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Soil and Land Use Capability classification assessment

127 Brymer Road, Rotokauri, Hamilton 3289

Report: 5th June 2023
On-site assessment: 8-9th December 2023
Attention: Russell Davies – Ultimate Developments
Re: Soil and Land Use Capability classification assessment - 127 Brymer Road, Rotokauri, Hamilton 3289.

Contents

1. Introduction

A soil and Land Use Capability (LUC) classification assessment of a site at 127 Brymer Road, Rotokauri, Hamilton 3289 (Brymer Road site), totalling 81.1 ha was undertaken to comply with rules of the Proposed Waikato District Plan - Decisions Version (PDP) and the Operative Waikato District Plan (ODP) in relation to the protection of high class soil. The report includes an assessment against the National Policy Statement for Highly Productive Land (NPS-HPL) which became operative on the 17th of October 2022.

The 81.1 ha site comprises five land parcels (Lot 3 DP 385271, Lot 1 DPS 87291, Lot 22 DPS 79526, Part Lot 2 DP 18355 and Allot 365 Pukete PSH) located on the north-western urban fringe of Hamilton City, bounded to the south by State Highway 23 to Raglan (**Figure 1).** To the north-east, the site is bounded by Brymer Road and the Hamilton City boundary to the east.

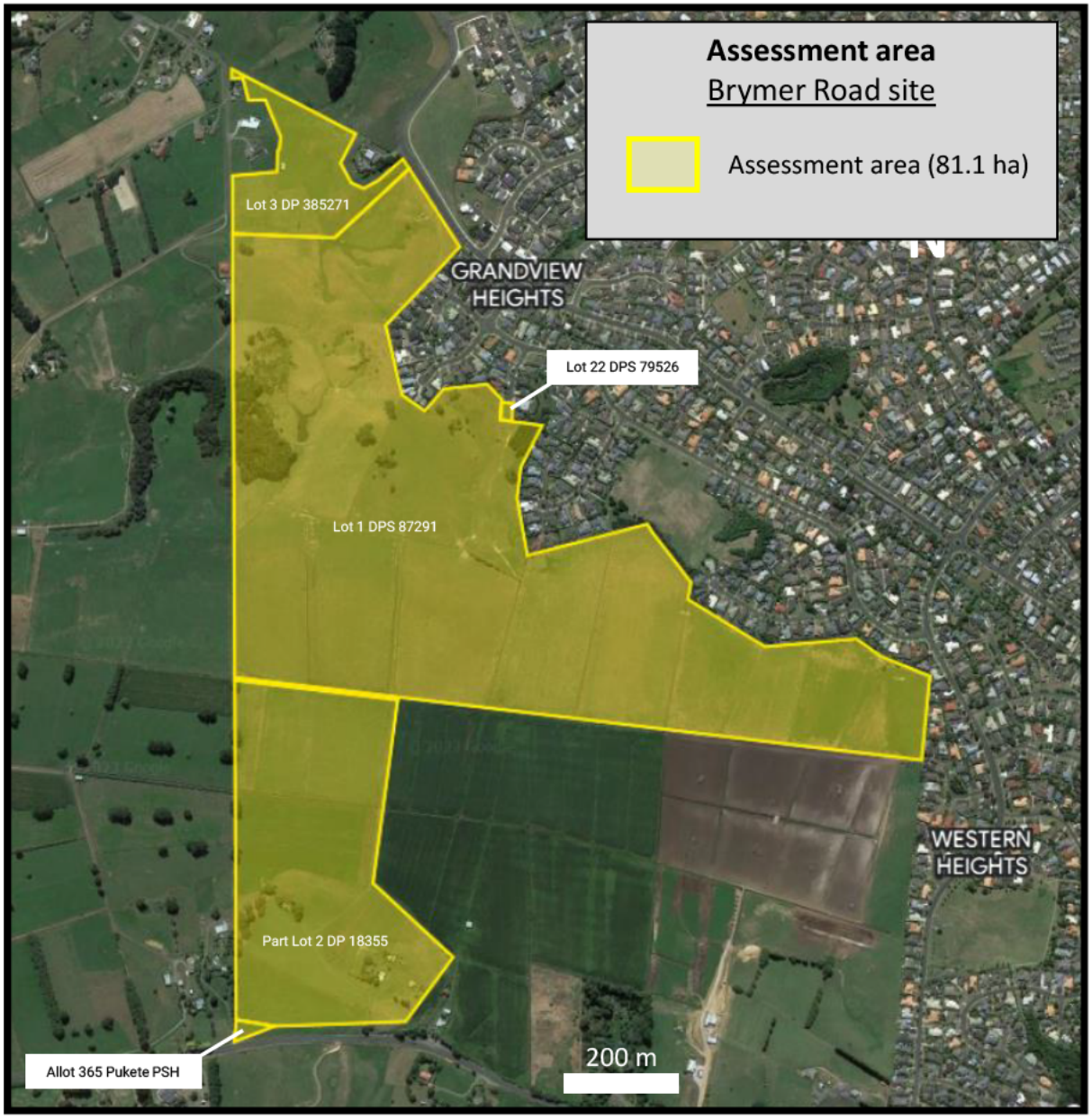


***Figure 1**. Assessment area 127 Brymer Road, Rotokauri, Hamilton 3289 (Brymer Road site).*

2. LUC background

