Waimea Plains Soils and Landuse

Andrew Burton

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Waimea Plains Soils

- Past information from the Fundamental Soils Layer
- In 2011 Council began more detailed soil mapping for the Waimea Plains
  - Started with the Redwood Valley, Appleby and Waimea-West areas
  - Showed much more variability of soil types
  - New data is to a 1:10,000 scale suitable for property level use
  - Allows for remapping of land productivity classifications and soil versatility mapping
- Further work planned to look at water holding capacity and plant rooting depths to assist with irrigation management

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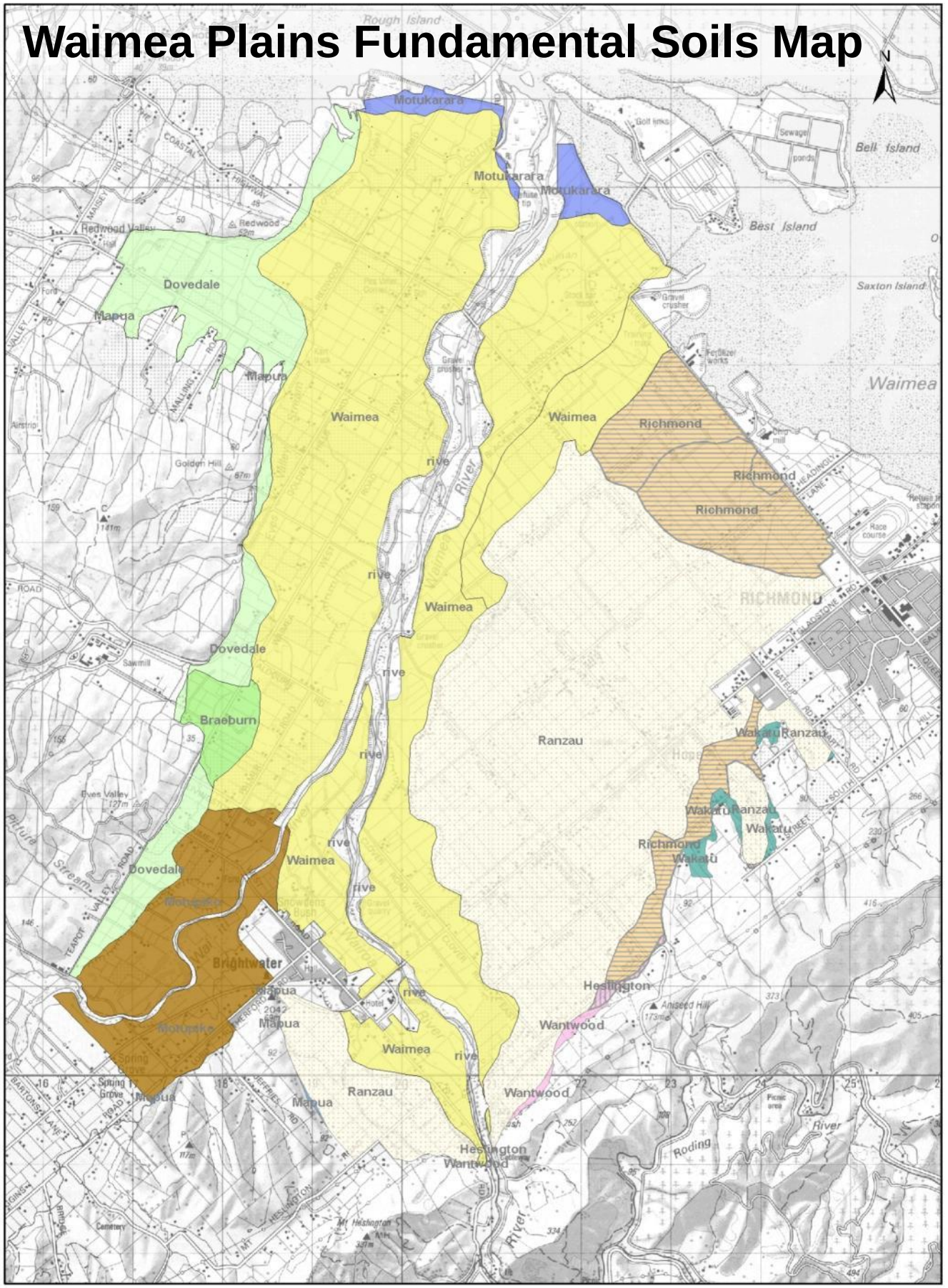
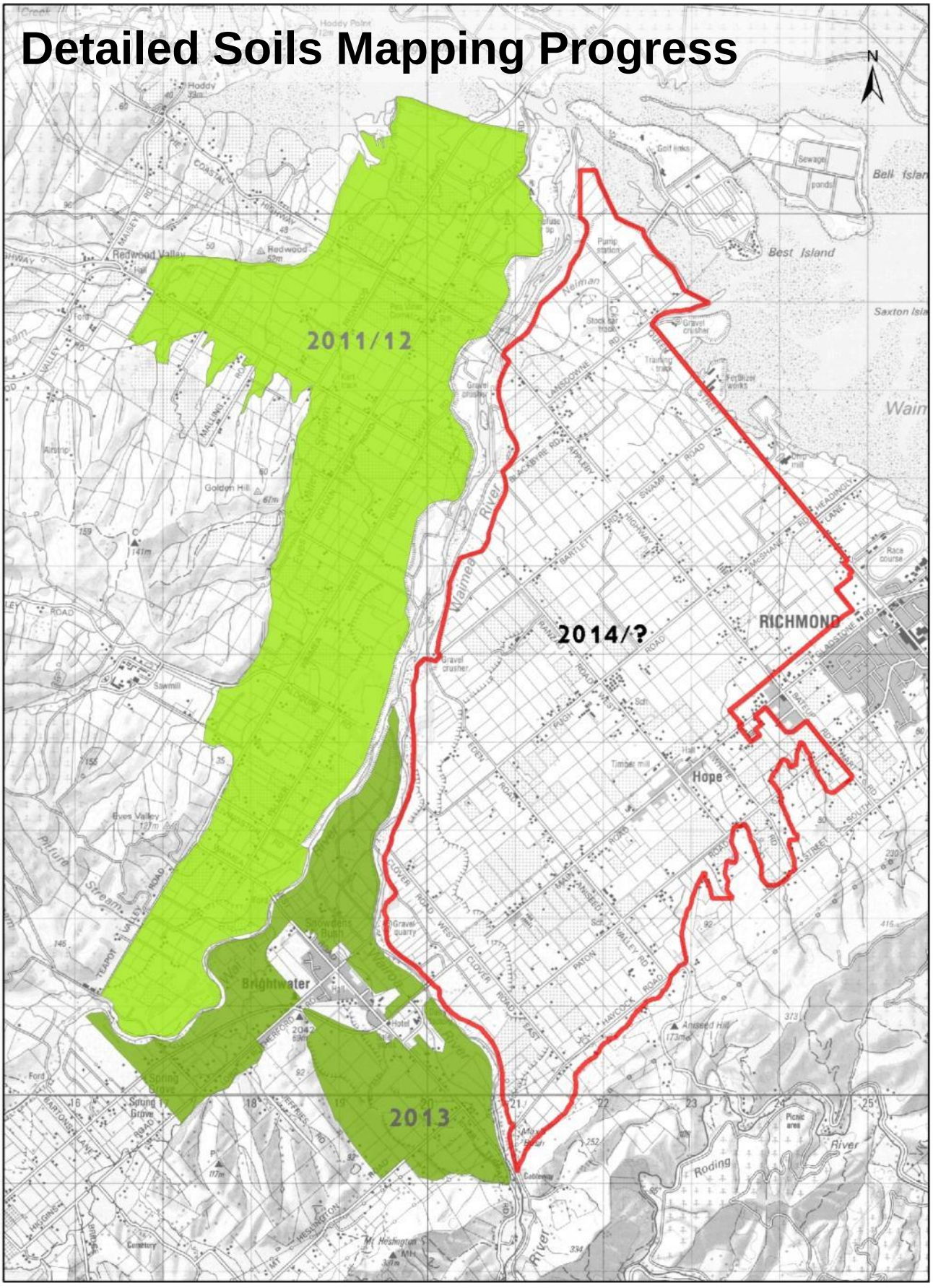
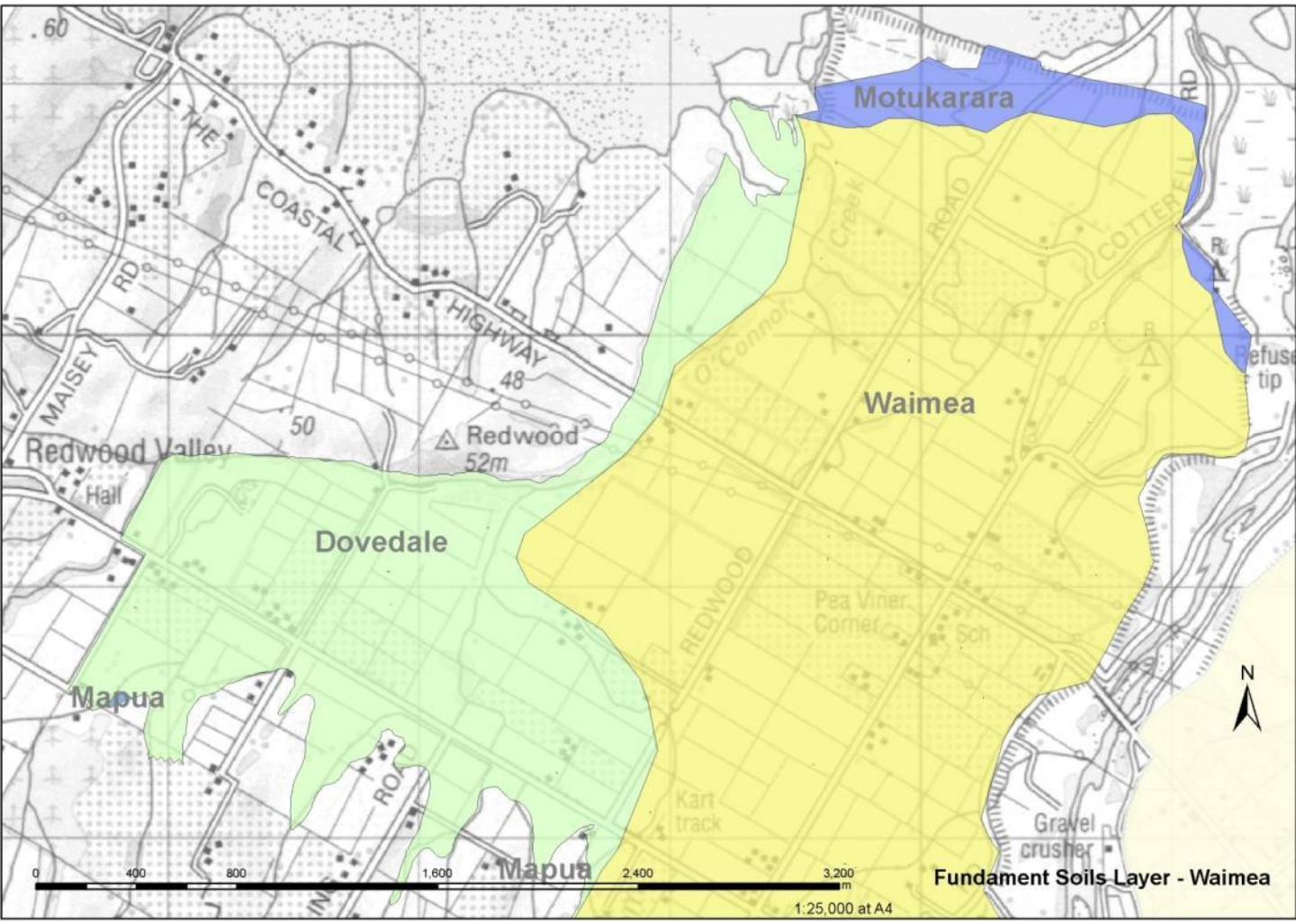
Waimea Plains Fundamental Soils Map



