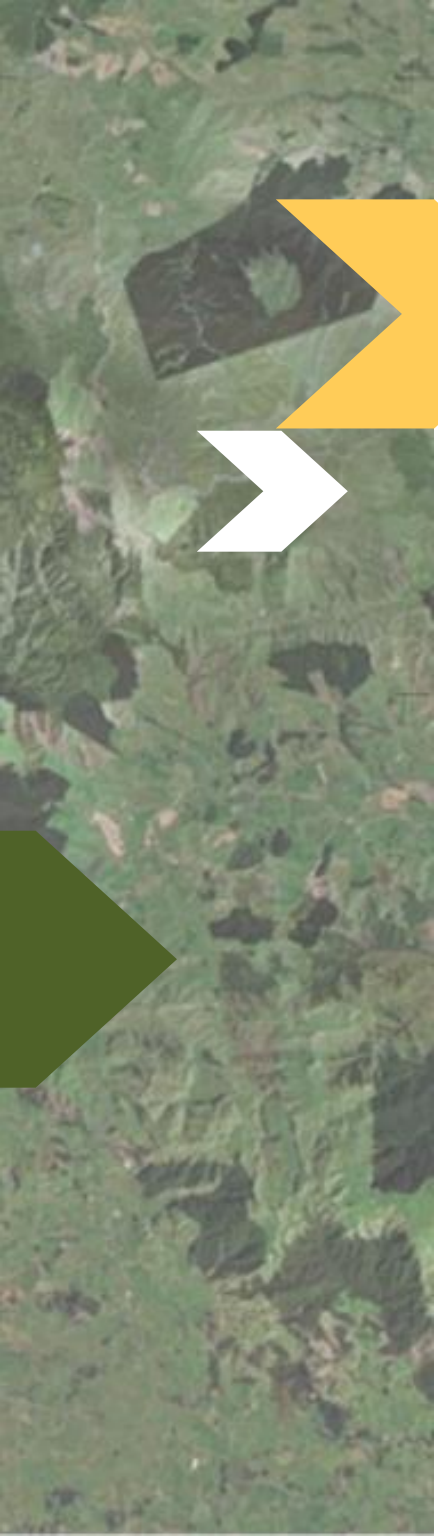
USING SPATIAL DATA TO UNEARTH THE POTENTIAL OF THE SOIL BELOW OUR FEET

Suzanne Bergman

Kenex



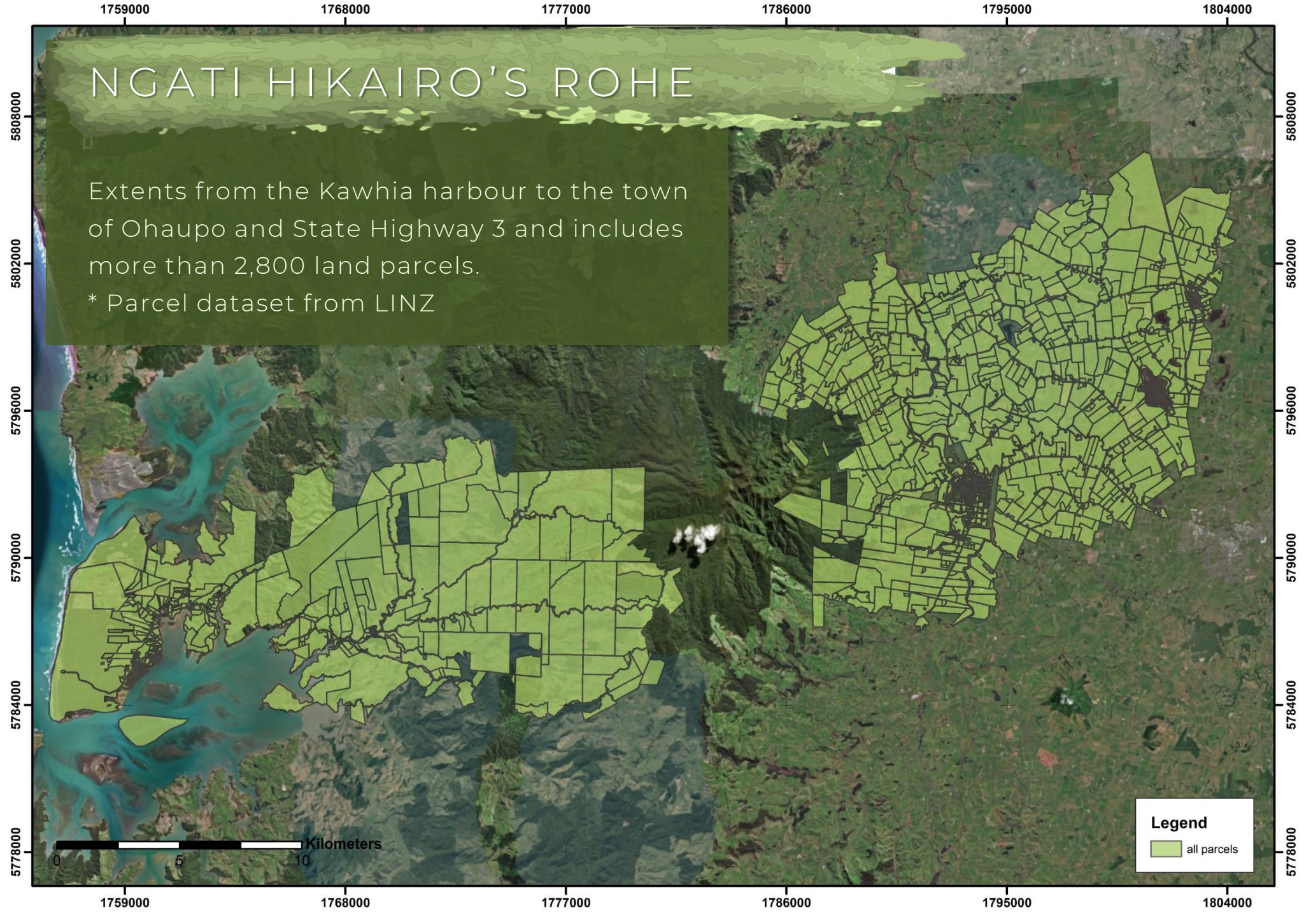
What is the aim?

Identify the land blocks most suitable for a hop growing trial in the Waikato area.

NGATI HIKAIRO'S ROHE

Extents from the Kawhia harbour to the town of Ohaupo and State Highway 3 and includes more than 2,800 land parcels.