LUC classification is the common method for assessing land in New Zealand; it uses the Land Use Capability System, which is part of the New Zealand Land Resource Inventory (NZLRI) as produced by the Water and Soil Division of the Ministry of Works, for the National Water and Soil Conservation Organization during the 1970s. In 2009 the 3rd Edition of the LUC Survey Handbook[1] was published and has been used for this assessment. The LUC uses a systematic arrangement of different kinds of land according to those properties that determine its capacity for permanent sustained production, where the word "capability" is used in the sense of "suitability for productive use" after taking into account the physical limitations the land may have.

The LUC classification is specifically designed to provide an index of versatility. There are eight land use capability classes (**Figure 2**) arranged in order of increasing degree of limitation or hazard to use; and a decreasing order of use, from Class 1 to 8.

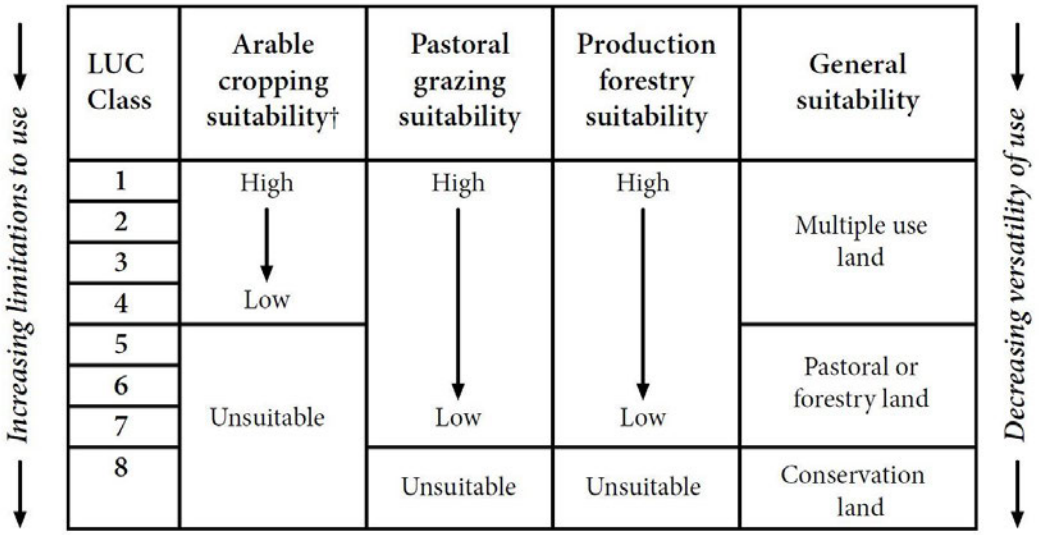


***Figure 2**. Increasing limitations to use and decreasing versatility of use from LUC Class 1-8.*

Within each LUC Class the land is assigned a subclass according to the kind of limitation (e = Erodibility, w = Wetness, s = Soil limitations within the rooting zone, c = Climate). At the most detailed level LUC groups together those inventory units which respond similarly to the same management and which are suitable for the same kinds of crops, pasture, or forest species with the same potential yield and which require the application of the same conservation measures.