Detailed Soils Mapping Progress



Fundamental Soils Map for Redwood Valley



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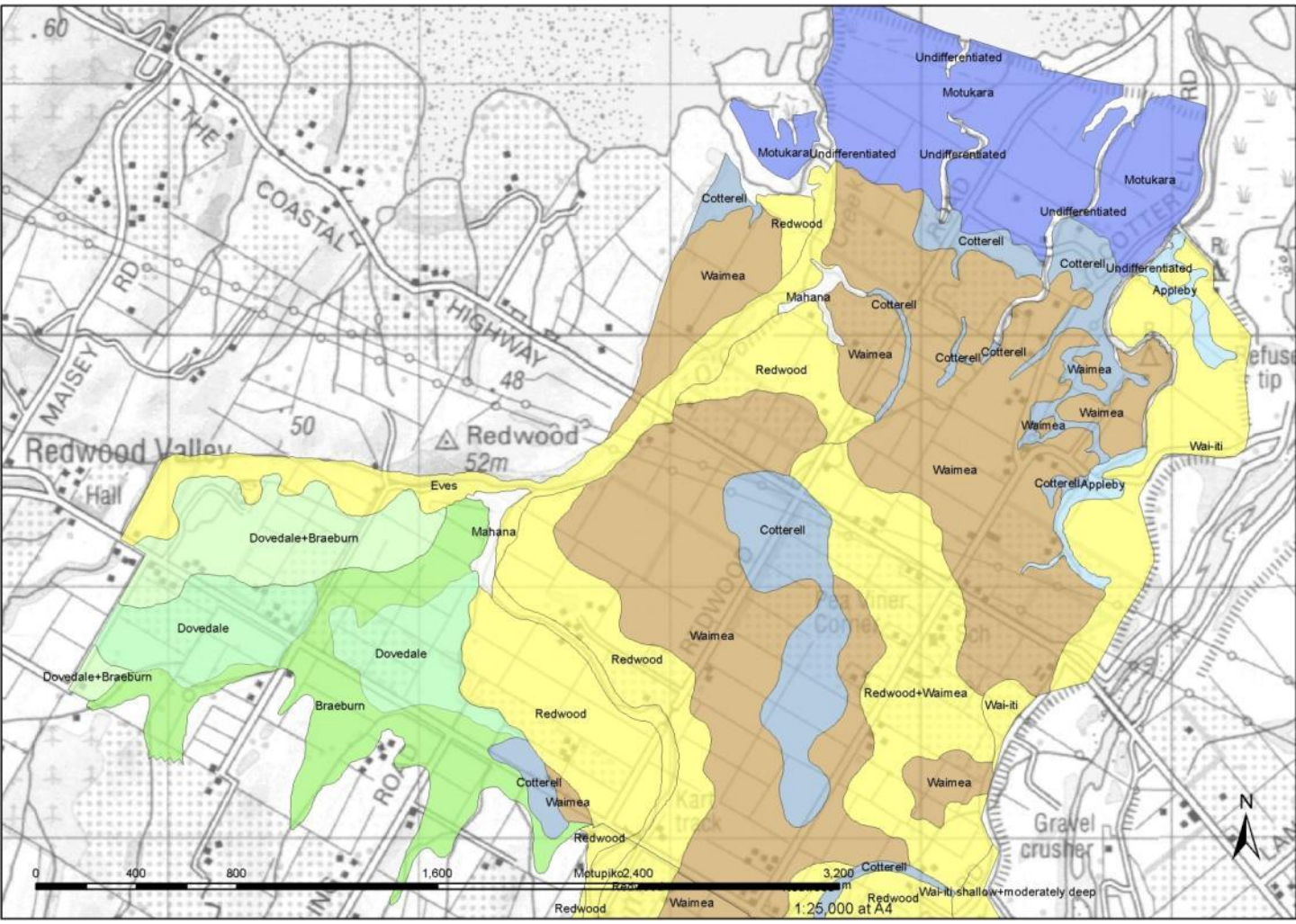
New Detailed Soils Map for Redwood Valley



