



# Soil and Resource Report for 47 Millbrook Road, Waipu.

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## 1.0 INTRODUCTION

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This report has been prepared at the request of the client to assess the Land Use Capability (LUC) classes at a proposed drive through service centre at 47 Millbrook Road, Waipu. The New Zealand Resource Inventory (NZLRI) maps have classified the site as LUC class 2. As such, this area could potentially fall under the National Policy Statement for Highly Productive Land (NPS-HPL) and the Northland Regional Policy Statement (NRPS) on highly versatile soil.

The purpose of the report is to map the proposed site in detail and identify any Highly Productive Land as defined by the National Policy Statement for Highly Productive Land (NPS-HPL) and any highly versatile soil as defined by the NRPS. To achieve this, a site visit was carried out to map the soils and land use classes present and assess them in relation to the NPS-HPL and the highly versatile soils classification.

This report presents the description of each of the soil types identified on the proposed site as well as descriptions of each of the LUC units mapped. This information is then used to determine and quantify any highly productive land present. This information is accompanied by LUC, soil and soil classification maps along with the relevant LUC unit and soil profile descriptions.

## 2.0 MAPPING METHOD

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A site visit was carried out on the 24<sup>th</sup> of May 2023 to evaluate and describe the soil types and the LUC units present. The site of interest was mapped at a scale of 1:5,000.

LUC mapping was carried out in accordance with the methods described in the 3rd Edition of the Land Use Capability Survey Handbook (Lynn et al 2009). This process involves making a land resource inventory (LRI) of the property in which soil types, soil parent materials, land slopes, erosion type and severity and land cover are recorded. Whenever any of these land features changes a new unit is made.

Specific field work activities include digging and describing soil profiles on each landform with supporting holes dug or profiles observed on bank/drain cuttings to establish soil boundaries, measuring slopes with a clinometer, and gathering any other data that may be of assistance in assessing the suitability of the land for primary production such as erosion, susceptibility of the land to flooding, winter wetness and/or cold, high temperatures, exposure to salt winds, aspect, and accessibility. This information is then used to determine the specific LUC units, as described in the LUC Classifications of the Northland Region (Harmsworth, 1996) for the area. At times when mapping at a scale finer than Harmsworth (1996) of 1:50,000, new LUC units are recorded and are noted with an \* in the LUC description table.

## 3.0 SITE DESCRIPTION

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The proposed site is located at 47 Millbrook Road and covers approximately 6.0 hectares. It consists of flat topography with a combination of alluvial clay and peat soils. Drainage varies from very poorly drained to poorly drained. The site currently forms part of a milking platform including rotational maize cropping. There are no residential or farm buildings on the site.



### 3.1 Soil Profiles and Descriptions

The soils identified at the proposed site are presented and described in the table below. Their distribution is shown on the soil map in Section 8.0 of this report.

Soil Profile	Soil Profile Description
	<p><b>Soil Name:</b> Waipu clay (YU)</p> <p><b>Soil classification:</b> Gleyed soils from the Waipu suite.</p> <p><b>Parent material:</b> Terrace alluvium from sedimentary rocks.</p> <p><b>Soil description:</b>            0-150mm: Friable, strongly developed, 3-10mm nut, slightly sticky, plastic, very dark grey (10yr 3/1), clay.            150-700mm: Friable, strongly developed, 2-5mm nut, sticky, plastic, light brownish grey (2.5y 6/2), clay with strong brown (7.5yr 4/6) to olive yellow (2.5y 6/8) mottling.</p> <p>Surface water present, water table at 220mm.</p> <p><b>Overall drainage:</b> Very poorly to poorly drained.</p>
	<p><b>Soil Name:</b> Waipu peaty silt loam and peaty clay (YUy)</p> <p><b>Soil classification:</b> Gleyed soils from the Waipu suite.</p> <p><b>Parent material:</b> Terrace alluvium from sedimentary rocks.</p> <p><b>Soil description:</b>            0-160mm: Friable, strongly developed, 2-5mm nut, slightly sticky, plastic, black (2.5y 2.5/1), silt loam.            160-700mm: Friable, moderately developed, 2-4mm nut, very sticky, plastic, yellowish brown (2.5y 6/4), silt loam.</p> <p>Water table at 520mm.</p> <p><b>Overall drainage:</b> Very poorly to poorly drained.</p>



**Soil Name:** Ruakaka peaty silt loam (RKv)

**Soil classification:** Organic soils from the Ruakaka suite.

**Parent material:** Peat and sand.

**Soil description:**

0-330mm: Friable, strongly developed, 3-5mm nut, sticky, plastic, black (2.5y 2.5/1), peaty silt loam.

