LandVision Ltd
INNOVATIVE LAND MANAGEMENT SOLUTIONS

Land Resources Report

for

Tahimana Subdivision

Stagecoach Road Ruby Bay

August 2026

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Nelson

1 Summary

1.1 The Land Resource Inventory & Landuse Capability Classification

The regional scale LUC mapping shows that the property contains 0.3 ha of 3e6 land, 8.0 ha of 4e5 land and 64.4 ha of 6e16 land.

A paddock scale LUC/LRI map at 1:6,000 was undertaken from LandVision Ltd and at the more detailed scale showed there was 43.5 ha of IVe5, 24.7 ha of VIe16, and 4.6 ha of VIw2. This survey showed there was no highly productive classes I to III land. As the property contains no highly productive land under the NPS HPL a detailed productivity report is not required.

The dominant soils found on the better LUC unit IVe5 are the Mapua clay loam soils formed on the Moutere gravels. The underlying clay material is prone to severe shinking and swelling with poor internal structure that limits soil moisture holding capability and soil drainage. On areas where there has been a history of production forestry this is accentuated.

1.2 Legislation for Subdivision

The subject land is situated in Rural Zone 3 under the Tasman Resource Management Plan. Rural 3 Zone is not zoned general rural or rural production; hence this proposal does not trigger NPS_HPL 3.5 (7)(a)(i). The objective of Rural 3 zone is to enable the retention of opportunities for a range of residential living options within rural locations, including coastal and peri-urban areas.

The Tasman Resource Management Plan (TRMP) defines land with a high productive value as meeting at least two of the following criteria, one of which must be (a):

(a) A climate with sufficient sunshine that supports sufficient soil temperature

(b) A slope of up to 15 degrees

(c) Imperfectly drained to well-drained soils

(d) Soil with a potential rooting depth of more than 0.8 meters and adequate available moisture

(e) Soil with no major fertility requirements that could not be practicably remedied

(f) Water available for irrigation;

Where that combination is to such a degree that it makes the land capable of producing crops at a high rate or across a wide range.

1.3 TDC Assessment Criteria for Productive Land

The Tasman Resource Management Plan (TRMP) defines land with a high productive value as meeting some criteria (two) around climate, slope, drainage, rooting depth, soil fertility, and water available for irrigation. The three LUC units present tick some of these boxes despite having poor quality soils, however the definition requires an assessment of the degree to which the combination of attributes makes the land capable of producing crops at a high rate across a wide range. The land is not capable of producing crops across a wide range.

The highest and best use for the property is semi intensive or extensive pastoral farming. The calculated income from this is insufficient for the property to be an economic unit.

1.4 Assessment of the Productive Capacity

- The Mapua soils have low natural fertility, poor physical properties and have limited productive use beyond extensive livestock grazing or forestry.
- Even if the soil quality was significantly better, slope and climate limits intensive land use.

2 Table of Contents

1 SUMMARY 1

1.1 The Land Resource Inventory & Landuse Capability Classification 1

1.2 Legislation for Subdivision 1

1.3 TDC Assessment Criteria for Productive Land 1

1.4 Assessment of the Productive Capacity 1

2 TABLE OF CONTENTS 2

3 THE PROJECT 4

4 PURPOSE OF THIS REPORT 4

5 ABOUT THE AUTHOR 4

6 RESOURCE AND ENVIRONMENTAL ASSESSMENT 5

6.1 Land Resources 5

6.2 Mapping Scale 5

6.3 Regional Scale LUC Mapping (New Zealand Land Resource Inventory) 5

6.4 Paddock Scale LUC Mapping 6

7 LEGISLATION FOR SUBDIVISION 7

7.1 National Policy Statement for Highly Productive Land 7

7.2 Tasman Resource Management Plan Productive Land 7

8 TECHNICAL ASSESSMENT OF THE PRODUCTIVE CAPACITY 8

8.1 Land Use Suitability 8

8.2 Implications of Lack of Scale and Irregular Shape 10

8.3 Implications of Soil Constraints 10

8.4 Water Availability 11

8.5 Potential Livestock Carrying Capacity 11

8.6 Reverse Sensitivity 12

8.7 Fragmentation of Productive Land 12

9 ASSESSMENT OF TDC CRITERIA FOR PRODUCTIVE LAND 12

10 APPENDIX 1: LAND RESOURCES SUMMARY (1:6,000 MAPPING) 14

10.1 Land Resource Summary 14

10.2 Land Resource Description by LUC Unit 14

10.3 Assessment of Land Strengths and Limitations by LUC Unit 16

11 APPENDIX 2: MAPS 18

11.1 Location Map 18

11.2 Regional Scale Landuse Capability Map 19

11.3 Paddock Scale Landuse Capability Map 20

11.4 Soil Resource Inventory Map 21
11.5 Land Resource Inventory Map 22
12 APPENDIX 3: LAND RESOURCES LEGENDS 23
12.1 Extended Geological Legend 23
12.2 Extended Soil Legend 24
12.3 Extended Slope Legend 25
12.4 Extended Vegetation Legend 25
12.5 Extended Erosion Legend and Erosion Rankings 26
12.6 Erosion Severity Rankings 26

3 The Project

The project is to subdivide and develop land for the purpose of establishing a residential and rural lifestyle development on approximately 70 hectares of land off Stagecoach Road, Tasman, in the Tasman District. The project will include works within the Stagecoach Road, Dicker Road and Williams Road reserves.

The project will include:

(a) Subdivision to create approximately 145 allotments, including 4 allotments for reserve, roading and services, and enable construction of approximately 141 residential units across a range of densities.

(b) Development of an open space network including a public reserve and walkways, and upgrades to shared pathways.

(c) Landscape planting and restoration and enhancement of waterways and wetlands.

(d) Associated infrastructure, including for three waters services and transport (including external road upgrade works).

4 Purpose of this Report

The purpose of this report is to:

1. Ascertain the Land Use Capability (LUC) classification of land within the proposed subdivision at the paddock scale and its relevance to the NPS HPL.
2. Assess the land in terms of the TDC Assessment Criteria for productive land.
3. Make an assessment on the land's productive capacity under the NPS HPL.