The LUC worksheets were compiled from all relevant databases of land resource documents available at the time, consequently some sheets suffered from a lack of information that only detailed soil and geological surveys could have provided. Therefore, there are **scale limitations**, which need to be considered, especially when interpretation is required at the individual property scale.

[1] Lynn IH, Manderson AK, Page MJ, Harmsworth GR, Eyles GO, Douglas GB, Mackay AD, Newsome PJF 2009. Land Use Capability survey handbook – a New Zealand handbook for the classification of land. AgResearch Hamilton; Manaaki Whenua Lincoln; GNS Science Lower Hutt, New Zealand.

The LUC units displayed on the 1970s worksheets remain reasonably robust but are subject to change. For example, the second edition (1993) Northland region worksheets were mapped at the more detailed scale of 1:50 000, replacing the earlier first edition 1:63,360 maps. In the first edition, 69 LUC units were defined compared with 91 LUC units in the second edition - about 60 of the first edition classification units changed.

The average area for a map unit is 125 ha, however, at the 1:50 000 scale of mapping it is theoretically possible to delineate an unhooked inventory map unit (no vinculum) area of 60 ha (60 ha = 600 m by 1000 m) provided the geology, soil, vegetation, erosion and slope are uniform.

The **purpose of this background information** is to illustrate and emphasise that the NZLRI information provides excellent physical base data for planners (a planning tool) but is not fit for purpose as a plan (map) unless undertaken at the correct scale. This assessment fulfils that purpose.

3. Non-productive land and modified soil

For an accurate assessment of LUC classification for a property, the assessment should be based on the current condition of the area (i.e. mapped in current state). This is important because some land management practices (e.g. the placement of tracks, excavation of drains, and general earthworks) result in irreversible changes to the soil (i.e. changes other than those that can be remediated by management practices and return the soil to its intrinsic state). These areas are referred to as non-productive land. Examples of non-productive land include native vegetation, wetlands and riparian areas, tracks, and buildings and curtilage. Non-productive land can include areas of modified soil. In essence, modified soil are classified as Anthropic Soils[2] and are no longer considered high class soil, or highly productive land if the productive capacity of the modified soil has been irreversibly reduced (e.g. mixed soil, truncated soil or placement of fill with minimal topsoil).

4. Definition of high class soil

The proposed Waikato District Plan - Decisions Version (PDP) defines high quality soil (high class soil) as[3]:

> *Means those soils in Land Use Capability Classes I and II (excluding peat soils) and soils in Land Use Capability Class IIIe1 and IIIe5, classified as Allophanic Soils, using the New Zealand* Soil Classification.

The other applicable definition of high class soil is provided by the Operative Waikato District Plan (ODP):

> *Means land classified as Land Use Capability Class I, II or IIIe, on the New Zealand Land Inventory Worksheets (as amended in the 1986 Second Edition) legend, provided land classified as Class IIIe is further described as containing well and moderately drained soil, in*

[2] Anthropic soils – "Other soils that have been formed by the direct action of people by either truncation, drastic mixing or by deposition of material 30 cm or more thick" (Hewitt, 2010).

[3] https://www.waikatodistrict.govt.nz/docs/default-source/your-council/plans-policies-and-bylaws/plans/district-plan-review/decisions/proposed-waikato-district-plan-(decisions-version)/part-1-introduction-and-general-provisions/interpretation/part-1_5-interpretation_definitions.pdf?sfvrsn=20e29ac9_2

accordance with Milne, J. D. G.; Clayden, B.; Singleton, P. L.; Wilson, A. D. 1995 Soil description handbook (revised edition press). Manaaki Whenua Press, Lincoln, New Zealand.

5. National Policy Statement for Highly Productive Land (NPS-HPL)

The National Policy Statement for Highly Productive Land (NPS-HPL)[4] came into force on the 17th October 2022 (clause 1.2(1)).