330-420mm: Very friable, strongly developed, 2-4mm crumb, non-stick, non-plastic, dark reddish brown (2.5yr 2.5/3) peat.

420-550mm: Friable, moderately to strongly developed, 3-5mm nut, non-sticky, non-plastic, yellowish brown (10yr5/6) sand.

550-700mm: Friable, moderately developed, 5mm nut, slightly sticky, non-plastic, very pale brown (10yr 8/2) fine sand.

**Overall drainage:** Very poorly drained.

### 3.2 Land Use Capability Descriptions

LUC classifications categorize land into eight classes according to its long-term capability to sustain one or more productive uses.

- Classes 1-4 have arable potential with limitations to this land use moving from class one being the most versatile, multi-use land with minimal physical limitations for arable use and increasing to severe limitations under class four land. These classes are also suitable to viticulture, berry production, pastoralism, tree crops and production forestry.
- Classes 5-7 are suitable for pastoral farming and production forestry.
- Class 8 land has no productive use and is rather managed for catchment protection and conservation purposes.

The LUC units mapped on the proposed site are presented in the table below with copies of the full unit descriptions taken from Harmsworth (1996) contained in Appendix 1. An LUC map showing the distribution of the mapped units is contained in Section 8.

Resource information	Luc unit	Total area (ha)	Parent material	Dominant soil type	Slope (degree)	Land Cover	Erosion degree & severity		Landuse suitability	Stock carrying capacity (su/ha)
							Actual	Potential		Forestry site index (FSI)
<b>3w 2</b> Poorly drained flat areas within floodplains, valley plains on low terraces with gley, fertile soils developed on sedimentary and volcanic alluvium	See areas in the table in Section 4.2		Fine alluvium	Gley soils on estuarine clays, sands, and alluvium	0-3 <sup>o</sup>	Pasture		Slight streambank and deposition	Horticulture Vegetables Intensive Grazing Forestry	Average: 17 Top: 20 Potential: 24 FSI: 18-21 <b>Revised</b> Average: 15 Top: 20 Potential: 22
<b>3w 4</b> Flat land to undulating land with organic soils on alluvial and estuarine plains, terraces and in interdune areas.			Peat and fine alluvium	Organic soils on peat or peat and sand	0-7 <sup>o</sup>	Pasture	Nil	Negligible to Slight wind when cultivated	Grazing Horticulture Cereals Root and green fodder crops	Average: 17 Top: 20 Potential: 24 FSI: 19-29
<b>4w 1</b> Flat to undulating areas on floodplains, valley plains and low terraces with severe continuing wetness or flooding limitation.			Fine alluvium.	Recent soils on sedimentary and volcanic alluvium.	0-7 <sup>o</sup>	Pasture	Nil	Moderate streambank and deposition.	Intensive grazing Root and green fodder crops. Forestry	Average: 17 Top: 20 Potential: 24 FSI: 20-23 <b>Revised</b> Average: 13 Top: 15 Potential: 18

*Land use capability unit descriptions are taken from the author's field work, and the Land Use Capability Classification of the Northland Region (Harmsworth, 1996).*

*Revised stock carry capacities are taken from a review of Harmsworth (1996) stock carry capacities by Bob Cathcart in 2017*

## 4.0 SOIL CLASSIFICATIONS

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### 4.1 Highly Productive Land

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The NPS-HPL came into effect in October 2022. This policy seeks to protect the productivity potential of our most productive land by regulating non-productive land uses and inappropriate subdivision. The policy statement identifies all land in LUC classes 1, 2 and 3 as highly productive land. The following definition is taken from section 1.3, page 4 of the NPS-HPL:

*LUC 1, 2, or 3 land means 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 that uses the Land Use Capability classification.*

### 4.2 Highly Versatile Soils

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The Northland Regional Council has regulations around the use of highly productive soils. These regulations will undergo revision after the issuing of the NPS-HPL but are still part of the operative NRPS so have been included in this report.

One of the objectives of NRPS is the maintenance, and where possible, enhancement of the life-supporting capacity of soils, especially those which have potential to support intensive primary production. These soils are categorised as highly versatile and are identified on page 89, footnote 10 of the NRPS as LUC units 1c 1, 2e 1, 2w 1, 2w 2, 2s 1, 3e 1, 3e 5, 3s 1, 3s 2, and 3s 4.