5 About the Author

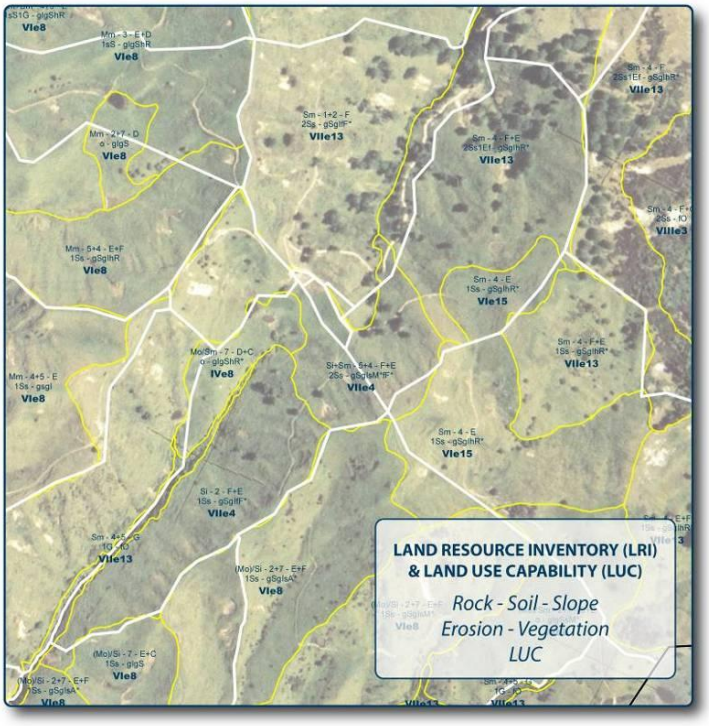
This report has been undertaken by Lachie Grant from LandVision Ltd. I hold a Masters of Agri Sci (hons) from Massey University specialising in land resources, erosion processes and soil mechanics) and a Bachelor of Agricultural Science degree (specialising in soils, nutrient management, agricultural engineering, and farm management) from Massey University.

From 2005 to present I worked as the director of the land management consultancy company LandVision Ltd specialising in land resources and whole farm planning throughout the country. From 2002 to 2005 I was the Land Manager at Taranaki Regional Council and from 1992 to 2002 I worked for Manawatu Whanganui Regional Council as a land management officer / soil conservator. I am very familiar with farm systems and farm management.

I have been involved in paddock scale LUC/LRI mapping (1:8,000 or better) of over 1.2 million hectares throughout New Zealand with LandVision Ltd as part of integrated farm planning, freshwater farm planning, nutrient management planning, erosion control reporting and highly productive land assessments. Further to this I have prepared over 20 highly productive land assessments for clients throughout the country as part of the NPS HPL and have peer reviewed over ten highly productive land assessment reports for six district/city councils as part of the NPS HPL.

6 Resource and Environmental Assessment

6.1 Land Resources



The land resource has been described and evaluated according to the Land Resource Inventory (LRI) and Landuse capability classification system (LUC). The land resources survey was undertaken at a 1:6,000 scale.

The LRI system involves mapping landscape units according to five inventory factors (rock type, soil unit, slope class, erosion type and severity, and vegetation).

From the LRI assessment, the area was then classified as LUC, which further groups similar units according to their capacity for sustainable production under arable, pastoral, forestry or conservation uses across the region. The LUC code is broken down into three components, which show the general capability (I-VIII classes), the major limitations (four subclass limitations of wetness, erosion, soil and climate), and the capability unit to link with regional classifications and known best management practices. The LUC unit is shown in bold in Figure 1, (e.g. VIIe4) and the LRI is shown by a series of symbols laid out in a set pattern as shown in the bottom right corner.

6.2 Mapping Scale

The regional LUC map was undertaken in the 1980's at a scale of 1:50,000 requires one observation point every 25 ha. For the size of the property this is about three observation points.

For mapping at 1:6,000 scale mapping requires one observation point every 0.49 ha. For the size of the property this is about 145 observation points.

6.3 Regional Scale LUC Mapping (New Zealand Land Resource Inventory)

The following table shows the LUC areas from the NZLRI regional scale LUC mapping for the area. A regional scale LUC map is shown in Appendix 2.

LUC Unit	Area (ha)
3e6	0.3
4e5	8.0
6e16	64.7
Total	**72.7**

6.4 Paddock Scale LUC Mapping

The following table summarises the extent of the various LUC units found on the property and classifies these into production units. Appendix 1 to 3 contains detailed descriptions of the Land Use Classification (LUC) categories, the Land Resource Inventory (LRI) details and the associated maps for the property.

Paddock scale LUC Unit	Area (ha)	Slope	Area (ha)	Production Units
IVe5	43.5	C	10.6	Rolling
		C+D	32.9	Rolling to strongly rolling
VIe16	24.7	D+E	7.5	Easy to moderate hill country
		E+D	14.3	
		Road	2.8	Road reserve
VIw2	4.6	C+B	4.6	Wetlands
Total	**72.7**			

(Note: the LUC class for paddock scale mapping is always denoted by Roman numerals).

The LUC unit VIw1 is effectively wetland and occurs generally in the gully system. It is currently non-productive and under the proposal it will be retained a wetland. As a wetland it has no productive value.

The LUC unit VIe16 is easy to moderate hill country. This unit is capable of very low stocking rates due to soil type, slope and very poor moisture holding capability. It is also prone to weed regeneration as the soil moisture levels and soil fertility limit pasture growth over the summer periods enabling the sward to be opened and prone to weed germination.

The IVe5 land is like the VIe16 land except the slope is rolling to strongly rolling rather than easy to moderate hill country. There may be slightly deeper topsoil depth for IVe16 due to slope but it still has the same soil type and inherent limitations.

The following table shows the current landuse on the property for the different LUC units and production units.

Production unit	LUC unit	Landuse				Total
		Cutover forestry	Semi improved pasture	Wetland association species, rushes, & semi-improved pasture	Unvegetated (road)	
Rolling	IVe5	0	10.6	0	0	**10.6**
Rolling to strongly rolling		0	32.9	0	0	**32.9**
Easy to moderate hill country	VIe16	7.5	14.3	0	0	**21.8**
Road reserve		0	0	0	2.8	**2.8**
Wetlands	VIw2	0	0	4.6		**4.6**
Total						**72.7**

7 Legislation for Subdivision

7.1 National Policy Statement for Highly Productive Land

The National policy statement for Highly Productive Land 2022 (NPSHPL) came into effect in October 2022 with the objective being *"Highly productive land is protected for use in land based primary production, both now and for future generations".*

To give effect to the objectives and policies of the NPS_HPL local authorities must identify highly productive land within the region that meets the following criteria within the regional policy statements and district plans:

3.5 (7) (a) is (i) zoned general rural or rural production at the commencement date; and

(ii) LUC 1, 2 or 3; but

(b) is not (i) identified for future urban development at the commencement date; or

(ii) subject to a Council initiated, or an adopted, notified plan change to rezone it from general rural or rural production to urban or rural lifestyle at the commencement date; or

(iii) subject to a resource consent application for subdivision, use or development on LUC 3 land for any activity other than rural lifestyle, where that consent has been lodged at or after the commencement date.

In the NPSHPL, a reference to a "zone" is to a zone described in Standard 8 (Zone Framework Standard) of the National Planning Standards; or for local authorities that have not yet implemented the Zone Framework Standard of the National Planning Standards, a reference to the nearest equivalent zone.