* Parcel dataset from LINZ



How to get there

Parameters

Parameters provided by industry experts at Hop Revolution.

Land use analysis

GIS operations and freely available national data from LINZ and Landcare was used to identify the parcels suitable for hops farming.

Land parcels selection and ranking

Ranked parcels from most to least suitable based on provided parameters

Land Use Analysis

Parameters

HEALTHY GRASSLAND

Land cover classification from free satellite images

TERRAIN

Flat land with a slope < 5 °

LAND USE CAPABILITY

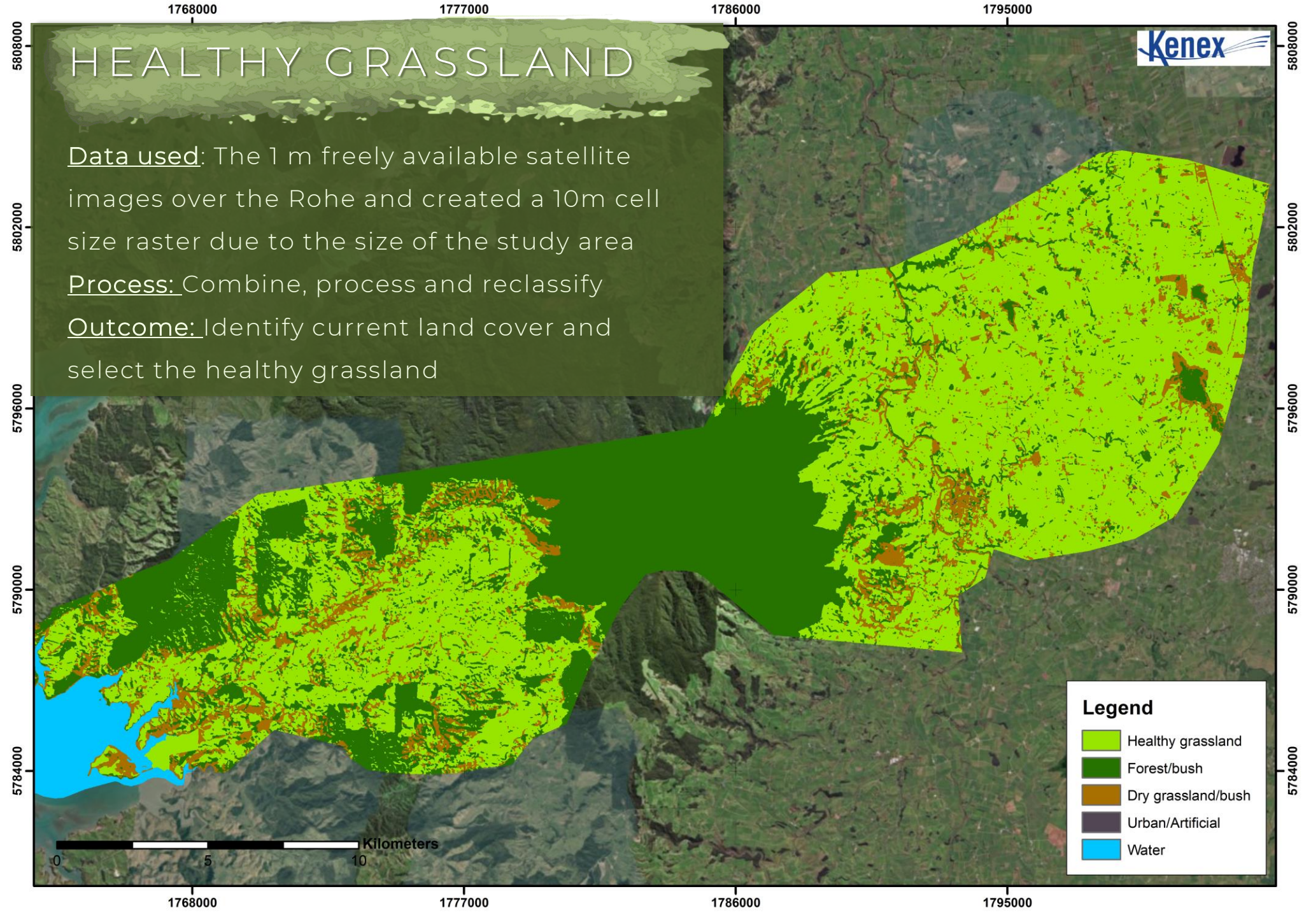
LUC Class 1 – 4
Highly arable

