Site Specific Assessment of the Properties and Distribution of Versatile Land at 14 Banks Road, Rongotea

Land Use Capability Assessments

Site Specific Assessment of the Properties and Distribution of Versatile Land at 14 Banks Road, Rongotea

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1 Summary

1.1 Project and Client

- This assessment consists of a 1:15,000 scale soil and Land Use Capability Assessment and survey, leading to determination of the properties and distribution of Versatile and Other Land at 14 Banks Road, Rongotea (Figure 1).
- The report has been produced to identify and map any Versatile Land in the proposed subdivision site at 14 Banks Road, according to the definition of Versatile Land in the Manawatu District Council (MDC) District Plan, for the purposes of incorporation into a proposal for a private plan change.
- Te Kapiti Trust (the landowners) are applying for a plan change to the Manawatū District Plan to rezone and modify planning provisions on 21ha of land at Rongotea. The site is currently zoned Rural under the Manawatū District Plan and the proposal is to rezone the 21ha to Village Zone. An adjacent 10ha lot, also owned by Te Kapiti Trust, is available to be utilised for stormwater management. The site address is 14 Banks Road, Rongotea.
- The Manawatū District Council have previously identified a rezoning opportunity for the area and the landowner is seeking to advance this process through a private plan change. The purpose of the plan change is to deliver a viable area for housing to support the growth and development of the Manawatū District. A detailed analysis of the constraints and opportunities of rezoning this area will occur in the preparation of the plan change.

Figure 1: Location of the proposed site. The red ring encircles 14 Banks Road. The adjacent lot in yellow may be made available for stormwater management and has also been evaluated in this report.

1.2 Objectives

- Determine the nature and distribution of soil classes on land at 14 Banks Rd, Rongotea, using Hewitt (2010), and Milne et al. (1995).
- Categorise Land Use Capability Classes and subclasses for the soils on the site, by first principles according to Lynn et al. (2009), taking a detailed soil map into account.
- Correlate the Land Use Capability Classes with nzLUC units (Lynn, 2020) and regional legacy LUC units (Fletcher, 1987).
- Determine which land is Versatile Land according to the Manawatu District Council District Plan.
- Determine which land is Highly Productive according to the default setting for the draft National Policy Statement for Highly Productive land.

1.3 Conclusion

- In summary, our 1:15,000 site-specific mapping based on first principles using Lynn et al (2009) shows that the site contains no Versatile Land or Highly Productive Land. All map units have an LUC Class of 4w or 6w. In the case of the 4w land this is because of an underlying pan and perched water table that has led to low Available Water Holding Capacity and poor drainage. The 6w land is low lying with a rising water table.
- From my perspective as an experienced NZ pedologist this is land highly suited to use for housing and should not be protected for future productive use.

2 Land overview

The proposed development site (Figure 2) is a 21 ha block located directly adjacent to Rongotea town centre south of Severn St. An adjacent 10ha lot is available to be utilised for stormwater management. The site address is 14 Banks Road, Rongotea.

Figure 2 Location of the proposed private plan change at 14 Banks Road, Rongotea.

3 The Physical Resource

The site is primarily composed of a flat (0-3°) uplifted terrace that is overlain by a thick layer of windblown silt (loess) with uniform soils with a predictable and simple pattern. Rainfall falling on the site drains into two branches of the headwaters of a small stream that leaves 14 Banks Road and the adjacent site via the south in the western end of the property.

A small tributary (east of 14 Banks Road) begins as an undulation in the paddock, a convergent swale (<3° = flat), but progresses to being more incised but with less than 20m relative relief from the terrace surface above to the base of the gully. The side slopes are B (4-7°) and C slopes (8-15°). In the base of the main gully there is another confined terrace, also composed of materials derived from loess, but probably from loess from the terrace above that has been reworked by streams and liquid forms of mass movement erosion over many years. In the central portion of the adjacent lot planned for potential stormwater management, the confined terrace in the valley floor gives way to a small swamp containing peat in a swale beside the stream. The stream itself has been straightened and deepened by diggers over time.

4 Infrastructure

There is currently limited infrastructure on the 14 Banks Road site or the adjacent site, apart from fences, reticulated stock-water, some shelterbelts and a gravelled lane. The proposed balance lot contains no buildings.