The subject land is situated in Rural Zone 3 under the Tasman Resource Management Plan. Rural 3 Zone is not zoned general rural or rural production; and neither are those the "nearest equivalent zone". Therefore the proposal does not trigger NPS HPL 3.5 (7)(a)(i).

LUC1, 2 and 3 is defined as land identified as Land Use Capability Class 1, 2, or 3, as mapped by the New Zealand Land Resource Inventory, or by any more detailed mapping in place at the commencement date that uses the Land Use Capability classification. NZLRI regional scale mapping identifies only 0.3 ha of the site as LUC 3. The remainder of the site is LUC 4 and 6. More detailed mapping does not identify any part of the site as LUC 3. Therefore, the proposal does not trigger NPS HPL 3.5(7)(a)(ii).

Therefore, the proposed subdivision on Rural 3 Zone land does not trigger an assessment under the NPS_HPL criteria.

7.2 Tasman Resource Management Plan Productive Land

The objectives and policies of the Tasman Resource Management Plan, Chapter 7, Rural Environment Effects, and the guidelines for subdivision in Rural 3 Zone seek to retain land with high productive values for future productive land uses. The objective of Rural 3 zone is to enable the retention of opportunities for a range of residential living options within rural locations, including coastal and peri-urban areas.

The Tasman Resource Management Plan (TRMP) defines land with a high productive value as meeting at least two of the following criteria, one of which must be (a):

(a) A climate with sufficient sunshine that supports sufficient soil temperature

(b) A slope of up to 15 degrees

(c) Imperfectly drained to well-drained soils

(d) Soil with a potential rooting depth of more than 0.8 meters and adequate available moisture

(e) Soil with no major fertility requirements that could not be practicably remedied

(f) Water available for irrigation;

Where that combination is to such a degree that it makes the land capable of producing crops at a high rate or across a wide range.

Note: This meaning is adapted from "Classification System for Productive Land in the Tasman District", Agriculture New Zealand, December 1994 and is equivalent to land under classes A, B, and C.

Note that unlike the NPS HPL, there is no proviso within the TRMP to recognise Regional Scale NZLRI and Land Use Category classes 1-3 as a criterium to locate land with a high productive value in Rural Zone 3. The land resources need to be ascertained through paddock scale mapping and on-site resource assessment and evaluated against the TRMP criteria listed below to identify High Value Productive Land.

8 Technical Assessment of the Productive Capacity

To assess the suitability of the subject land for high value crops, the productive capacity of the land was evaluated based on the land resources identified on site.

In summary, the property has 57.8 ha of land that are in productive (effective) land use. This accounts for about 80% of the subject land. All the current productive use is pastoral use but at a low stocking rate. The balance of area is wetland, cutover forestry and roading.

Of the total productive area, 43.5 ha is rolling to strongly rolling. The land less than 15 degrees (C slope in the LRI mapping) makes up about 10.6 ha and this occurs in two fragmented blocks of about 4 ha and 7 ha respectively. The dominant soil of the rolling to strongly rolling land is the Mapua clay loam soils formed on weathered conglomerate.

The wetland area (Vlw2) land is considered non-productive and is generally only suited to conservation values.

The easy to moderate hill country comprises of 14.3 ha in pasture, 7.5 ha in cutover forestry and 2.8 ha in roading. The dominant soils for this production unit is the Mapua clay loam hill series.

A number of physical constraints were identified on the subject land that limit the productive capacity for primary production. These include:

1. Soil constraints such as poor drainage and impermeable clay subsoils that critically restrict crop performance and production, and the ability for machinery to access the land at critical times.
2. Slope factors that limit the opportunity for machinery to safely operate on the land.
3. Fragmented and irregular production units, particularly those of easier contour. This limits scale for high value cropping enterprises to be economically or practically viable.
4. The soil type has the potential for a high risk of soil degradation under continued cultivation and a high risk of nutrient loss and freshwater contamination under intensive land uses.
5. The risk of pugging is also high with intensive grazing of heavy cattle during wet periods.
6. The limited moisture holding capacity of the topsoil mean that during summer months the vegetative cover is continuously under moisture stress. There is no irrigation water to mitigate against this.

The following sections assess land suitability for a variety of crops.

8.1 Land Use Suitability

The highest and best use for land over 15 degrees is pastoral farming and when the soil type is the Mapua clay loam or hill soil it is generally only suited to low intensity livestock farming. The reason for this is because of the flowing:

1. The slope is generally too steep for frequent tractor work.
2. The soils are summer dry and winter wet for arable cropping.
3. The soils are prone to pugging and treading damage by heavy cattle.

The following map highlights the areas less than 15 degrees (excluding the wetland). The LRI mapping recorded these areas as C slope (8-15 degrees) and the total area is about 10.6 ha. This land occurs in two irregular blocks.

For these two areas the following table assesses their suitability to grow regionally significant high value crops on a commercial scale

High Value Crops grown in the Tasman Region	District Comments	Comments regarding Subject Land
Pip Fruit	Apples and pears most widely grown horticultural crop. Grown for export. Primary objective is the export market. Total orchard area significantly reduced due to non-viable economic margins.	Not suitable due to: • Lack of scale, well below the minimum viable size for all crops listed here. • Soil constraints (drainage and clay content) result in poor root development and a high risk of root disease such as Phytophthora and Black foot disease, reduced plant vigour, stunted or affected plant growth and a high attrition rate. Critical lack of crop performance makes these crops non-viable for commercial scale production. • Insufficient available irrigation water. • High risk of seasonal water restrictions (rationing) during mid-season dry periods.
Kiwi Fruit	Regionally significant crop, grown for export. Mainly growing Zespri Sun Gold and Green varieties. Frost protection systems typically required.	
Viticulture.	Predominantly boutique wines of small vineyards (relative to Marlborough and Hawkes Bay). Site specific. Currently a critical downturn in viticulture where the returns are considered negative.	
Hops	Regionally significant crop. Recent increase in hop garden land use however economic constraints have marginalised the viability.	
Stone fruit.	Historically grown in the region on a commercial scale. Small scale operations	

	remain. Peaches, nectarines, apricots for domestic market.	
Citrus	Small citrus orchards operating.	
Berry fruit	Grown predominantly for domestic market. Boysenberries exclusive to Tasman region. Black currents grown for export.	
Market Gardening	Small scale producers within the region. Predominantly supply domestic market.	Not suitable due to: • Soil constraints with high clay content affecting most vegetable varieties grown. • Lack of scale to allow for crop rotation. • Very high risk of soil compaction from over cultivation. • High risk of seasonal water restrictions (rationing) during mid-season dry periods. • Insufficient available irrigation water. • Lack of security for long term water availability with consent renewal required in 2027 puts high risk on capital investment for permanent crops and associated expensive infrastructure.