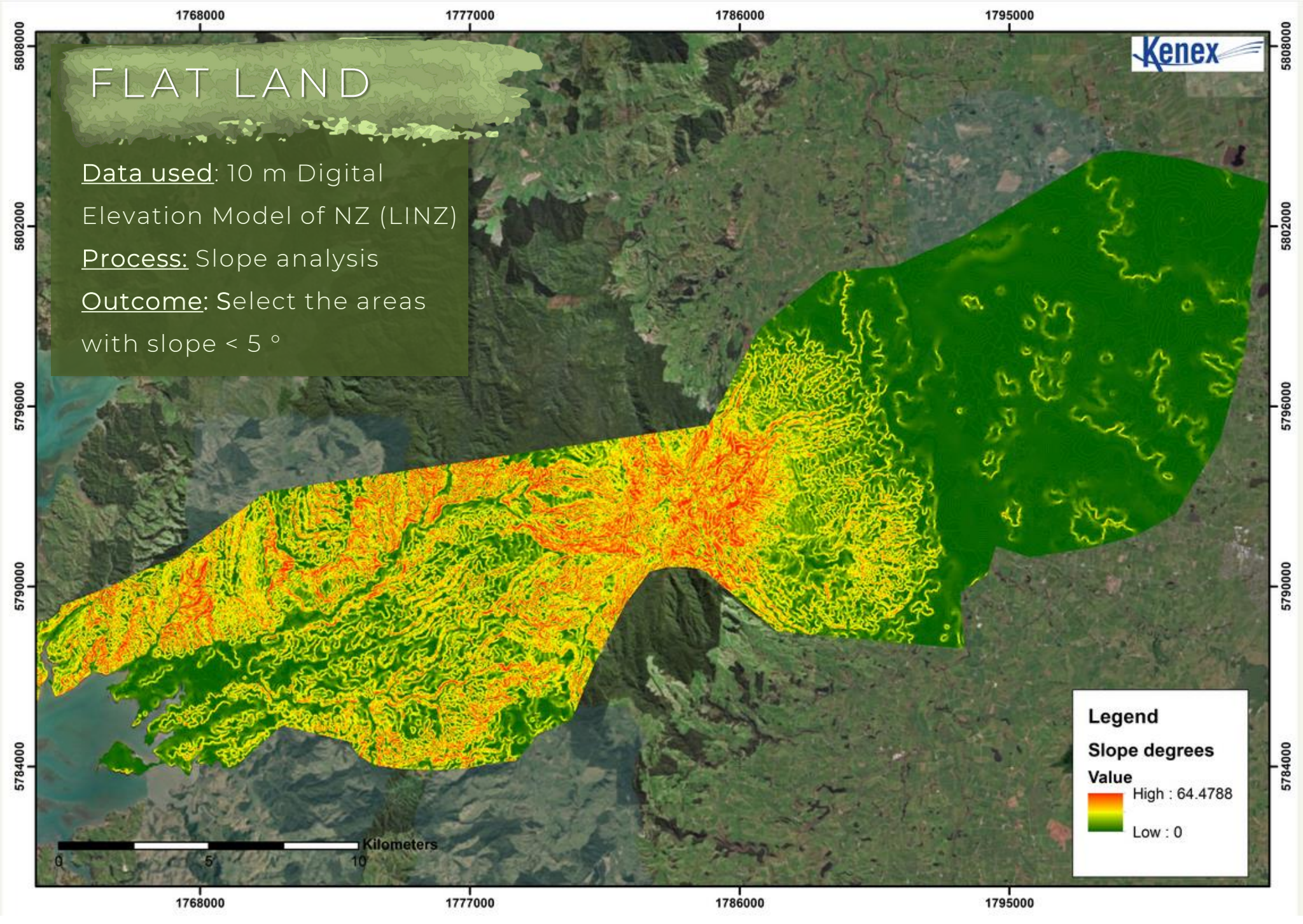
HEALTHY GRASSLAND

Data used: The 1 m freely available satellite images over the Rohe and created a 10m cell size raster due to the size of the study area

Process: Combine, process and reclassify

Outcome: Identify current land cover and select the healthy grassland



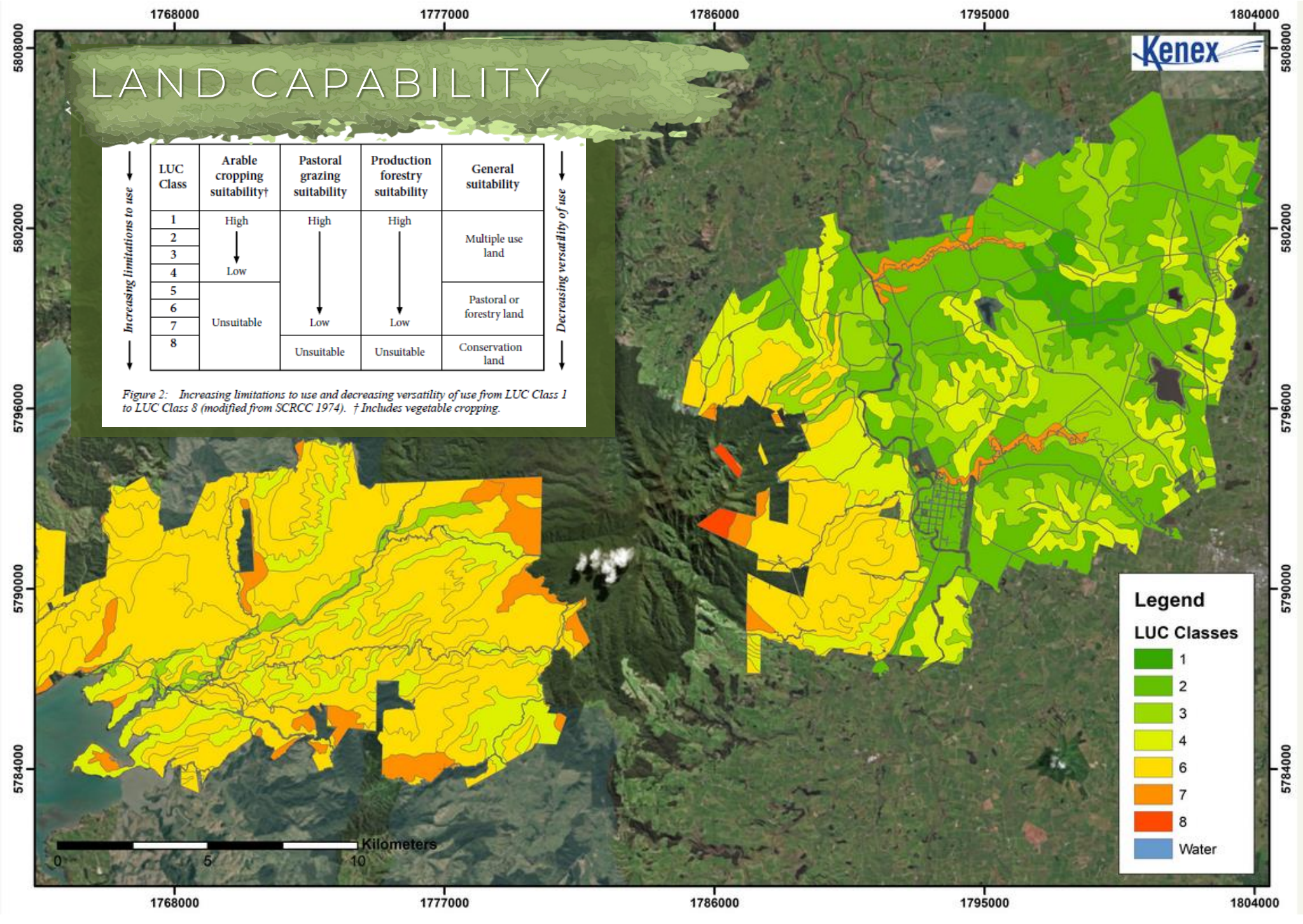

FLAT LAND
Data used: 10 m Digital Elevation Model of NZ (LINZ)
Process: Slope analysis
Outcome: Select the areas with slope < 5 °
Kenex
1768000
1777000
1786000
1795000
5808000
5802000
5796000
5790000
5784000
Legend
Slope degrees
Value
High : 64.4788
Low : 0
Kilometers
0
5
10