### 4.3 Site Classifications

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The table below shows the LUC area breakdown for the proposed site as well as the percentage of highly productive land.

LUC Unit	Area (ha)	Highly Versatile Soil Classification	HPL Classification	% of total Area
3w 2	3.24	Not highly versatile	HPL	54.7
3w 4	0.84	Not highly versatile	HPL	14.2
4w 1	1.03	Not highly versatile	Not HPL	17.4
4w 1+3w 2	0.80	Not highly versatile	Not HPL	13.5
<b>Total area</b>	<b>5.92</b>			
<b>Area HPL</b>	<b>4.08</b>		<b>Total % HPL</b>	<b>68.9</b>
<b>Area of highly versatile soil</b>	<b>0.0</b>		<b>Total % of highly versatile soil</b>	<b>0.0</b>
<b>Total area non-HPL</b>	<b>1.83</b>		<b>Total % non-HPL</b>	<b>31.1</b>

### 4.3.1 Reclassified LUC Units

The site is mapped by the NZLRI as LUC unit 2w 2 (see full description in appendix 2) but has been reclassified based on a detailed farm scale survey of the area with the new classifications shown in the tables above and on the LUC map in Section 6.

- 2w 2 to 4w 1 – This reclassification has been done due to the heavy clay soils and poor to very poor drainage. The clay texture and prolonged soil wetness, including high water tables and surface ponding, severely restrict the timing and methods of cultivation that can be used and the type of crops that can be grown.
- 2w 2 to 3w 2 – The wetness limitation on this area is more than slight and includes some areas with a shallow clay subsoil and high water tables. As such, it has been reclassified as LUC class 3.
- 2w 2 to 3w 4 – This area has been reclassified due to the Ruakaka peat soils present and the increased wetness limitation of the area due to the poor drainage.
- 2w 2 to 4w 1+3w 2 – This area is dominated by Waipu clay soil with smaller areas of Waipu silt loam soils and has therefore been given a combination LUC classification. The reclassification from 2w 2 is outlined above.

## 5.0 HIGHLY PRODUCTIVE LAND ASSESSMENT

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Under the NPS-HPL all LUC units in LUC classes 1, 2 and 3 are classified as HPL. As such, both the LUC 3w 2 and 3w 4 units will come under this classification. These units cover 4.08ha or 68.9% of the proposed site. The area classified as 4w 1+3w 2 does not come under the NPS-HPL as it is dominated by the class 4 unit which will dictate the management and potential of the area. The remaining areas consist of LUC class 4 land and is therefore outside of the HPL classification. The HPL classifications are presented in the soil classifications map in Section 8.

## 6.0 HIGHLY VERSATILE SOIL ASSESSMENT

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None of the LUC units mapped on proposed development site (Lot 200) come under the highly versatile soils category as defined by the NRPS. Based on the NZLRI mapping the area of LUC unit 2w 2 (20.92ha) on Lot 100 is classed as highly versatile soil and under the development proposal would be retained for productive use (see the Lot 100 soil classifications map in Section 8).

## 7.0 PRODUCTIVITY ASSESSMENT

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This productivity assessment has been carried out based on the LUC units mapped on the proposed Lot 200 site and the LUC units mapped by the NZLRI on the parent Lot 100 site (see the NZLRI LUC map in Section 7). As part of the LUC descriptions for the Northland Region Harmsworth has assessed each unit for its stock carrying capacity. This is shown by stock units (SU) per hectare and represent one standard 55kg ewe raising one lamb. There are three classes, average, top and potential. For the purpose of this analysis potential carrying capacity has been used. The tables below present the area of each LUC unit, its HPL classification, the potential stock carrying capacity per hectare and the total number of potential SU that can be carried over both sites.



