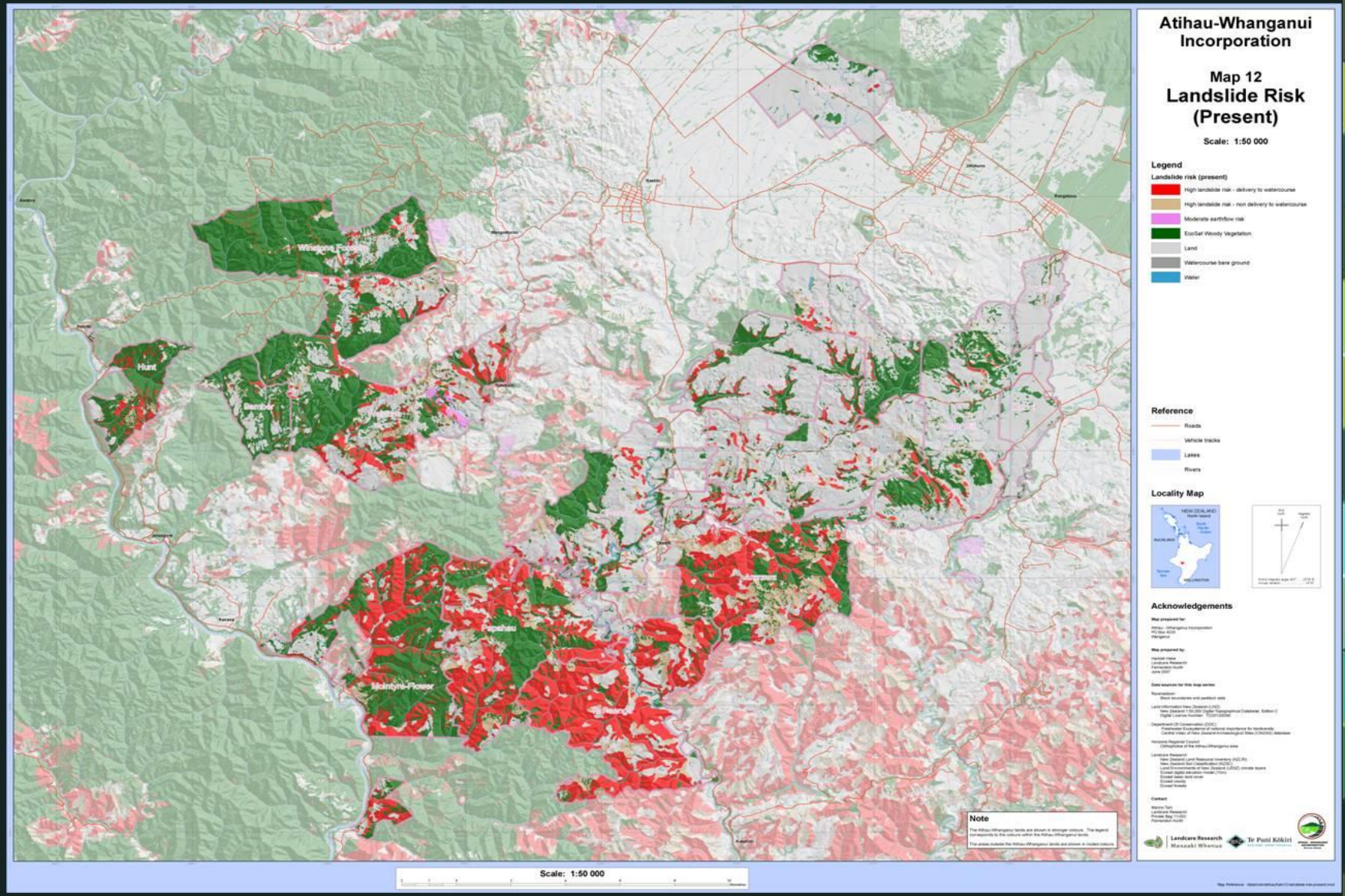
Land Characteristics



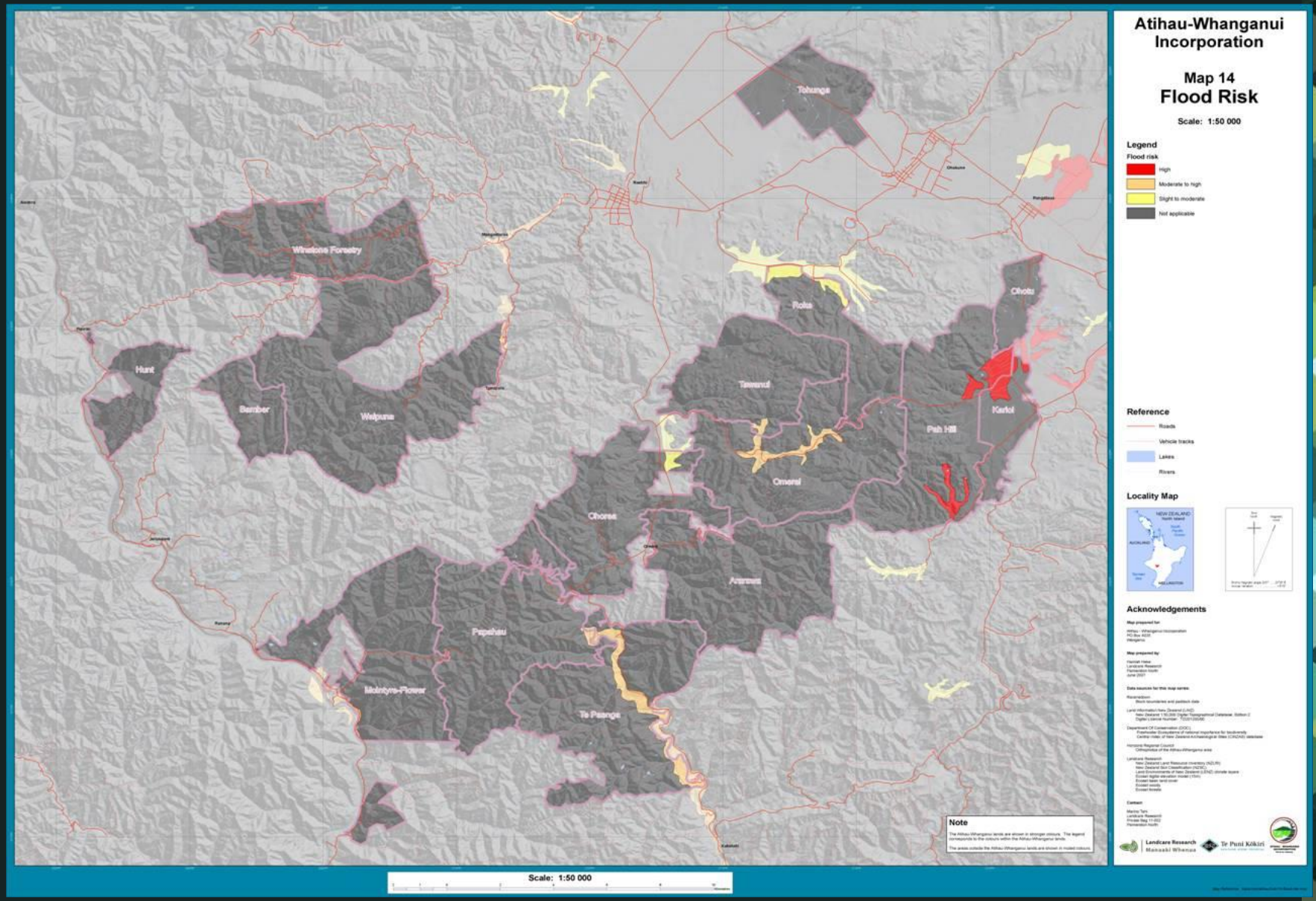
Land Use Capability



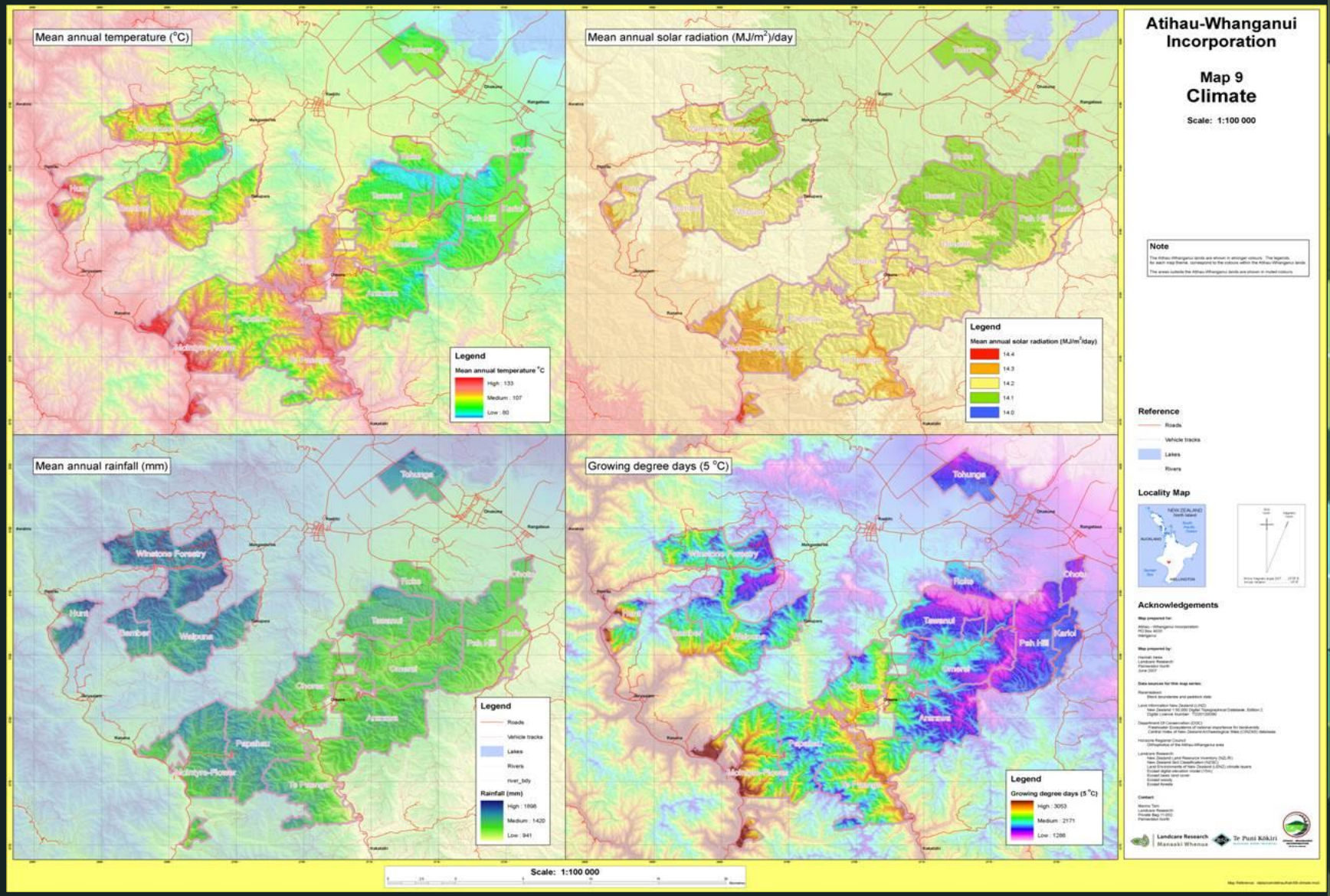
Risk Assessment



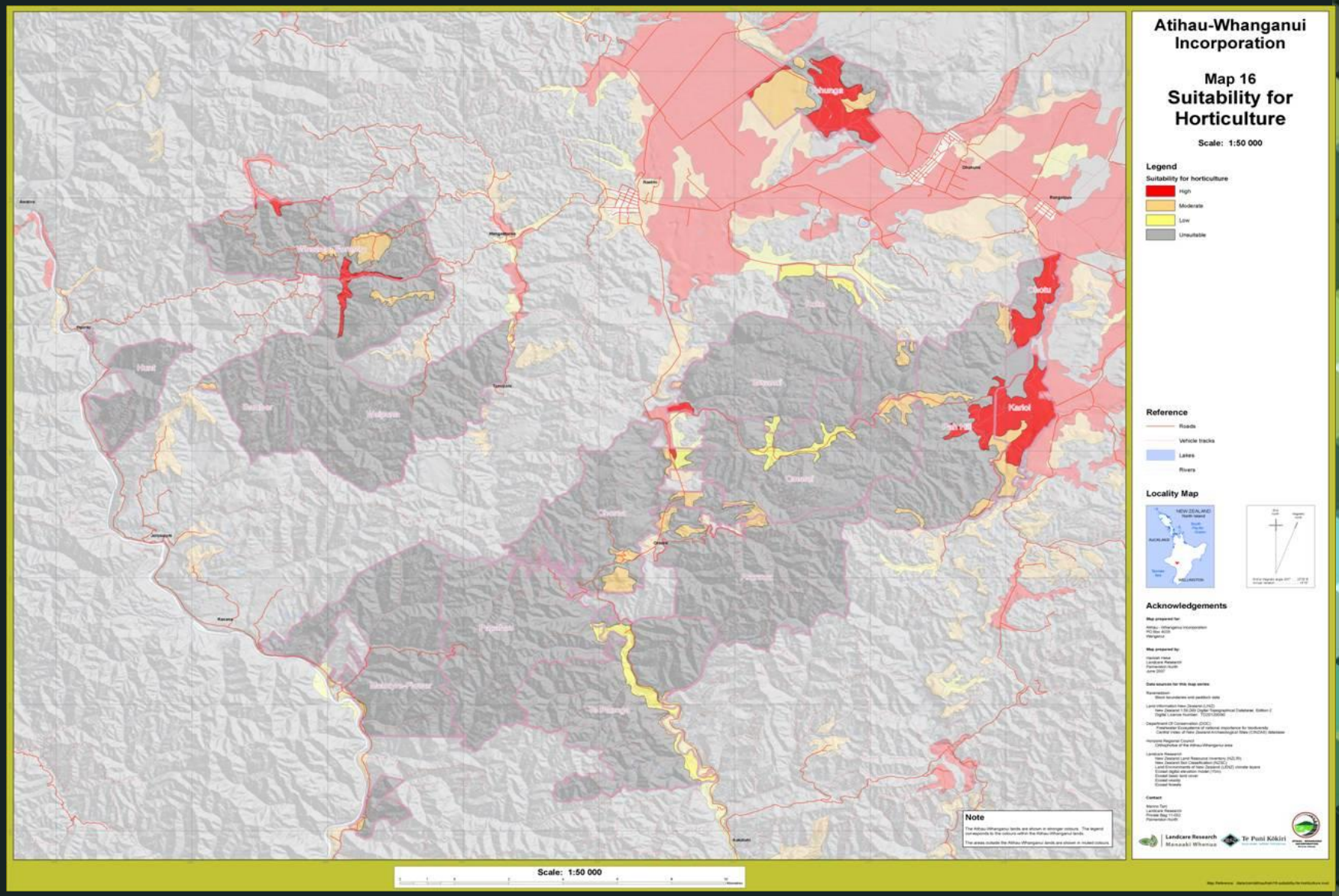
Risk Assessment



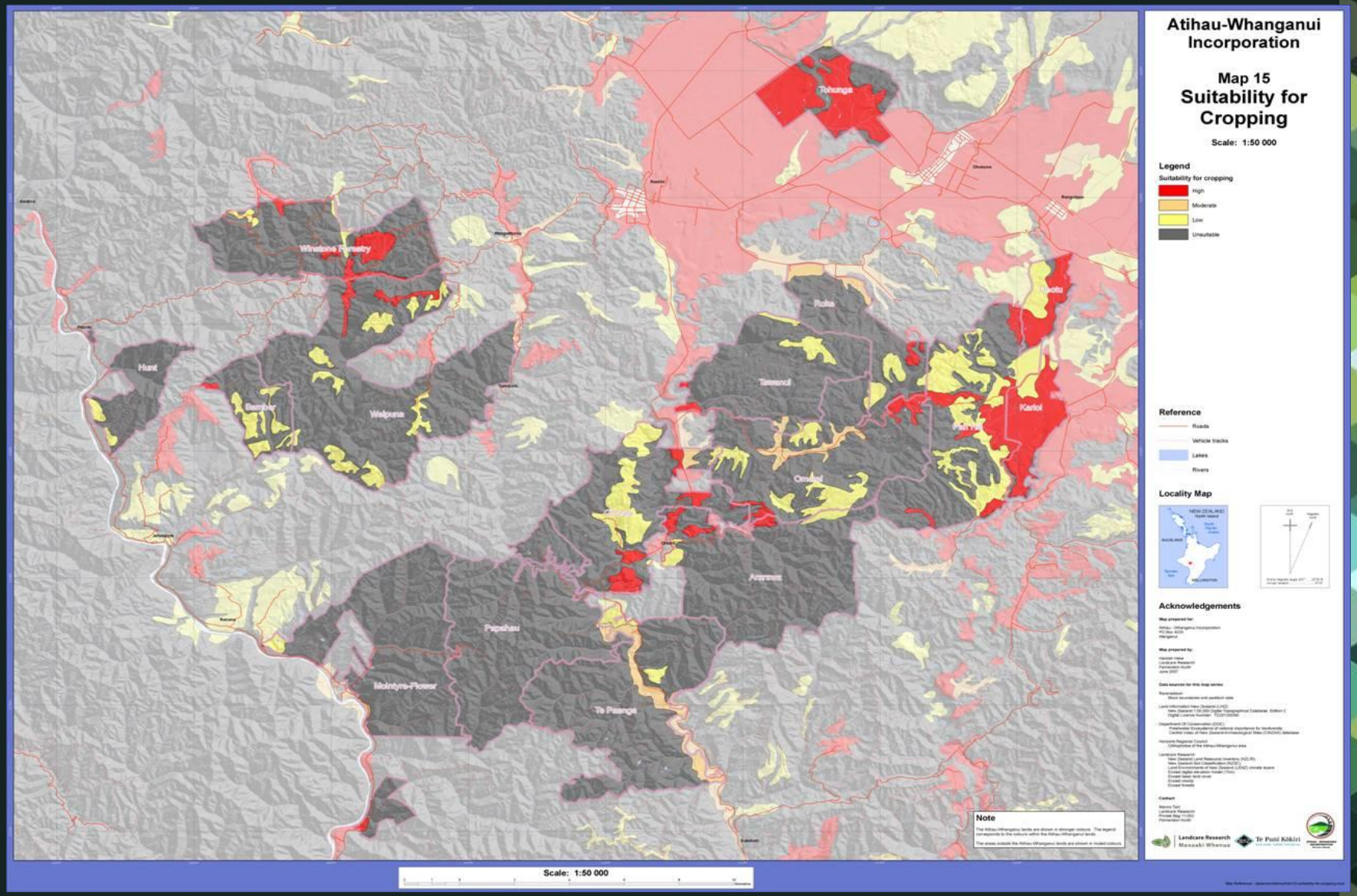
Land Characteristics



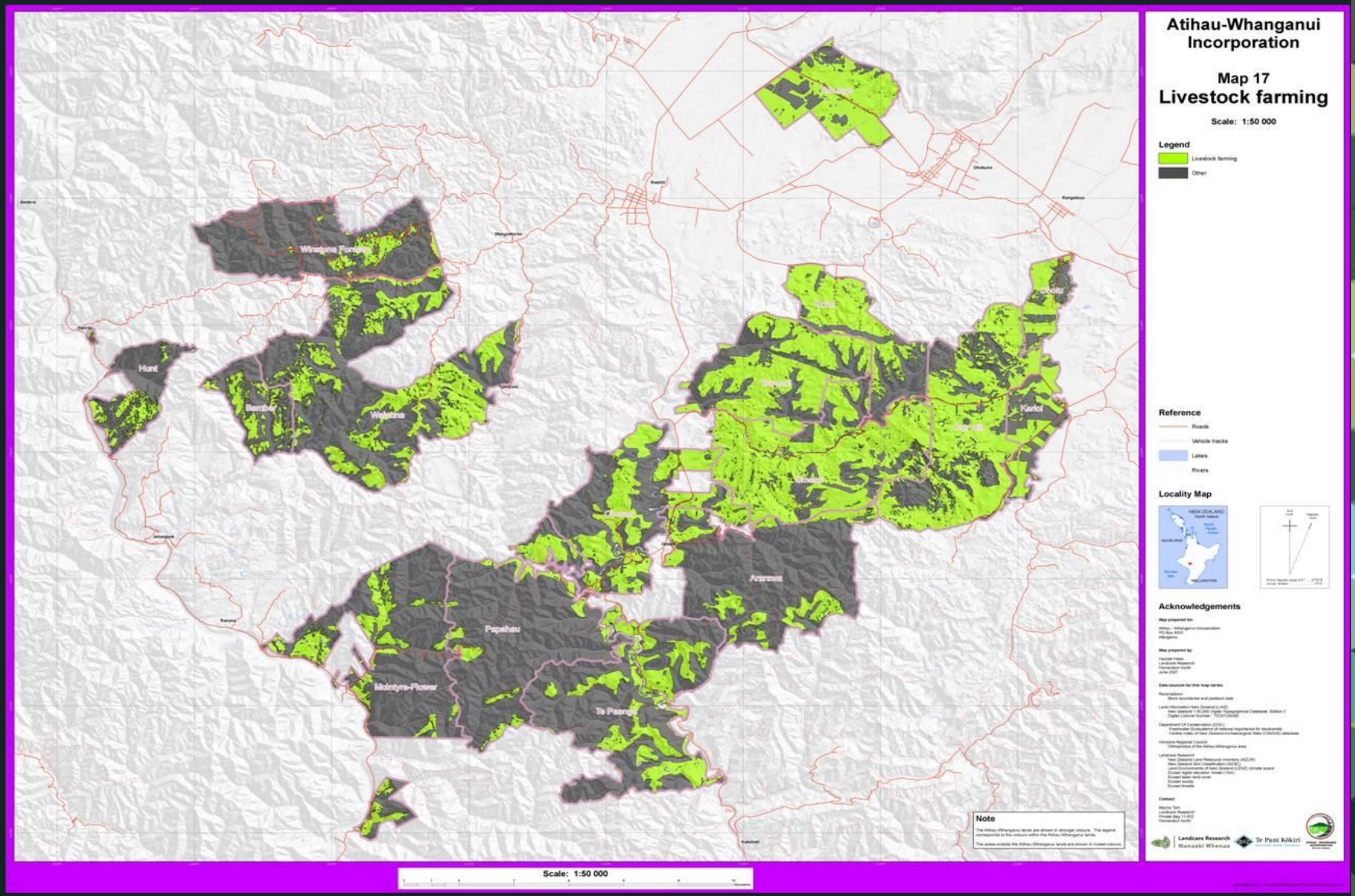
New Land Use Opportunities



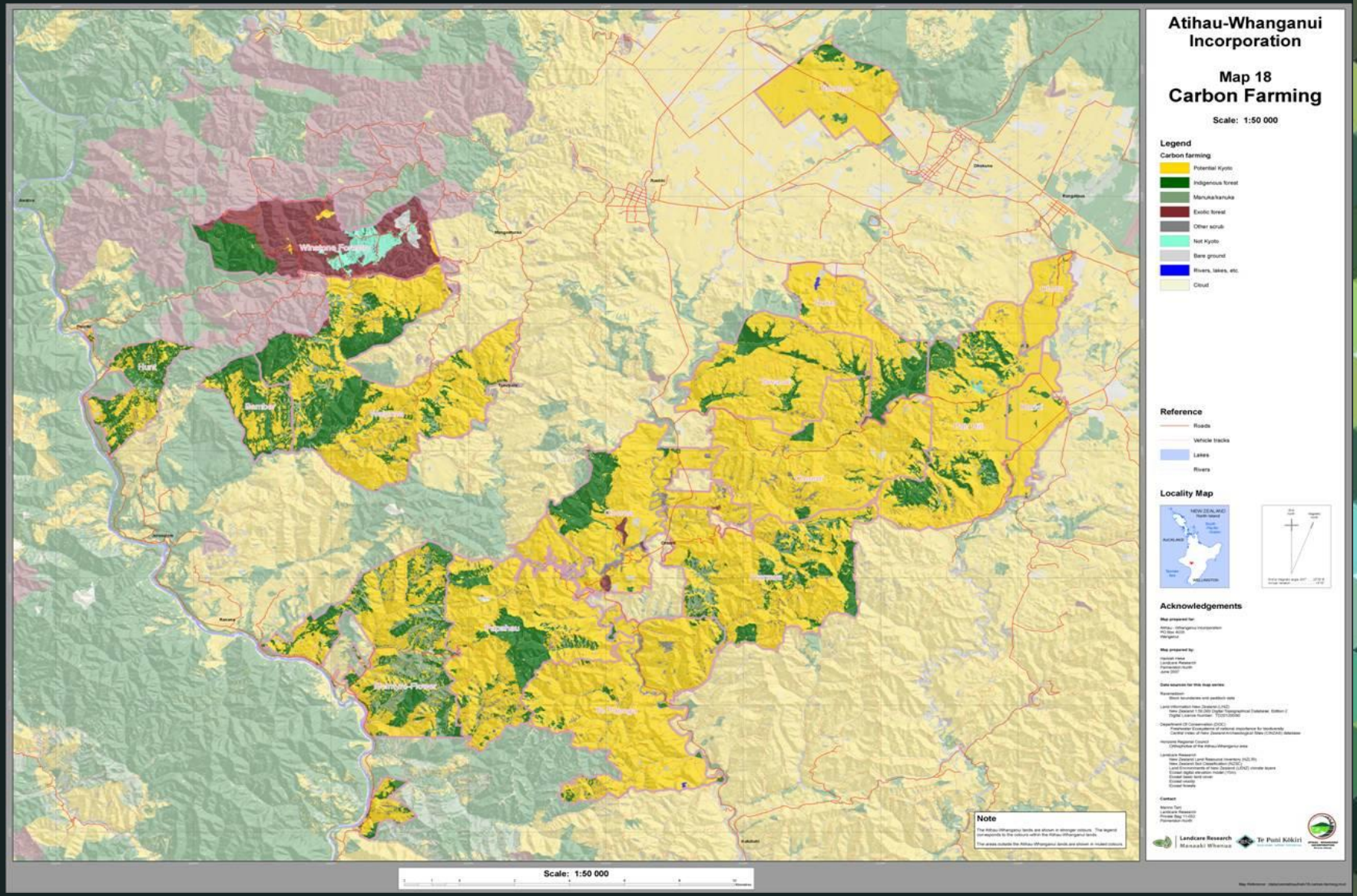
New Land Use Opportunities



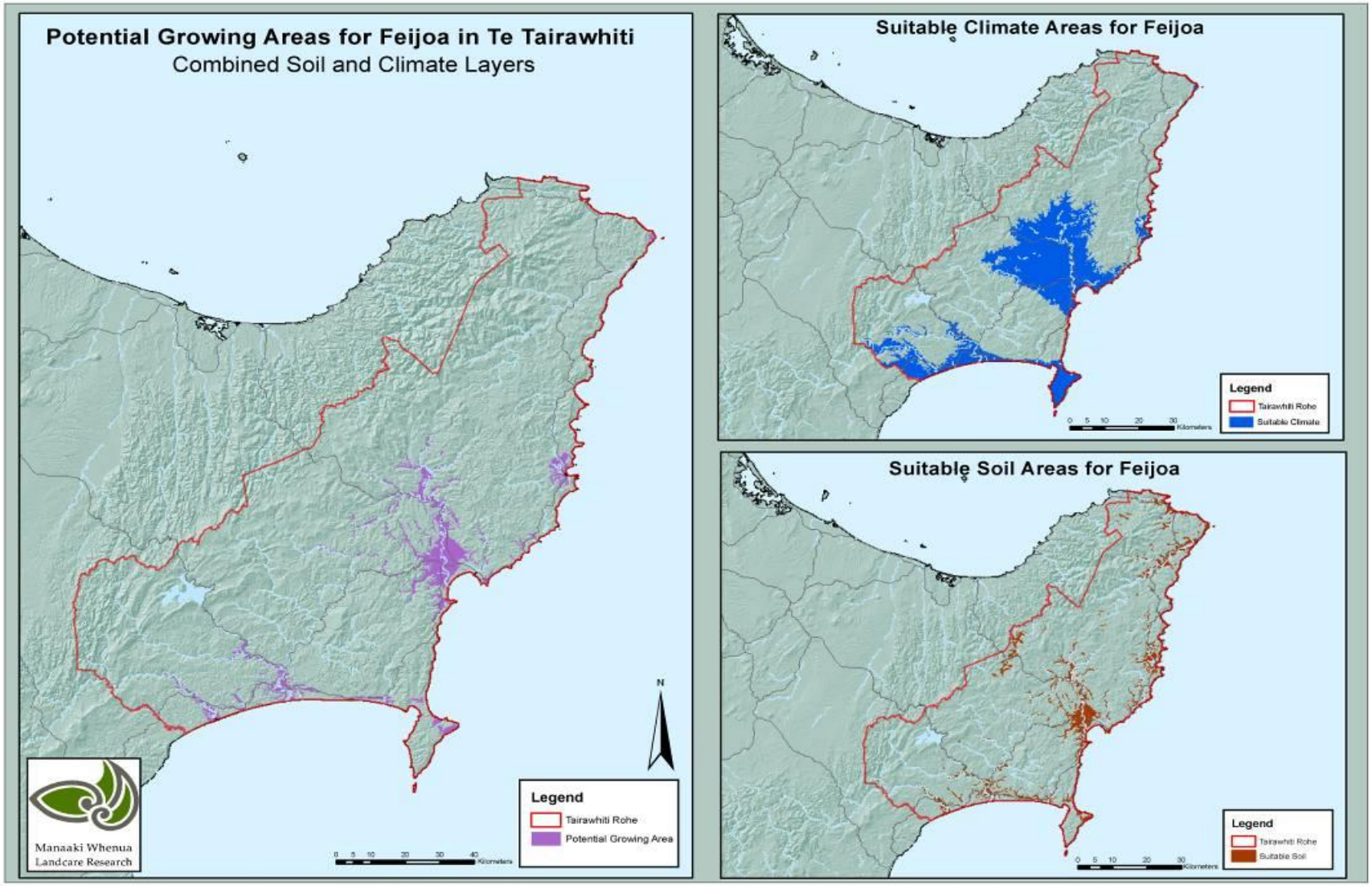
New Land Use Opportunities

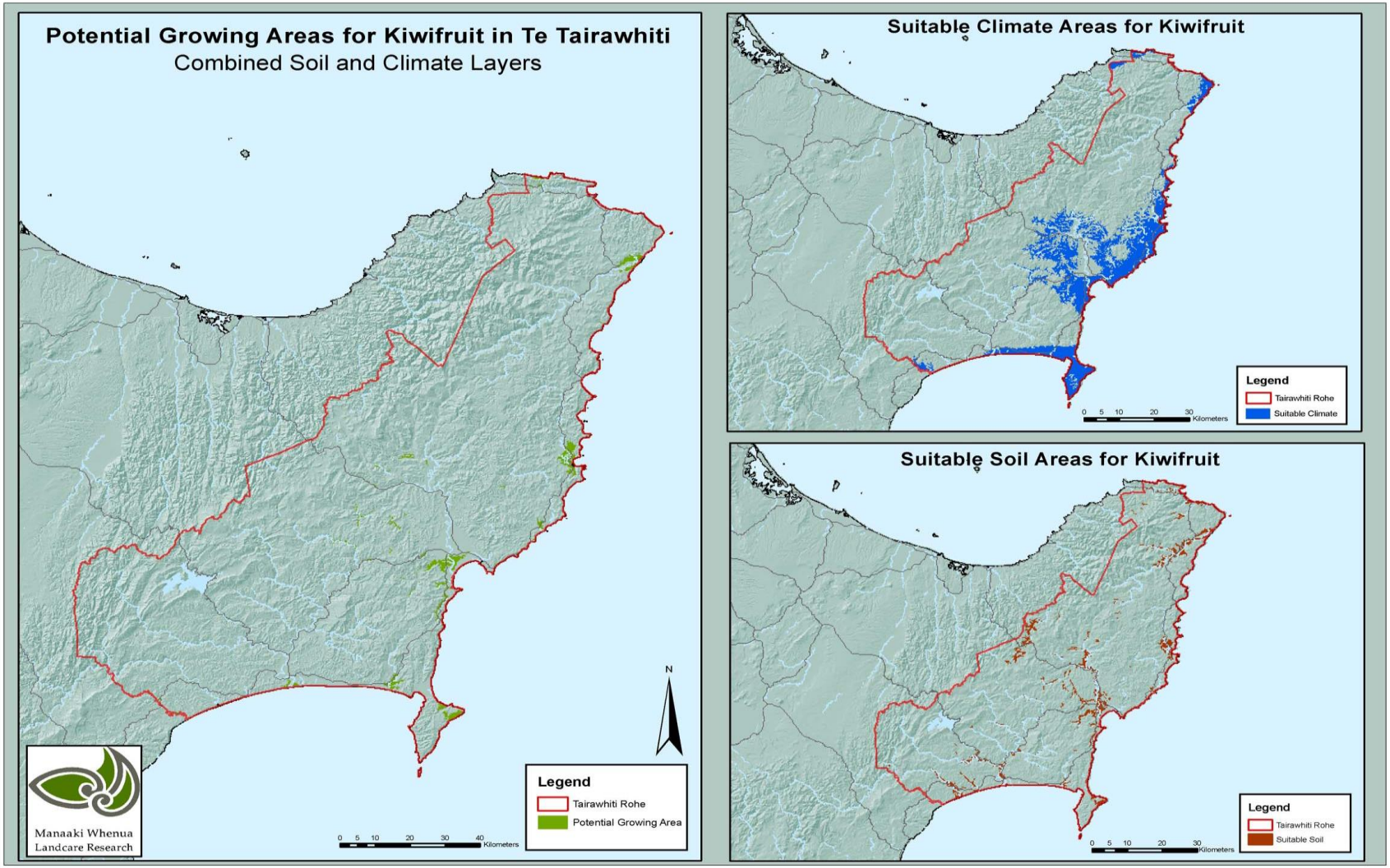


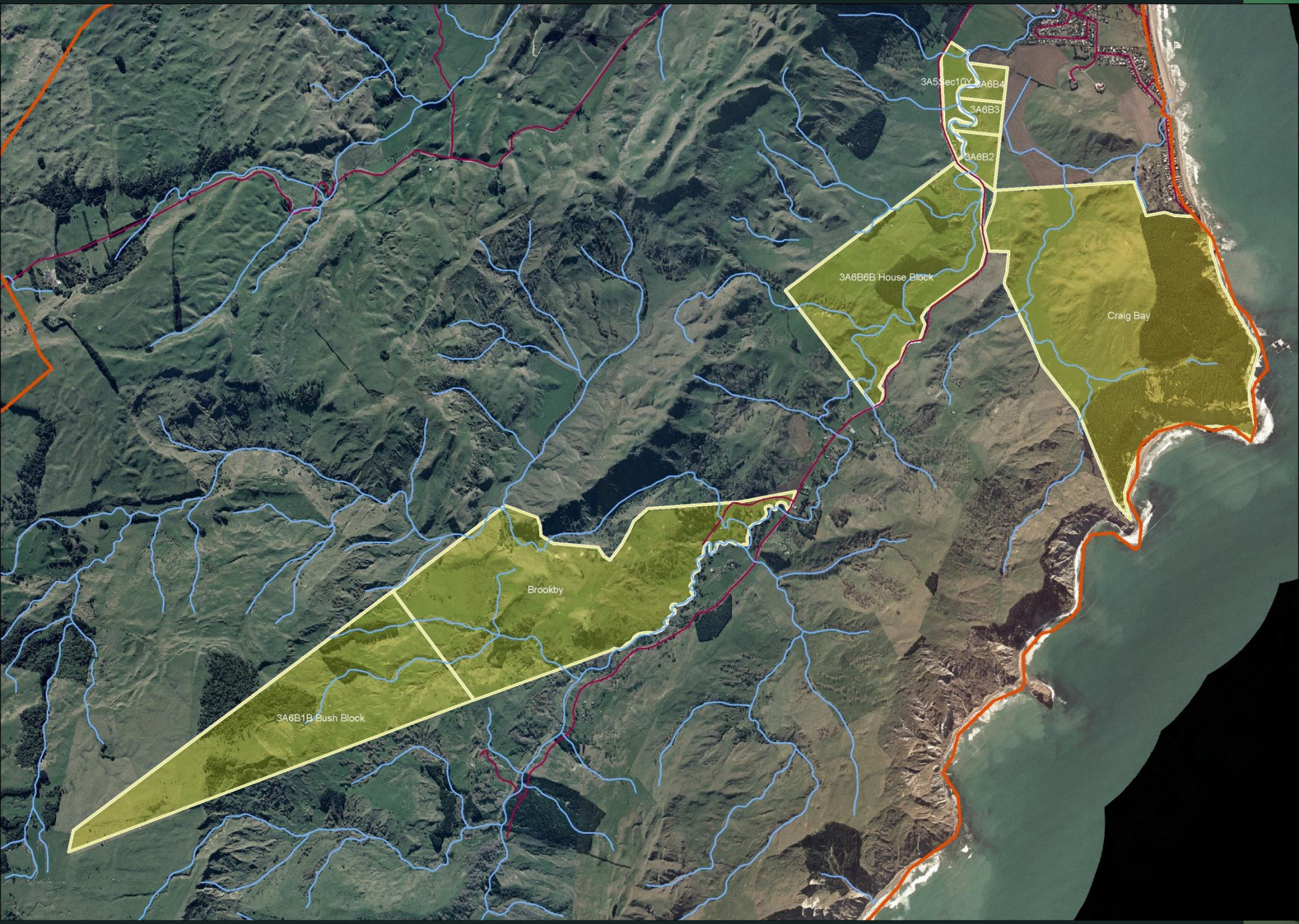
New Land Use Opportunities

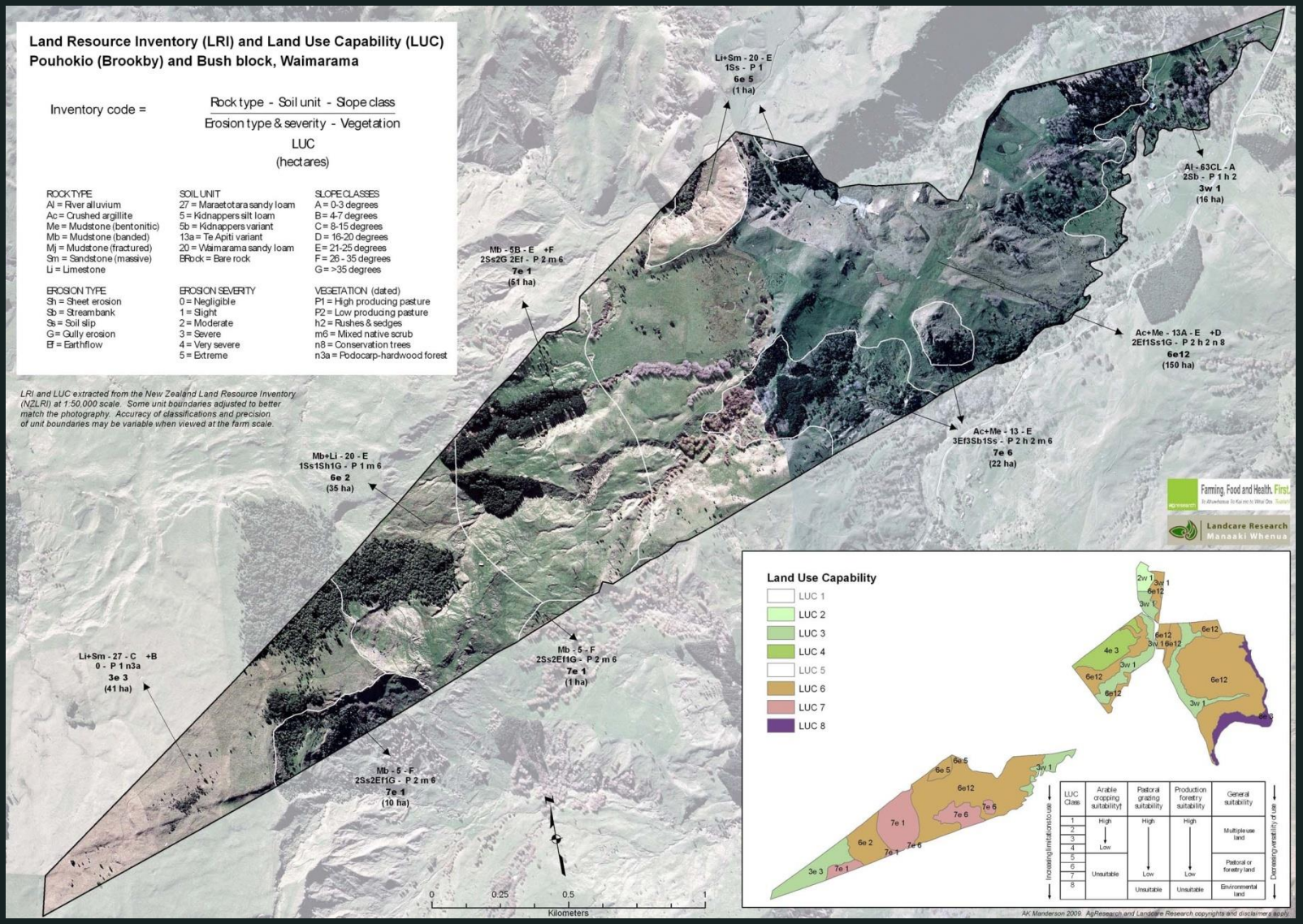


New Land Use Opportunities

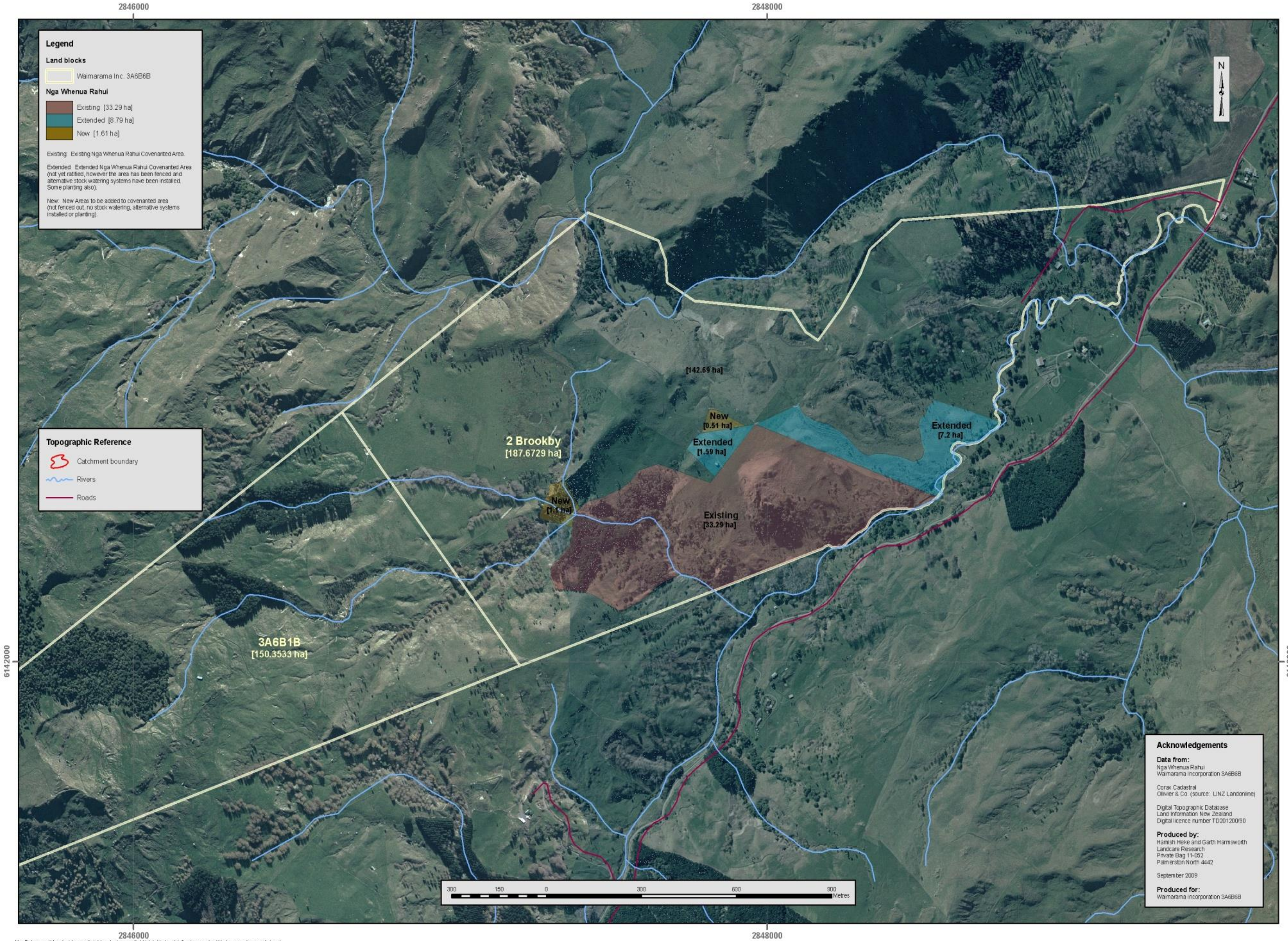



Potential Growing Areas for Kiwifruit in Te Tairawhiti
Combined Soil and Climate Layers
N
Legend
Tairawhiti Rohe
Potential Growing Area
0 5 10 20 30 40 Kilometers
Manaaki Whenua
Landcare Research
Suitable Climate Areas for Kiwifruit
Legend
Tairawhiti Rohe
Suitable Climate
0 5 10 20 30 Kilometers
Suitable Soil Areas for Kiwifruit
Legend
Tairawhiti Rohe
Suitable Soil
0 5 10 20 30 Kilometers


3A5Sec10Y
3A6B4
3A6B3
3A6B2
3A6B6B House Block
Craig Bay