"Highly productive land" is defined as:

> *means land that has been mapped in accordance with clause 3.4 and is included in an operative regional policy statement as required by clause 3.5 (but see clause 3.5(7) for what is treated as highly productive land before the maps are included in an operative regional policy statement and clause 3.5(6) for when land is rezoned and therefore ceases to be highly productive land).*

At present NPS-HPL clause 3.5(7) applies because maps produced in accordance with clause 3.4 have not yet been included in an operative regional policy statement as required by clause 3.5. Clause 3.5(7) says:

> *(7) Until a regional policy statement containing maps of highly productive land in the region is operative, each relevant territorial authority and consent authority must apply this National Policy Statement as if references to highly productive land were references to land that, at the commencement date:*
>
> *(a) is*
>
> *(i) zoned general rural or rural production; and*
>
> *(ii) LUC 1, 2, or 3 land; but*
>
> *(b) is not:*
>
> *(i) identified for future urban development; 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.*

The NPS-HPL includes the following guidance in clause 3.4(5):

> *(5) For the purpose of identifying land referred to in subclause (1):*
>
> *(a) mapping based on the New Zealand Land Resource Inventory is conclusive of LUC status, unless a regional council accepts any more detailed mapping that uses the Land Use Capability classification in the New Zealand Land Resource Inventory; and*
>
> *(b) where possible, the boundaries of large and geographically cohesive areas must be identified by reference to natural boundaries (such as the margins of waterbodies), or legal or non-natural boundaries (such as roads, property boundaries, and fence-lines); and*
>
> *(c) small, discrete areas of land that are not LUC 1, 2, or 3 land, but are within a large and geographically cohesive area of LUC 1, 2, or 3 land, may be included; and*
>
> *(d) small, discrete areas of LUC 1, 2, or 3 land need not be included if they are separated from any large and geographically cohesive area of LUC 1, 2, or 3 land.*

[4] National Policy Statement for Highly Productive Land 2022. September 2022.

6. Soils and LUC classification according NZLRI information (1:50,000 scale)

Based on the available NZLRI map information[5] the assessment area is mapped as Hamilton clay loam on strongly rolling slopes (slope class D) with an LUC classification of 4e2, Kaipaki peaty loam on flat to gently undulating slopes (slope class A) with a LUC classification of LUC 2w2, and Rukuhia peat on flat to gently undulating slopes (slope class A) with a LUC classification of LUC 2s5. Applying the proposed Waikato District Plan (Decisions Version) and Operative Waikato District Plan definitions for high class soil, LUC 2w2 and 2s5 are high class soil and LUC 4e2 is not high class soil.

The distribution of the NZLRI LUC map units and the resulting NPS-HPL highly productive land for the Brymer Road site is shown in **Figure 3**.