Stock Carrying Capacity on Lot 100

LUC units Lot 100	HPL classification	Area (ha)	Potential SU/ha	Total SU
2w 2	HPL	20.92	30	627.6
4w 1	Not HPL	4.80	24	115.2
<b>Total</b>		25.72		742.8

Stock Carrying Capacity on Lot 200

LUC units Lot 200	HPL classification	Area (ha)	Potential SU/ha	Total SU
3w 2	HPL	3.24	24	77.8
3w 4	HPL	0.84	24	20.2
4w 1	Not HPL	1.03	24	24.7
4w 1+3w 2	Not HPL	0.80	24	19.2
<b>Total</b>		5.91		141.9

Stock Carrying Capacity on HPL for Lot 100 & Lot 200

Lot	LUC units	Area (ha)	Potential SU/ha	Total SU
100	2w 2	20.92	30	627.6
200	3w 2, 3w 4	4.08	24	97.9
<b>Total</b>		24.79		725.5

Percentage of Total Stock Carrying Capacity on HPL per Site

Lot	SU on HPL	% of Total SU on HPL
100	627.6	86.5
200	97.9	13.5

Current productivity of the whole block (Lots 100 & 200) equates to a potential carrying capacity of 884.7 SU, 742.8 on Lot 100 and 141.9 on Lot 200. Of those SUs a total of 725.5 are supported by HPL, 97.9 of those or 13.5% are located on the proposed Lot 200 subdivision with the remaining 627.6 or 86.5% on Lot 100.

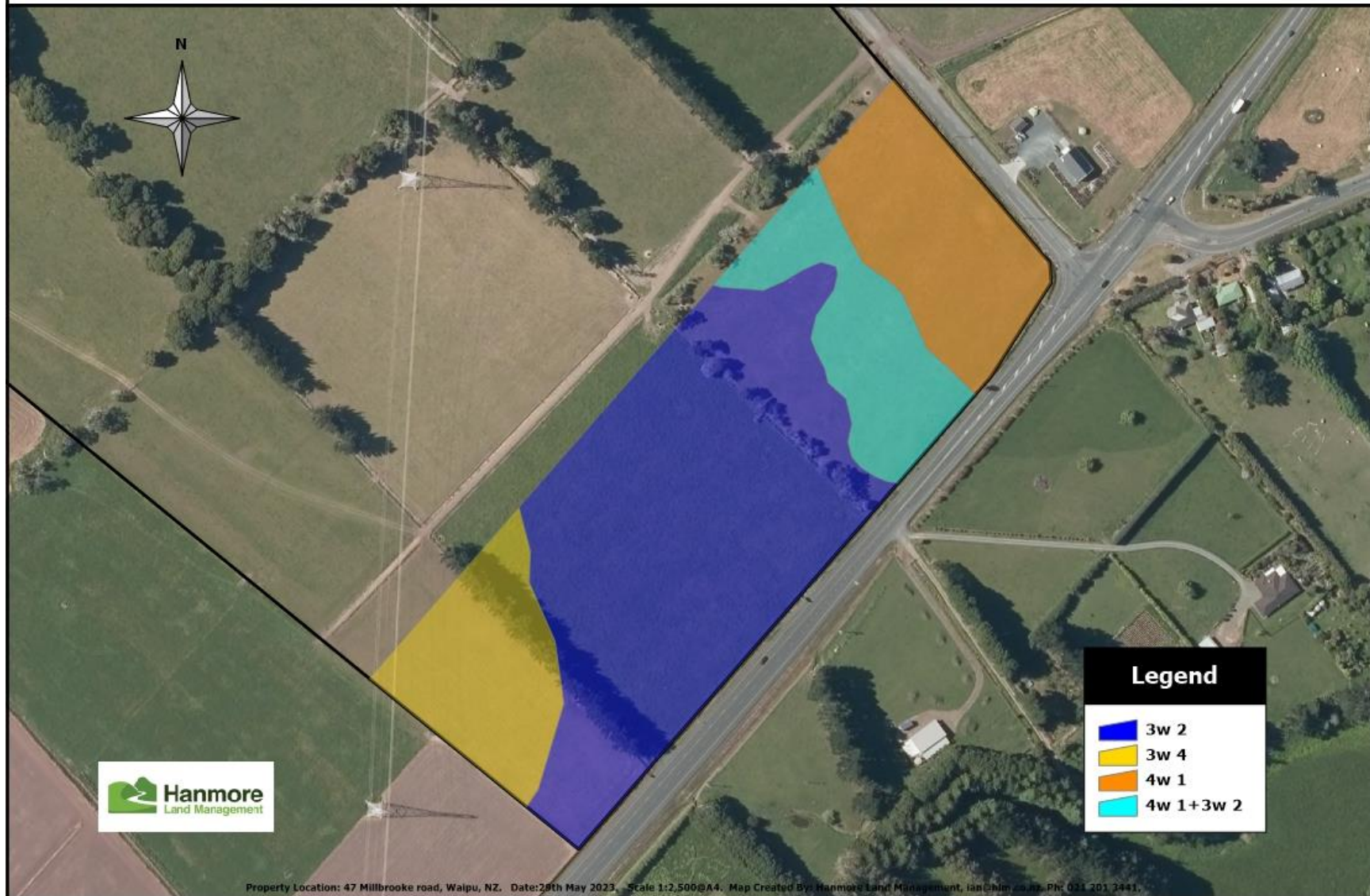
The proposed subdivision will result in the loss of 4.08ha of HPL from a total of 25ha over the whole site. This will result in a loss in potential carrying capacity of 97.9 SU or 13.5% of the potential productivity of the HPL.