LAND CAPABILITY

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

Increasing limitations to use ↓ ↓ *Decreasing versatility of use*

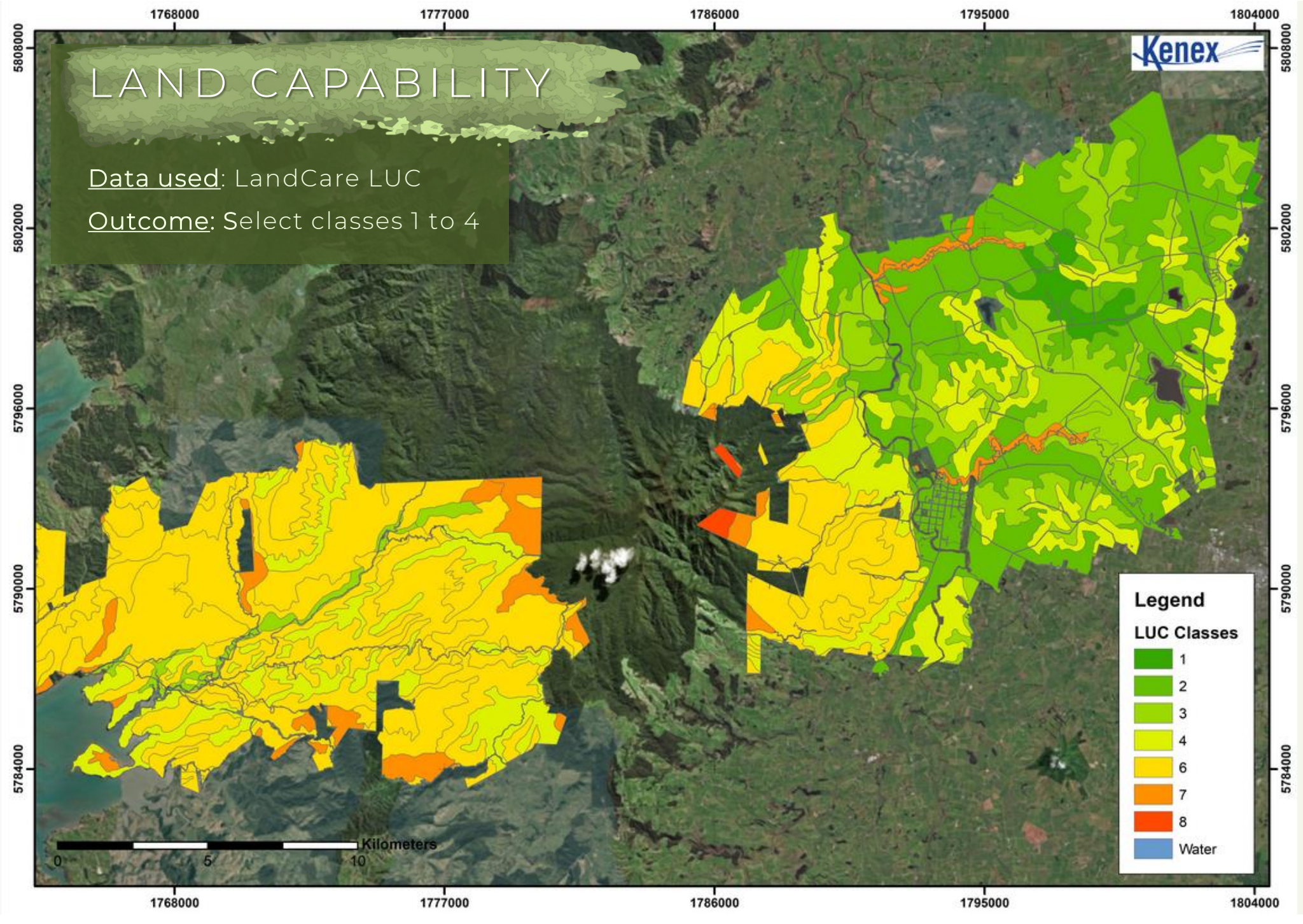
Figure 2: Increasing limitations to use and decreasing versatility of use from LUC Class 1 to LUC Class 8 (modified from SCRCC 1974). † Includes vegetable cropping.