8.2 Implications of Lack of Scale and Irregular Shape

Pip fruit is currently the most widely grown commercial crop established on Mapua soils in coastal Tasman. Recent NZ pip fruit industry data indicates with upper end returns on 65-80% Class 1 pack-outs and premium prices on export grade apples the minimum viable commercial orchard is 15-25 ha. This assumes an economies of scale for the annual fixed costs and is based on 2025 market prices. The property only has 10.6 ha of land that could be classed as suitable for horticulture but split in two blocks. This is considered too small to be a viable commercial orchard.

The irregular shape presents challenges for any orchard layout with increased wastage around head rows.

8.3 Implications of Soil Constraints

All soils present on the subject land have constraints to productive capacity due to drainage issues, physical impediments and the high clay content derived from the underlying geology and topography.

The rolling phase of Mapua clay loam has been described as having ‘imperfect to poor drainage’ with <5% low chroma orange mottles within 15cm of the base of the A horizon. The soil is highly prone to compaction under cultivation (or continuous tractor movements) along with moderate sheet erosion when fellow or devoid of vegetative cover. This puts constraint on all short-term crops, both perennial or annuals, that require continual tractor work. Further to this, sufficient area is required with short term rotational crops in order to spell the land and enable organic matter accumulation to prevent long term soil structural degradation. High clay content in the B and C horizons present moderate to high constraint on root development and root function leading to poor plant performance and root disease. This pertains to all commercially grown crops with rooting depths greater than 20-25cm. This soil is prone to pugging under intensive grazing and care with grazing through wet months is required.

The clay chemistry of the Mapua clay loams also result in issues for maintaining sufficient long term soil nutrient levels at the optimum levels required to obtain viable yields for intensive horticultural landuse. These deeply weathered soils are inherently deficient in phosphate, potassium, magnesium, soil pH and a number

of trace elements including Boron (The Living Mantle, Les Molloy, 1993). Continual long term fertiliser applications are required to overcome the deficiencies and historically this has proven a critical limitation to crop performance, most notably in the pip fruit industry with diseases such as Phytophera and corky-pit. Further to this, the risk of nutrient loss and subsequent freshwater contamination, through both overland flow and diffuse movement of nutrients through the soil profile, is significantly elevated under intensive land uses. This contradicts the objectives of the TRMP to mitigate the risk of nutrient contamination from high-risk land use practices.

For these soil-related reasons the soils present on the subject land are recognised as having low versatility and moderate to low productive capacity.

The highest and best use of the Mapua rolling soil is semi-intensive or extensive pastoral farming.

Further to this, the permanent constraints associated with these soils have also been recognised as a limitation to current and historical land uses across this part of the Tasman landscape by notable New Zealand pedologists. The following was noted by Les Molloy (1998) in The Living Mantle: *The Mapua soils have traditionally been the basis of the apple and pear orchards of Nelson, not because of their suitability for pip-fruit trees but largely because of land speculation and patterns of land ownership at the beginning of the century (1900). With the benefit of modern scientific information, it is easy to see that the Mapua soils are not ideal for a Pip fruit industry. Consequently, most of the recent horticultural expansion in the Nelson district has been on the alluvial soils*.

8.4 Water Availability

The property has no water available for irrigation.

8.5 Potential Livestock Carrying Capacity

The physical constraints described above indicate that the productive area of the subject land has at best a **moderate productive capacity only.** Due to the physical constraints identified above, the land is not suited to commercially viable horticultural or intensive land uses. The highest and best land use option is therefore semi-intensive pastoral farming. The following table shows the physical potential stock carrying capacity for the land that is currently in productive use. To achieve the physical potential requires all limitations to be removed.

Productive land	Area (ha)	Potential stock rate (su/ha)	Estimated physical potential stocking rate (su)
Rolling land	10.6	7	74
Rolling to strongly rolling land	32.9	6	200
Easy to moderate hill country	14.3	4	57
Total	57.8	6.7	328

The above table shows the potential stocking rates for the different production units which are based off LUC unit and slope. If livestock gross margins are currently $80/su then the property has the potential to generate around $26,300 per year (or $455 /ha/year) under pastoral farming. The annual rates for the property are currently $10,500 and the capital value of the property are $4,140,000. To service the rates and half the capital value of the property (at 7% interest) requires $10,500 and $145,000 respectively, annually. If wages are taken into consideration then it is estimated that at the minimum wage for 15 hrs per week needed to run the property requires an additional $18,000. These costs can not be met by on-farm income consequently even if the property realises its full potential as a pastoral farm, there is insufficient income for it to be considered as an economic unit.

8.6 Reverse Sensitivity

Reverse sensitivity is not considered a potential issue with the proposed subdivision considering the current landuse on adjacent properties. If it is considered a potential issue then it can be managed with plantings and a no complaints clause for the sections.

8.7 Fragmentation of Productive Land

Due to the nature of the surrounding land the proposed subdivision will not create fragmentation of other primary productive land.

9 Assessment of TDC Criteria for Productive Land

The Tasman Resource Management Plan (TRMP) defines land with a high productive value as meeting at least two of the following criteria, one of which must be (a):

(a) A climate with sufficient sunshine that supports sufficient soil temperature

(b) A slope of up to 15 degrees

(c) Imperfectly-drained to well-drained soils

(d) Soil with a potential rooting depth of more than 0.8 meters and adequate available moisture

(e) Soil with no major fertility requirements that could not be practicably remedied

(f) Water available for irrigation;

Where that combination is to such a degree that it makes the land capable of producing crops at a high rate or across a wide range.

Note: This meaning is adapted from “Classification System for Productive Land in the Tasman District”, Agriculture New Zealand, December 1994 and is equivalent to land under classes A, B, and C.

Criteria	Production Units			Comments
	Rolling to strongly rolling	Easy to moderate hill country	Wetlands	
Area (ha)	43.5	24.7	4.6	
(a) a climate with sufficient sunshine that supports sufficient soil temperature	Yes	Yes	Yes	The whole of the Tasman region generally satisfies this criterion.
(b) a slope of up to 15 degrees	Yes in part	No	Yes in part	Slope on the LUC IVe5 land that is mapped as either D+C slope or C+D slope will have some area less than 15 degrees, but generally minimal.
(c) imperfectly-drained to well-drained soils	Yes in part	Yes	No	Imperfectly drained soil 1 intergrades with poorly drained Soil 3 in LUC IVe5 and VIw2.
(d) soil with a potential rooting depth of more than 0.8 meters and adequate available moisture	No	No	No	All soils have topsoil less than 40-50cm.
(e) soil with no major fertility requirements that could not be practicably remedied	Yes in part	Yes in part	Yes in part	There is limited ability to correct soil nutrient status long term on these soils due to low phosphate retention and low pH.