Mapping has shown variability of soils originally in the same classification

Motukarara

Mahana

Mapping has shown variability of soils originally in the same classification

Waimea

Wai iti

Detailed soils information also being gathered

Soil name and map symbol: Motukarara soils (Mo)

Concept and overview

Motukarara soils occupy 100 ha and occur on the northern most and lowest lying part of the plains surface adjacent to the Waimea inlet. They are imperfectly to poorly drained soils formed from alluvial sediments that have been modified by fluvial action in an estuarine environment. Their imperfect to poor drainage is due to high groundwater conditions consequent upon their proximity to the Waimea Estuary.

Relationship to previously named soils

Motukarara soils were mapped by Chittenden et al. (1966) to the north of Nelson at Wakapuaka but were not separated around the margin of the Waimea estuary. These imperfectly to poorly drained estuary margin soils were included within Waimea soils. Motukarara soils have been mapped elsewhere in the South Island (Soil Bureau Staff 1968, Ward et al. 1964, Kear et al. 1967) as the soils on low lying land around the margins of estuaries, typically with slight to moderate salt concentrations due to their proximity to saline water. Tamutu soils (Gibbs et al. 1953 and Ward et al. 1964) were mapped in close proximity to Motukarara soils but on slightly higher ground that was better drained.

Landform origin and history

The alluvial materials on the low-lying land adjacent to the Waimea estuary were probably deposited as part of the Holocene construction of the Waimea Plain. Subsequent to the deposition of the sediments, a small Late Holocene sea level rise (Woodroffe and Horton 2005) may have reworked the sediments adjacent to the coast, removing much of the clay loam material that characterises the Waimea soils and leaving a patchy distribution of predominantly shallow to moderately deep sand to silt textured alluvium with gravelly patches. The ground surface is bisected with shallow channels, formerly estuarine leads, but now remaining as low lying poorly drained areas since stopbanking removed direct sea access. 1938 aerial photos, taken before stopbanks were in place, show that some of this area was estuarine in character. No evidence was observed of the effects of salinity and it is probable that since the coastal stopbanks were emplaced, any salts, had they been present, would have been leached from the soil.

Key features and physical properties

Motukarara soils are shallow and imperfectly drained soils with weakly developed horizons and gravelly subsoils. The topsoil averages 15cm in thickness, is brown to dark brown coloured and has dominantly silt loam texture. The depth of fine material over gravel averaged 38cm. The subsoils are predominantly olive to greyish coloured with mottle colours that range from yellowish red to greenish grey. A watertable, commonly present at around 50cm, rises near the surface in the wetter months with areas of surface wetness.

Soil Variability

Topsoils vary in thickness (4-22cm) and there is a wide range of variation in soil colours and mottle patterns depending on the degree of wetness. The depth

to gravel ranges from 10-95cm with 35% of profiles moderately deep (45-90cm) and 5% deep (>90cm). The soil drainage varies from well drained or moderately well drained on patches of slightly higher ground to imperfectly drained andpoorly drained on the lowest lying surfaces. In a few places, soil textures are sandy.