It should be noted that in the context of running a viable farming business on the whole block the loss of the 6ha to the proposed development would have a minor impact. 2020 Dairy NZ statistics show that the average dairy farm size in Northland was 143ha (DairyNZ) while Beef and Lamb NZ statistics show that the average effective area for finishing farms in the Northland, Waikato, and Bay of Plenty regions for 2020-2021 was 233ha (Beef+lamb NZ). The whole block covers just over 31ha which is well outside of the average farm sizes for the region. As such it would not be a financially viable farming unit on its own. Currently it forms part of a larger farming unit incorporating other legal titles. If the proposed subdivision were to go ahead it would not prevent the remaining 25.72ha from continuing to function in this capacity.

### 47 Millbrooke Road Lot 200 Soil Map



# 47 Millbrooke Road Lot 200 Land Use Capability Classifications



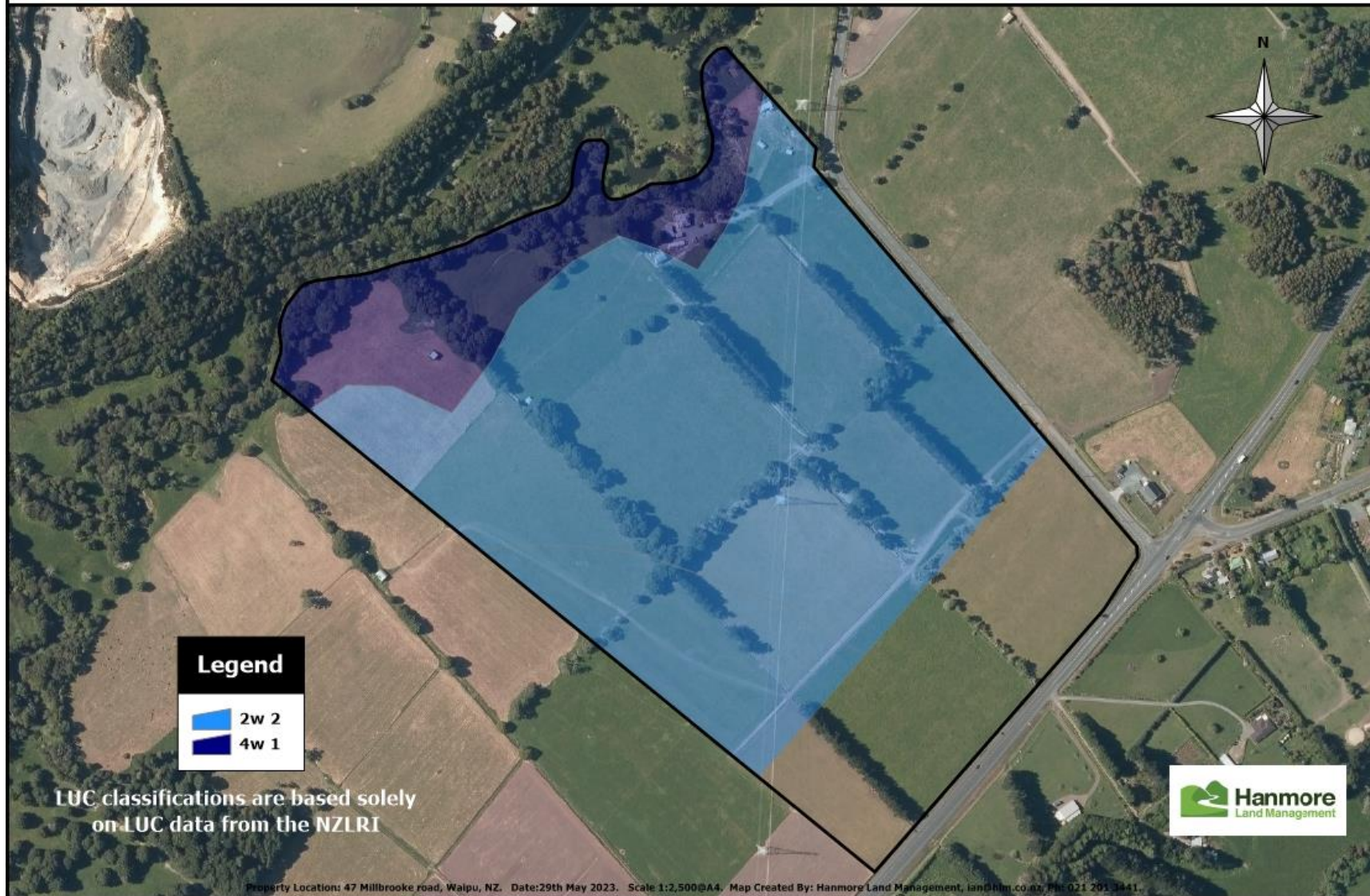


# 47 Millbrooke Road Lot 200 Soil Classifications





## 47 Millbrooke Road Lot 100 Land Use Capability Classifications





## 47 Millbrooke Road Lot 100 Soil Classifications



## 9.0 APPENDICES

### 9.1 Appendix 1 - LUC units mapped in this report.

#### 122 LUC UNIT DESCRIPTIONS

<b>LUC unit:</b>	<b>lllw2 (19 394 ha)</b>
<b>LUC suite:</b>	2. Alluvial and estuarine plains and low terraces
<b>LUC subsuite:</b>	2b. Estuarine plains with gley soils: (LUC units llw2, llw2)
<b>Description:</b>	Poorly drained flat areas within floodplains, valley plains and on low terraces with gley fertile soils developed on sedimentary and volcanic alluvium. Has moderate wetness limitation for arable use, but can be effectively drained.