(f) water available for irrigation	No	No	No	

Applying the above TRMP definition of highly productive land to the proposed subdivision, notwithstanding all three production units may meet the assessment criteria in part the land has to be assessed as a whole and having small areas of land that may meet the slope criteria, or fertility criteria does not make the property land of high productive value. This is made clear in the definition set out above where it is stated “where that combination is to the degree that it makes the land capable of producing crops at a high rate or across a whole range”. The degree or extent of which a slope of up to 15 degrees, land with good drainage, and the ability to correct soil nutrients is limited. The easy to moderate hill country production unit is too steep for the use of machinery which significantly restricts nearly all intensive land use options. The poorly drained soil found on the wetland production unit also eliminates any form of cropping or intensive pastoral land use due to drainage challenges. Parts of rolling to strongly rolling production unit could be considered to have moderate productivity capacity however major variation in topsoil depth across this unit and summer dry conditions restricts intensive landuse. Winter wet limits the grazing of heavy cattle due to the susceptibility pugging and treading damage. There is insufficient infrastructure for lamb trading.

The high productive land definition quoted above references the classification system or productive land in the Tasman District, noting that classes A, B, and C are land of high productive value. Under these classification maps the Tahimana site is class E and does not fit the definition.

10 Appendix 1: Land Resources Summary (1:6,000 mapping)

10.1 LAND RESOURCE SUMMARY

The property currently comprises 72.7 ha of which 57.8 ha are presently considered effective grazed pasture. Of this area around 4.6 ha, situated at the bottom of the basin, have scattered rushes in parts. Around 7.5 ha are in cutover forestry with regenerating weed and scrub species present and the remaining 2.8 ha consist of access road.

Approximately 10.6 ha of the property is rolling, 32.9 ha is rolling to strongly rolling and 14.3 ha is easy to moderately steep hill slopes.

The underlying geology predominantly consists of weathered conglomerate. There is alluvium and colluvium, derived from the hill slopes, overlying the conglomerate adjacent to the waterways and in the lower part of the gully systems.

There are two soil types found in correlation to the underlying parent rock material. Mapua clay loam derived from the clay loam, covers most of the property, and this is segregated into rolling and hill phases. The second, recent soil is formed on alluvium and colluvium. There is slight sheet erosion on some of the hill slopes particularly where the vegetative cover is minimal.

Three different Land Use Capability (LUC) units were identified as part of the land resource survey. These units are predominately influenced by soil, slope and production capability and includes 43.5 ha (60%) of LUC class IV land and 29.3 ha (30%) of class VI land. These are described in the Table below.

10.2 LAND RESOURCE DESCRIPTION BY LUC UNIT

LUC and description	Total area (ha)	Parent material	Dominant soil type	Slope degree	Dominant vegetation	Erosion degree and severity		TDC Productive Land Classification
						Actual	Potential	
IVe5 Rolling to strongly rolling downlands with low fertility soils on Moutere Gravels. 	43.5	Weathered conglomerate Cw	Brown Soils 1R 1R+1H	C 8-15^0 D 16-20^0	Effective pasture.	Slight sheet and gully erosion.	Slight sheet and soil slip erosion.	TRMP Productive land in part NES_HPL No
VIe16 Strongly rolling to steep, low fertility hill country mainly on weathered gravels and colluvium with moderate rainfall. 	24.7	Weathered conglomerate Cw	Brown Soil 1H 1H+1R	E 21-24^0 D 16-20^0	Effective Pasture	Slight to moderate sheet, slight gully erosion.	Slight to moderate soil slip and sheet erosion.	TRMP No NES_HPL No

LUC and description	Total area (ha)	Parent material	Dominant soil type	Slope degree	Dominant vegetation	Erosion degree and severity		TDC Productive Land Classification
						Actual	Potential	
Vlw2 Wet floodplains and waterways in moderate rainfall districts. 	4.6	Alluvium and Colluvium over conglomerate Al+Co/Cw	Recent Soil 3	E' 21-24^0 B+A 0-7^0	Pasture, exotic broadleaf trees and unvegetated streambed. 0.1 ha	Nil.	Moderate streambank and deposition.	TRMP No NES_HPL No

10.3 ASSESSMENT OF LAND STRENGTHS AND LIMITATIONS BY LUC UNIT

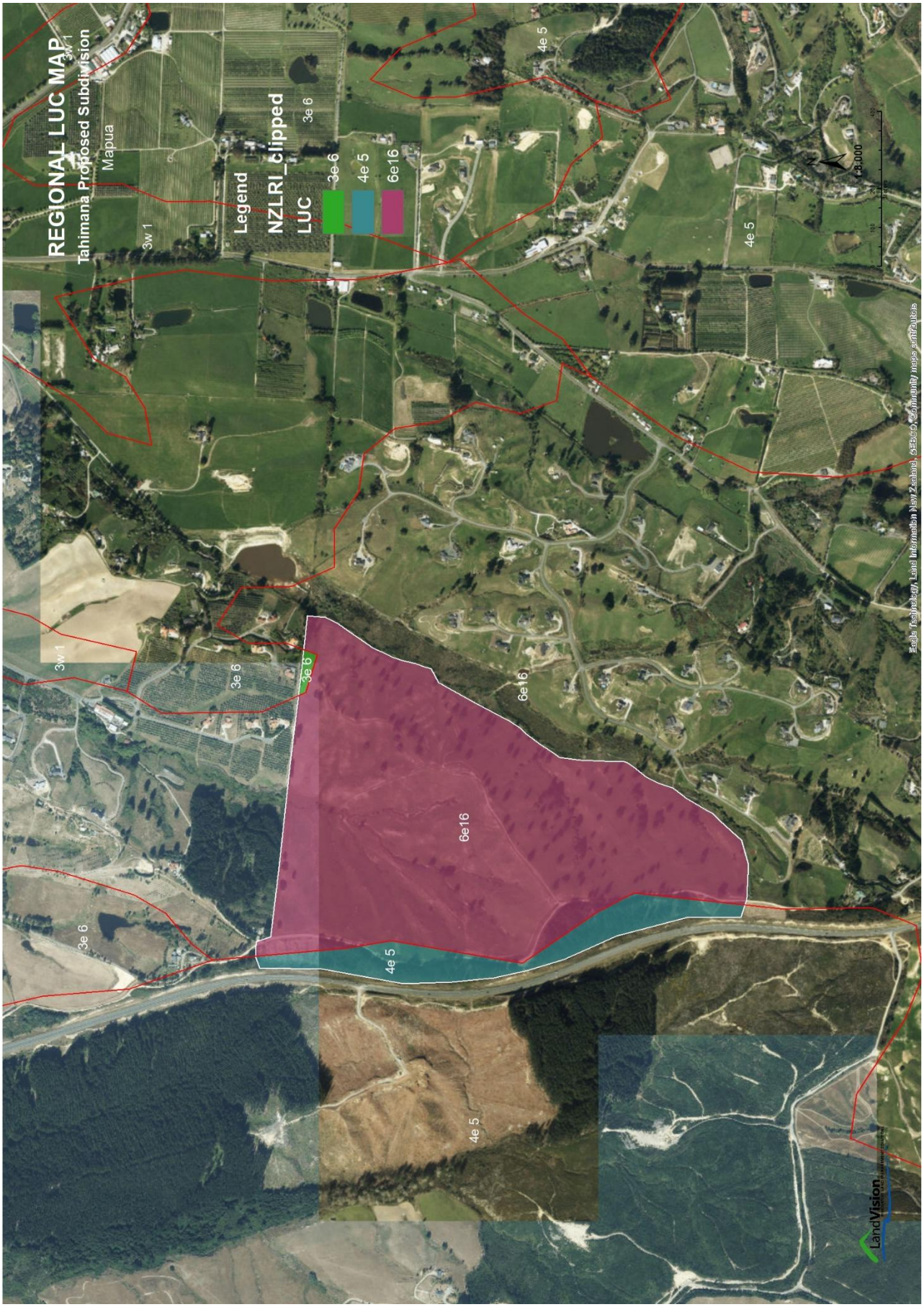
LUC unit	Area (ha)	Strengths	Limitations	Land use suitability	Conditions of use
IVe5 Rolling to strongly rolling downs with low fertility soils on Moutere Gravels. 	43.5	Reasonable drainage characteristics on the most part however this is variable. Good access. Contour suitable for tractor work on the most part. Predominantly sunny aspect.	Topsoil has been stripped in parts during previous forestry harvesting. Poor natural fertility with inherently leached soils. Prone to sheet erosion with slope and overgrazing. Drought prone in the summer. Variable top soil. Clay soils have variable drainage characteristics. Prone to pugging and compaction if mismanaged.	Semi-intensive pastoral farming.	Fertilise to lift soil nutrient levels to optimum levels. Care to avoid pugging and compaction. Weed control often required. Retain pasture cover to minimise sheet erosion. Site tracks appropriately to avoid induced erosion. Minimise fellow periods if cultivating.
VIe16 Strongly rolling to steep, low fertility hill country mainly on weathered gravels and colluvium with moderate rainfall. 	24.7	Reasonable drainage characteristics on the most part. Relatively stable hill slopes. 'Easy hill' contour with strongly rolling to moderately steep slopes.	Contour not suitable for tractor work. Poor natural fertility, highly leached soil. Prone to soil slip and sheet erosion with slope. Drought prone in the summer. Variable top soil depth and drainage characteristics. Topsoil has been stripped during previous forestry harvests.	Pastoral farming, retirement or forestry.	Fertilise to lift soil fertility to optimum levels. Weed control. Retain pasture cover to minimise sheet erosion. Site tracks appropriately to avoid induced erosion. Minimise fellow periods if cultivating.