Associated and similar soils

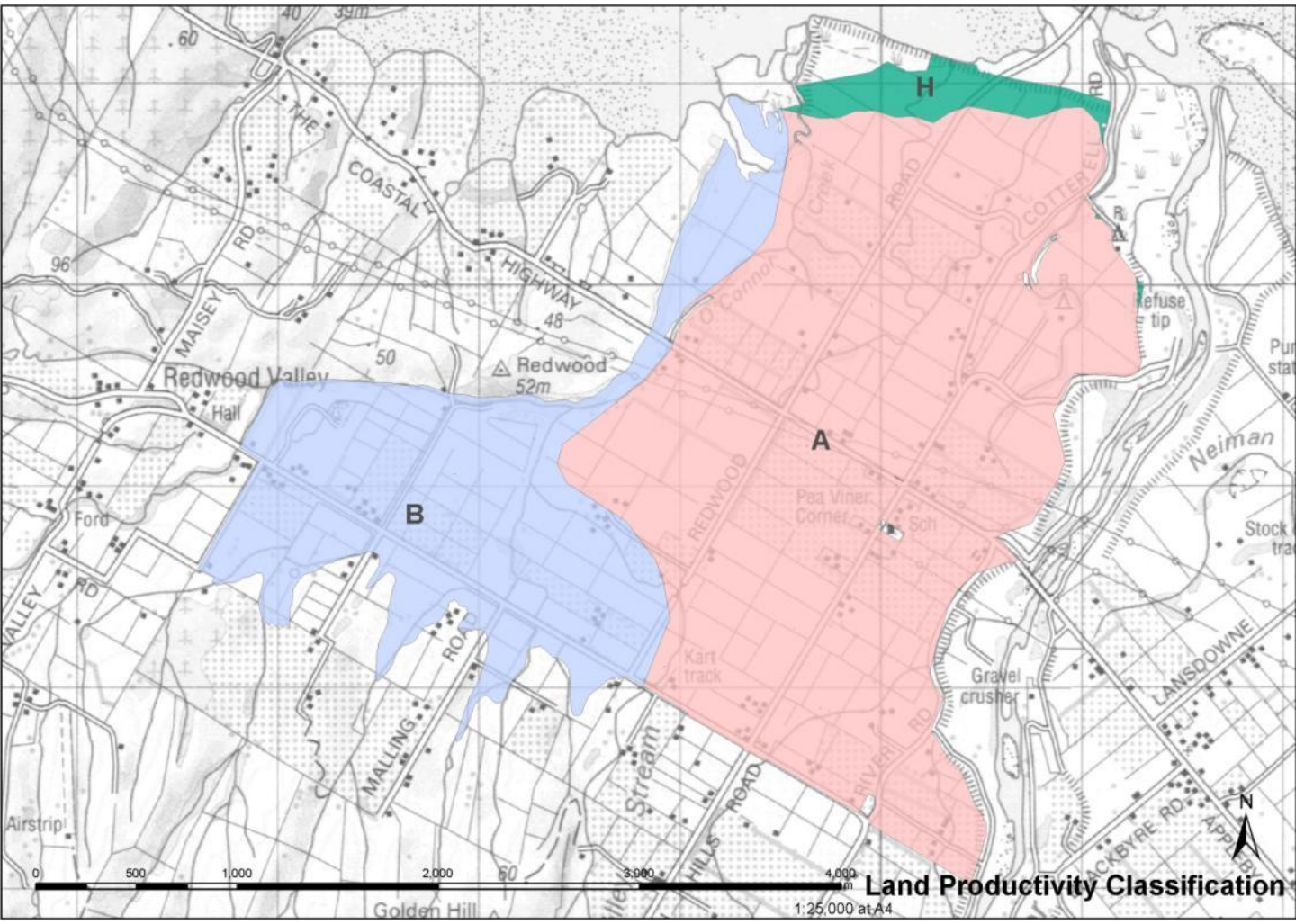
Motukarara soils have similarities with Appleby soils (imperfectly drained soils from recent river alluvial deposits) and also with Cotterell soils (imperfectly drained soils from deeper clay loam alluvium) with which they grade into. Where the soils are formed on patches of well drained or moderately well drained sand or gravelly sand, they resemble Taumutu soils, which have been mappedin the Canterbury district (Ward et al. 1964, Kear et al. 1967) in association with Motukarara soils.

Versatility and land use rating

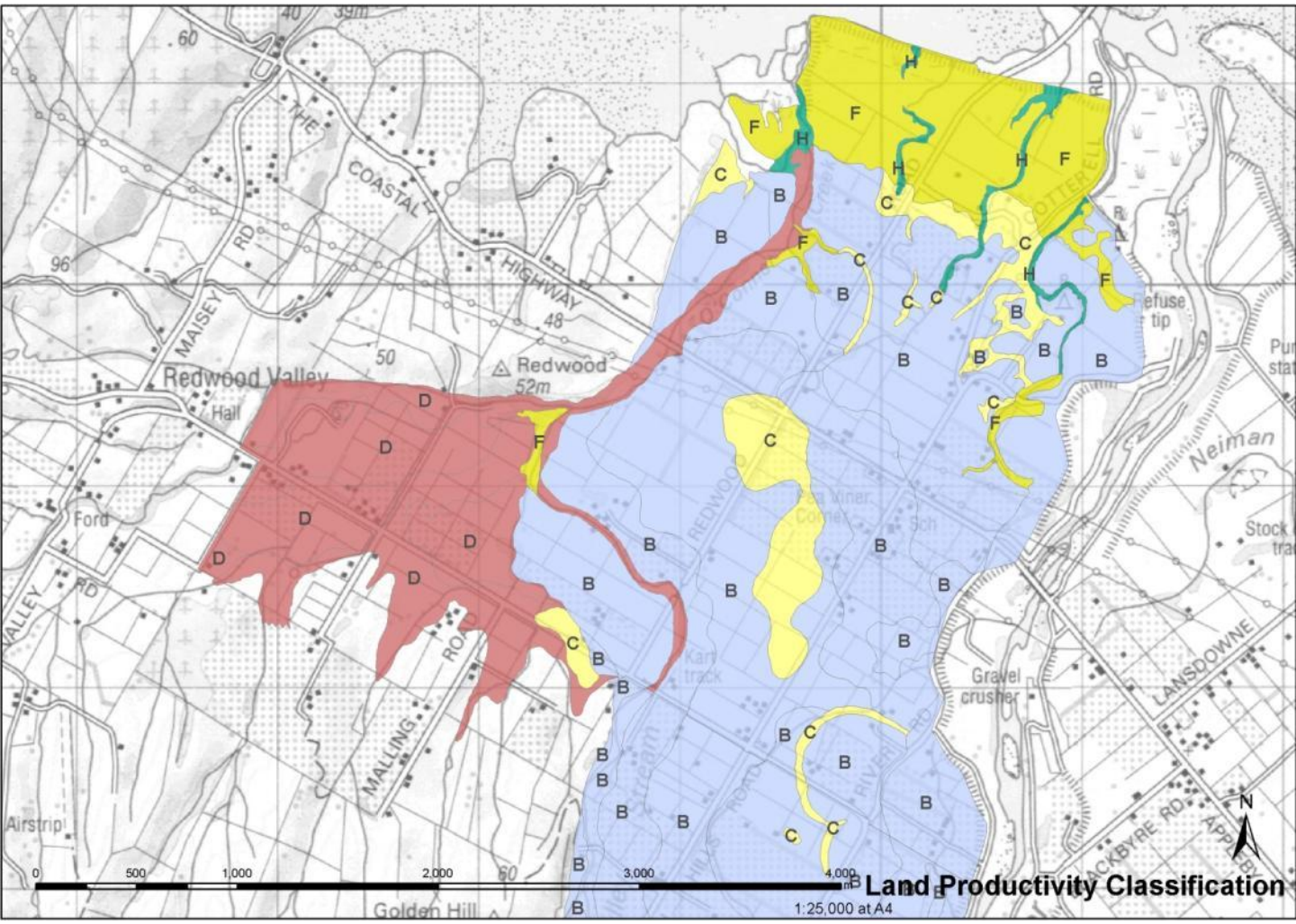
Motukarara soils have a low versatility (average 3.3 Table 2) with significant limitations to intensive use. These include imperfect drainage with significant seasonal wetness, shallow soils with low available water capacity, shallow rooting depth, summer moisture deficiency, weakly developed soil structure and susceptibility to flooding. They are included in class F of the Tasman District Council classification system for land management.