<b>Type location:</b>	P08/887775 Notorious West Road
<b>Altitudinal range:</b>	0–60 m
<b>Slope:</b>	Flat (A), 0–3°
<b>Landform:</b>	Floodplains, plains.
<b>Rock type:</b>	Fine alluvium (Af).
<b>Soils:</b>	Gley soils on estuarine clays, sands and alluvium. Gley soils of Kaipara suite (KP, KPy, KA, KAy, TZ, TZy), Waipu suite (YUa, YUay, YU, YUy, YA) and Waipapa suite (KO, KOy, KOl, KOy, YF).
<b>Erosion:</b>	<i>Present:</i> Negligible (0) to slight (1) streambank (Sb) and deposition (D) <i>Potential:</i> Slight (1) streambank (Sb) and deposition (D)
<b>Vegetation:</b>	Improved pasture (gl), rushes, sedges (hR), vegetables, nurseries (CV).
<b>Annual rainfall range:</b>	1200–1400 mm
<b>Land use:</b>	<i>Present:</i> Grazing – Intensive incl. dairying – Present average carrying capacity (s.u./ha) = 17 – Top farmer carrying capacity (s.u./ha) = 20 <i>Potential:</i> Cropping – Root and green fodder crops. Cereals. Cropping – Root and green fodder crops. Cereals. Vegetables. Horticulture. Grazing – Intensive – Attainable physical potential carrying capacity (s.u./ha) = 24 Forestry – Production – site index for <i>Pinus radiata</i> = 18–21
<b>Soil conservation management:</b>	– Potential for occasional flooding. Suitable flood protection should be carefully planned; management should be considered over broader catchment area. – Drainage required for management of watertable levels. Maintain condition of drains. – Streambank protection may be necessary in some areas. – Stopbanks recommended close to flood prone areas. – Maintain clearance of vegetation within stream and river channels.
<b>Comments:</b>	Some horticulture on Waipapa suite soils if deep drained.