LUC unit	Area (ha)	Strengths	Limitations	Land use suitability	Conditions of use
VIw2 Wet floodplains and waterways in moderate rainfall districts. 	4.6	Protected from wind. Good pasture growth in the shoulder season. Potential source of stock water.	Flood prone adjacent to the waterway. Poorly drained soils not suitable for drainage. Variable topsoil depth. Poorly drained soil a limitation to pastoral production. Prone to pugging. Not suitable for cultivation.	Pastoral grazing or retirement for wetland development.	Exclude cattle when waterway of slowing or during prolonged wet periods.

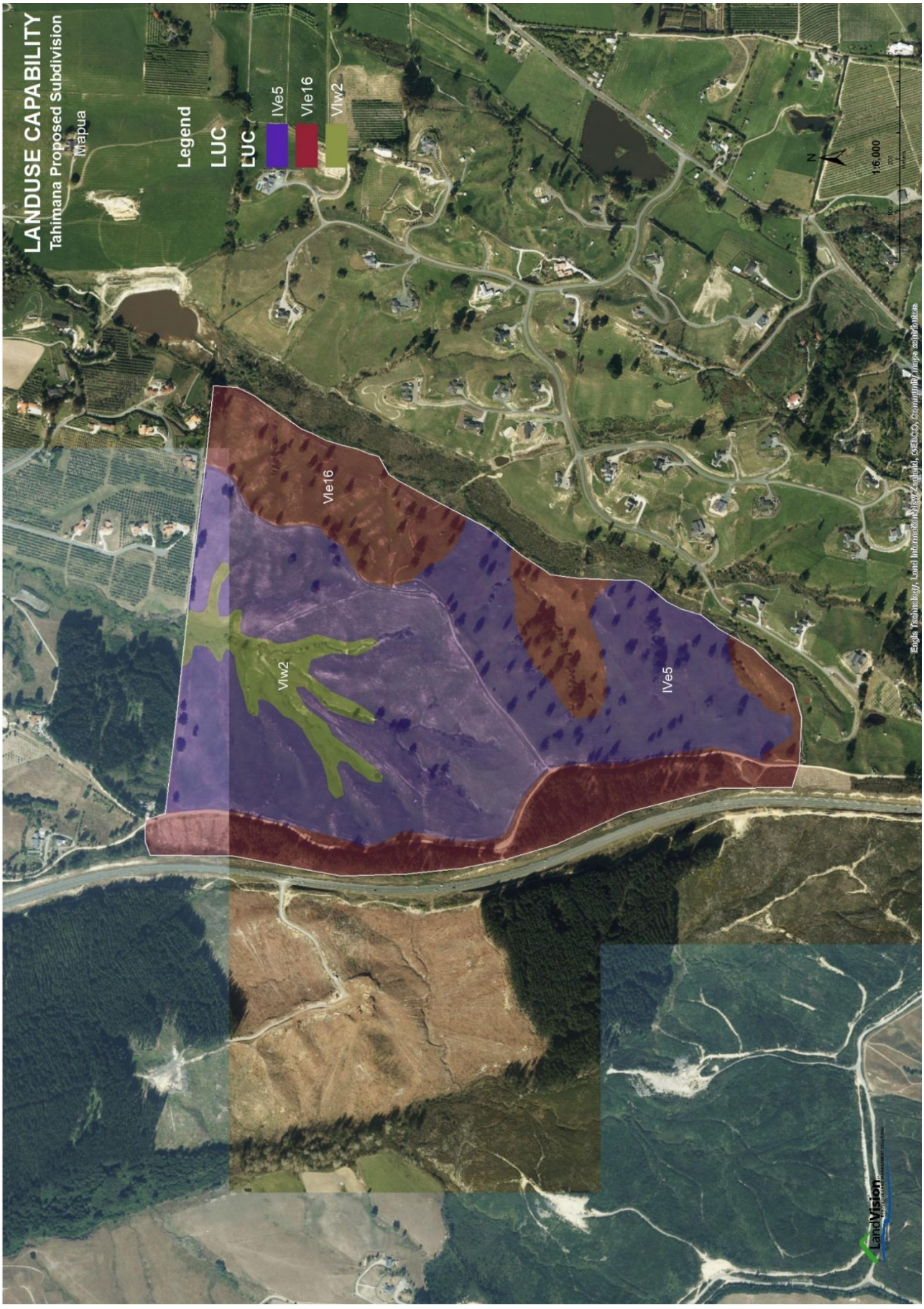
11 Appendix 2: Maps

11.1 Location Map

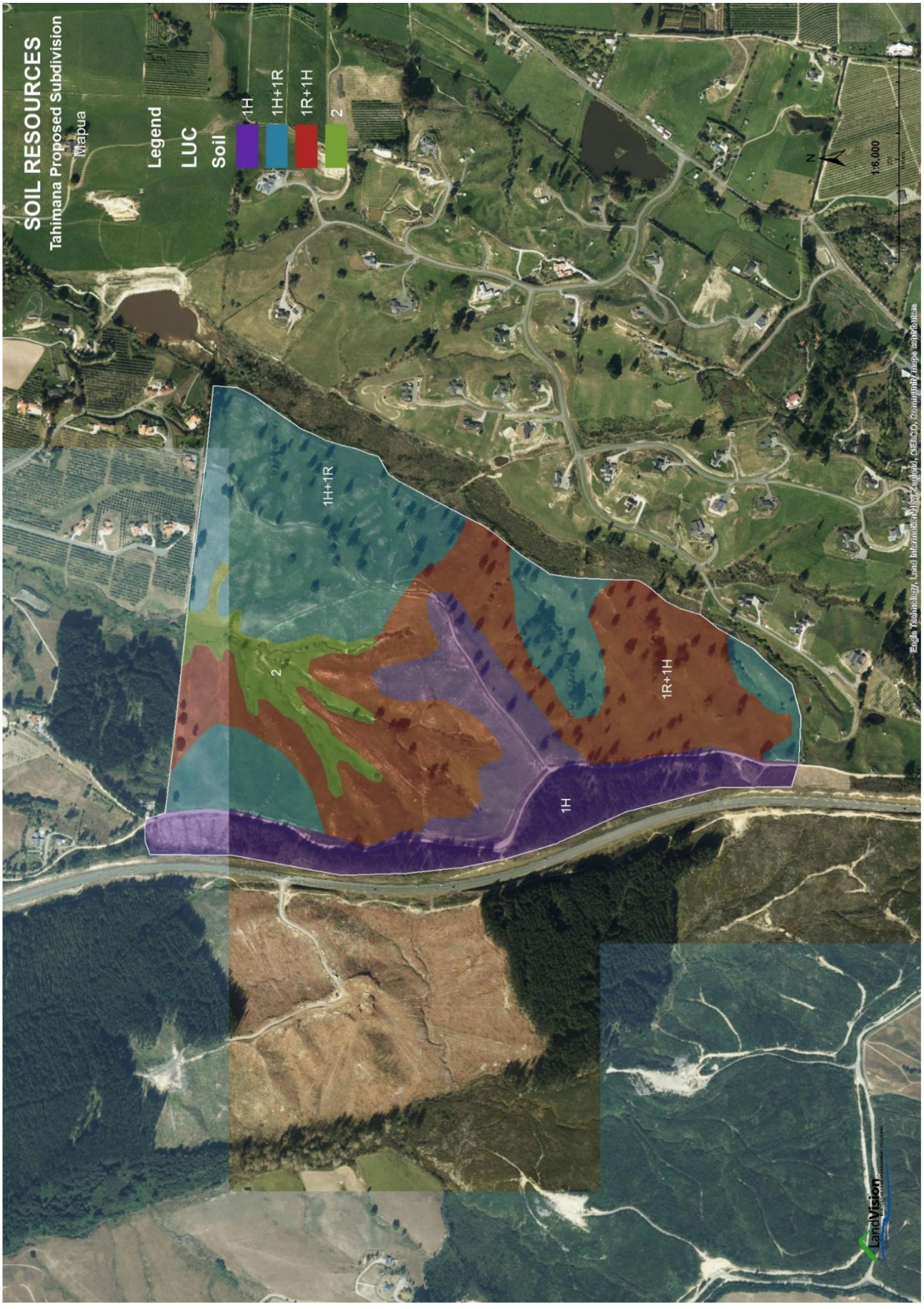
11.2 Regional Scale Landuse Capability Map



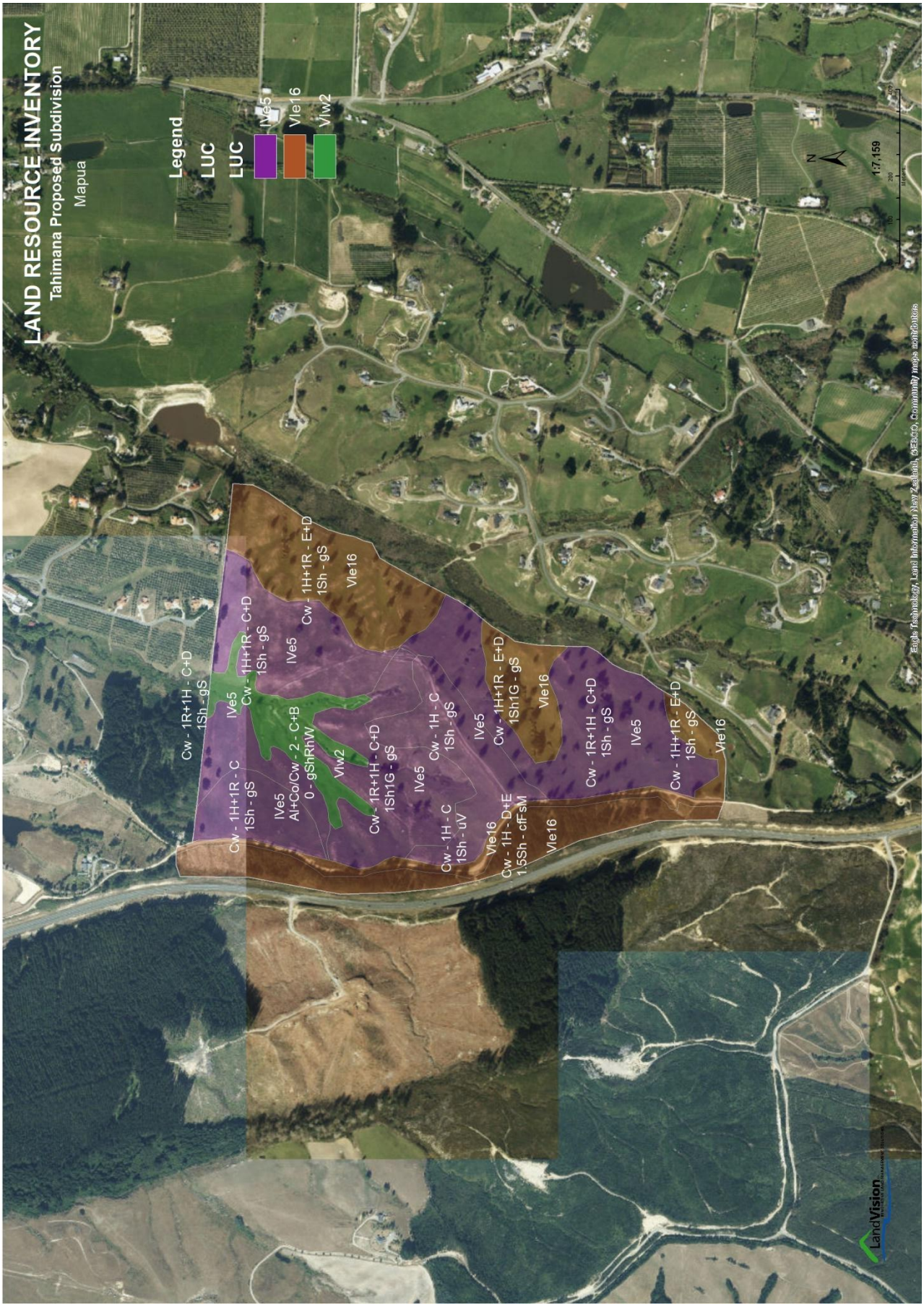
11.3 Paddock Scale Landuse Capability Map