Brookby
3A6B1B Bush Block

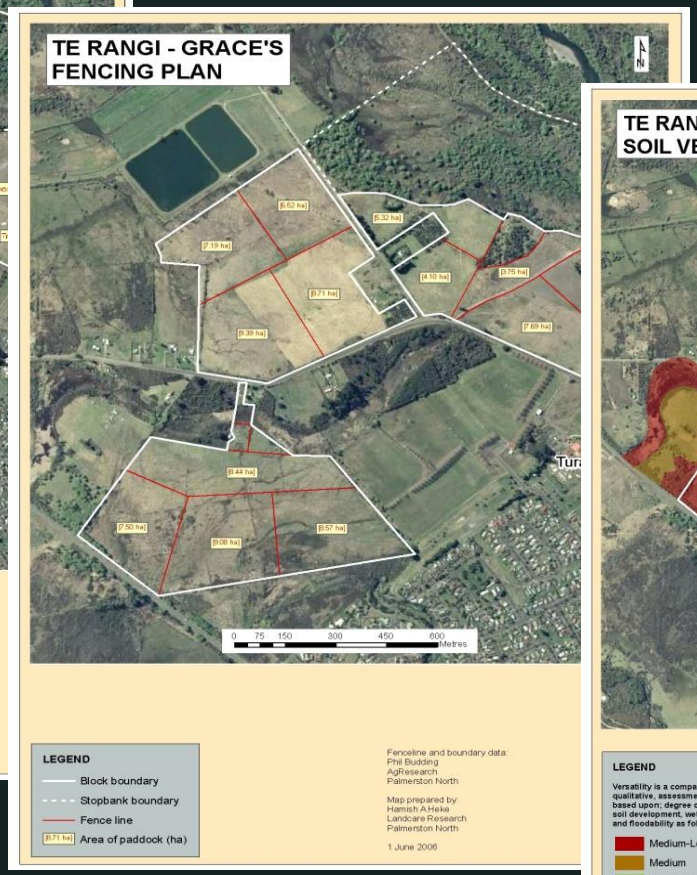

Land Resource Inventory (LRI) and Land Use Capability (LUC)
Pouhokio (Brookby) and Bush block, Waimarama
Inventory code = Rock type - Soil unit - Slope class / Erosion type & severity - Vegetation / LUC (hectares)
ROCK TYPE
Al = River alluvium
Ac = Crushed argillite
Me = Mudstone (bentonitic)
Mb = Mudstone (banded)
Mj = Mudstone (fractured)
Sm = Sandstone (massive)
Li = Limestone
SOIL UNIT
27 = Maraetotara sandy loam
5 = Kidnappers silt loam
5b = Kidnappers variant
13a = Te Apiti variant
20 = Waimarama sandy loam
BRock = Bare rock
SLOPE CLASSES
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
Sh = Sheet erosion
Sb = Streambank
Ss = Soil slip
G = Gully erosion
Ef = Earthflow
EROSION SEVERITY
0 = Negligible
1 = Slight
2 = Moderate
3 = Severe
4 = Very severe
5 = Extreme
VEGETATION (dated)
P1 = High producing pasture
P2 = Low producing pasture
h2 = Rushes & sedges
m6 = Mixed native scrub
n8 = Conservation trees
n3a = Podocarp-hardwood forest
LRI and LUC extracted from the New Zealand Land Resource Inventory (NZLRI) at 1:50,000 scale. Some unit boundaries adjusted to better match the photography. Accuracy of classifications and precision of unit boundaries may be variable when viewed at the farm scale.