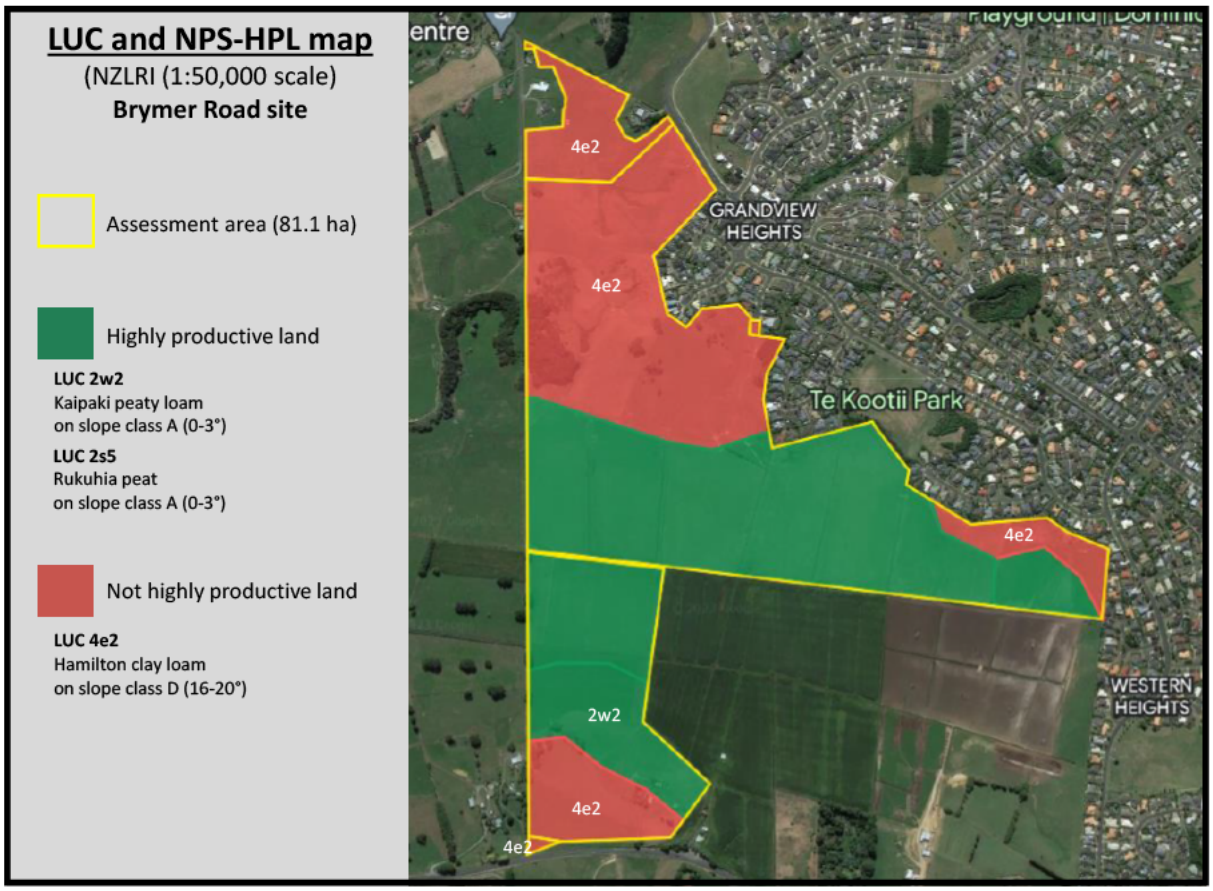


***Figure 3**. distribution of the NZLRI LUC map units for the Brymer Road site.*

[5] https://lris.scinfo.org.nz/layer/48136-fsl-north-island-all-attributes/; https://lris.scinfo.org.nz/layer/48076-nzlri-land-use-capability-2021/.

7. Property scale soil and LUC classification assessment

Landsystems undertook a detailed on-site soil and LUC assessment of the Brymer Road site according to standard methods (Milne et al., 1993[6] and Lynn et al., 2009[7]). The on-site assessment was undertaken on 8-9th December 2022.

Observations of slope angle, topography and soil parent material were made over the relevant area. Soil augering up to 80 cm depth was used to assess soil properties such as soil horizons, drainage, plant root depths, texture, structure, and colour.

This information was used to determine soil type and soil boundaries, from which the necessary LUC classification was assigned. All soils were assessed in current condition and areas with modified soil were identified and mapped.

8. Soil and LUC classification

A summary of the soils and LUC units identified for the Brymer Road site is provided in **Table 1**.

***Table 1**. Summary of the soils and LUC units identified for the Brymer Road site.*

Soil type	Parent material	Soil drainage	Slope class	LUC unit	Comment
Hamilton clay loam	Hamilton ashes	Moderately well drained	C (8 - 15°)	3e3	Rolling slopes limit cultivation
Hamilton clay loam	Hamilton ashes	Moderately well drained	D (16 - 20°)	4e2	Steep slopes with variable soil depth
Hamilton clay loam	Hamilton ashes	Moderately well drained	E+F (0 - 7°)	6e2	Steep slopes with variable soil depth
Rotokauri clay loam	Hamilton ashes colluvium	Imperfectly drained	A+B (0 - 7°)	2w3	Seasonal wetness limitation
Rotokauri clay loam	Hamilton ashes colluvium	Poorly drained	A+B (0 - 7°)	3w2	Annual wetness limitation, prone to high water table and runoff from hills
Kaipaki peaty loam	Peat over alluvium	Poorly drained	A (0 - 3°)	2w2	Very poor drainage despite drains, prone to high water table
Kaipaki peaty loam	Peat over alluvium	Very poorly drained	A (0 - 3°)	4w2	Very poor drainage despite drains, surface ponding, prone to high water table and runoff from hills
Rukuhia peat	Peat	Very poorly drained	A (0 - 3°)	3w1	Very poor drainage despite drains, prone to high water table

[6] Milne JDG, Clayden B, Singleton P.L, Wilson AD. 1995. Soil Description Handbook. Lincoln, New Zealand, Manaaki Whenua Press. 157p.