11.4 Soil Resource Inventory Map



11.5 Land Resource Inventory Map



12 Appendix 3: Land Resources Legends

12.1 Extended Geological Legend

The main rock types found on the property are shown in the following table.

	**Weakly consolidated conglomerate (Cw):** consists of rounded to angular predominantly gravel sized clasts of variable composition, strength and degree of weathering set in a very compact to weak matrix. It is lower quaternary in age. Weakly consolidated conglomerate is associated with other rock types such as sandstone and mudstones. The dominant erosion forms are sheet and soil slip in the regolith.
	**Alluvium (Al):** very loose to compact (or soft to stiff), sand, silt and clay forming surface deposits 50 cm or more thick. Located on floodplains, low terraces and fans. Where adjacent to a stream or river they are prone to streambank erosion and or deposition. **Colluvium (Co):** rock fragments and soil material which have accumulated at the base of steep slopes as a result of gravity.

12.2 Extended Soil Legend

The property comprises of two dominant soil types as described below. Soil pits were dug in key locations for profile descriptions and the GPS co-ordinates for these are given in the description below.

Soil 1R Mapua clay loam, Rolling phase

Soil 1H Mapua clay loam, Hill phase

Name: **Soil 1,** Mapua clay loam, rolling phase MpR and Mapua clay loam, hill phase MpH

LUC map symbol: 1R and 1H

Location: Found across the rolling downs on LUC unit IVe5 and VIe16.

Parent rock material: Moutere Gravels, weathered conglomerate

Drainage status: Imperfectly to moderately well drained

Topsoil consistence: Friable when moist, plastic when wet.

Degree of topsoil development: Moderately to weakly developed

Profile description:

Soil 1H: Mapua Hill soil profile found on ridges and on LUC class VIe16: 5-8cm moderately developed, medium nut, silt clay loam, yellow grey (10YR 5/3), over 5-10cm weakly developed, fine nut crumb clay loam, orange grey (10YR 5/4), over conglomerate and clay, orange white (10YR 6/8 + 10YR 5/4).

Soil 1R: Mapua Rolling soil found on rolling slopes: 10-15 cm moderately developed, medium nut, silt clay loam, yellow grey (10YR 5/3), 10-30cm over cm weakly developed, fine nut crumb clay loam, orange grey (10YR 5/4), over conglomerate and clay, orange white (10YR 6/8 + 10YR 5/4) with occasional brown to orange mottles.

Management considerations:

Variable topsoil depth depending on position across the topography, clay subsoils typically result in imperfectly drained profile, good pasture production on the shoulder seasons, prone to drought during summer months.

Name: **Soil 3,** Recent alluvial soil

LUC map symbol: 3

Location: Found at the northern end of the property, adjacent to waterways in the central basin. On LUC VIw2.

GPS Co-ordinates of profile sample site: -41.218418 173.053214

Parent rock material: Alluvium and colluvium derived from Mapua clay loam soils.

Drainage status: Poorly drained

Topsoil consistence: Friable when moist, friable when wet.

Degree of topsoil development: Weakly developed.

Profile description: 20-30cm moderately developed fine nut and granular silt loam, grey (10YR 4/1) over 20-25cm weakly developed fine nut and block silt over fine granular sandy clay alluvium, yellow with orange mottles (10YR 7/3).

Management considerations:

Found on the low terrace adjacent to the waterway. Wetness limitation with rising water table in wet months. Well drained topsoil but depth to mottles variable.

12.3 Extended Slope Legend

The definitions of the slope classes mapped on the LRI Map are shown in the table below, along with a summary of the various slope classes found on the property.

Slope class	Degrees	Slope description	Access suitability
A	0-3°	Flat to gentle undulating	Tractor
B	4-7°	Undulating	Tractor
C	8-15°	Rolling	Tractor
D	16-20°	Strongly rolling	Some tractor, four-wheel bike
E	21-25°	Moderately steep	Two-wheel bike
F	26-35°	Steep	Walking and some two-wheel bike
G	>35	Very steep	Walking
+	*Indicates a compound slope*		
/	*Indicates average slope is borderline between two slope classes*		

Slope class	Total Property Area (ha)	Percentage of total area (%)
C+B, C, C+D	50.9	70.0
D, D+C	7.5	10.4
E+D, E	14.3	19.7
Total	**72.7**	**100**

12.4 Extended Vegetation Legend

The vegetation types and the definitions of the symbols on the LRI Map are shown in the table below.

Vegetation type	Map symbol	Area (ha)	Percentage (%)
Semi-improved, effective, pasture	gS	57.8	10.4
Grazed pasture, rushes and wetland species	gS hR hW	4.6	79.5
Cutover Forestry and regenerating scrub and weed species	cfFsM	7.5	6.3
Unvegetated road	uV	2.8	3.9
Total		**72.7**	**100**

12.5 Extended Erosion Legend and Erosion Rankings

	**Sheet erosion (Sh):** There is potential for sheet erosion on the steep to very steep slopes where there is very limited vegetation or on the soil slip erosion scars. Sheet erosion occurs where running water washes soil or organic material from the surface. The primary control of sheet erosion is by maintaining a vegetative cover through grazing management and soil fertility.

12.6 Erosion Severity Rankings

The table below outlines the classification for severity and quantifies the erosion types and severities found on the property.

Erosion severity	LRI symbol	Area affected (ha)
Slight	1	47.6
Slight - moderate	1.5	7.5
Moderate	2	-
Moderate - severe	2.5	-
Severe	3	-
Very severe	4	-
Extreme	5	-