Li+Sm - 20 - E
1Ss - P 1
6e 5
(1 ha)
Al - 63CL - A
2Sb - P 1 h 2
3w 1
(16 ha)
Mb - 5B - E +F
2Ss2G 2Ef - P 2 m 6
7e 1
(51 ha)
Ac+Me - 13A - E +D
2Ef1Ss1G - P 2 h 2 n 8
6e12
(150 ha)
Ac+Me - 13 - E
3Ef3Sb1Ss - P 2 h 2 m 6
7e 6
(22 ha)
Mb+Li - 20 - E
1Ss1Sh1G - P 1 m 6
6e 2
(35 ha)
Mb - 5 - F
2Ss2Ef1G - P 2 m 6
7e 1
(1 ha)
Li+Sm - 27 - C +B
0 - P 1 n3a
3e 3
(41 ha)
Mb - 5 - F
2Ss2Ef1G - P 2 m 6
7e 1
(10 ha)
0 0.25 0.5 1
Kilometers
Farming, Food and Health, First.
Landcare Research
Manaaki Whenua
Land Use Capability
LUC 1
LUC 2
LUC 3
LUC 4
LUC 5
LUC 6
LUC 7
LUC 8
LUC Class
Arable cropping suitability†
Pastoral grazing suitability
Production forestry suitability
General suitability
High
Low
Unsuitable
Multiple use land
Pastoral or forestry land
Environmental land
Increasing limitations to use
Decreasing versatility of use
AK Manderson 2009 AgResearch and Landcare Research copyrights and disclaimers apply

WAIMARAMA LAND BLOCKS: NGA WHENUA RAHUI

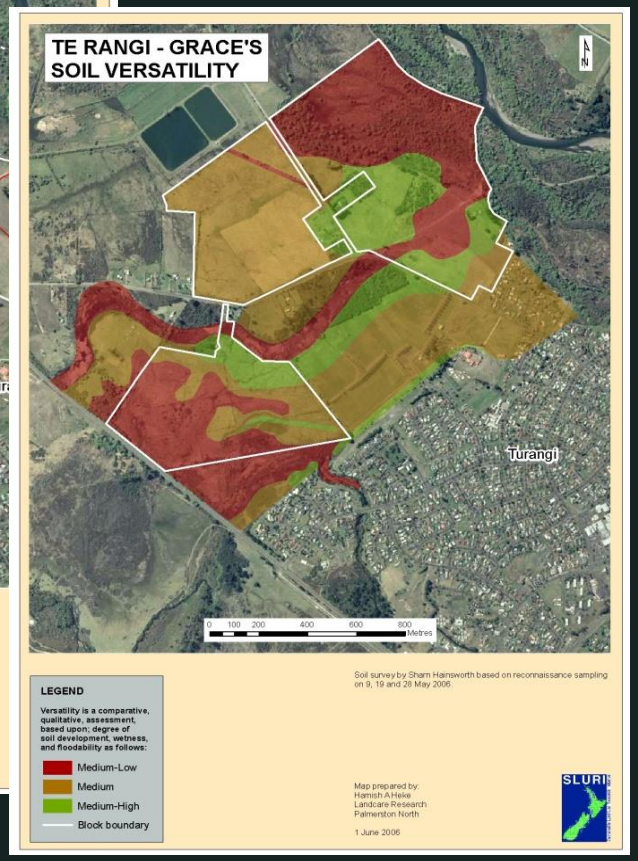


Map Reference: K:\com\univ\massey\vi_futures\waimarama\hah\data\wblocks_clip\a3 waimarama land blocks -nga_whenua_rahui.mxd