Horizon	Depth cm	Description
A	0-6cm	brown to dark brown (10YR 4/3) silt loam; weakly developed fine polyhedral structure; very weak soil strength; many fine roots
BC(g)	6-20cm	light olive brown (2.5Y 5/4) silt loam; 10% light brownish grey (2.5Y 6/4) and 5% reddish brown (5YR 3/4) mottles; weakly developed medium blocky structure; slightly firm soil strength, few fine roots
C(g)	20-40cm	olive brown (2.5Y 4/4) clay loam; 30% greyish brown (2.5Y 3/2) and 10% dark greyish brown (10YR 4/4) medium mottles; weakly developed medium blocky structure; slightly firm soil strength, few fine roots
Cg	40-55cm	light greyish brown (23.5Y 6/2) clay loam; 30% brown to dark brown (7.5YR 4/4) fine distinct mottles; apedal
Cr	55-74cm+	greenish grey (5GY 5/1) silty to sandy gravel; 40% medium and fine stones; apedal; disordered

AgNZ Land productivity classification for the Redwood area



Land productivity classification based on new detail soils mapping



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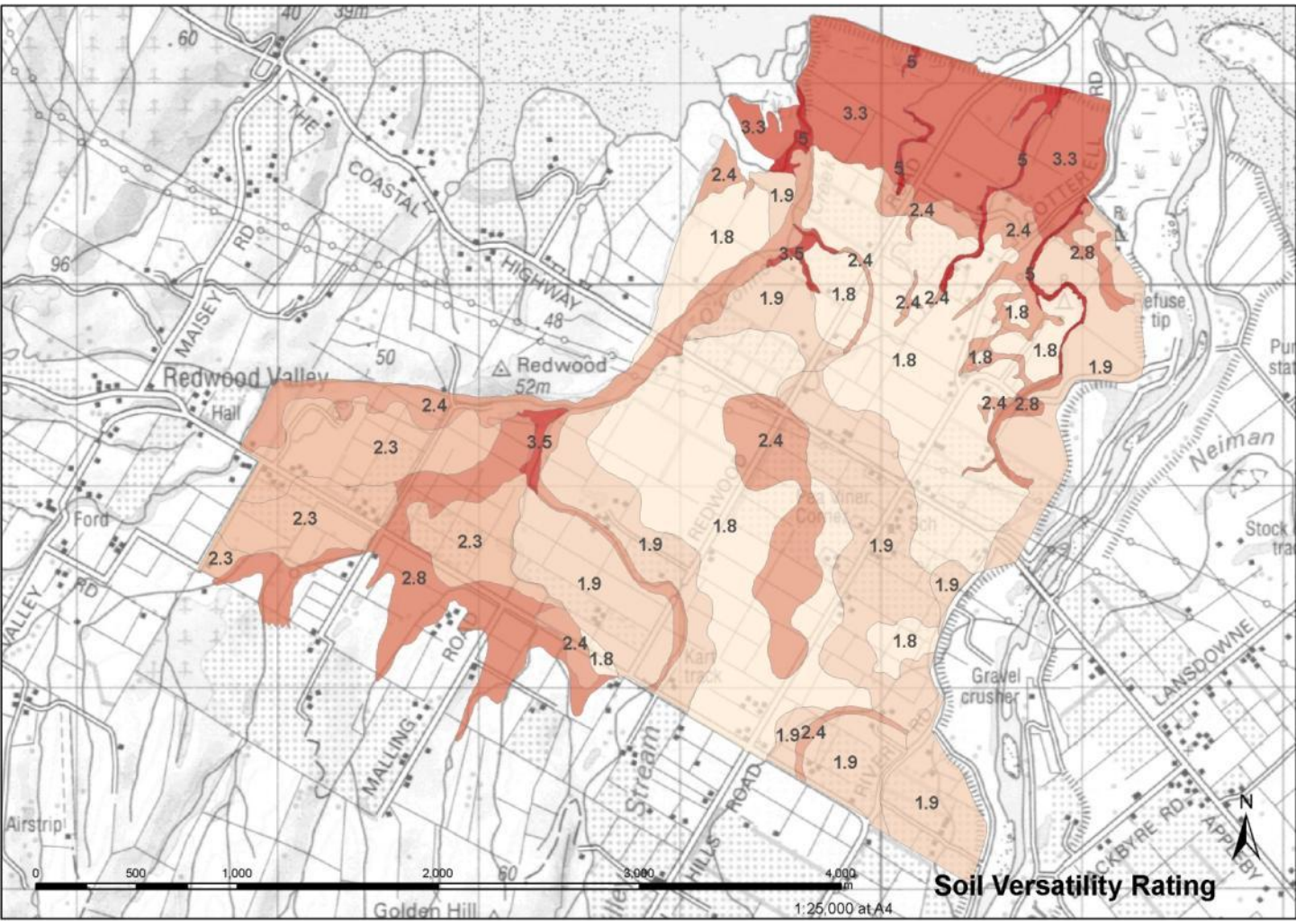
Soil Versatility Rating based on new detail soils mapping



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Soil Versatility Rating: individual parameter scores