5 Land use

14 Banks Road and the adjacent site are currently being used for grazing of beef cattle.

6 Land Use Capability and Versatility Assessment

6.1 Method

On the afternoon of Wednesday the 18th of May 2022 and the morning of Thursday the 19th of May 2022, Sharn Hainsworth and Nadia Laubscher from LUC Assessments Ltd undertook a 1:15,000 scale field survey of the soils, Land Use Capability (LUC) and versatility of the land at 14 Banks Road Rongotea (in yellow and inside the red oval in Figure 1) and the adjacent site (shown in yellow but outside of the red oval in Figure 1). It had rained heavily on the evening of 17 May 2022 to the extent that paddocks throughout the Manawatū Plains were covered in surface water on the morning of Wednesday 18th May 2022. The method we used was based on free mapping based on sampling on each landform observed on the site at an observation density exceeding the minimum requirements dictated by Lynn et al. (2009) and Grealish (2018). Soil sampling was based on auger observations using a hand-held dutch soil auger, with a control depth of one metre or to a depth that was considered below the limits of "diggability", as defined by Webb and Lilburne (2011). Results were recorded in terms of designated soil horizons (Milne et al., 1995), functional soil horizons (Webb and Lilburne, 2011), and in terms of the New Zealand Soil Classification (Hewitt, 2010). Water table depths (which should have been at their seasonal highest points) were also recorded, along with features indicating drainage issues such as segregations and concretions of manganese and iron oxide. All augerings were photographed with the auger as the scale and accompanied by site photos. All locations were geolocated using handheld Garmin GPS devices. Lynn et al. (2011) was then used to determine the LUC Class and subclass from first principles for each of the sites where soil observations were recorded.

Following fieldwork, the soil observations were shown on maps using GIS and combined with an understanding of the landforms on the site, 1:15,000 scale soil, LUC and Versatile Land maps were produced. A map of Highly Productive Land (based on the criteria in the Draft National Policy Statement for Highly Productive Land 2019 (draft NPS-HPL) has also been produced. For ease of use the LUC classes and subclasses identified on this site have been correlated with broader scale LUC units published in both Fletcher (1987) and Lynn (2020).

6.2 Results

A desktop assessment of the site shows that the site has been mapped at 1:50,000 scale as predominantly 2s2 (on the tread of the main terrace), with 3e4 in the more rolling gullies draining the site. These units are regional LUC units, based on Fletcher (1987). LUC 2s2 land is specifically discussed in the Manawatū District Plan with regards to the definition of Versatile Land or otherwise. The more recent national correlation by Lynn (2020) shows that these map units would be best considered nz3s27 and nz3e16, so both Class 3 land. Looking further into the surrounding 1:50,000 scale (regional scale) NZLRI map units and the text of Fletcher (1987), and correlating with nzLUC units, the peaty soil we found in the valley floor has an LUC of 2w4 and an nzLUC of nz2w12. From a regional scale desktop assessment alone, the land on this site would not be considered Versatile Land under the Manawatū District Plan, except for the lowest lying, wettest soils on the site (the peaty area). However,

going by the criteria for the Draft NPS-HPL because these LUC units are classified as Class 3 land, Horizons Regional Council will likely have no choice but to map this land as "Highly Productive Land".

Figure 3: 1:50,000 scale map of site (classified by Fletcher (1987) and Lynn (2020))

Figure 4 shows the location of soil observations on the site. Table 1 outlines the results of our fieldwork, classification and correlation. All auger descriptions are described with scaled photographs in Appendix A.

Figure 4: Map of soil observations

Table 1: Landforms, soils, LUC, Versatile/Other Land and Highly Productive/Other Land as described on 14 Banks Road Rongotea and adjacent site