Land boundaries on GIS



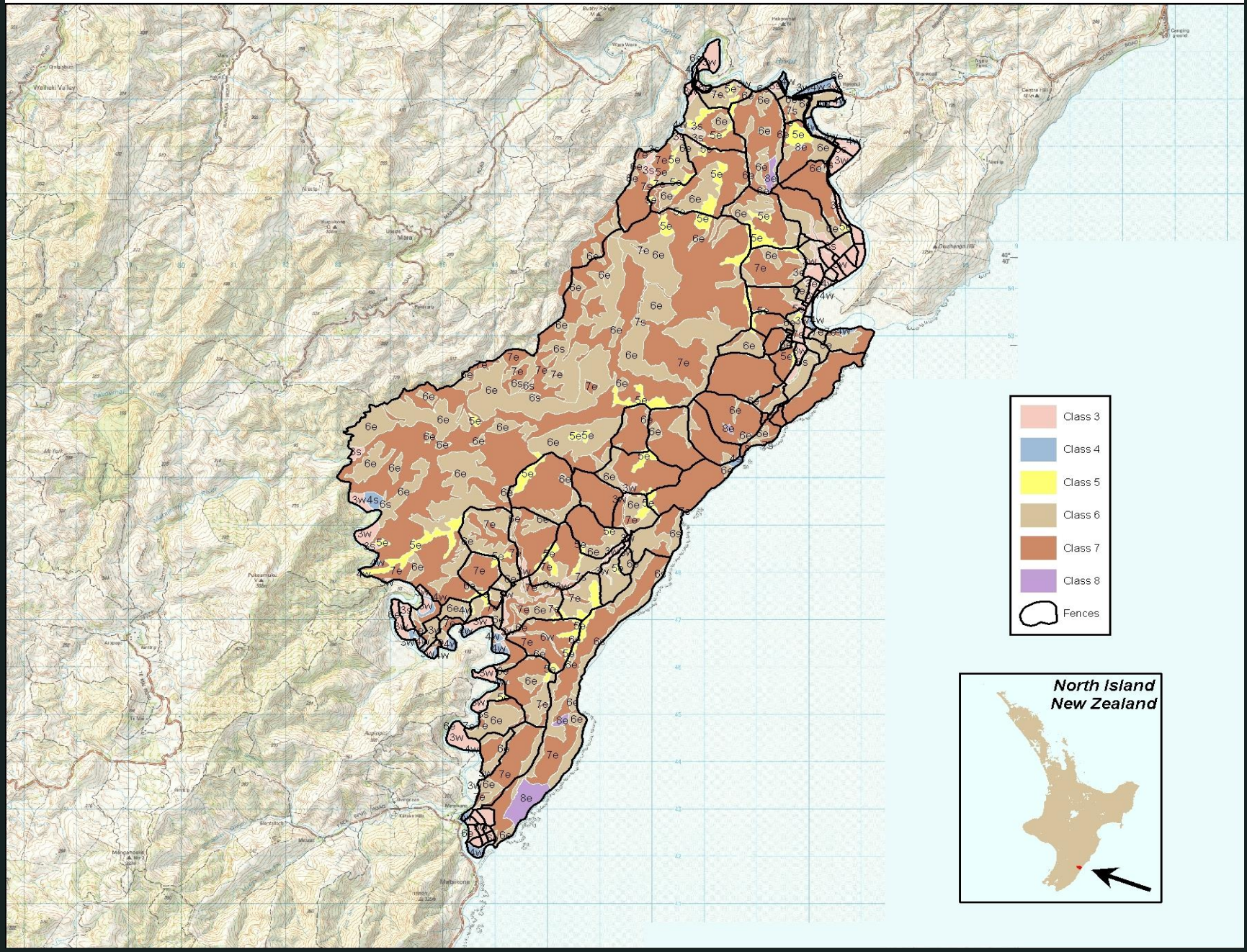
Fence-lines and landform on GIS

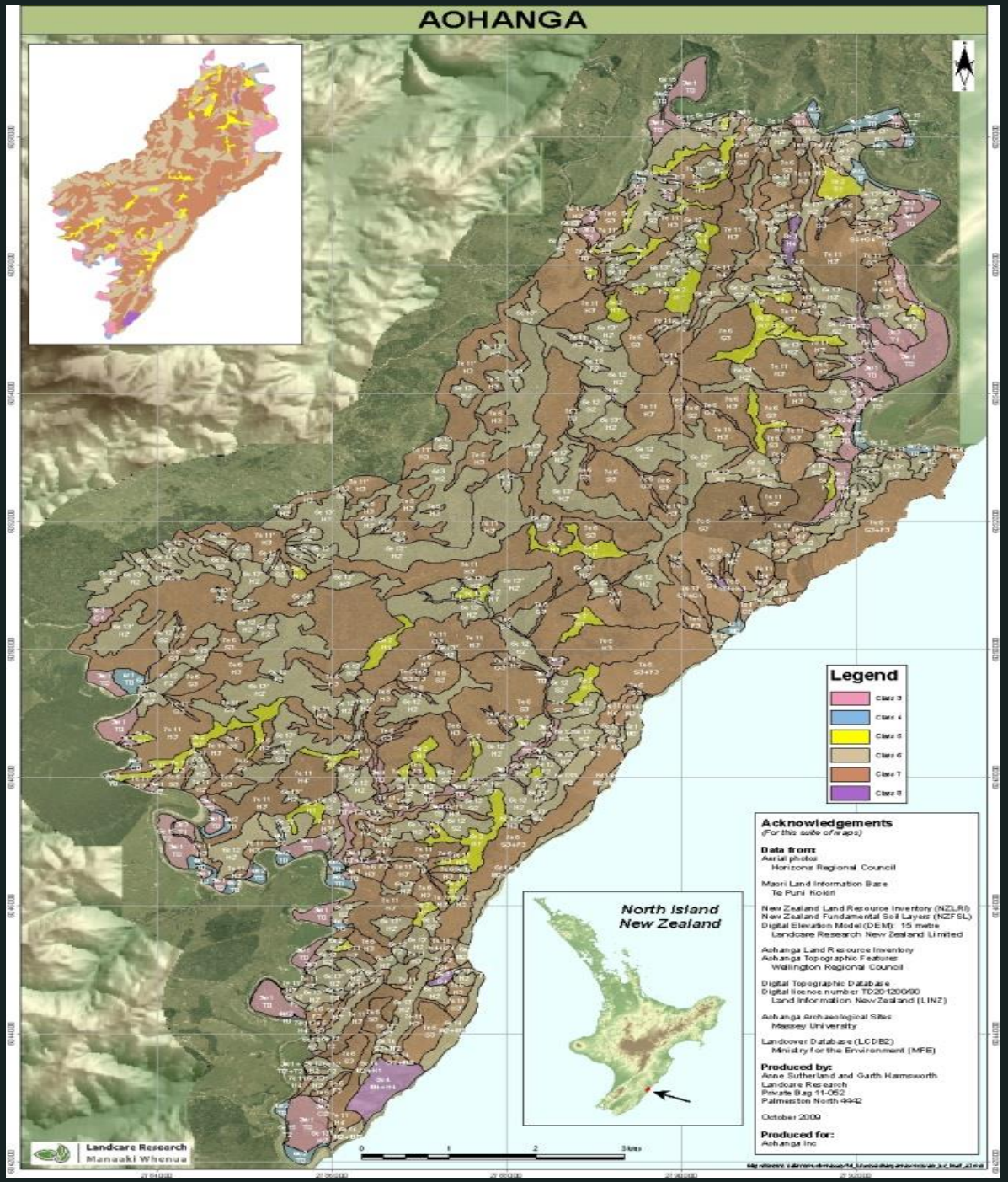


Soil versatility

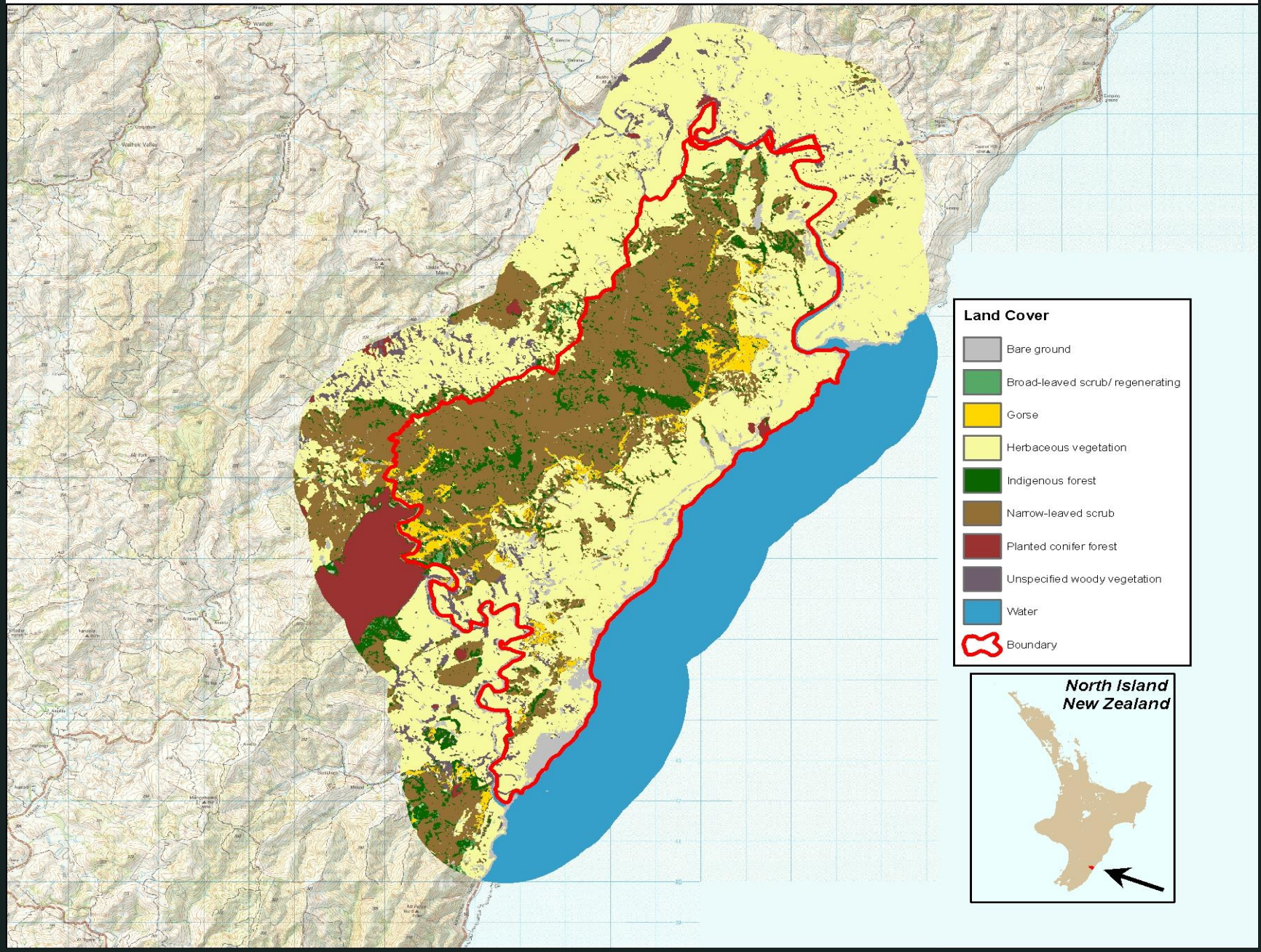
Case Study - Aohanga

AOHANGA

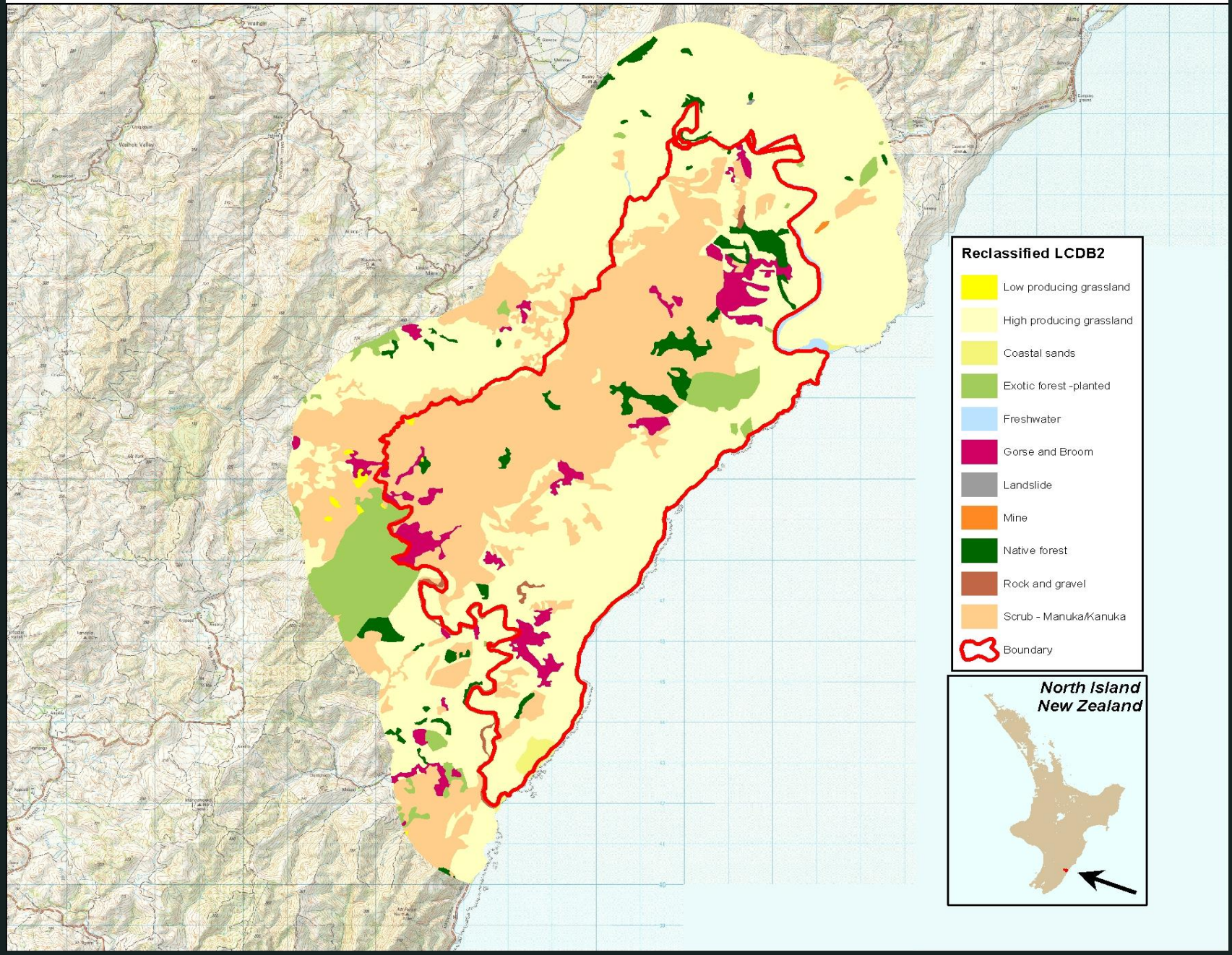

Class 3
Class 4
Class 5
Class 6
Class 7
Class 8
Fences
North Island
New Zealand


AOHANGA
Legend
Class 3
Class 4
Class 5
Class 6
Class 7
Class 8
Acknowledgements
(For this suite of maps)
Data from:
Aerial photos
Horizons Regional Council
Maori Land Information Base
Te Puni Kokiri
New Zealand Land Resource Inventory (NZLRI)
New Zealand Fundamental Soil Layers (NZFSL)
Digital Elevation Model (DEM): 15 metre
Landcare Research New Zealand Limited
Aohanga Land Resource Inventory
Aohanga Topographic Features
Wellington Regional Council
Digital Topographic Database
Digital licence number TD/201200/90
Land Information New Zealand (LINZ)
Aohanga Archaeological Sites
Massey University
Landcover Database (LCDB2)
Ministry for the Environment (MFE)
Produced by:
Anne Sutherland and Garth Harmsworth
Landcare Research
Private Bag 11-052
Palmerston North 4442
October 2009
Produced for:
Aohanga Inc
North Island
New Zealand
Landcare Research
Manaaki Whenua
0
1
2
Kilometers

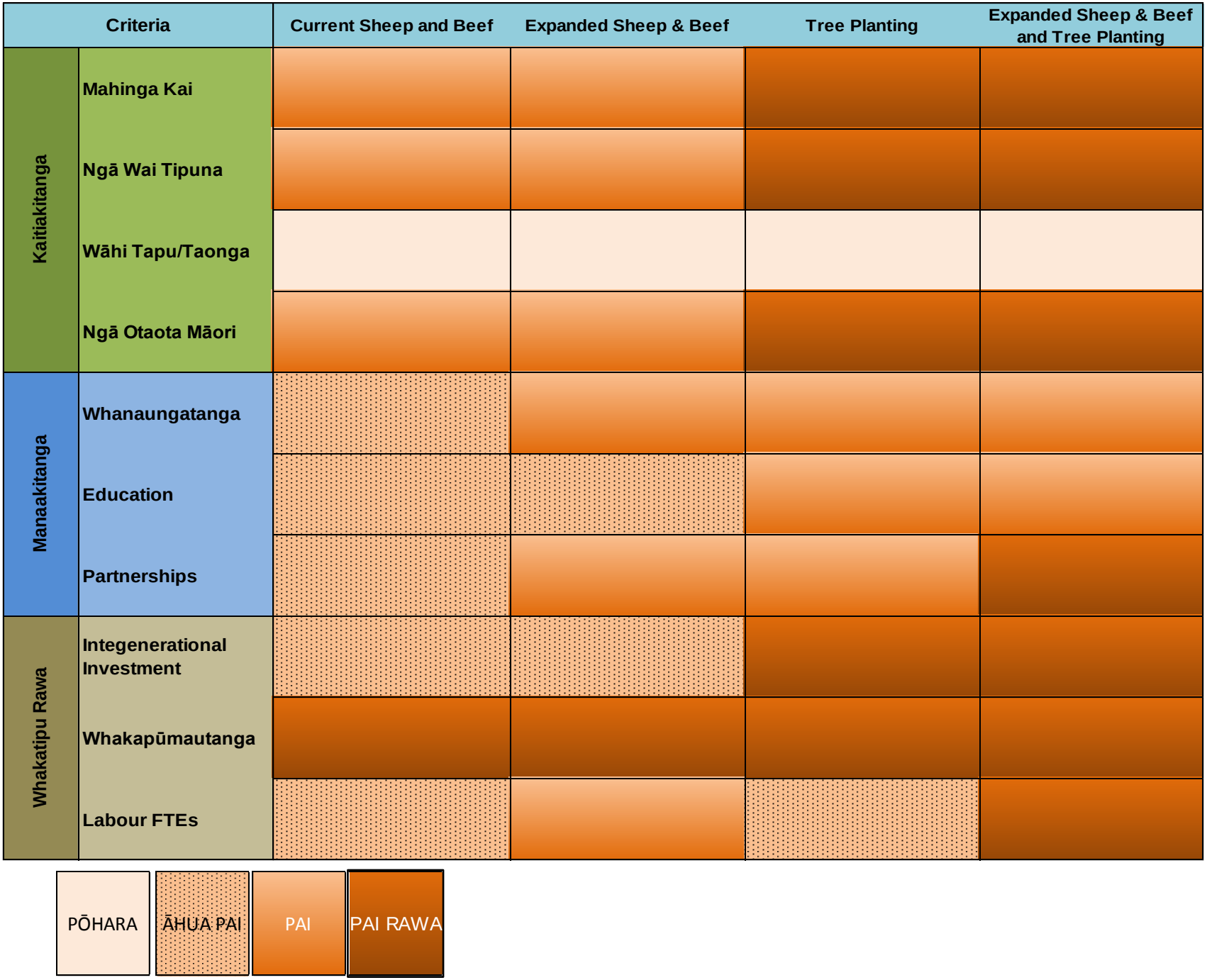
AOHANGA


Land Cover
Bare ground
Broad-leaved scrub/ regenerating
Gorse
Herbaceous vegetation
Indigenous forest
Narrow-leaved scrub
Planted conifer forest
Unspecified woody vegetation
Water
Boundary
North Island
New Zealand

AOHANGA

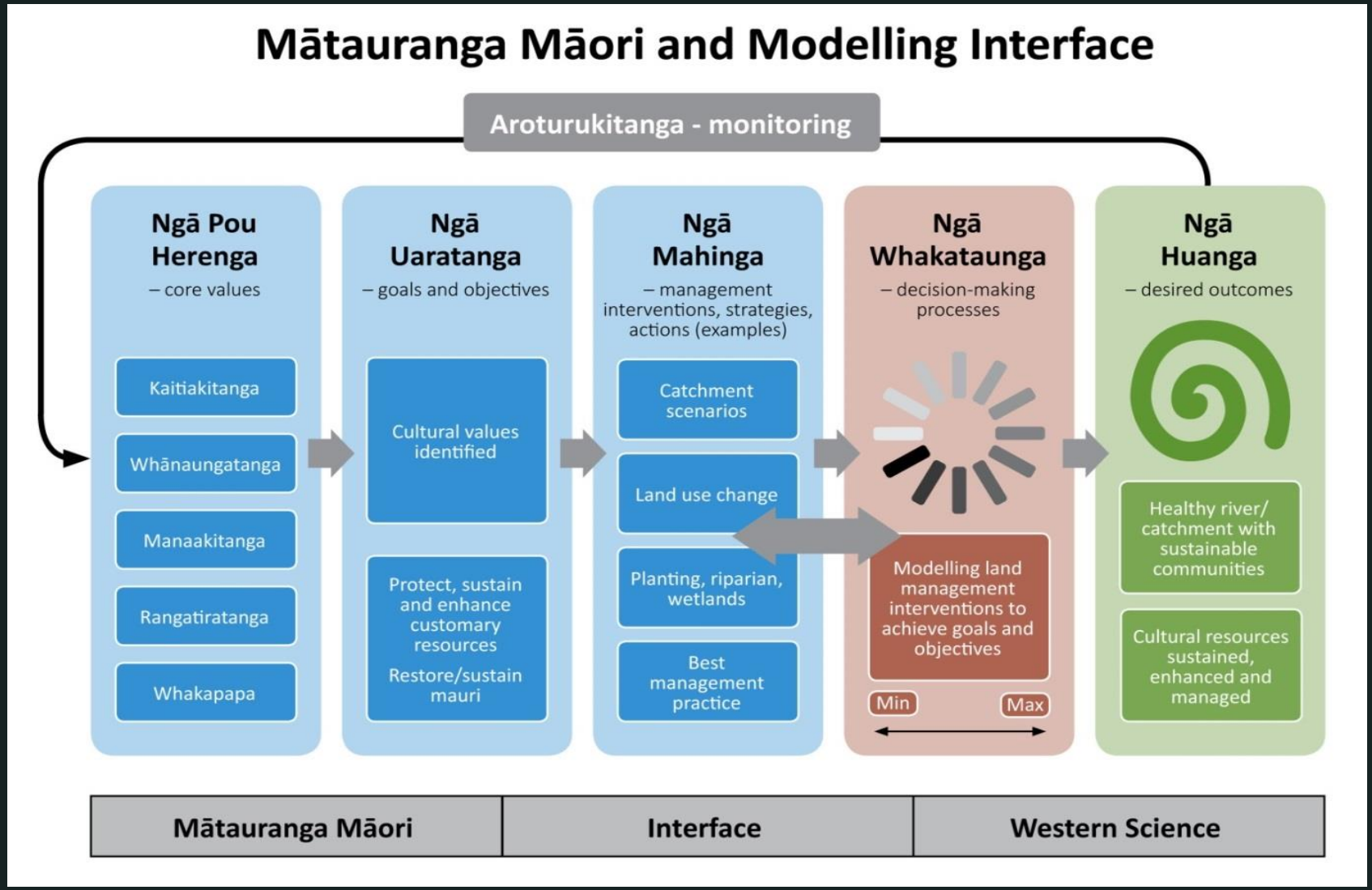

Reclassified LCDB2
Low producing grassland
High producing grassland
Coastal sands
Exotic forest -planted
Freshwater
Gorse and Broom
Landslide
Mine
Native forest
Rock and gravel
Scrub - Manuka/Kanuka
Boundary
North Island
New Zealand


Te Rereahowhata
Hokonui
Te Kai Pukatea
Rangi Haka Haka
Kopiro
Rakauhau
Waingongoro
Waingongoro Stream
Owahanga Hill
Te Oriti
Makiri
Tau Mata Whakapono
Tupaki Awhete
Cooking Area
Waimaunu
Te Motu O Tauwiri
Taumata O Tiaki
Kupe
Whakarutia Te Waka
Pah Kowai
Arawata
Taopo
ParoParo
Koronei
Mataikona River
Tara Matau
Waiparua
Maihi
Puke Tawai
Potaka
Te One Roa
Awatuangi
Puketewai
Otaumatarua
Omarua Pakihau
Aupiripiri
Otane
Karaka Hills
Teikapure
Te Koha Matai E Kona Kainga o Whatonga
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2009 DigitalGlobe
© 2009 MapData Sciences PtyLtd, PSMA
Image Horizons Regional Consortium
©2009 Google
Imagery Dates: Jan 4, 2004 - Apr 22, 2007
lat -40.719366° lon 176.302500° elev 115 m
Eye alt 21.19 km


Criteria
Current Sheep and Beef
Expanded Sheep & Beef
Tree Planting
Expanded Sheep & Beef and Tree Planting
Kaitiakitanga
Mahinga Kai
Ngā Wai Tipuna
Wāhi Tapu/Taonga
Ngā Otaota Māori
Manaakitanga
Whanaungatanga
Education
Partnerships
Whakatipu Rawa
Integenerational Investment
Whakapūmautanga
Labour FTEs
PŌHARA
ĀHUA PAI
PAI
PAI RAWA

Kaupapa Māori modelling framework

Mātauranga Māori and science approaches can be used together to achieve iwi/hapū aspirational goals and outcomes/agreed outcomes



2 new science programmes

Short title: Next generation S-map, smarter decisions

(Digital soil map of New Zealand)

(MBIE funded Oct 2016)

Short title: Soil health: oneone ora, tangata ora

Descriptive title: Soil ecosystem health and resilience – a pathway to prosperity and wellbeing

(MBIE funded Oct 2016)

S-map MBIE Exec Summary

Focus on four main work streams:

1 & 2) Development of a spatial framework and a flexible technical infrastructure that supports the use of digital soil mapping techniques

3) Quantification and predictive modelling of soil hydrological attributes that control water flow through soils

4) Development of tools and outputs to support different decision-making needs that are more culturally responsive, interactive, and relevant at a range of scales.