<b>LUC unit:</b>	<b>IIIw4 (13 375 ha)</b>
<b>LUC suite:</b>	2. Alluvial and estuarine plains and low terraces
<b>LUC subsuite:</b>	2e. Peats: (LUC units IIIw4, IVw3, Vlw3, VIw2)
<b>Description:</b>	Flat to undulating land with organic soils on alluvial and estuarine plains, terraces, and in interdune areas. Land types include poorly drained valley floors on peat and sand within older sand dune environments and peaty areas on surface of Quaternary-aged terraces. In sand country isolated pockets of podzols on lacustrine sediments, too small to be separately delineated, may be included with soils in this unit. Watertables may be near the surface in winter months. Has moderate wetness limitation for arable use.
<b>Type location:</b>	004/315342 Spains Road, Sweetwater
<b>Altitudinal range:</b>	0–100 m
<b>Slope:</b>	Flat to undulating (A, A+B), 0–7°
<b>Landform:</b>	Peat areas on terraces, alluvial plains, swamps, valley floors, valley plains. Often mapped in depressions between sand dunes.
<b>Rock type:</b>	Peat (Pt) often intercalated with fine alluvium (Af), e.g. Pt/Af, Pt+Pt/Af.
<b>Soils:</b>	Organic soils on peat or peat and sand. Organic soils of Ruakaka suite (OT, PZ, RK, RKu, RKd, RKv, RKl) and Otonga suite (OG, OGd, OGv, OR, ORd).
<b>Erosion:</b>	<i>Present:</i> Negligible (0) <i>Potential:</i> Negligible (0) to slight (1) wind (W) when cultivated
<b>Vegetation:</b>	Improved pasture (gf), rushes, sedges (hR), vegetables, nurseries (cV), subtropical fruit (cS), manuka, kanuka (sM), root and green fodder crops (cR).
<b>Annual rainfall range:</b>	1200–1600 mm
<b>Land use:</b>	<i>Present:</i> Grazing – Intensive – Present average carrying capacity (s.u./ha) = 17 – Top farmer carrying capacity (s.u./ha) = 20 Cropping – Root and green fodder crops. Cereals. <i>Potential:</i> Grazing – Intensive – Attainable physical potential carrying capacity (s.u./ha) = 24 Cropping – Root and green fodder crops. Cereals. Horticulture. Forestry – Production – site index for <i>Pinus radiata</i> = 19–22
<b>Soil conservation management:</b>	– Drainage required in some areas to control/manage watertable levels. Maintain condition of drains. Optimum watertables for specific land uses should be regulated and water allocation planned and monitored. – Suitable flood protection should be carefully planned and management considered over broader catchment area. Stopbanks may be necessary in some areas. – Shelterbelts recommended in some areas particularly under arable land use, e.g. cropping, or horticultural land use, to help regulate watertable levels and for micro-climatic control.
<b>Comments:</b>	Occasional logs/organic debris requires removal for horticulture/cropping particularly in the sand country. Can be effectively drained for high-producing pasture and arable land (e.g. horticulture).



<b>LUC unit:</b>	<b>IVw1 (35 423 ha)</b>
<b>LUC suite:</b>	2. Alluvial and estuarine plains and low terraces
<b>LUC subsuite:</b>	2c. Poorly drained floodplains and low terraces: (LUC units IVw1, Vlw1, VIw1)
<b>Description:</b>	Flat to gently undulating areas on floodplains, valleyplains and low terraces on alluvium, with continuing severe wetness or flooding limitation to arable use. Severe limitations to cropping because of runoff from adjacent hills, flooding of streams and high watertables. Potential for moderate streambank erosion and deposition. Recent soils on alluvium characteristic of this unit. Weakly to strongly leached yellow-brown earths and brown granular loams and clays with severe wetness limitations recorded on higher terraces. Waipuna clay on higher terraces included because of continuing wetness due to poor internal drainage of soils. Areas assessed as requiring on-farm drainage.
<b>Type location:</b>	Q06/pt R06/21 7305
<b>Altitudinal range:</b>	0–100 m
<b>Slope:</b>	Flat to undulating with limited areas of undulating land (A, B), 0–7°
<b>Landform:</b>	Floodplains and low terraces.
<b>Rock type:</b>	Fine alluvium (Af). Undifferentiated fine-grained alluvium, floodplain alluvium (Af), and fine alluvium intercalated with organic-peat deposits (Af + Pt).
<b>Soils:</b>	Recent soils on sedimentary and volcanic alluvium. Recent soils of Whareora suite (WFa, WF, WFa) and Kohumaru suite (MF, MFm). Moderately to strongly leached yellow-brown earths of Whareora suite (WU). Moderately to strongly leached brown granular loams and clays of Kohumaru suite (KM, KMm). Gley soils of Kaipara suite (TZ, TZy, KP, KPy, KA, KAy), Waipapa suite (KO, KO <sub>r</sub> , KO <sub>l</sub> , KO <sub>y</sub> , YF), Waipua suite (YUa, YUay, YU, YUy, YA) included where wetness is considered a severe limitation to arable use.
<b>Erosion:</b>	<i>Present:</i> Negligible (0) to moderate (2) streambank (Sb). Negligible (0) to slight (1) deposition (D). Some areas may show moderate (2) to severe (3) deposition after floods <i>Potential:</i> Moderate streambank (Sb) and deposition (D)
<b>Vegetation:</b>	Improved pasture (gl), rushes, sedges (hR), wetland vegetation (hW), gorse (sG), manuka, kanuka (sM).
<b>Annual rainfall range:</b>	1200–1600 mm
<b>Land use:</b>	<i>Present:</i> Grazing – Intensive – Present average carrying capacity (s.u./ha) = 17 – Top farmer carrying capacity (s.u./ha) = 20 Cropping – Root and green fodder crops <i>Potential:</i> Grazing – Intensive – Attainable physical potential carrying capacity (s.u./ha) = 24 Cropping – Root and green fodder crops Forestry – Production – site index for <i>Pinus radiata</i> = 20–23.
<b>Soil conservation management:</b>	These areas may be prone to occasional flooding (deposition and erosion). Suitable flood protection such as drainage and stopbanks should be