ID	Landform	NZSC	NZSC code	LUC (Fletcher 1987)	nzLUC (Lynn 2020)	LUC (Lynn et al 2009)	Versatile land (MDC DP)	Highly productive land (NPS HPL)
66	Terrace tread	Argillic Perc-Gley Pallic (shallow)	PPJ;Md;Z/C; (m/s) A	2s2	nz3s27	4w (borders on 3ws)	Other	Other (borders on HPL)
67	Alluvial basin	Organic Orthic Gley (deep)	GOO;Md;Z/C; (m) B	2w4	nz2w12	6w	Other	Other
69	Terrace tread	Mottled Fragic Pallic (mod deep)	PXM;Md;L (m/s) A	2s2	nz3s27	3w	Other	HPL
70	Valley floor	Typic Perch-Gley Pallic (shallow)	PPT;Md;L; (m/s) A	2w4	nz2w12	5ws	Other	Other
71	Valley floor	Typic Perch-Gley Pallic (shallow)	PPT;Md;L; (m/s) B	2w4	nz2w12	5ws	Other	Other
72	Terrace tread	Typic Perch-Gley Pallic (shallow)	PPT;Md;L/C;)m/s A	2s2	nz3s27	4w (borders on 3ws)	Other	Other (borders on HPL)
73	Terrace tread	Fragic Perch-Gley Pallic (shallow)	PPX;Md;z;)m/s A	2s2	nz3s27	4w (borders on 3ws)	Other	Other (borders on HPL)
74	Sideslope	Typic Perch-Gley Pallic (shallow)	PPT;Md;L;)m/s A	2s2	nz3s27	4w (borders on 3ws)	Other	Other (borders on HPL)
75	Terrace tread	Typic Perch-Gley Pallic (shallow)	PPT;Md;L;)m/s A/B	2s2	nz3s27	4w (borders on 3ws)	Other	Other (borders on HPL)
76	Valley floor	Argillic Perch-Gley Pallic (shallow)	PPJ;Md;Z/C; (m/s) A	2s2	nz3s27	4w (borders on 3ws)	Other	Other (borders on HPL)
78	Terrace tread	Typic Perch-Gley Pallic (shallow)	PPT;Md;L;(m/s) A	2s2	nz3s27	4w (borders on 3ws)	Other	Other (borders on HPL)
79	Terrace tread	Typic Perch-Gley Pallic (shallow)	PPT;Md;L;(m/s) A	2s2	nz3s27	4w (borders on 3ws)	Other	Other (borders on HPL)
80	Terrace tread	Argillic Perch-Gley Pallic (shallow)	PPJ;Md;Z/C; (m/s) A	2s2	nz3s27	4w (borders on 3ws)	Other	Other (borders on HPL)
82	Gully	Argillic Perch-Gley Pallic (shallow)	PPJ;Md;Z/C; (m/s) B	3e4	nz3e16	4w (borders on 3ws)	Other	Other (borders on HPL)
83	Terrace tread	Argillic Perch-Gley Pallic (shallow)	PPJ;Md;Z/C; (m/s) A	2s2	nz3s27	4w (borders on 3ws)	Other	Other (borders on HPL)
84	Terrace – swale	Argillic Perch-Gley Pallic (shallow)	PPJ;Md;Z/C; (m/s) A	2s2	nz3s27	4w (borders on 3ws)	Other	Other (borders on HPL)
85	Terrace - ridge	Typic Perch-Gley Pallic (shallow)	PPT;Md;L;)m/s A	2s2	nz3s27	4w (borders on 3ws)	Other	Other (borders on HPL)

On the flat terrace tread, the majority of the soils are Perch Gley Pallic Soils. These soils have high clay contents and are underlain by a dense layer (a partial or fully developed fragipan). The top of the partial fragipan (the depth of the slowly permeable layer in the soil) is generally shallow (within 45cm of the soil surface), although in some cases moderately deep (between 45–60cm from the soil surface). These soils could be classified as Class 3 with both a wetness and a soil limitation. However, given the silty clay texture and the presence of many to abundant 10mm iron/manganese nodules, just below the topsoil in these soil profiles, it is evident that they have drainage closer to the very poor end of the poor drainage class. This will have a significant adverse impact on the capability and productivity of these soils during wet seasons. Thus this land has been classified as Class 4w instead of 3w or 3s. This is neither Versatile Land or Highly Productive Land. This land does however border on being classified as Highly Productive Land even though it is not Versatile Land. This land takes up the majority of the land on the site.

The soils on the sideslopes on the site are very similar to those on the flats. If these had been classified as Class 3, they would have been classified as 3e because of the strongly rolling component of much of the sideslopes. However these have been classified as Class 4w for the same reason as the soils on the terrace tread. This is neither Versatile Land or Highly Productive Land. It does border on being classified as Highly Productive Land.

Figure 5: 1:15,000 scale map of the soil to subgroup level (Hewitt, 2010)

The soils on the valley floor (excluding the map unit containing a significant area peaty topsoil in the site being considered for stormwater management) are also Perch-Gley Pallic Soils with high clay contents. These are close to being classified as Ironstone Orthic Gley

Soils (very high amounts of iron/manganese nodules) but the subsoils are too dense to be considered Gley Soils. These also are classified as Class 4w land. This is far from being classified as Versatile Land or Highly Productive Land.