Soil Health

Three Main Objectives:

1. Science: Soil Resilience (soil health over long term by testing pedogenic thresholds)

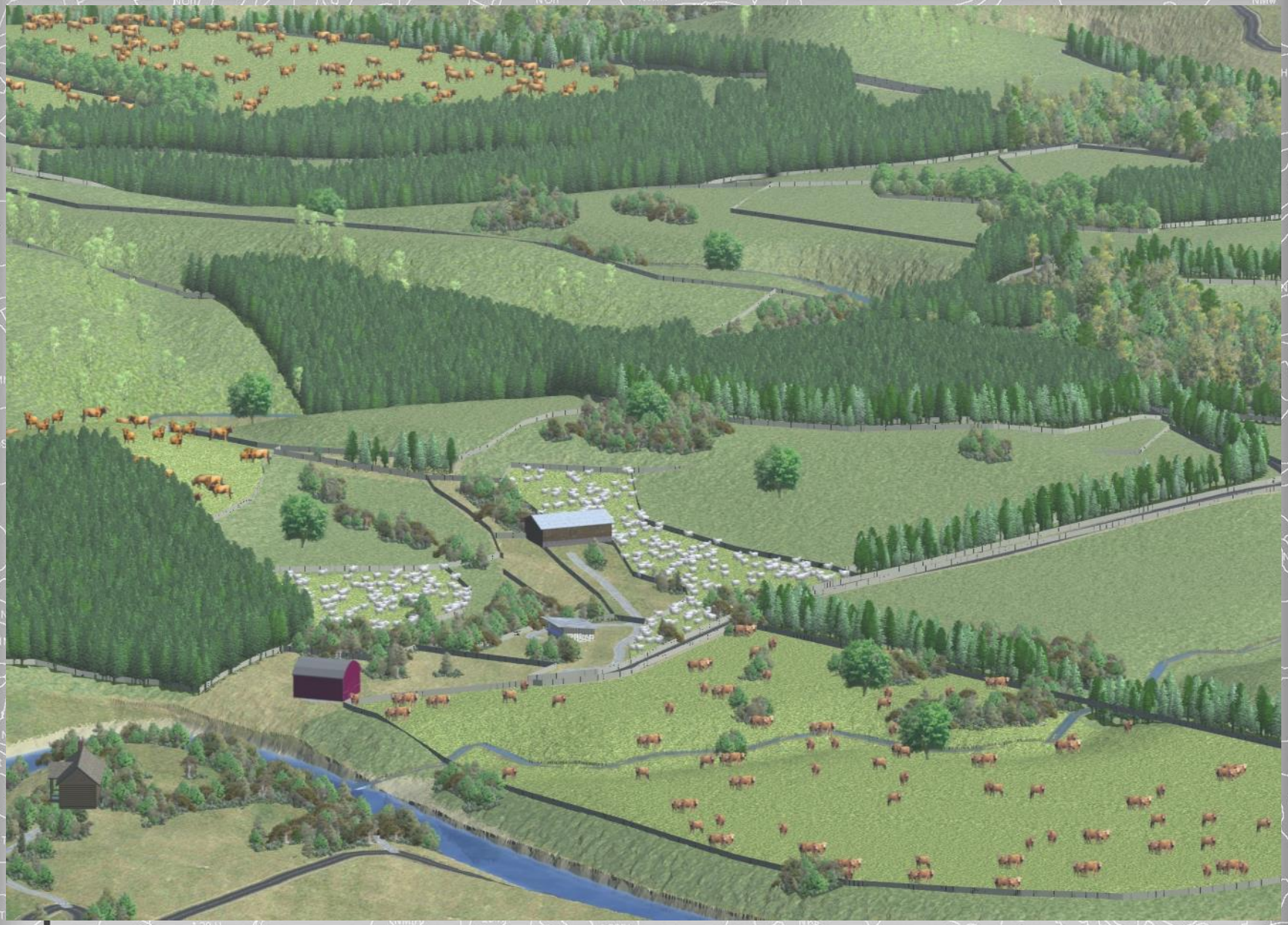
2. Māori perspectives/concepts and indicators of Soil Health

3. Develop an Integrated Soil Health Framework for policy and planning

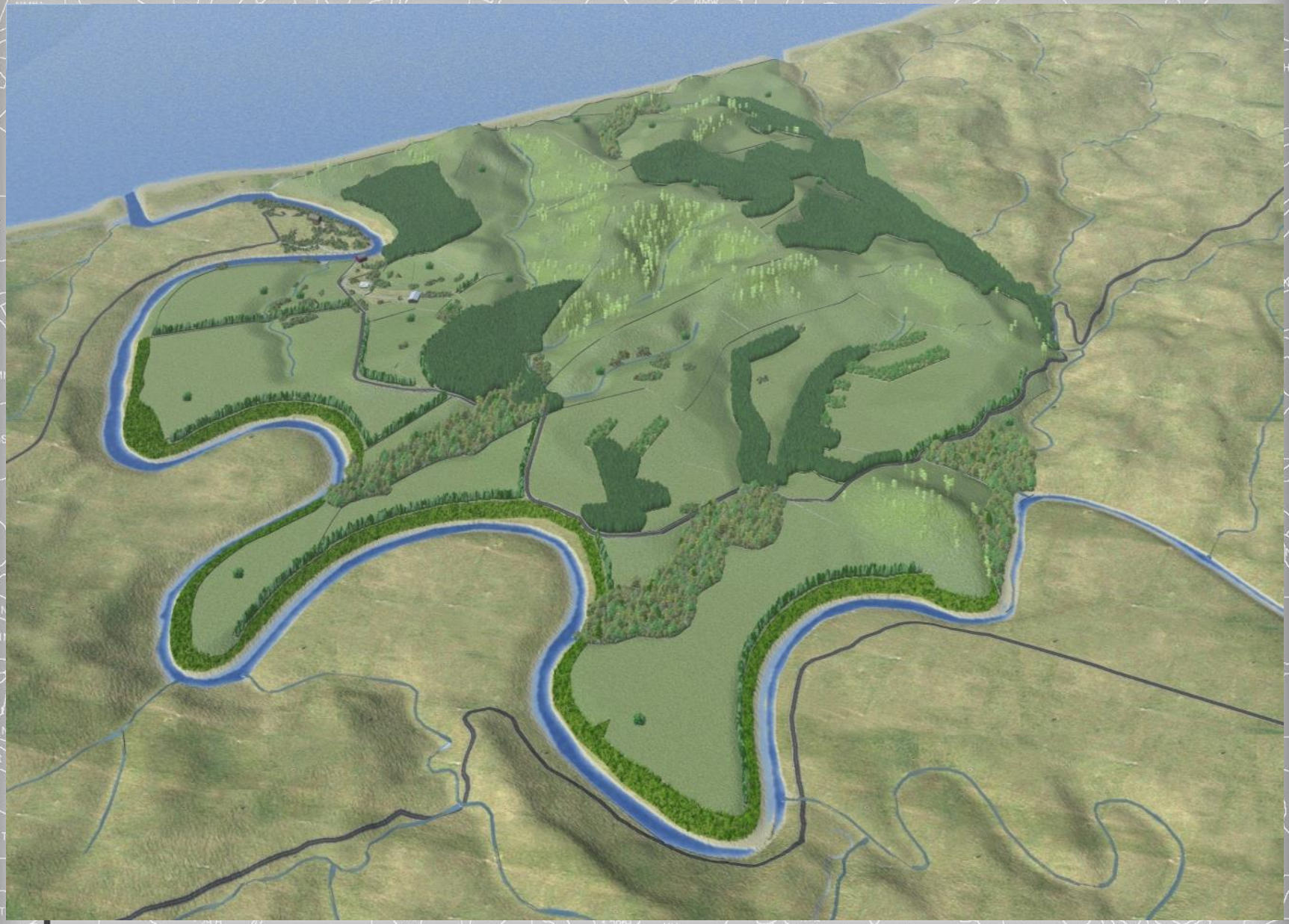

2. Ten year plan

Fig. Three D model of existing land use


2d Visualized erosion after a 1 in 50yr event (7%)

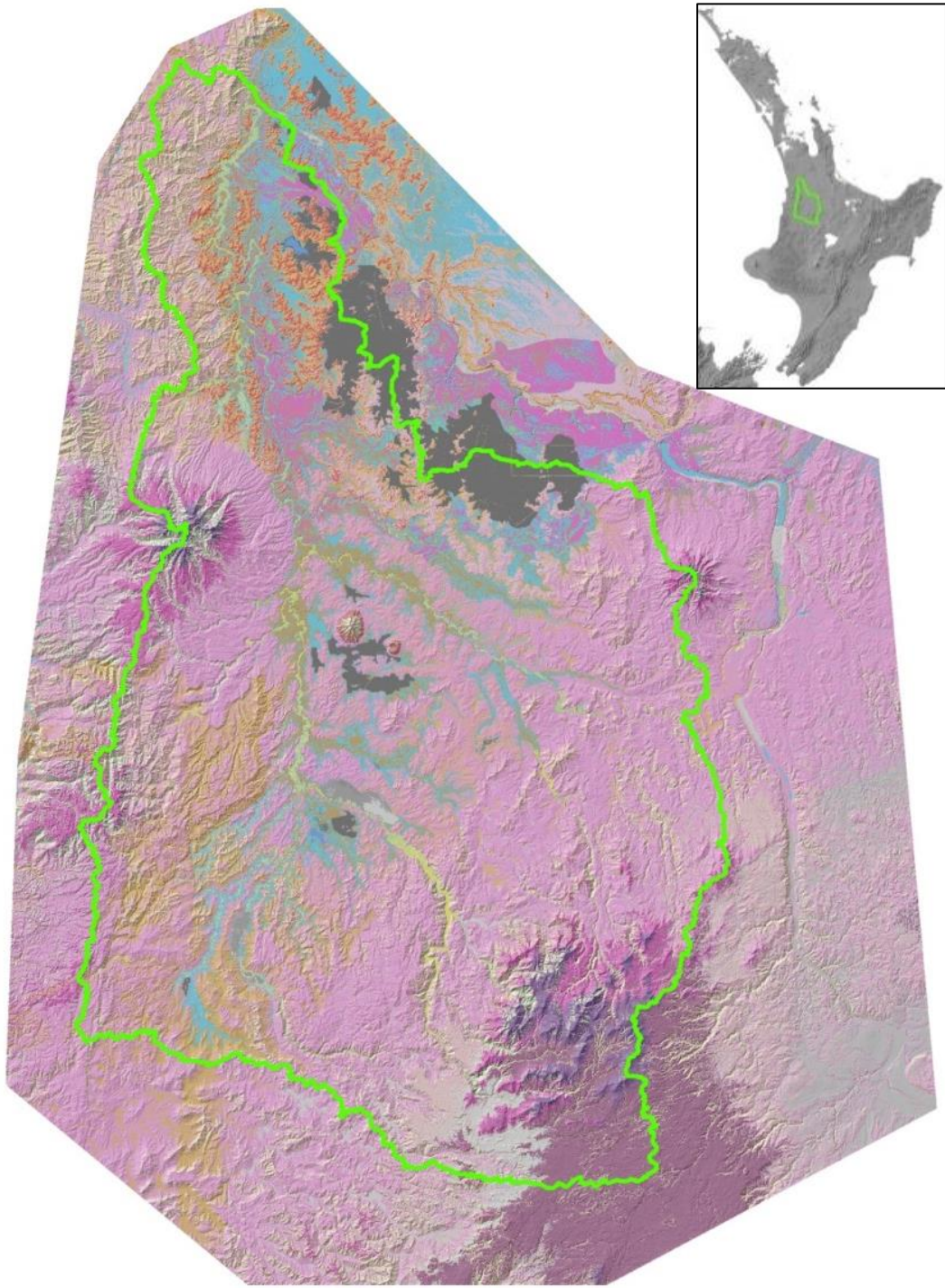


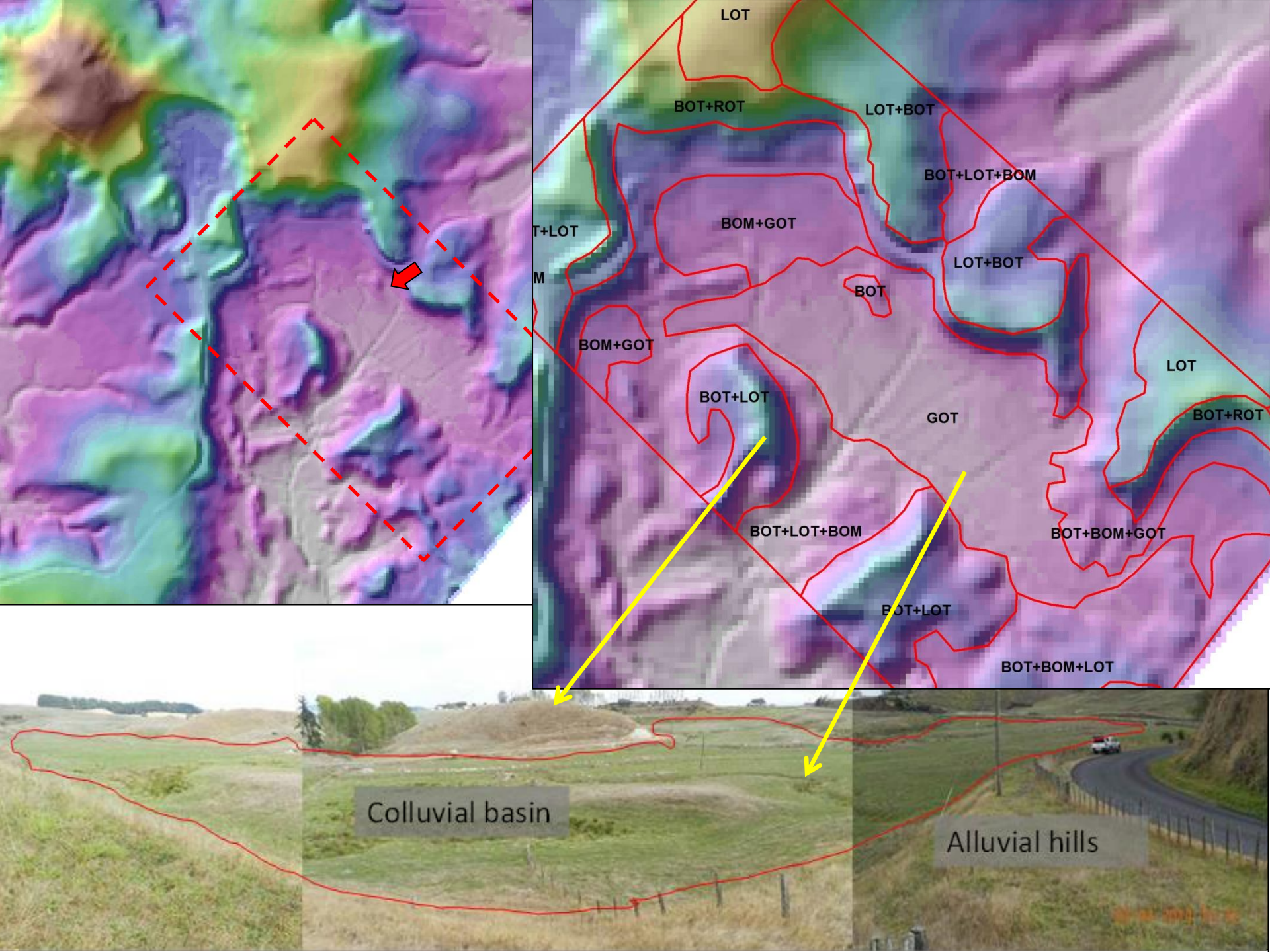
3D Recommended landscape changes



Waipa DSM

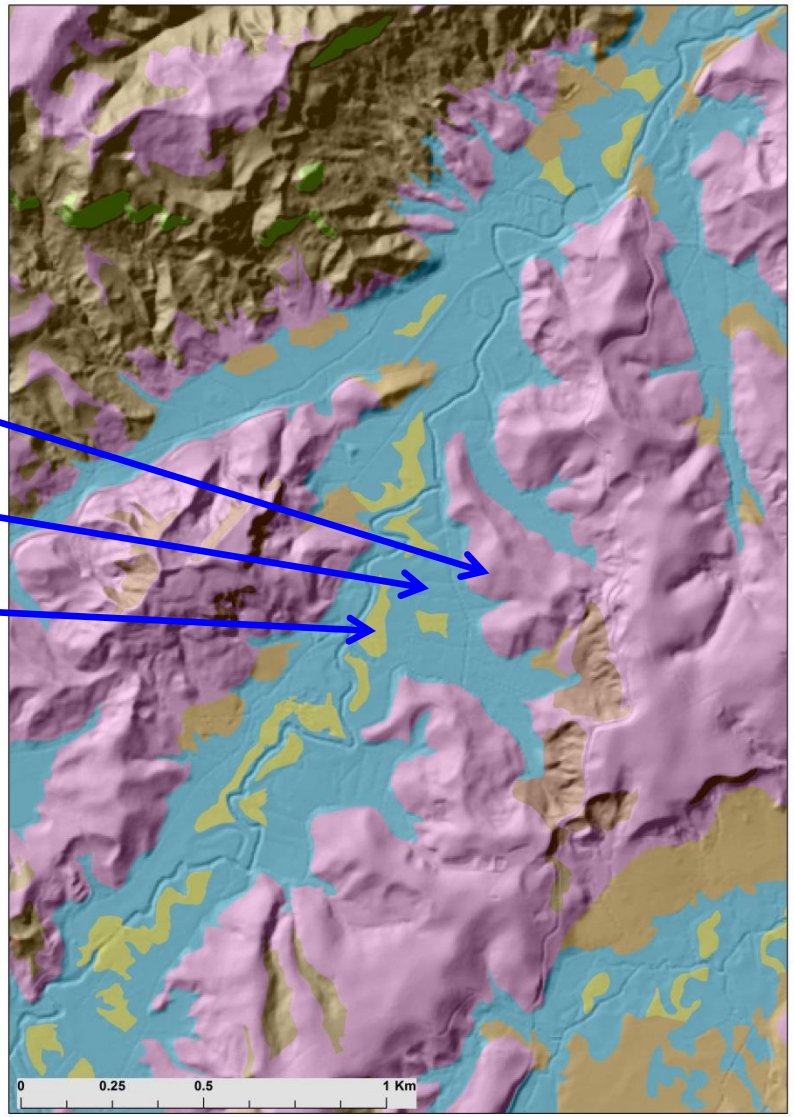
- A digital soil map for the Waipa
- 1:50,000 scale
- Fit for purpose
- Stepping stone to farm scale
- Other uses?




LOT
BOT+ROT
LOT+BOT
BOT+LOT+BOM
T+LOT
BOM+GOT
M
LOT+BOT
BOT
BOM+GOT
LOT
BOT+LOT
GOT
BOT+ROT
BOT+LOT+BOM
BOT+BOM+GOT
BOT+LOT
BOT+BOM+LOT
Colluvial basin
Alluvial hills

S-map → Overseer → Regulation?