LAND CAPABILITY

Data used: LandCare LUC

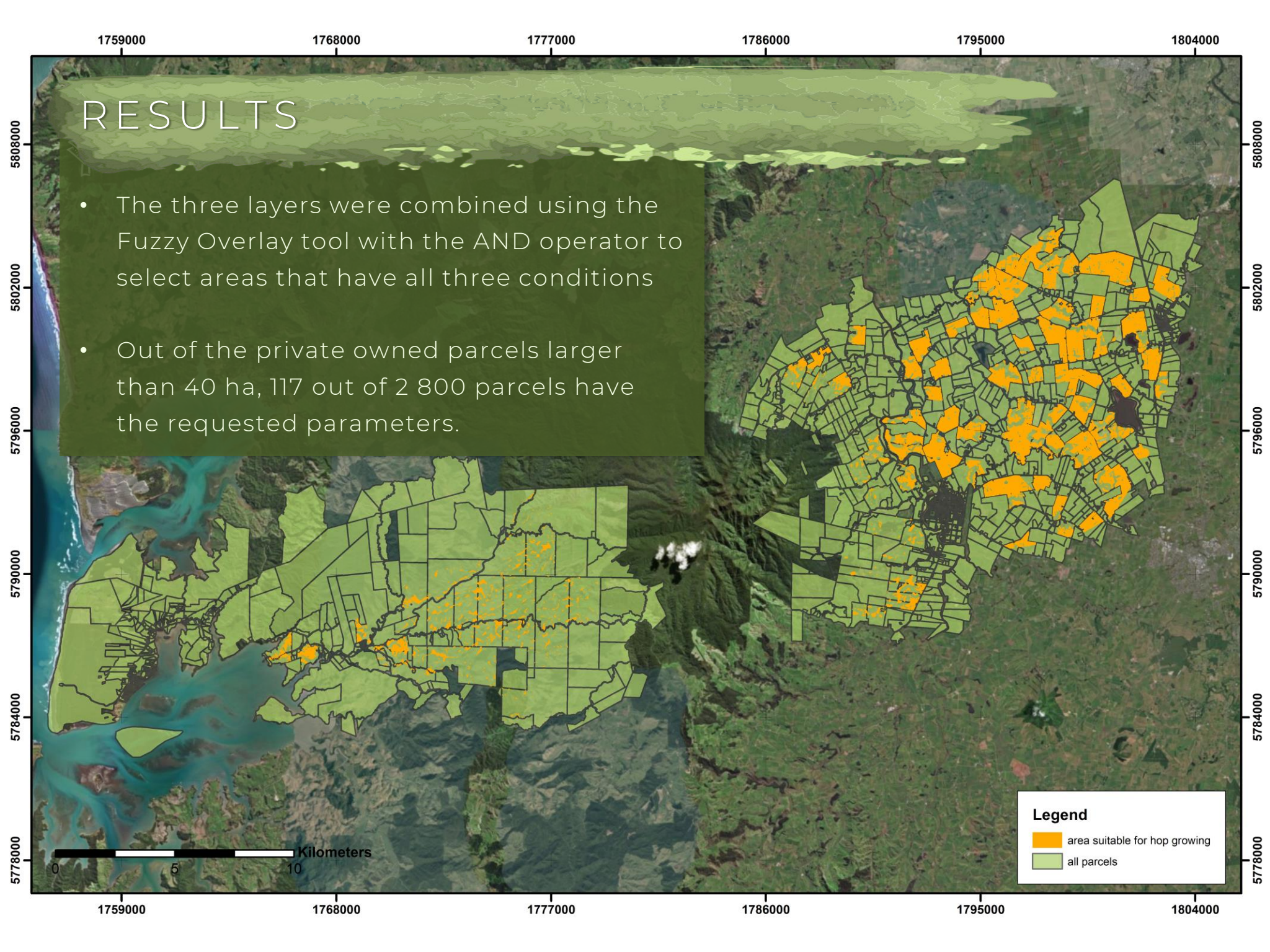
Outcome: Select classes 1 to 4



RESULTS

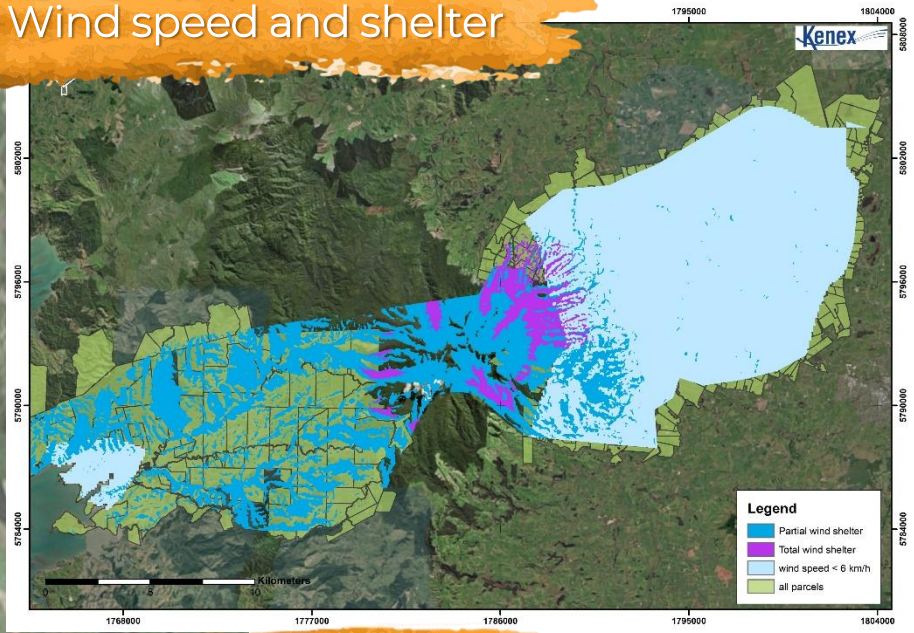
- The three layers were combined using the Fuzzy Overlay tool with the AND operator to select areas that have all three conditions

- Out of the private owned parcels larger than 40 ha, 117 out of 2 800 parcels have the requested parameters.