TABLE 2

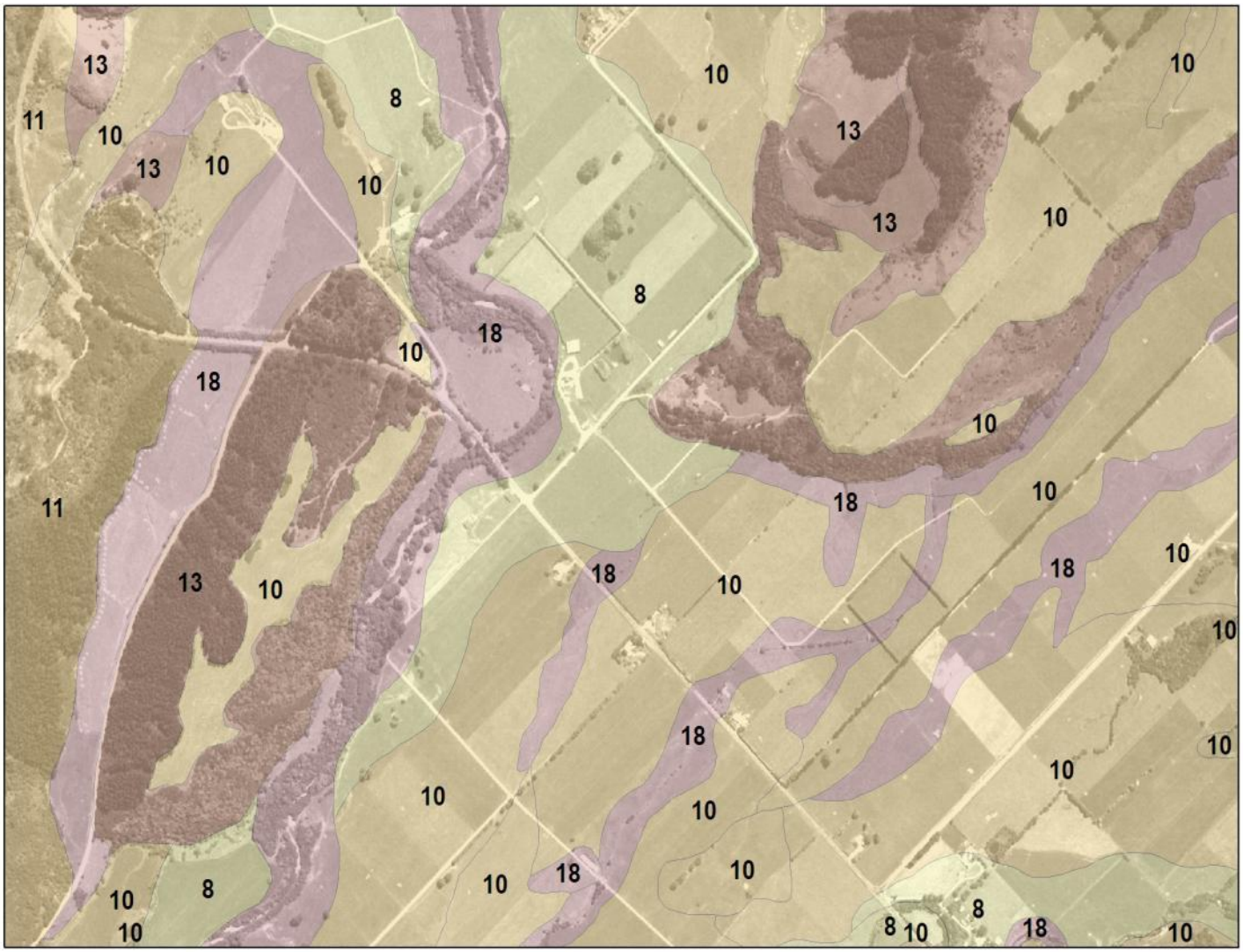
Soil Versatility Ratings

Soil Name	Braeburn	Motukarara	Wai-iti	Appleby	Redwood	Waimea	Cottrell	Eves	Mahana	Dovedale
Topography	1	1	2	1	1	2	4	3	1	1
Irrigability	4	2	4	2	2	2	3	4	3	3
Drainage	3	1	3	1	1	3	1	4	2	4
AWC	4	2	2	3	1	2	2	2	3	2
Stoniness	3	2	2	3	1	1	1	1	3	4
Permeability	3	2	3	3	3	3	2	3	3	4
Nutrients	3	2	2	2	3	3	3	3	4	4
Trafficability	4	2	4	2	3	3	2	5	2	4
Workability	3	2	3	2	3	3	3	5	2	4
Rooting Depth	4	3	3	2	1	2	3	3	3	3
Erosion/flooding	4	3	4	1	1	1	4	5	1	1
Waterlogging	3	1	3	1	2	3	1	4	1	3
Average	**3.3**	**1.9**	**2.8**	**1.9**	**1.8**	**2.4**	**2.3**	**3.5**	**2.3**	**2.8**

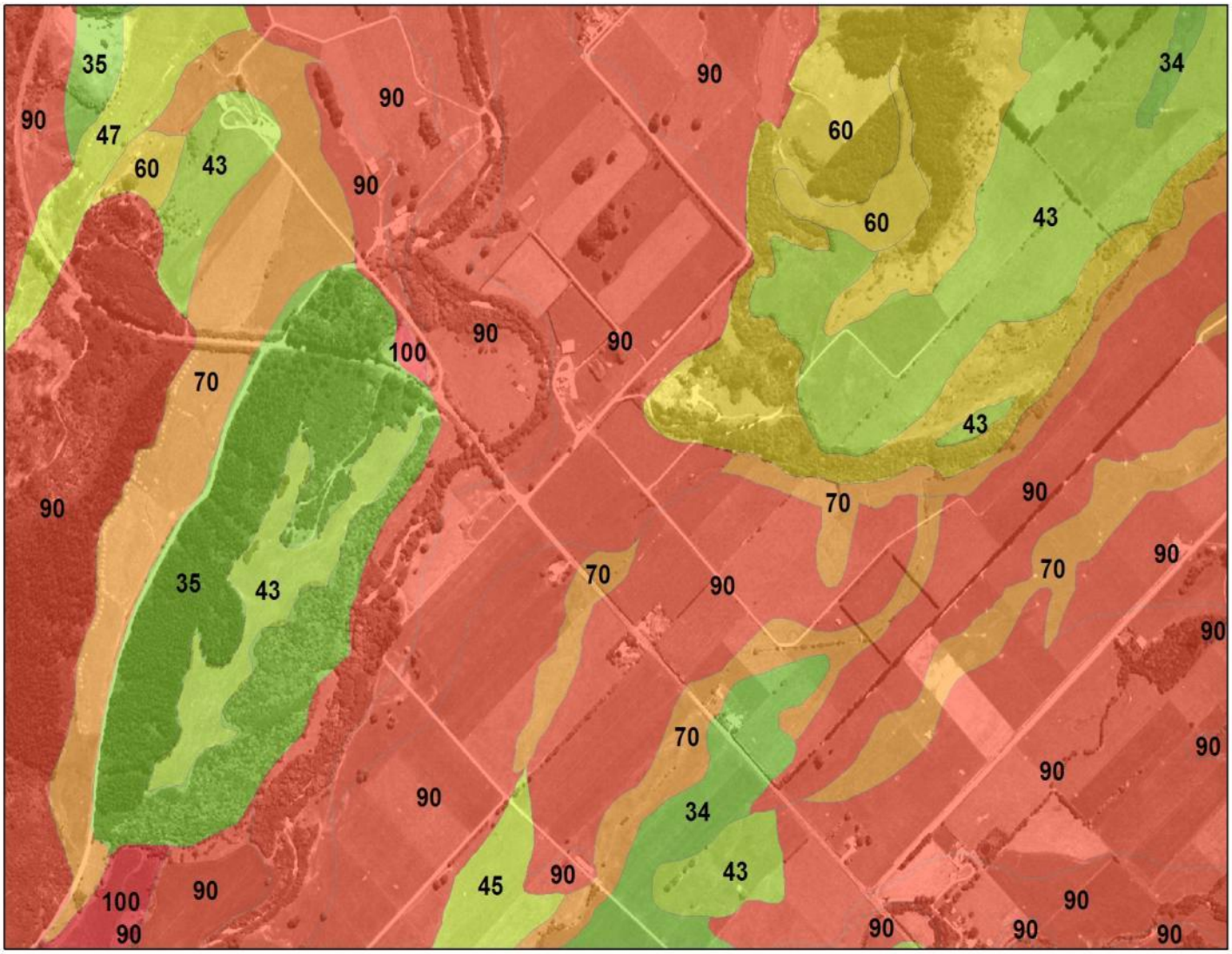
0-1	Highly Versatile	few limitations
1-2	Moderate to high versatility	slight limitation
2-3	Moderate to low versatility	moderate limitations
3-4	Low versatility	significant limitations
4-5	Non versatile	severe limitations

Soils sampling: physical, chemical and biological information on Waimea Plains

Planning to create water holding capacity maps for irrigation management



Planning to create rooting depth maps for irrigation management



“Smap” soil information sheet example

Takaka (Selwyn_46.1) **Family: *f***

Key physical properties

Depth class (diggability)		Deep (> 1 m)
Texture profile		Silty Loam
Potential rooting depth		Unlimited
Rooting barrier		No significant barrier within 1 m
Topsoil stoniness		Stoneless
Topsoil clay range		20 - 35 %
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 - 72 mm/h)
Profile available water	(0 - 100cm or root barrier)	
	(0 - 60cm or root barrier)	High (106 mm)
	(0 - 30cm or root barrier)	High (57 mm)
Dry bulk density, topsoil		1.09 (g/cm3)
Dry bulk density, subsoil		1.30 (g/cm3)
Depth to hard rock		No hard rock within 1 m
Depth to soft rock		No soft rock within 1 m
Depth to stony layer class		No significant stony layer within 1 m