Soil	N leaching kg/ha/y
Allophanic	31
Gley	21
Recent	48



Critical to know:

- Which soils are present
- Proportion of each
- Where they are located

To inform land use and management

Bay of Plenty REGIONAL COUNCIL

Waikato REGIONAL COUNCIL Te Kaunihera ā Rohe o Waikato

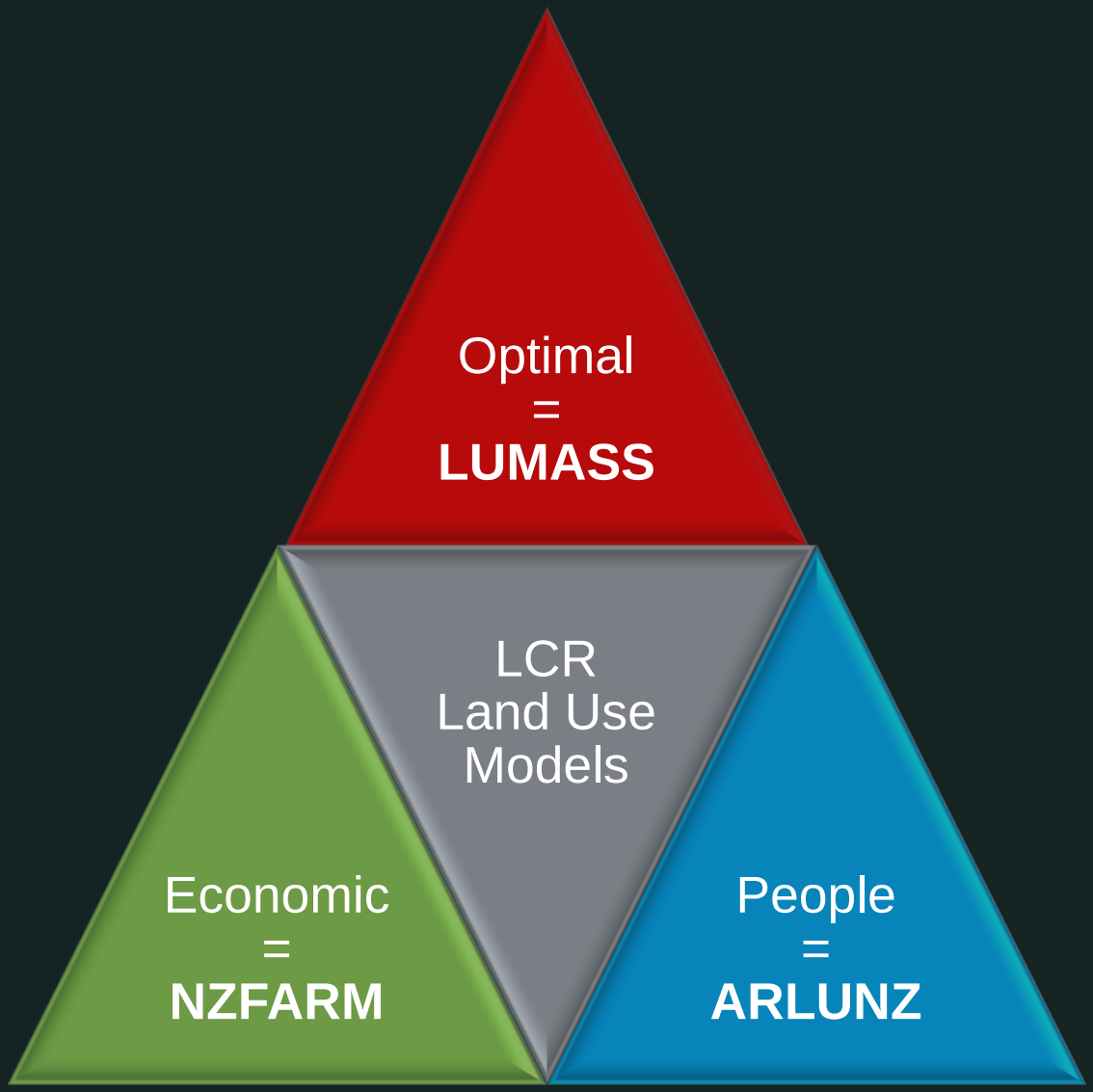
LANDCARE RESEARCH MANAAKI WHENUA

Māori decision tools

Integrated tools:

1. **LUMASS** - Indicate what is the optimal land use based on environmental/economic goals and constraints
    1. Good for catchments, rural scenarios and decisions
    2. Assessing the resource-use efficiency of land use
2. **NZFARM** - Consistently compare the economic & environmental impacts of policy scenarios & policy design
3. **ARLUNZ** - See how land use change is influenced by social processes and economics
    1. Social networks, succession plans, imitation, endorsement

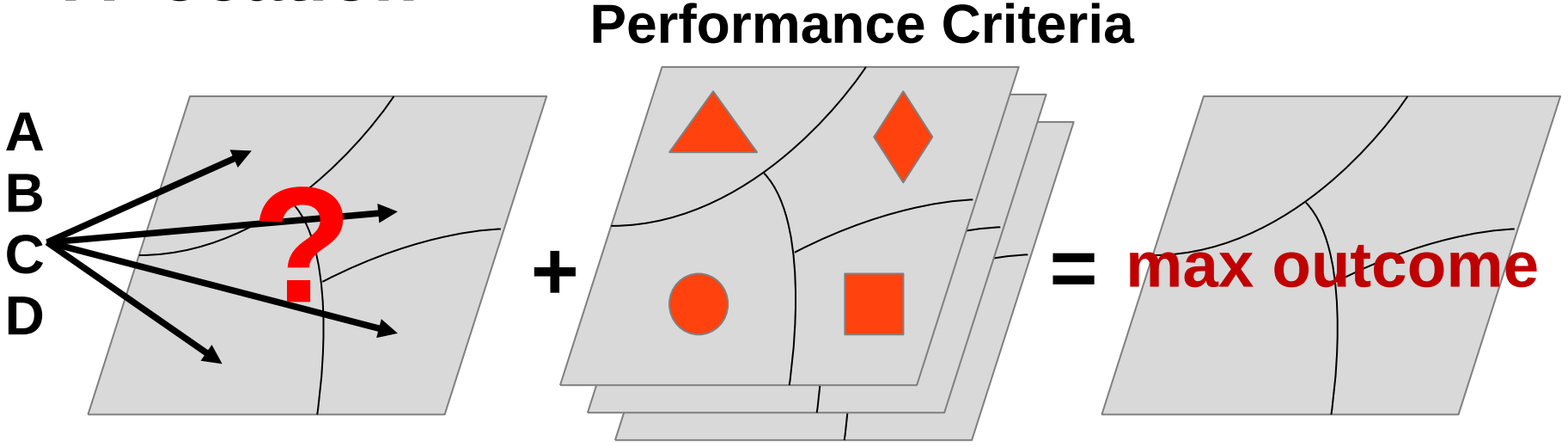
Integrated modelling approaches



Overview of models

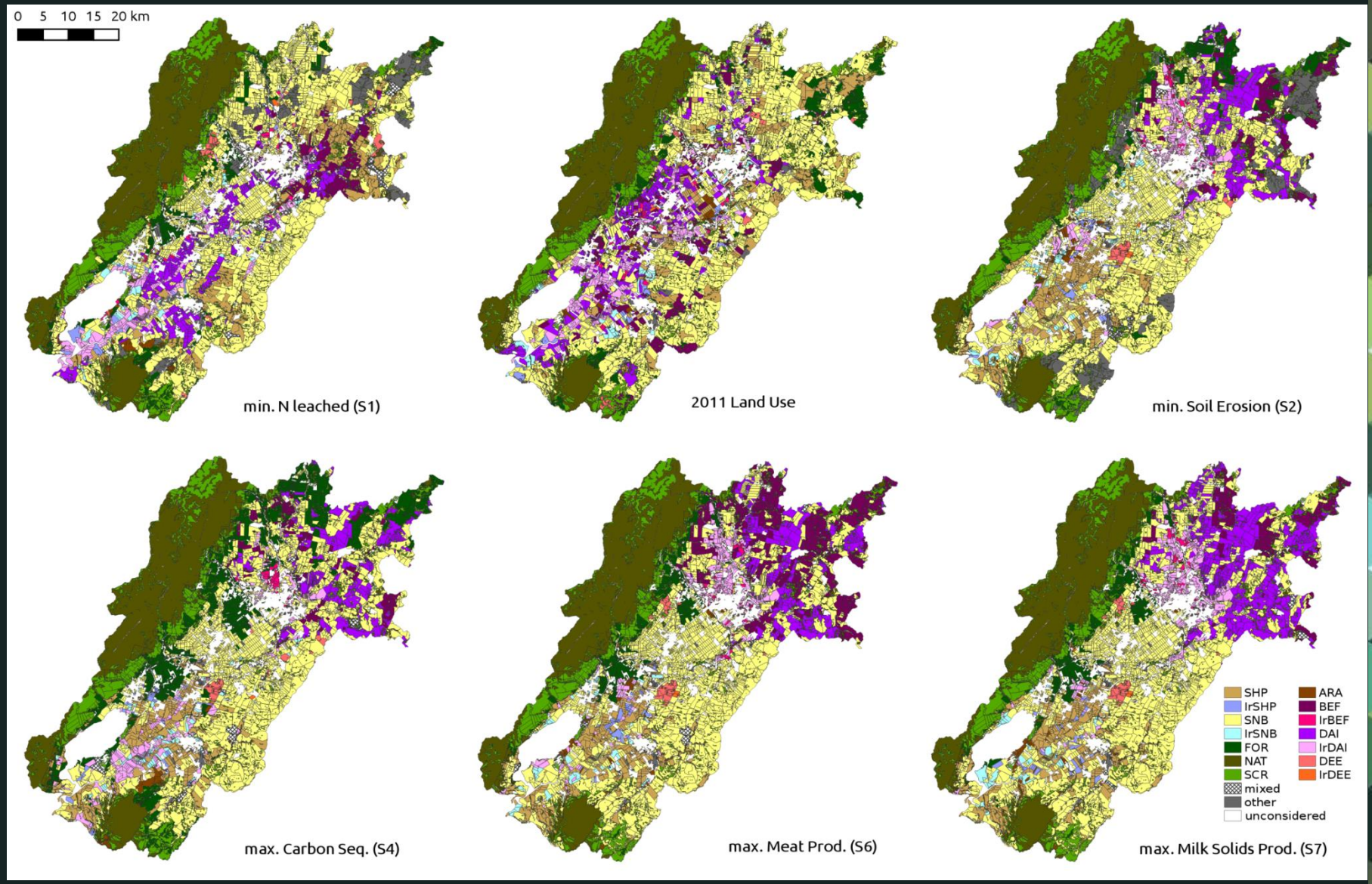
Model	Scale	Specialisation	Land Uses	Modelling Unit
LUMASS	Catchment	Optimisation	All rural land uses (Productive/Non-Productive)	User defined
NZFARM	National & Catchment	Economic	All rural land uses (Productive/Non-Productive)	National = 5km Grids Catchment = Sub-catchment/LUC
ARLUNZ	Catchment	Behaviour Economic Social	All rural land uses (Productive/Non-Productive)	Farm/Cadastral

LUMASS – Optimal Spatial Resource Allocation



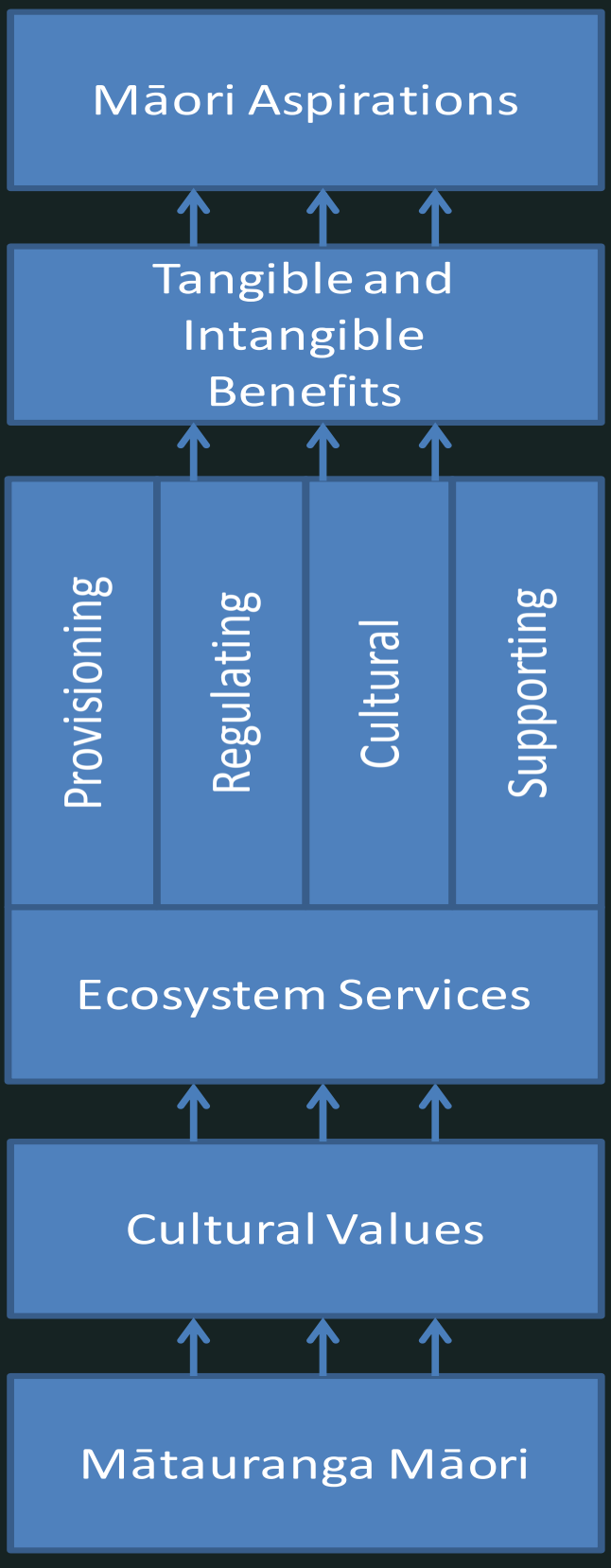
Resource	+	Performance	=	Outcome
Land-Use	+	Productivity	=	max Revenue
Land-Use	+	Env. Indicator	=	min Env. Impact
Water	+	Spec. Efficiency	=	max Efficiency
Habitat	+	Suitability	=	max Biodiversity

Exploring Limits: Land-use configurations maximising individual services



An ecosystem services classification framework of provisioning, regulating, cultural and supporting services showing the 33 main service sub-categories for New Zealand (Dymond et al. 2012)

			Important services to assess in NZ	Natural ecosystems	Production ecosystems
Total value of ecosystem services	Direct use values	Provisioning services	Food: crops	Forest	Pasture
		Regulating services	Food: livestock	Shrubland	Cropland
	Indirect use values	Cultural services	Food: aquaculture	Grassland	Orchard
		Supporting services	Food: capture fisheries	Alpine ecosystem	Forest
	Passive values	Option values	Food: wild foods	Subalpine shrubland	
		Existence values	Fibre: timber and wood fibres	Wetland	
		Bequest values	Fibre: others	Estuary	
			Biomass fuel	Mangroves	
			Freshwater	Lake	
			Genetic resources	River	
			Minerals	Marine	
			Physical support for dwellings		
			Climate regulation (global)		
			Water regulation Water purification and waste treatment		
			Erosion regulation		
			Pest regulation Disease regulation Pollination		
			Air quality regulation		
			Natural hazard regulation		
			Spiritual and aesthetic values		
			Recreation		
			Tourism		
			Sense of belonging		
			Soil formation and maintenance		
			Provision of natural habitat free of weeds and pests		


Māori Aspirations
Tangible and Intangible Benefits
Provisioning
Regulating
Cultural
Supporting
Ecosystem Services
Cultural Values
Mātauranga Māori

Unlocking the potential - Conclusions & recommendations

- More holistic kaupapa Māori approach needed to Māori land
- Meaningful information/knowledge aligned to aspirations and values (meet needs)
- Requires a collective and partnership approach (not single block) between land owners, Govt, iwi/hapū, councils, industry to develop capacity and scale
- Regional approaches e.g., iwi/hapū growth strategies, regional economic growth strategies, etc

Conclusions & recommendations

- Range of frameworks and models available e.g., integrated models, cultural values frameworks, ecosystem service frameworks, bio-economics, etc
- Diversified multi-functional landscapes/multiple use matched to land types, physical potential
- Move from data to knowledge (better understanding) about characteristics and properties of Māori land
- Catchment approaches are useful (e.g., within environmental limits, cultural impacts, regulations)
- Need to understand global markets, consumer values and needs, value added premium products

http://www.maorilandonline.govt.nz/gis/home.htm

- Māori Land Online — Ministry of Justice, New Zealand - Windows Internet Explorer

http://www.maorilandonline.govt.nz/gis/home.htm

File Edit View Favorites Tools Help

Search Videos Facebook Entertainment Watch TV Watch Movies Radio

Google maori land online Search Share More

Favorites Staffroom home page. Land... Suggested Sites Web Slice Gallery Customize Links Free Hotmail Windows Marketplace Windows Media Windows

- Māori Land Online — Ministry of Justice, New Zealand

Page Safety Tools

Home | Owner Interest Search | Block Search | Map Search

Welcome to the Māori Land Online website

This website, originally launched in 2004, provides a snapshot of current ownership, trustee, memorial and block information for land that falls within the jurisdiction of the Māori Land Court under Te Ture Whenua Māori Act 1993 and other legislation – this is primarily Māori Customary and Māori Freehold Land, but also includes, General Land Owned by Māori, Crown Land Reserved for Māori and some treaty settlement reserves, mahingā kai and fishing rights areas.

The site has three main searches each of which is set out below:

Owner Interest Search

District : Tairawhiti	
23285	Anewa
23542	Herehereteau B4R2B
23991	Kopua A2
24054	Kopututea 1 & 2 (Aggregated) (Kop
24437	Lot 2 Deposited Plan 2394 and Lot Estate)
24116	Mahanga 1C1A2 and Others (Aggr
24485	Mangapoike 2C1
24481	Mangatuna 3 & 4

A search for interests held by owners and trustees in Māori Freehold Land or land that falls within the Māori Land Court's jurisdiction.

Block Search

A search for Land Blocks, Trusts and locations of land held by owners – this also includes a search by Land Information New Zealand (LINZ) reference.

Map Search

A visual map search of all Land Blocks in the Māori Land Court system in New Zealand and includes layers for Local and Regional Councils.

Looking for Help? Try Here

Want to provide Feedback? Try Here

Want to contact us? Try Here

If you have visited this website before you may have to refresh your web browsers cache to benefit from the latest additions. For help on clearing cache click here

Our pages now contain links to the Landcare Research Maori Land Visualisation Tool - which provides detailed soil and land usage information for Maori Land Blocks. You can view this through the block detail pages or by going directly to their site at http://whenuaviz.landcareresearch.co.nz.

Please note that we do not maintain the Landcare site - and take no responsibility for their information or the availability of their site.

Note: Although Māori Land Online is updated regularly, the Māori Land Court and the Ministry of Justice cannot guarantee the accuracy of the information on this site. To ensure accuracy the information should be checked against the records held by the Māori Land Court and Land Information New Zealand. Unlike titles registered and issued under the Land Transfer Act 1952, the accuracy of the Māori Land Court record is not accompanied by a state guarantee. Use of this site should be read in conjunction with the disclaimer.

MINISTRY OF JUSTICE Tāhū o te Ture

Māori Land Court | About this Site | Site Owner
Accessibility | Disclaimer | Privacy Statement | Copyright | Contact Us
Māori Land Court data last updated: 03/03/2014
LINZ data last updated: 03/03/2014