considered on a long-term basis, management should be directed over whole catchment.

- On-farm drainage required. Maintain condition of drains.
- Stopbanks should be constructed in flood prone areas and their condition maintained.
- Streambank protection may be required. Erosion can be locally severe and difficult and expensive to repair or control.
- Maintain clearance of vegetation within stream and river channels.
- Watertables need to be monitored and controlled.

**Comments:**

Soils may range from well to poorly drained. Much land can be effectively drained, but high watertables, periodic flooding, and runoff from surrounding hills add to the drainage difficulty. Many areas require stopbank protection.

## 110 LUC UNIT DESCRIPTIONS

<b>LUC unit:</b>	<b>Ilw2 (22054 ha)</b>
<b>LUC suite:</b>	2. Alluvial and estuarine plains and low terraces
<b>LUC subsuite:</b>	2b. Alluvial and estuarine plains with gley soils: (LUC units Ilw2, Illw2)
<b>Description:</b>	Flat to gently undulating areas within alluvial plains, valley plains and low terraces, with fertile, gley, soils formed on estuarine and alluvial deposits. Unit represents those naturally 'wet' areas which have been systematically drained, resulting in land having a high potential for sustained arable and pastoral production. This unit is extensively mapped in the Ruawai-Dargaville area, on the flats near Kaitaia, and just south of Whangarei.
<b>Typical location:</b>	P08/030650 Ruawai
<b>Altitudinal range:</b>	0–60 m
<b>Slope:</b>	Flat to gently undulating (A), 0–3°
<b>Landform:</b>	Floodplains, low terraces. Includes plains formed on estuarine and alluvial sediments.
<b>Rock type:</b>	Fine alluvium (Af).
<b>Soils:</b>	Gley soils on estuarine clays, sands and alluvium. Gley soils of the Kaipara suite (KP, KPy, KA, KAy, TZ, TZy) and Waipu suite (YUa, YUay, YU, YUy, YA).
<b>Erosion:</b>	<i>Present:</i> Negligible (0) <i>Potential:</i> Negligible (0) to slight (1) streambank (Sb) and deposition (D)
<b>Vegetation:</b>	Improved pasture (gl), vegetables, nurseries (cV).
<b>Annual rainfall range:</b>	1200–1400 mm
<b>Land use:</b>	<i>Present:</i> Grazing – Intensive grazing incl. dairying – Present average carrying capacity (s.u./ha) = 21 – Top farmer carrying capacity (s.u./ha) = 26 <i>Potential:</i> Cropping – Vegetables. Root and green fodder cropping Cropping – Cereals. Root and green fodder crops. Horticulture. Grazing – Attainable physical potential carrying capacity (s.u./ha) = 30 Forestry – Production – site index for <i>Pinus radiata</i> = 25–28
<b>Soil conservation management:</b>	– Drainage required in some areas. Maintain condition of drains. – Suitable flood protection should be considered on long-term basis. Stopbanks may be necessary in some areas. – Shelterbelts recommended in some areas particularly under arable land use, cropping. – Timing of cultivation, tillage, may be important consideration. Avoid cultivating saturated soils (e.g. near field capacity).
<b>Comments:</b>	Usually mapped in association with Illw2, which is usually less effectively drained, often associated with areas of peat, and occasionally receives runoff from rolling and hill-country areas.

## 10.0 REFERENCES

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