[7] Lynn IH, Manderson AK, Page MJ, Harmsworth GR, Eyles GO, Douglas GB, Mackay AD, Newsome PJF. 2009. Land Use Capability survey handbook – a New Zealand handbook for the classification of land. AgResearch Hamilton; Manaaki Whenua Lincoln; GNS Science Lower Hutt, New Zealand.

Un-named humic silt loam	Mixed alluvium	Very poorly drained	A (0 - 3°)	4w1	Prone to flooding, rushes
Non-productive land/modified soil	-	-	-	-	Buildings and curtilage, excavated drains and spoil, wetlands and seeps, tracks, native vegetation areas, disturbed soil and earthworks.

The mapped distribution of the soils and LUC map units is shown in **Figure 4**.

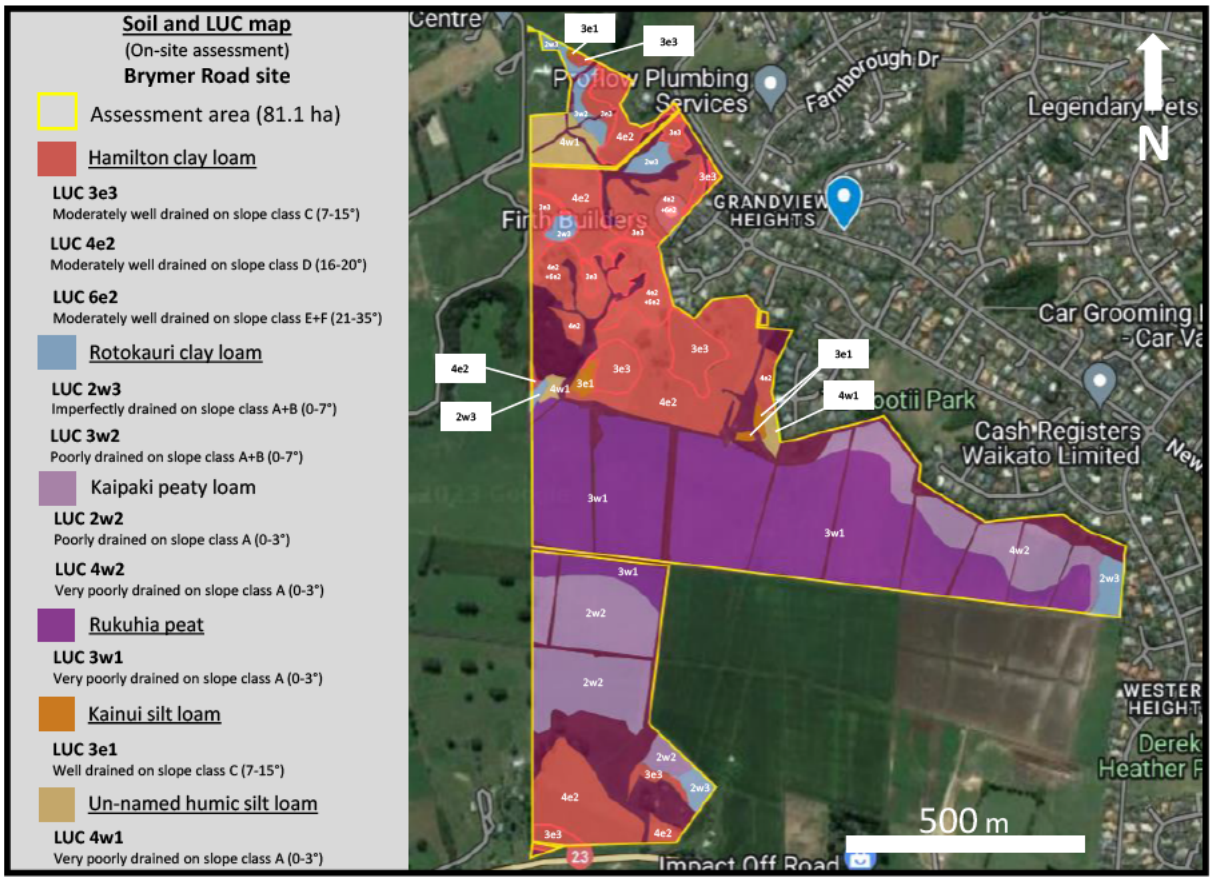


***Figure 4**. On-site mapped distribution of the soils and LUC map units, Brymer Road site.*

9. Waikato District Plan high class soil

The LUC map units for the Brymer Road site are further classified according to the Waikato District Plan PDP and ODP high class soil definitions (**Table 2**).

Table 2. *Soils and LUC units identified for the Brymer Road Site.*

Soil type	Parent material	Soil drainage	Slope class	LUC unit	HCS - PDP definition	HCS - OPD definition
Hamilton clay loam	Hamilton ashes	Moderately well drained	C (8 - 15°)	3e3	Not high class soil	High class soil