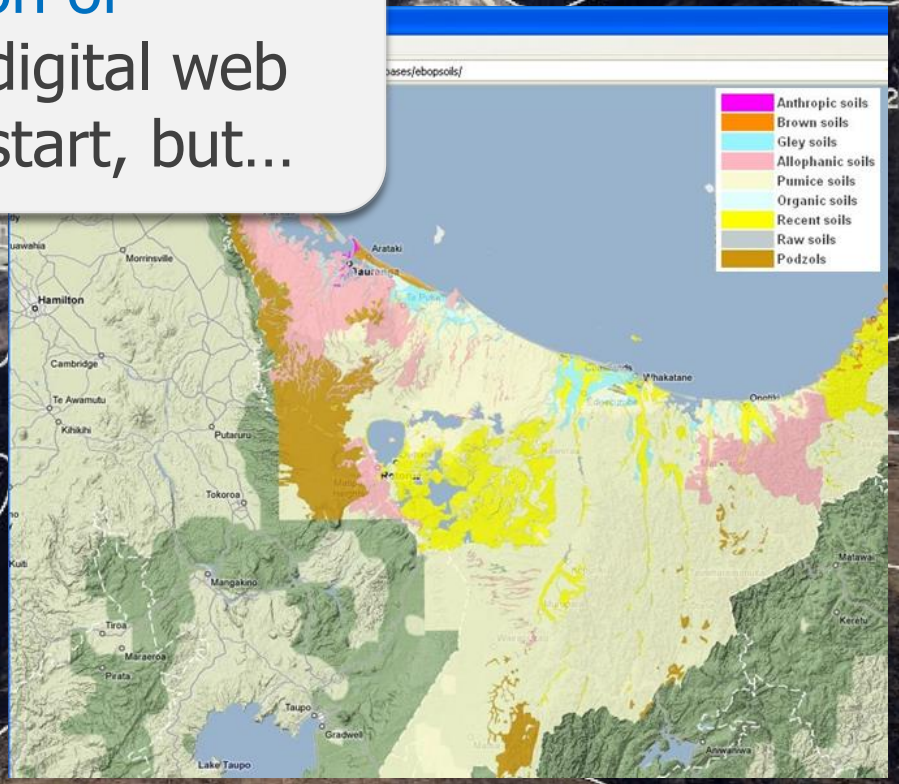
New Zealand Government

Internet 100%

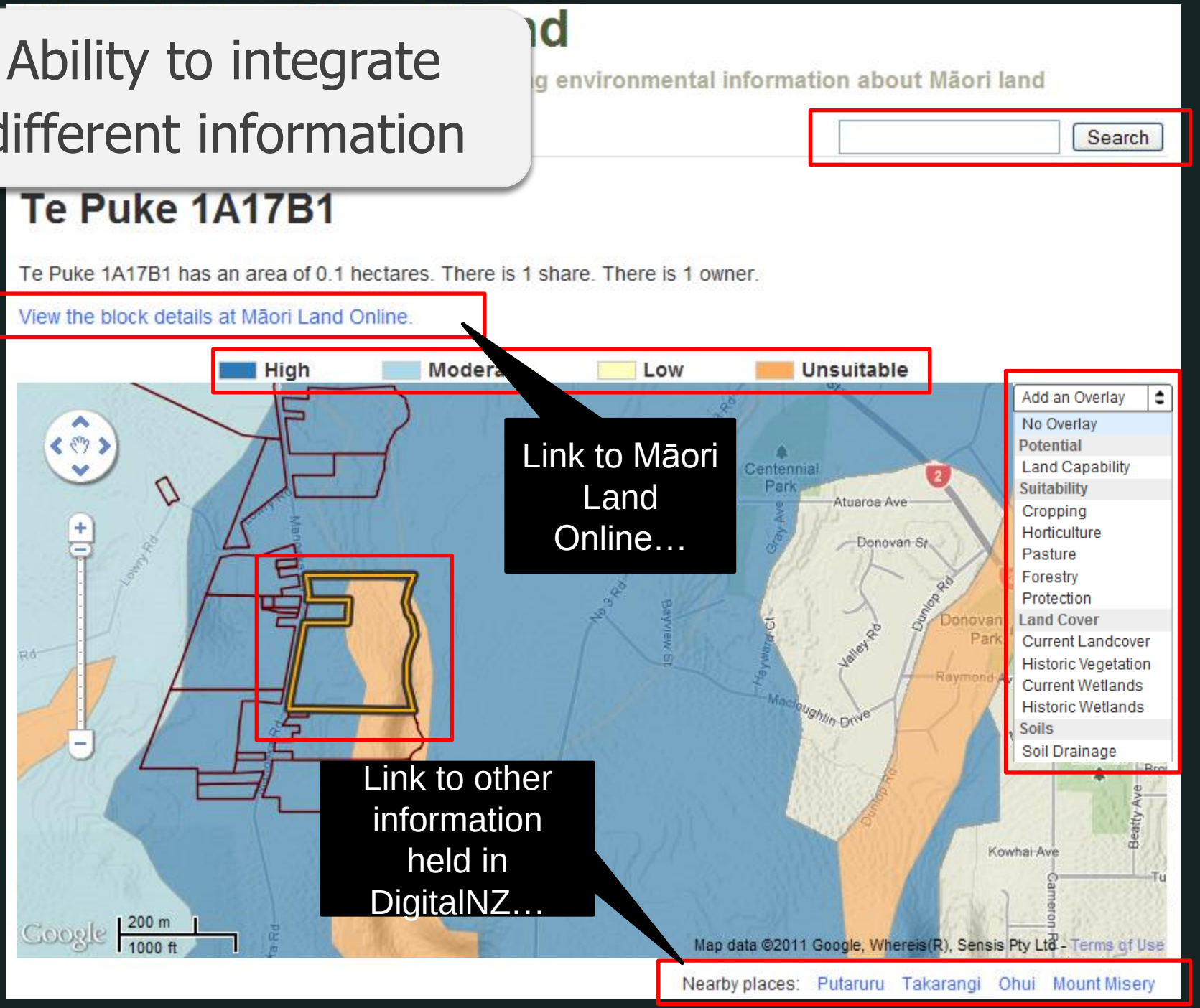
Start Final LINZ 5 March 2014 ... - Māori Land Online —... 1:19 p.m.

Landcare land resource information is rich in detail but it can be difficult for land owners to interpret

The creation of advanced digital web maps is a start, but…



Ability to integrate different information



Visualising Māori Land

A prototype tool for accessing and interpreting environmental information about Māori land

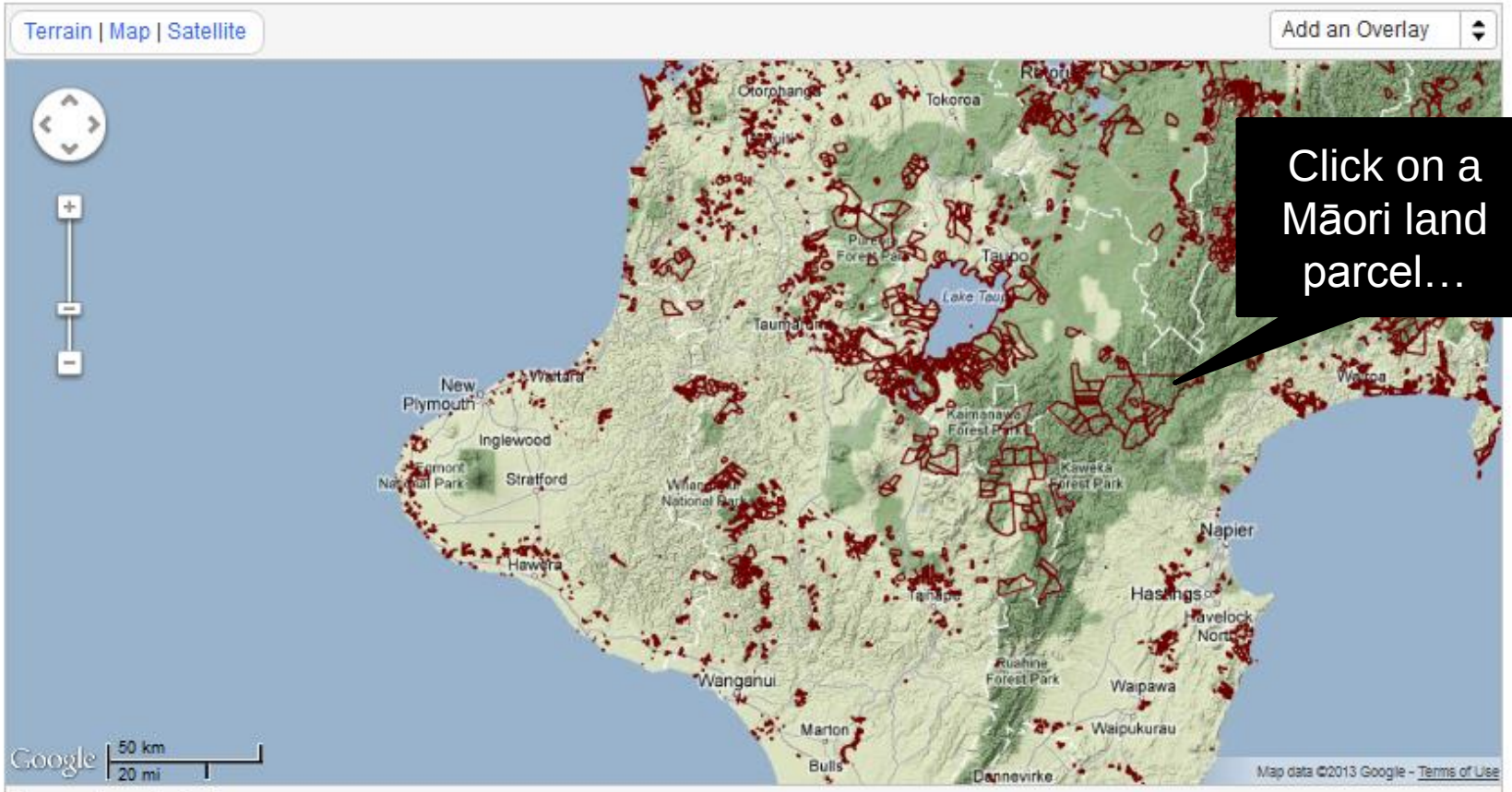
Home About Give Feedback Help Make an enquiry

Landcare Research
Manaaki Whenua

Select a land parcel...

Nau Mai Haere mai - Welcome

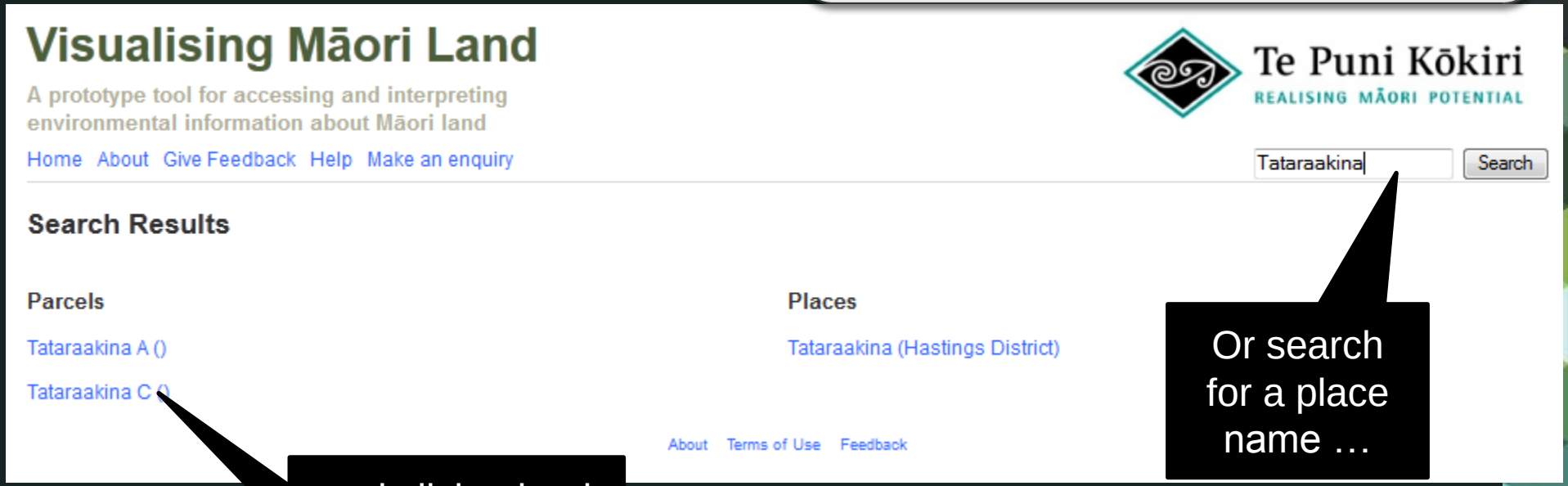
This website is primarily intended to help Māori land owners and managers to
of their Māori land blocks. To use this site either type the registered name of yo
location of your land block and click on the land block's boundary. We welcome



No overlay selected

You can select an overlay from the top left of the map

Search of a land parcel...



Visualising Māori Land

A prototype tool for accessing and interpreting environmental information about Māori land

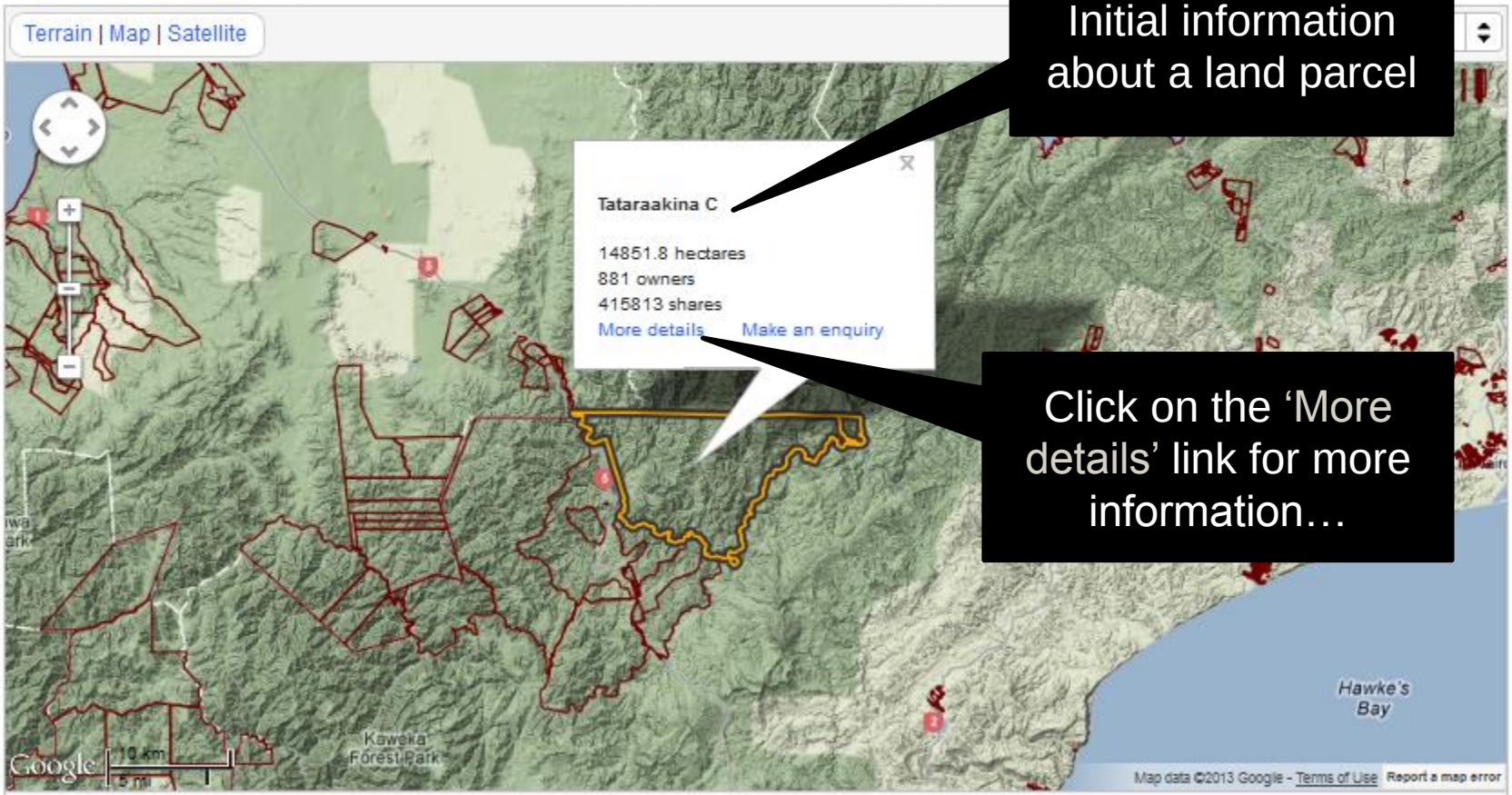
Landcare Research
Manaaki Whenua

Home About Give Feedback Help Make an enquiry

Search

Nau Mai Haere mai - Welcome

This website is primarily intended to help Māori land owners and managers to find out more about the physical characteristics, constraints and potential of their Māori land blocks. To use this site either type the registered name of your land block in the search box above or using the map, zoom to the location of your land block and click on the land block's boundary. We welcome your thoughts and com



No overlay selected

You can select an overlay from the top left of the map


Visualising Māori Land
A prototype tool for acces
environmental informatio
Home About Give Feedbac
Parcel information up front
Te Puni Kōkiri
REALISING MĀORI POTENTIAL
Search
Tataraakina C
View the block details at Māori Land Online.
Title Information
Make an enquiry about this parcel
Area: 14851.8 ha
Owners: 881
Shares: 415813
Mortgaged: No
Leased: Yes
Notes: The land is managed by a trust.
Land potential
Land cover
Climate
Soil properties
A view of Land Use classes for the current land parcel
Land Potential
What is the potential of this land?
Class
Area
Description
7
57%
8474.84 ha
Marginal for pastoral and forestry
Non-arable land with severe limitations to use under perennial vegetation such as pasture or forest.
8
28%
4149.73 ha
Extreme limitations
Land with very severe to extreme limitations or hazards that make it unsuitable for cropping, pasture or forestry.
6
13%
1962.54 ha
Not suited to cropping but good for pastoral and forestry
Non-arable land with moderate limitations for use under perennial vegetation such as pasture or forest.
4
2%
264.69 ha
Significant limitations for cropping and horticulture
Land with moderate limitations for arable use, but suitable for occasional cropping, pasture or forestry.
Learn more about land use classes...
Land Use limitations for the current land parcel
What limitations are there?
14417.33 ha
Erosion
erosion susceptibility, deposition or the effects of past erosion damage first limits production
Soil Composition
434.48 ha
soil physical or chemical properties in the rooting zone such as shallowness, stoniness, low moisture holding capacity, low fertility (which is difficult to correct), salinity, or toxicity first limits production

Visualising Māori Land

A prototype tool for accessing and interpreting environmental information about Māori land

Home About Give Feedback Help Make an enquiry

Te Puni Kōkiri
REALISING MĀORI POTENTIAL

Search

Tataraakina C

View the block details at Māori Land Online.

Title Information

Make an enquiry about this parcel

Area: 14851.8 ha **Owners:** 881 **Shares:** 415813

Mortgaged: No **Leased:** Yes **Notes:** The land is managed by a trust.

Land potential | Land c | oil properties

Enquire about this land use

Land Potential

What is th land?

Land Use class

Land Use description

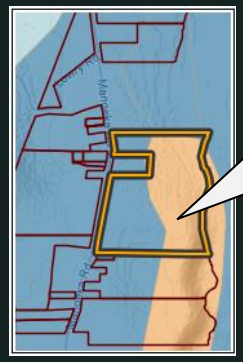
Class	Area	Description
7	57% 8474.84 ha	**Marginal for pastoral and forestry** Non-arable land with severe limitations to use under perennial vegetation such as pasture or forest.
8	28% 4149.73 ha	**Extreme limitations** Land with very severe to extreme limitations or hazards that make it unsuitable for cropping, pasture or forestry.
6	13% 1962.54 ha	**Not ted d forestry** Non-a nder perennial vegetation such as pasture or forest.
4	2% 264.69 ha	**Significant ture** Land with r suitable for occasional cropping, pasture or forestry.

Proportion of land area that is Land Use class 8

Learn more about land use classes...

What limitations are there?

14417.33 ha	**Erosion** erosion susceptibility, deposition or the effects of past erosion damage first limits production
434.48 ha	**Soil Composition** soil physical or chemical properties in the rooting zone such as shallowness, stoniness, low moisture holding capacity, low fertility (which is difficult to correct), salinity, or toxicity first limits production



Te Puke No.1A No.4B

9.5 hectares
32 owners
22.9625 shares
Managed by a trust

What is the drainage like on this land?

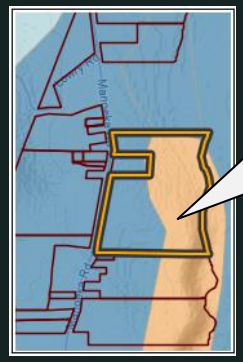
Current vs Historic Wetlands

No applicable features on this parcel.

Learn more...

Soil Drainage

Learn more...



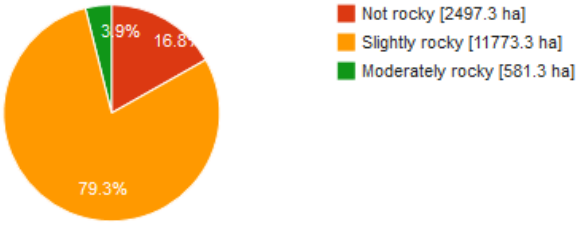
Te Puke No.1A No.4B

9.5 hectares
32 owners
22.9625 shares
Managed by a trust

What are the soil properties of this land?

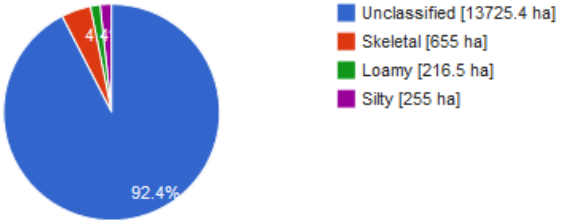
Soil Physical Characteristics

Rock outcrops and surface boulders



Learn more...

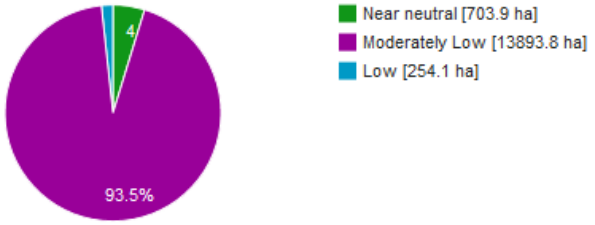
Particle Size



Learn more...

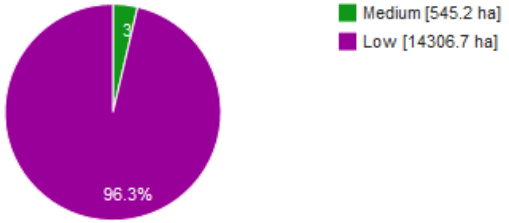
Soil Chemistry

Measure of acidity (pH)



Learn more...

Cation exchange capacity



Learn more...