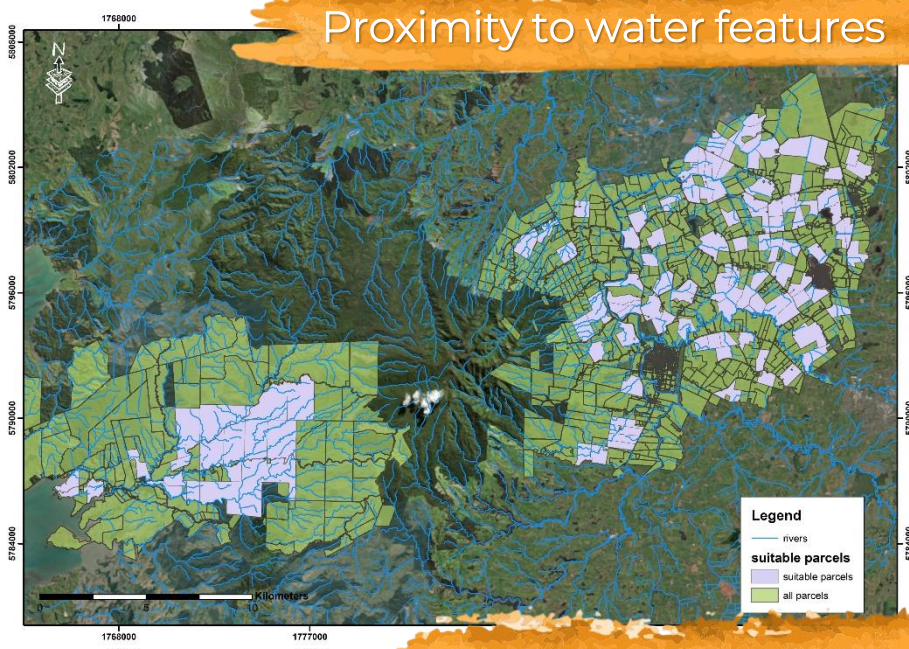


Land Parcel Selection and Ranking

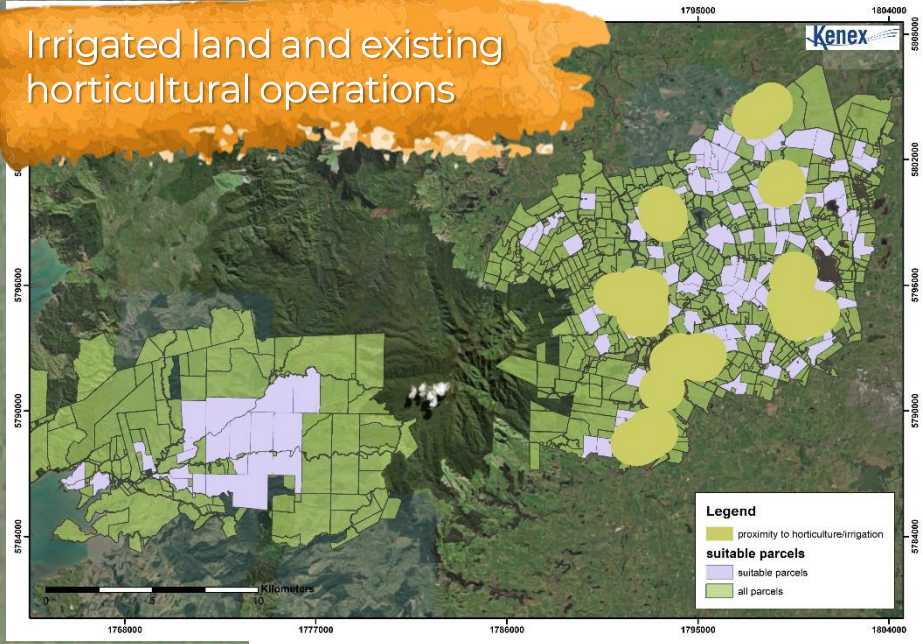
Wind speed and shelter



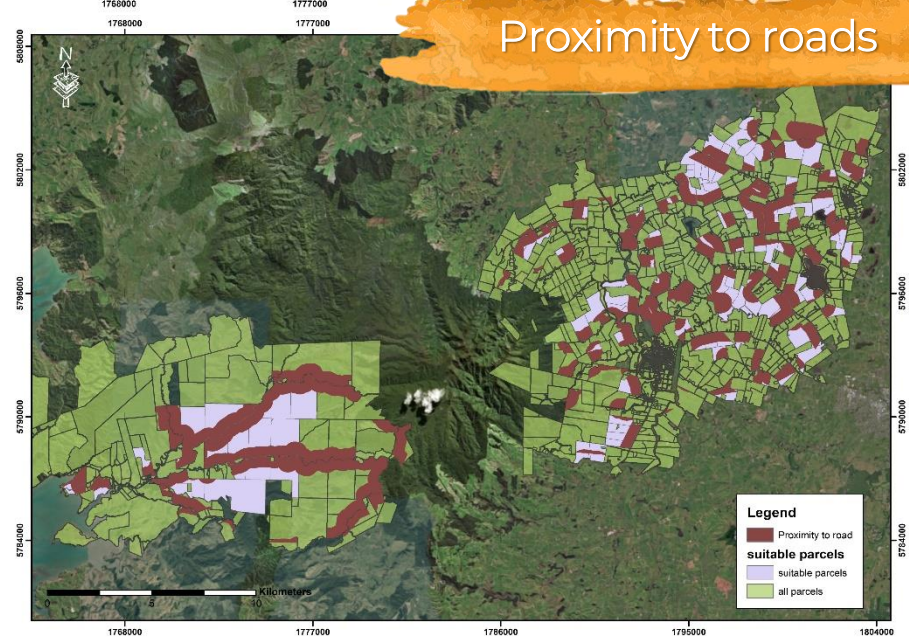
Proximity to water features