Hamilton clay loam	Hamilton ashes	Moderately well drained	D (16 - 20°)	4e2	Not high class soil	Not high class soil
Hamilton clay loam	Hamilton ashes	Moderately well drained	E+F (0 - 7°)	6e2	Not high class soil	Not high class soil
Rotokauri clay loam	Hamilton ashes colluvium	Imperfectly drained	A+B (0 - 7°)	2w3	High class soil	High class soil
Rotokauri clay loam	Hamilton ashes colluvium	Poorly drained	A+B (0 - 7°)	3w2	Not high class soil	Not high class soil
Kaipaki peaty loam*	Peat over alluvium	Poorly drained	A (0 - 3°)	2w2	Not high class soil	High class soil
Kaipaki peaty loam*	Peat over alluvium	Very poorly drained	A (0 - 3°)	4w2	Not high class soil	Not high class soil
Rukuhia peat*	Peat	Very poorly drained	A (0 - 3°)	3w1	Not high class soil	Not high class soil
Un-named humic silt loam	Mixed alluvium	Very poorly drained	A (0 - 3°)	4w1	Not high class soil	Not high class soil
Non-productive land/modified soil	-			-	Not high class soil	Not high class soil

* Organic Soil

The estimated distribution of soil and LUC classes based on the PDP and ODP high class soil definitions are shown in **Figure 5** and **Figure 6** respectively.

Figure 5. *The soil and LUC classes for the Brymer Road Site (based on the PDP).*