Visualising Māori Land

A prototype tool for accessing and interpreting environmental information about Māori land

Landcare Research Manaaki Whenua

Home About Give Feedback Help Make an enquiry

Search

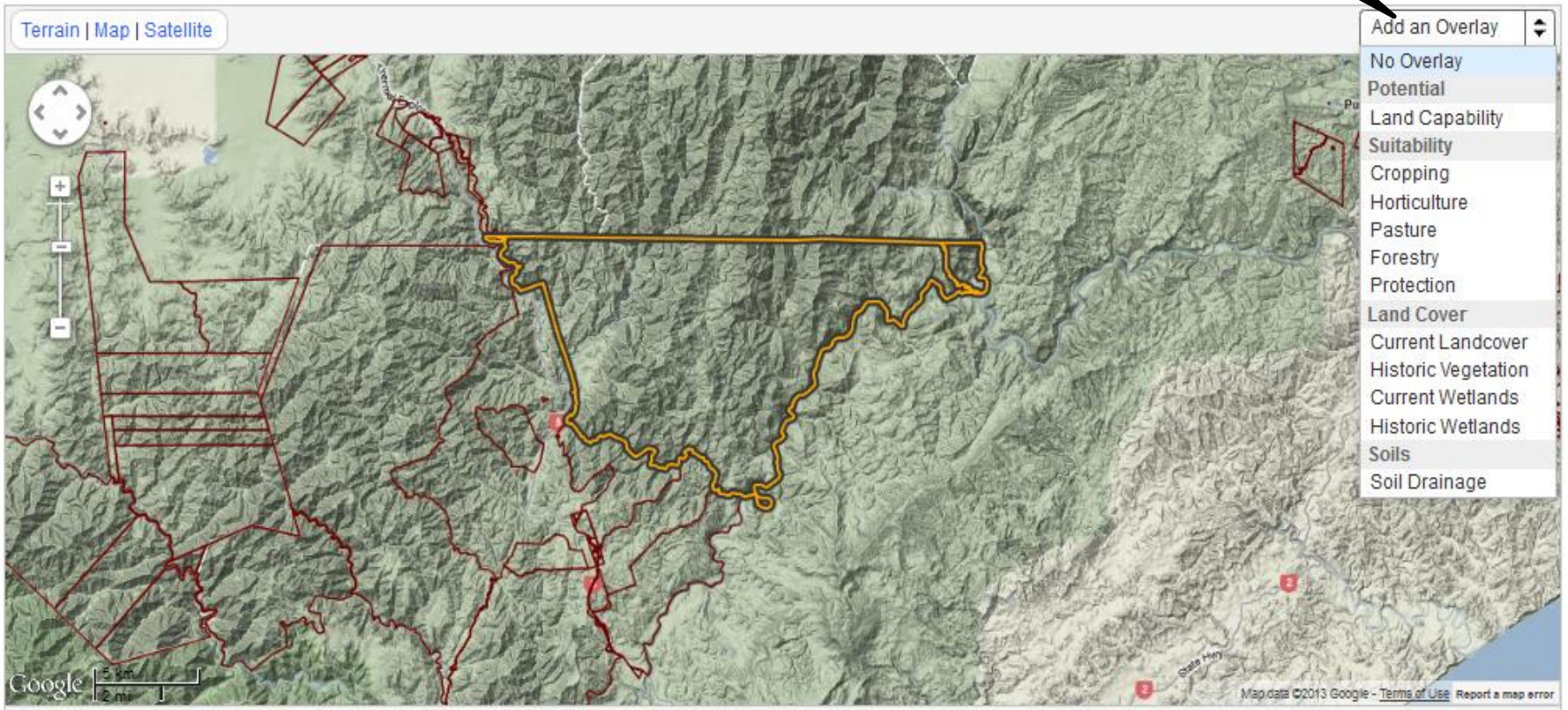
Select an improved land use and land cover type

Tataraakina C

View the block details at Māori Land Online.

ke an enquiry about this parcel

naged by a trust.



No overlay selected

You can select an overlay from the top left of the map

Nearby places: Paraweranui Tahuwera AWAHOHONU FOREST Hurumauku

Visualising Māori Land

A prototype tool for accessing and interpreting environmental information about Māori land

Home About Give Feedback Help Make an enquiry

Te Puni Kōkiri
REALISING MĀORI POTENTIAL

Search

View a map of the Land Use capability

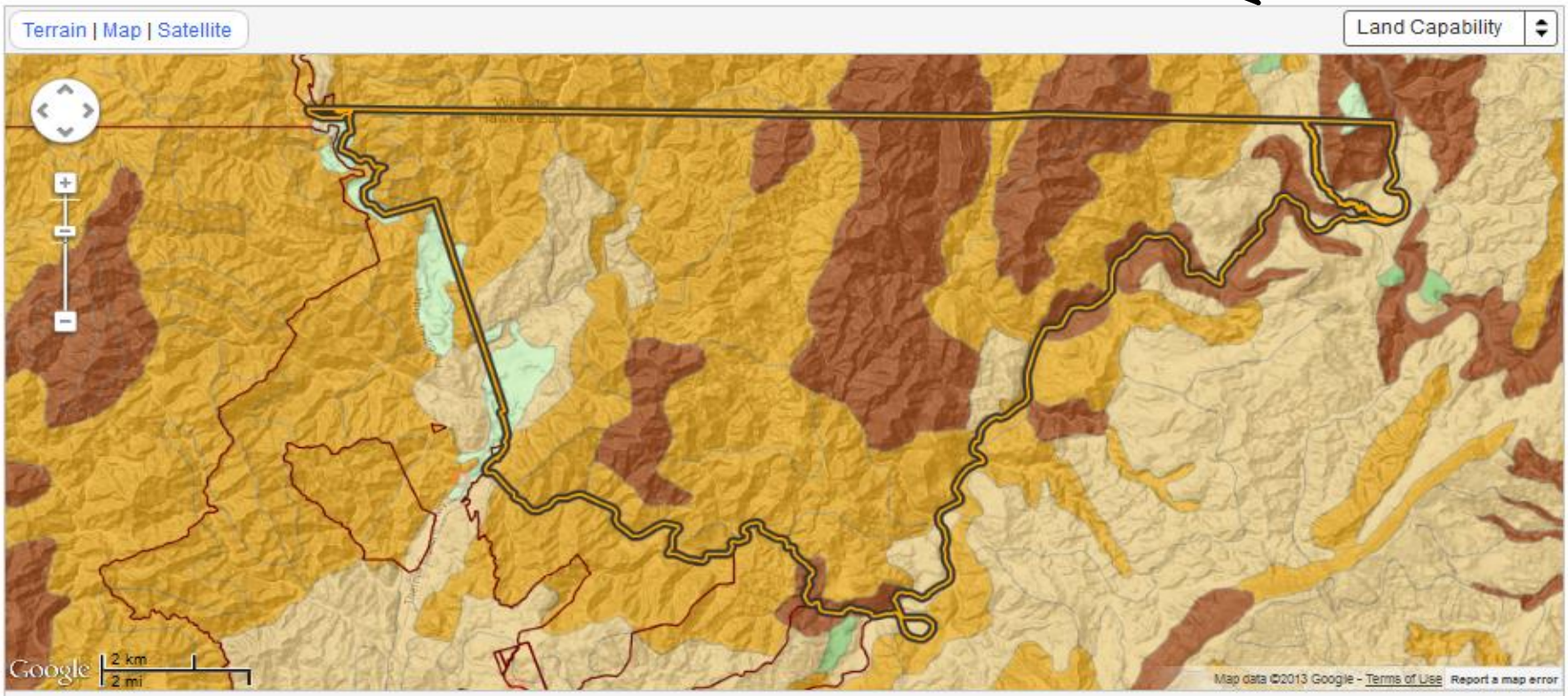
Tataraakina C

Make an enquiry about this parcel

View the block details at Māori Land Online.

res: 415813

Note land is managed by a trust.



Land Capability

This layer shows the general capability and versatility of the land, and incorporates the degree of physical resource limitation to agriculture, by interpreting and colour coding each of the original eight land-type classes of Land Use Capability (LUC) within the New Zealand Land Resource Inventory(NZLRI).

- Unclassified
- Best
- Excellent
- Crops, pasture, and forest
- Occasional crops, pasture, and forest
- Pasture and forest
- Moderately limited
- Severely limited
- Extremely limited

Visualising Māori Land

A prototype tool for accessing and interpreting environmental information about Māori land

Landcare Research
Manaaki Whenua

Home About Give Feedback Help Make an enquiry

Search

View a map of the land cover

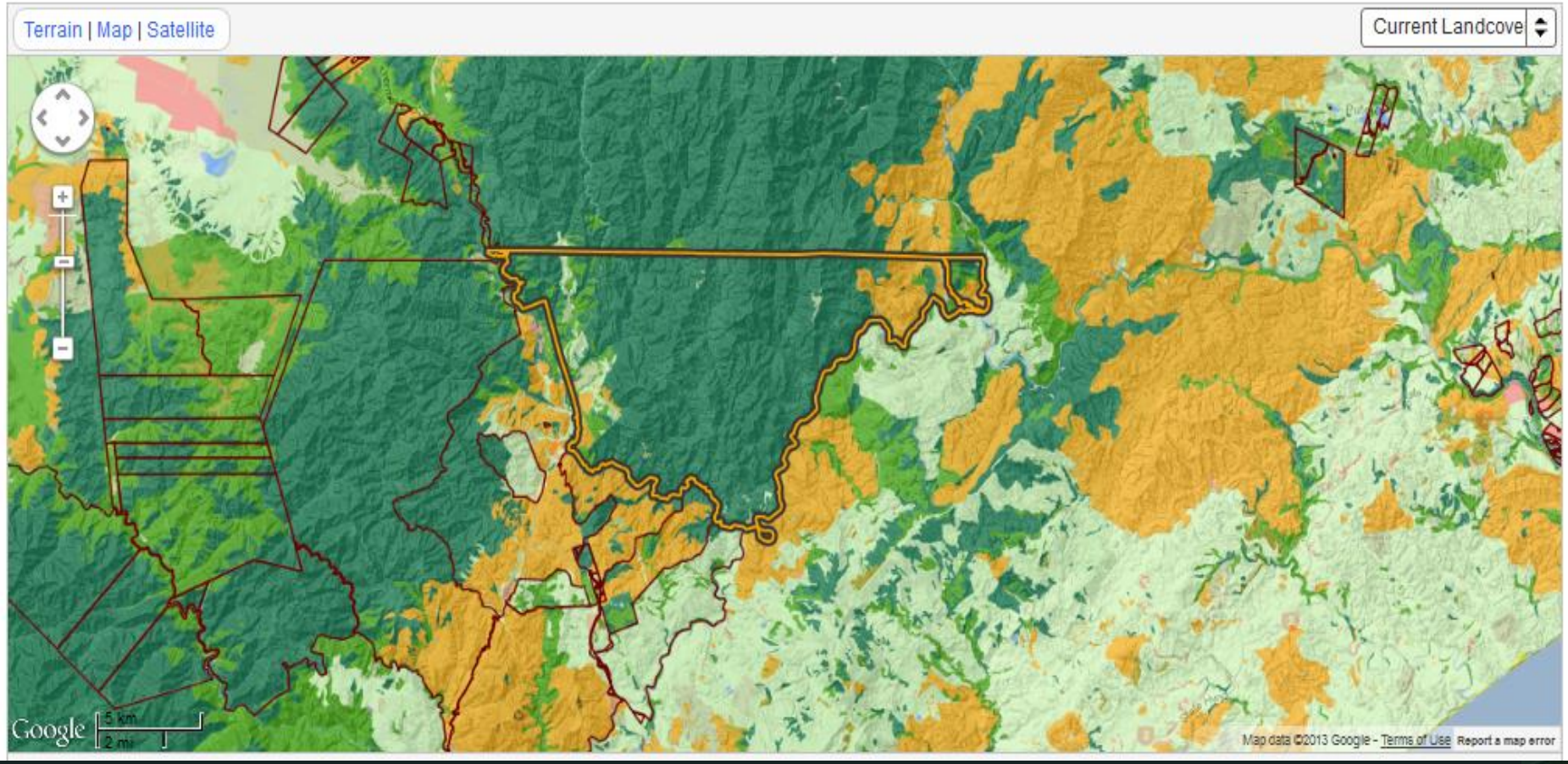
Tataraakina C

View the block details at Māori Land Online.

Make an enquiry about this parcel

Share 5813

Mortgaged: No **Leased:** Yes **Notes:** The land is managed by a trust.



Visualising Māori Land

A prototype tool for accessing and interpreting environmental information about Māori land

Home About Give Feedback Help Make an enquiry

Te Puni Kōkiri
REALISING MĀORI POTENTIAL

Search

Enquire for more information about the lands legal title

Tataraakina C

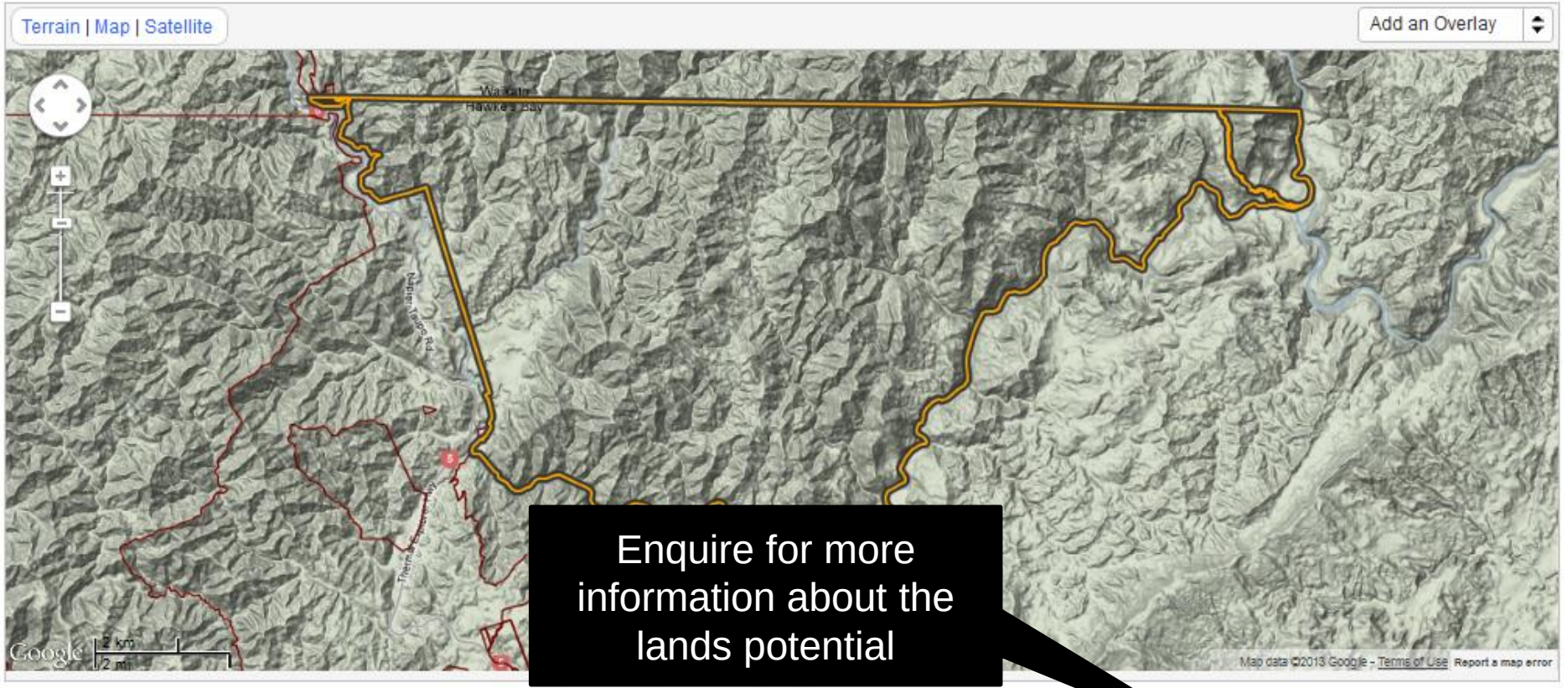
View the block details at Māori Land Online.

Title Information

Make an enquiry about this parcel

Area: 14851.8 ha **Owners:** 881 **Shares:** 415813

Mortgaged: No **Leased:** Yes **Notes:** The land is managed by a trust.

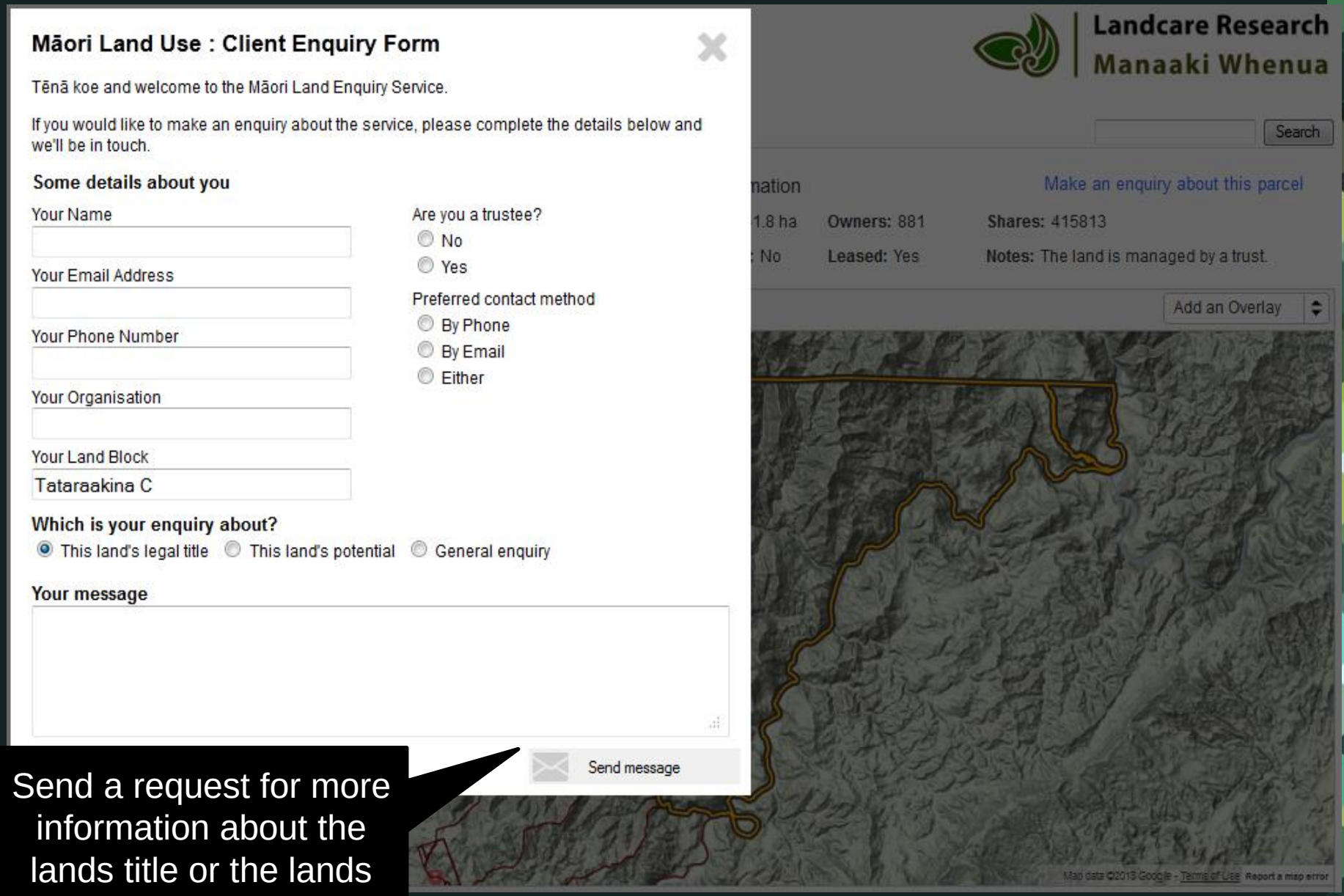


Enquire for more information about the lands potential

Nearby places: weranui Tahuwera AWAHOHONU FOREST Hurumauku

Land potential | Land cover | Climate | Soil properties

Enquire about this land use



Send a request for more information about the lands title or the lands potential