Key chemical properties

Topsoil P retention	Low (19%)

About this publication

- This information sheet describes the *typical average properties* of the specified soil.
- For further information on individual soils, contact Landcare Research New Zealand Ltd: www.landcareresearch.co.nz
- Advice should be sought from soil and land use experts before making decisions on individual farms and paddocks.
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Landcare Research Manaaki Whenua

Takaka (Selwyn_46.1) Family: *f*

Additional factors to consider in choice of crop and irrigation management practices

Vulnerability classes relate to soil properties only and do not take into account climate or management

Soil structure integrity

Erodibility of soil material	Moderate
Structural vulnerability	
Pugging vulnerability	not available yet

Water management

Water logging vulnerability	Very low
Drought vulnerability - if not irrigated	Low
Bypass flow	Low
Hydrological soil group	A

Contaminant management

N leaching vulnerability	Low
P leaching vulnerability	High
Bypass flow	Low
Dairy effluent (FDE) risk category	C if slope > 7 deg otherwise D

Additional information

Soil classification	Typic Fluvial Recent Soils
Family	*f*
Sibling number	46
Profile texture group	Silty
Soil profile material	Stoneless soil
Rock class of stones/rocks	Not Applicable
Rock origin of fine earth	From Hard Sandstone Rock
Parent material origin	Alluvium

Characteristics of functional horizons in order from top to base of profile:

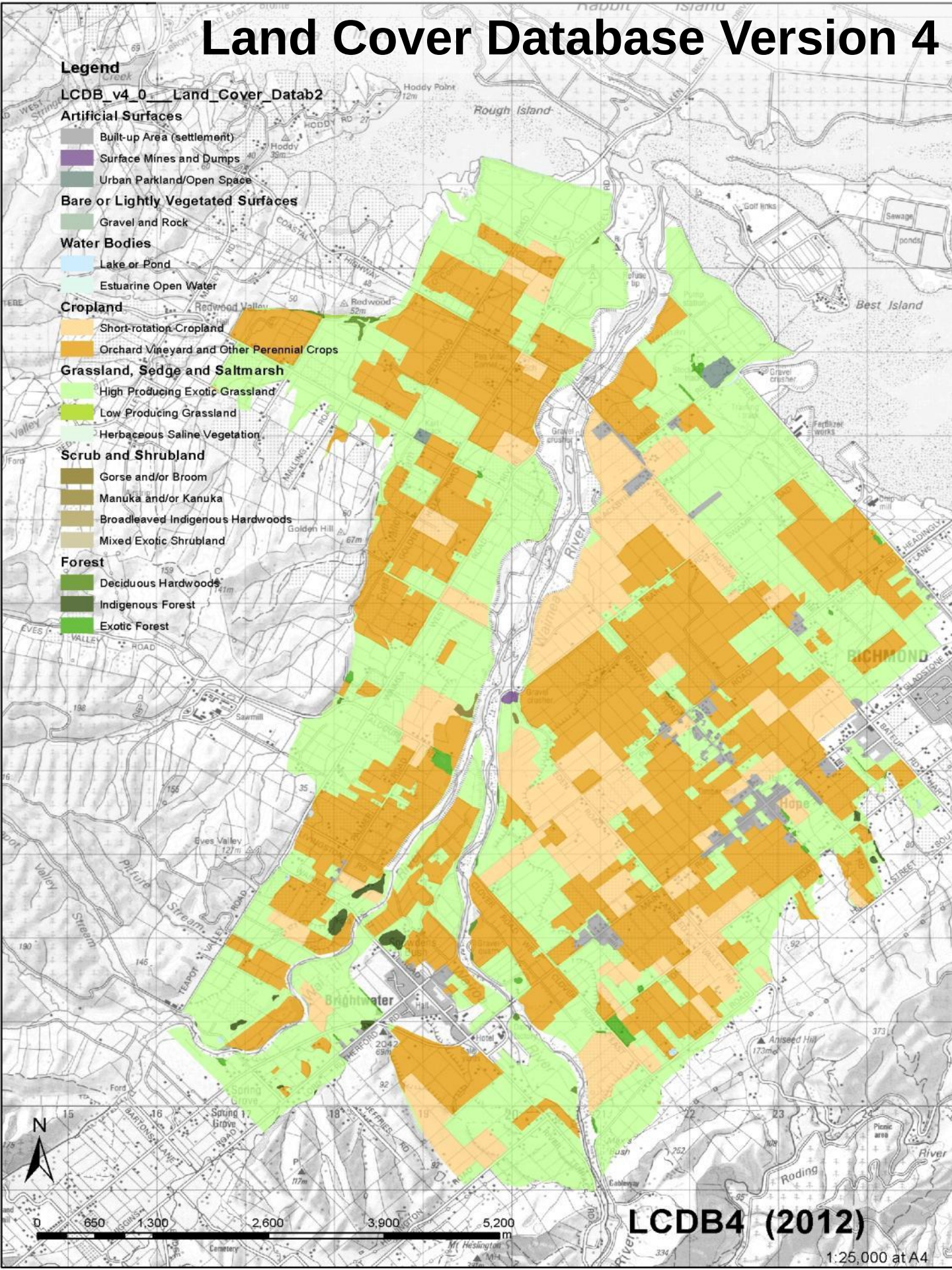
Functional Horizon	Thickness	Stones	Clay*	Sand*
Loamy Weak	10 - 25 cm	0 %	20 - 35 %	20 - 40 %
Loamy Weak	10 - 65 cm	0 %	20 - 35 %	20 - 40 %
Loamy Weak	30 - 60 cm	0 %	8 - 18 %	40 - 80 %

Waimea Plains Land use

- **Currently have access to:**
  - Land Cover Database version 4 (LCDB4 2012)
  - Agribase database