Irrigated land and existing horticultural operations



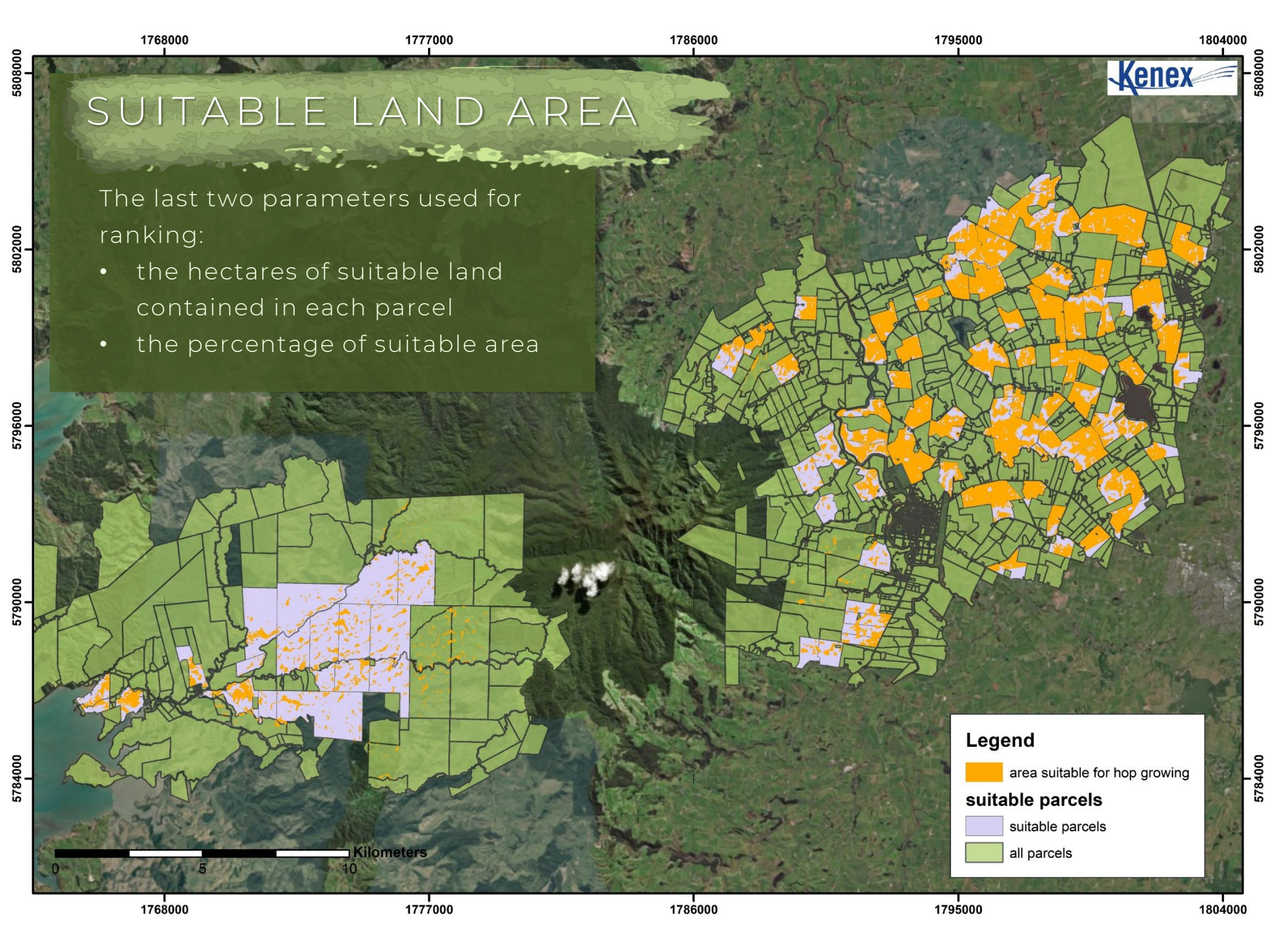
Proximity to roads



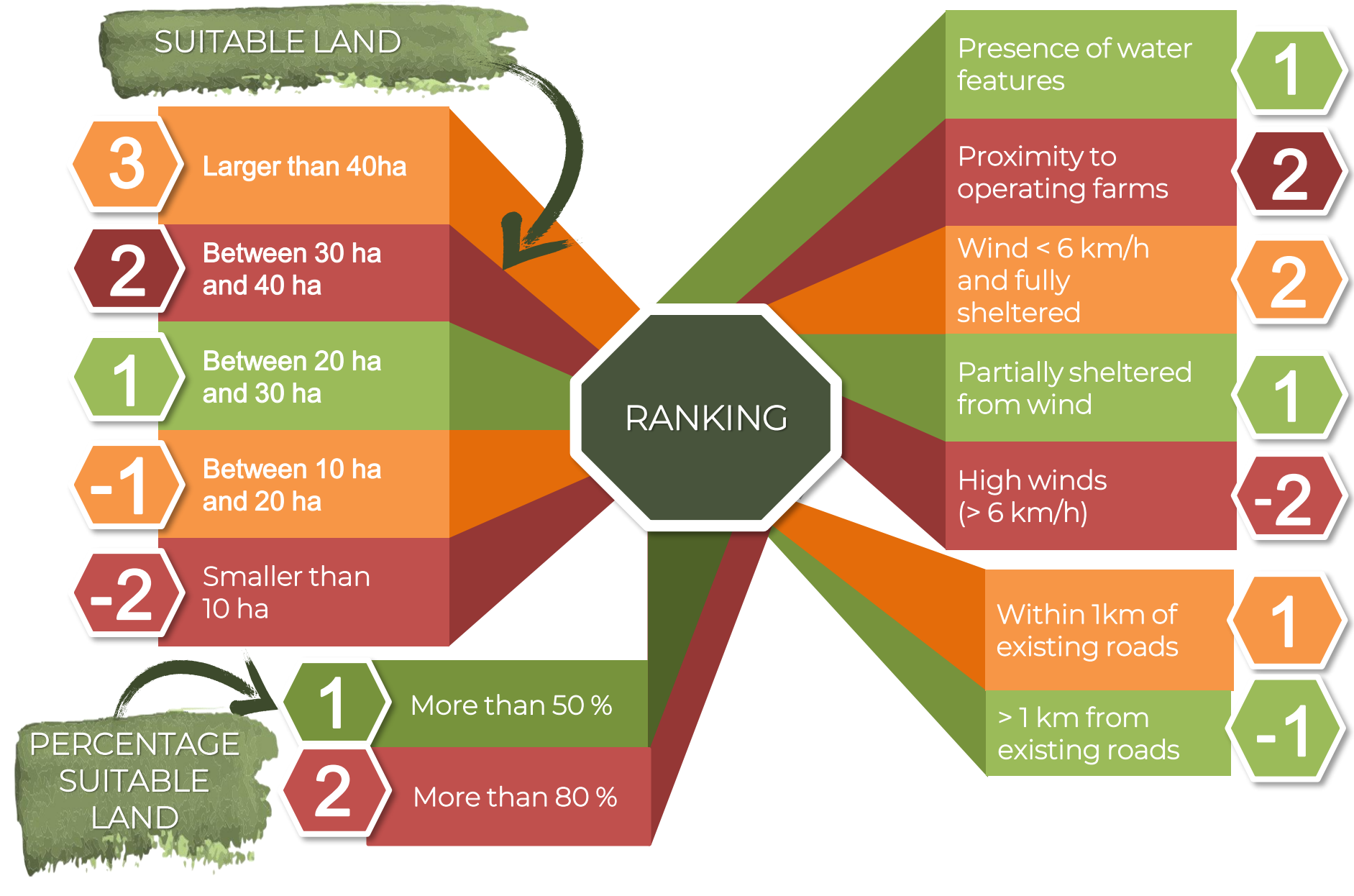
SUITABLE LAND AREA

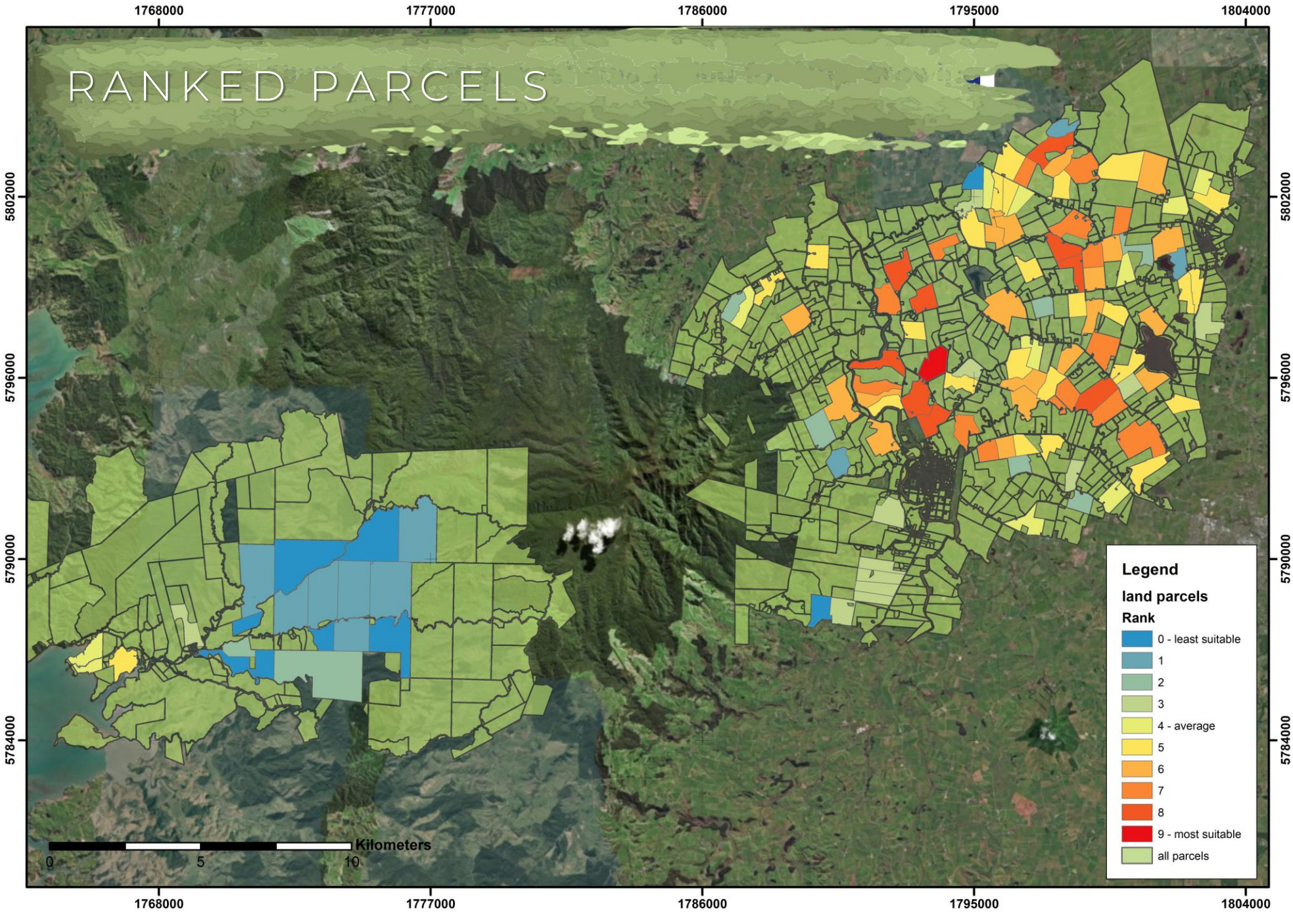
The last two parameters used for ranking:

- the hectares of suitable land contained in each parcel
- the percentage of suitable area



Ranking


SUITABLE LAND
3
Larger than 40ha
2
Between 30 ha and 40 ha
1
Between 20 ha and 30 ha
-1
Between 10 ha and 20 ha
-2
Smaller than 10 ha
PERCENTAGE SUITABLE LAND
1
More than 50 %
2
More than 80 %
RANKING
Presence of water features
1
Proximity to operating farms
2
Wind < 6 km/h and fully sheltered
2
Partially sheltered from wind
1
High winds (> 6 km/h)
-2
Within 1km of existing roads
1
> 1 km from existing roads
-1


RANKED PARCELS
1768000
1777000
1786000
1795000
1804000
5802000
5796000
5790000
5784000
Legend
land parcels
Rank
0 - least suitable
1
2
3
4 - average
5
6
7
8
9 - most suitable
all parcels
Kilometers
0
5
10

117
out of 2800 parcels meet requirements

58
very high ranks (5 to 7)

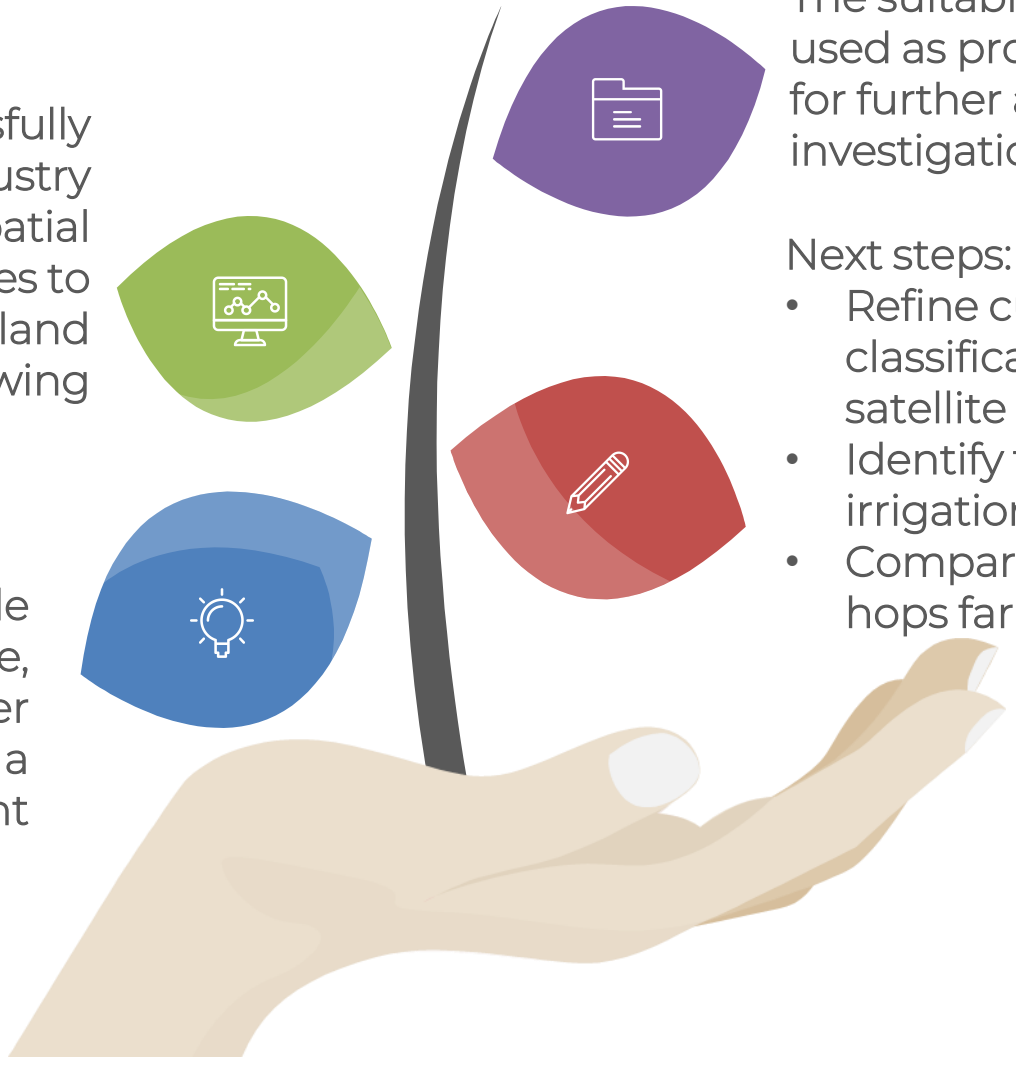
9
second highest rank

1
maximum rank of 9

Conclusions

We can successfully combine industry knowledge and spatial modelling techniques to select and rank land parcels for hop growing

The freely available data from Landcare, LINZ and other sources provided a great starting point



The suitable parcels can be used as prospective targets for further and more detailed investigation

Next steps:

- Refine current land cover classification using free 1 m satellite data and LiDAR
- Identify farms and irrigation accurately
- Compare against existing hops farms


Thank You