In the case of the small area in the valley floor in the adjacent site being considered for use for stormwater management that contains peaty topsoil, this too is outside of the Class 1-3 criteria at Class 6w due to a rising water table up near the surface causing very poor drainage. Artificial drainage has not taken away the wetness limitation to raise the LUC Class of this land. This is because of the natural landscape position in a swale in a narrow valley floor. This is far from being either Versatile Land or Highly Productive Land.

Figure 6: 1:15,000 scale map of LUC using first principles from Lynn et al. (2009)

Figure 7: 1:15,000 scale map showing Versatile and Other Land according to Manawatū District Council District Plan definition

Figure 8: 1:15,000 scale map showing Highly Productive Land according to draft NPS-HPL definition

6.3 Discussion

When considering which land in the Manawatū District is the least Versatile or Highly Productive and on that basis the most suitable for housing developments, this land is well suited in my opinion. The land on 14 Banks Road Rongotea, and the adjacent site being considered for stormwater management are not Versatile Land. Neither should they be mapped as Highly Productive Land if site specific mapping is allowed to inform that mapping process in the future. Compared with other soils and land types in the Manawatū such as the Manawatū and Kairanga soils, the soils on the 14 Banks Road site will not unduly detract from the productive capacity of the Manawatū Plains. This land is just not as versatile or capable of the same levels of productive capability as other soils such as land underlain by Manawatū and Kairanga soils. This is because of the clayey textures, poor drainage, and shallow soils over a pan that lead to droughtiness. There is also an associated high risk of bypass flow of contaminants to groundwater through the fragipan when used for agricultural or horticultural purposes.

7 Conclusion

In summary, our 1:15,000 site-specific mapping based on first principles using Lynn et al (2009) shows that the site contains no Versatile Land or Highly Productive Land. All map units have an LUC Class of 4w or 6w. In the case of the 4w land this is because of an underlying pan and perched water table that has led to low Available Water Holding Capacity and poor drainage. The 6w land is low lying with a rising water table.

From my perspective as an experienced NZ pedologist this is land highly suited to use for housing and should **not** be protected for future productive use.

8 References

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9 Appendix A

ID	Photo	Horizons (depth in cm)	Functional horizons
66		0-15 -Ap 15-20 Ap/Bg 20-42 Bt(g) 42-1002BC(x)(g)	tLW Yw YFs LCs
67		0-10 Ap/Oh 10-20 Bg 20-90 BCr	tOhL YFw YC
69		0-20 Ap 20-40 Bwg 40-60 BCg 60+ BC(x)	tLf LFw LFw LCs

ID	Photo	Horizons (depth in cm)	Functional horizons
70		0-15Apg 15-25 Ap/Bg 25-40 Bg1(Fe conc) 40-70 Bg2 70+ BC (g)	tLw LFw LFws LFw LFs
71		0-20Apg 20-30 Bg 30-45 Bg1(Fe conc) 45-70 Bg2 70+ BC (g)	tLw LFw LFws LFw LFs
72		0-15 Ap 15-30 Bg 30-45 BCg 45-90 BCt Note water table at ~70 cm	YC

ID	Photo	Horizons (depth in cm)	Functional horizons
73		0-15 Apg 15-30 Bg 30-90 BC (x) (g)	tLw LFs LCs
74		0-20 Apg 20-35 Bg 35-50 Bog -Mn concretion on top of pan 50+ BC(x)	
75		0-20 20-42 42 BCx	tLw LFs LFf

ID	Photo	Horizons (depth in cm)	Functional horizons
76		0-20 Apg 20-40 Bg 40-90 BCt (x)(g) Water perching soil dry in auger	tLs LFs YFs
78		0-15 Apg 15-25 Bg 25-42 BCg 42+	tLw LFs LCs LCf
79		0-20 Apg Mn conc present 20-43Bg 43+ BC (x)(g)	tLw LFs LCs

ID	Photo	Horizons (depth in cm)	Functional horizons
80		0-15Ap 15-30 Bg 30-45BCtg 45+ BCt (x)(g)	tLw YFs YCs YCf
82		0-15 Apg Mn conc present 15-25Bg 25-35 BCt 35-55 BC (x)(g)	tLw LFs YFs YCs

ID	Photo	Horizons (depth in cm)	Functional horizons
83		0-15 Apg 15-25Bg 25-50 BC (x)(g)	tLw LFs YCs
84		0-15 Apg 15-40Bg 40-58 BC (x)(g)	tLw LFs LCs
85		0-15 Apg 15-30Bg 30-40 Bog 40-90 BC (x)(g)	tLw LFws LFs LCs