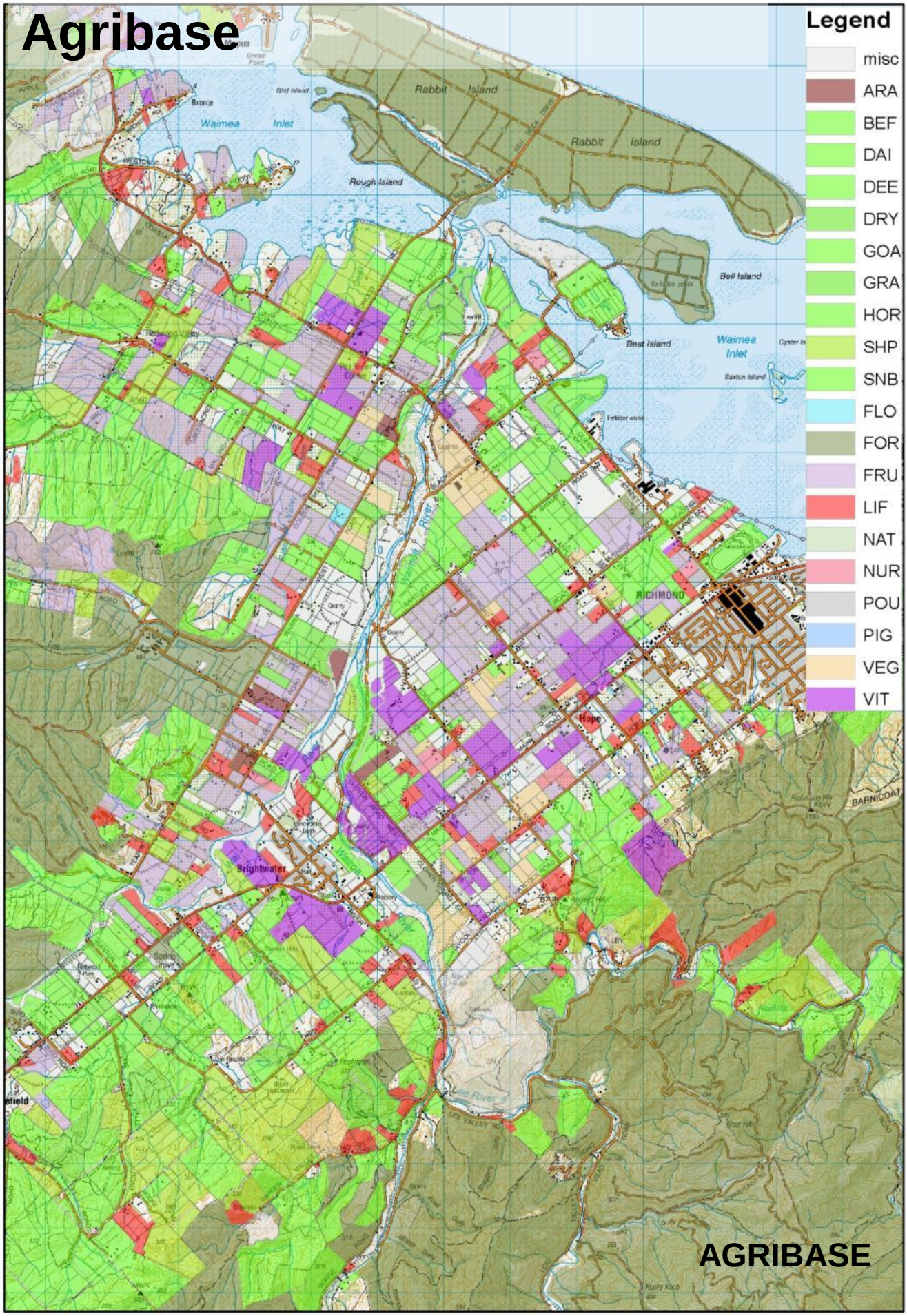
- **In 2010, Council undertook pilot study of a small area giving a more detailed review of landuse**
  - This identified up to 10-12% was non-productive land use (roads, dwellings and gardens)

Land Cover Database Version 4



LCDB4 (2012)

1:25,000 at A4


Agribase
Legend
misc
ARA
BEF
DAI
DEE
DRY
GOA
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HOR
SHP
SNB
FLO
FOR
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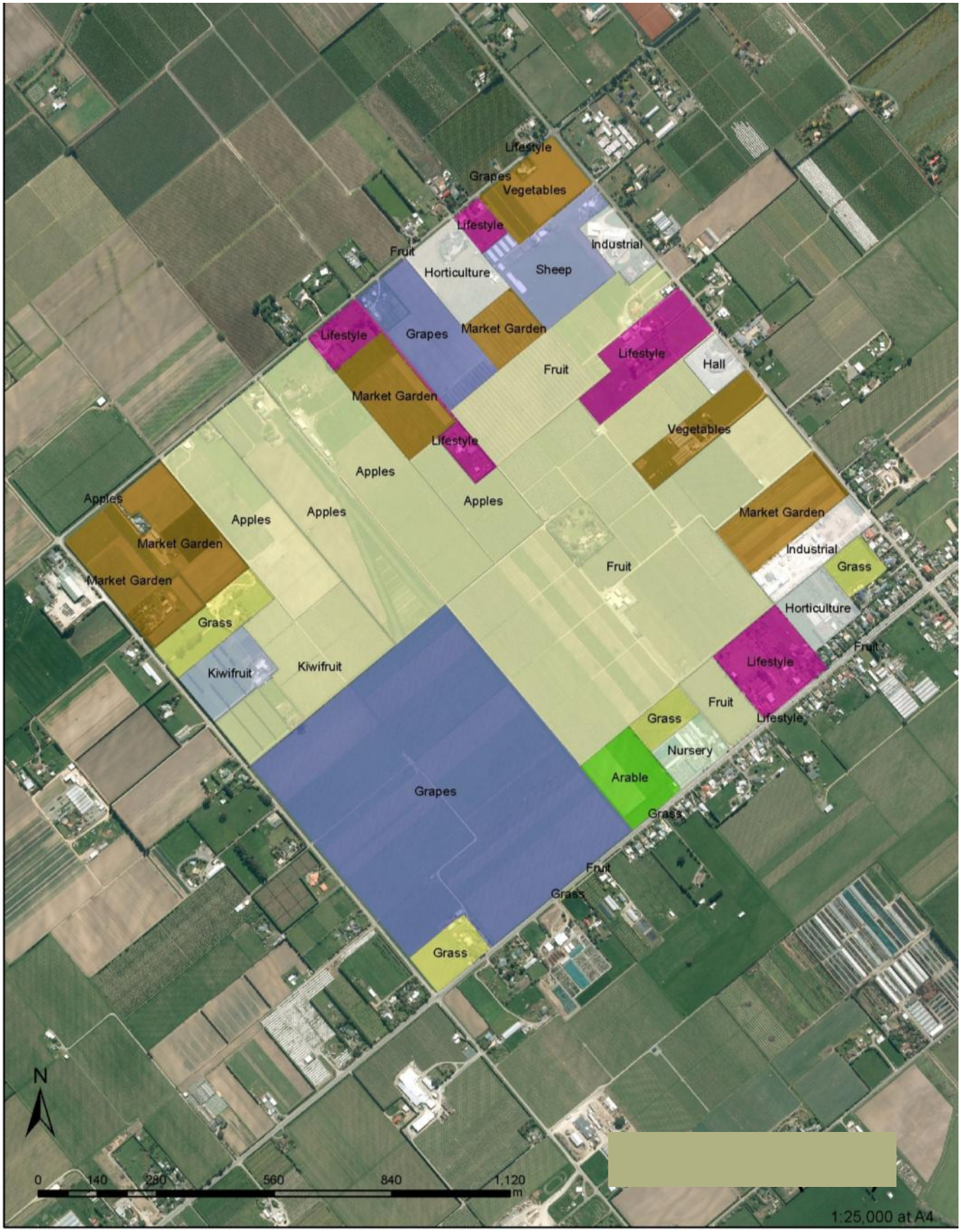
NAT
NUR
POU
PIG
VEG
VIT
Rabbit Island
Rabbit Island
Waimea Inlet
Rough Island
Bell Island
Beat Island
Waimea Inlet
Saxton Island
RICHMOND
Hope
Brightwater
BARNICOAT
AGRIBASE

Example: Land cover from LCDB4

Example: Bealing (2011) using Agribase



Pilot study: Council review in 2010 giving further land use detail