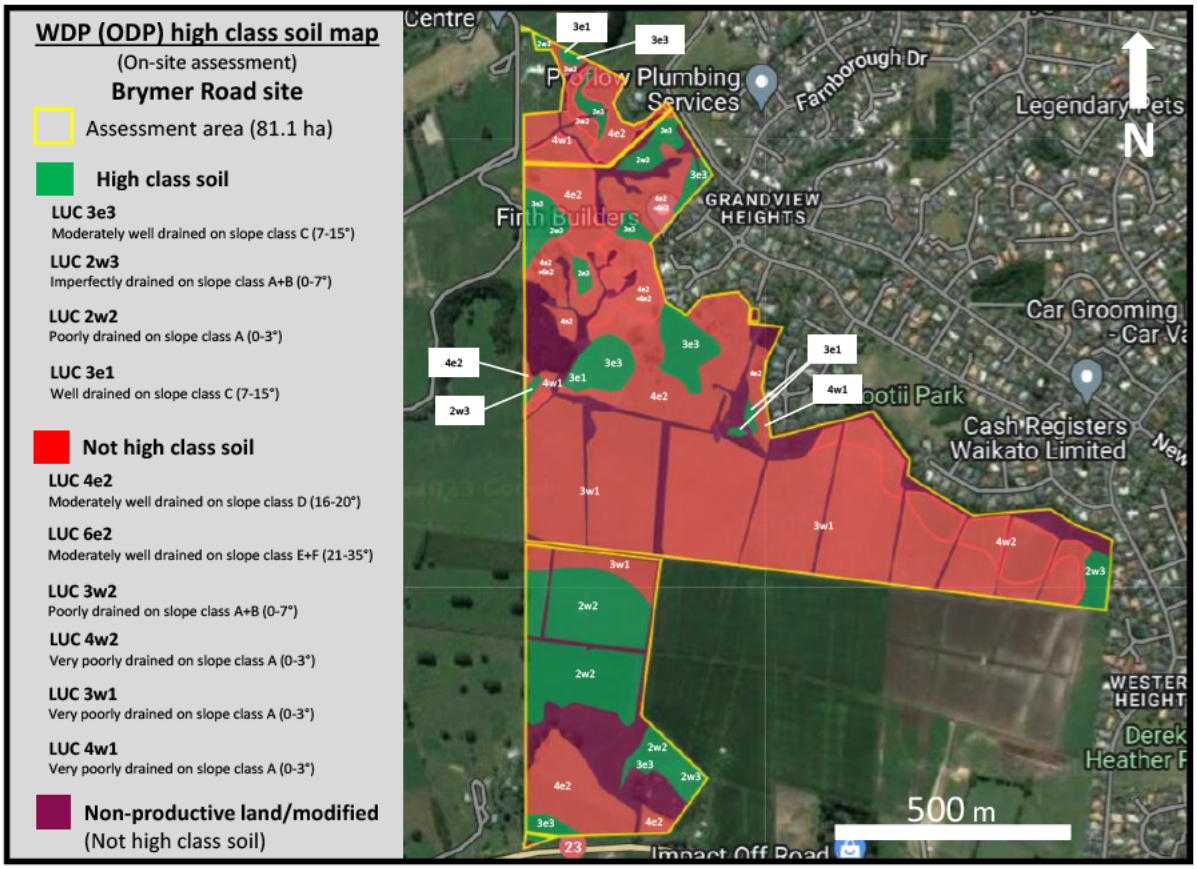


Figure 6. *The soil and LUC classes for the Brymer Road Site (based on the ODP).*

10. NPS-HPL highly productive land

The LUC map units for the Brymer Road site are further classified according to the NPS-HPL highly productive land (**Table 3**).

***Table 3**. NPS-HPL highly productive land for the Brymer Road Site, based on the LUC map units identified in the on-site assessment.*

Soil type	Parent material	Soil drainage	Slope class	LUC unit	NPS-HPL highly productive land
Hamilton clay loam	Hamilton ashes	Moderately well drained	C (8 - 15°)	3e3	Highly productive land
Hamilton clay loam	Hamilton ashes	Moderately well drained	D (16 - 20°)	4e2	Not highly productive land
Hamilton clay loam	Hamilton ashes	Moderately well drained	E+F (0 - 7°)	6e2	Not highly productive land
Rotokauri clay loam	Hamilton ashes colluvium	Imperfectly drained	A+B (0 - 7°)	2w3	Highly productive land
Rotokauri clay loam	Hamilton ashes colluvium	Poorly drained	A+B (0 - 7°)	3w2	Highly productive land
Kaipaki peaty loam	Peat over alluvium	Poorly drained	A (0 - 3°)	2w2	Highly productive land
Kaipaki peaty loam	Peat over alluvium	Very poorly drained	A (0 - 3°)	4w2	Not highly productive land
Rukuhia peat	Peat	Very poorly drained	A (0 - 3°)	3w1	Highly productive land
Un-named humic silt loam	Mixed alluvium	Very poorly drained	A (0 - 3°)	4w1	Not highly productive land
Non-productive land/modified soil	-	-	-	-	Not highly productive land

Based on the interpretation of NPS-HPL clause 3.5(7), LUC unit 4e2 is not highly productive land when applying the NPS-HPL, and LUC 2s3, 2e2, 2w3 and 3e3 are highly productive land. The areas of non-productive land and modified soil are not highly productive land. The distribution of NPS-HPL highly productive land is shown in **Figure 7.**

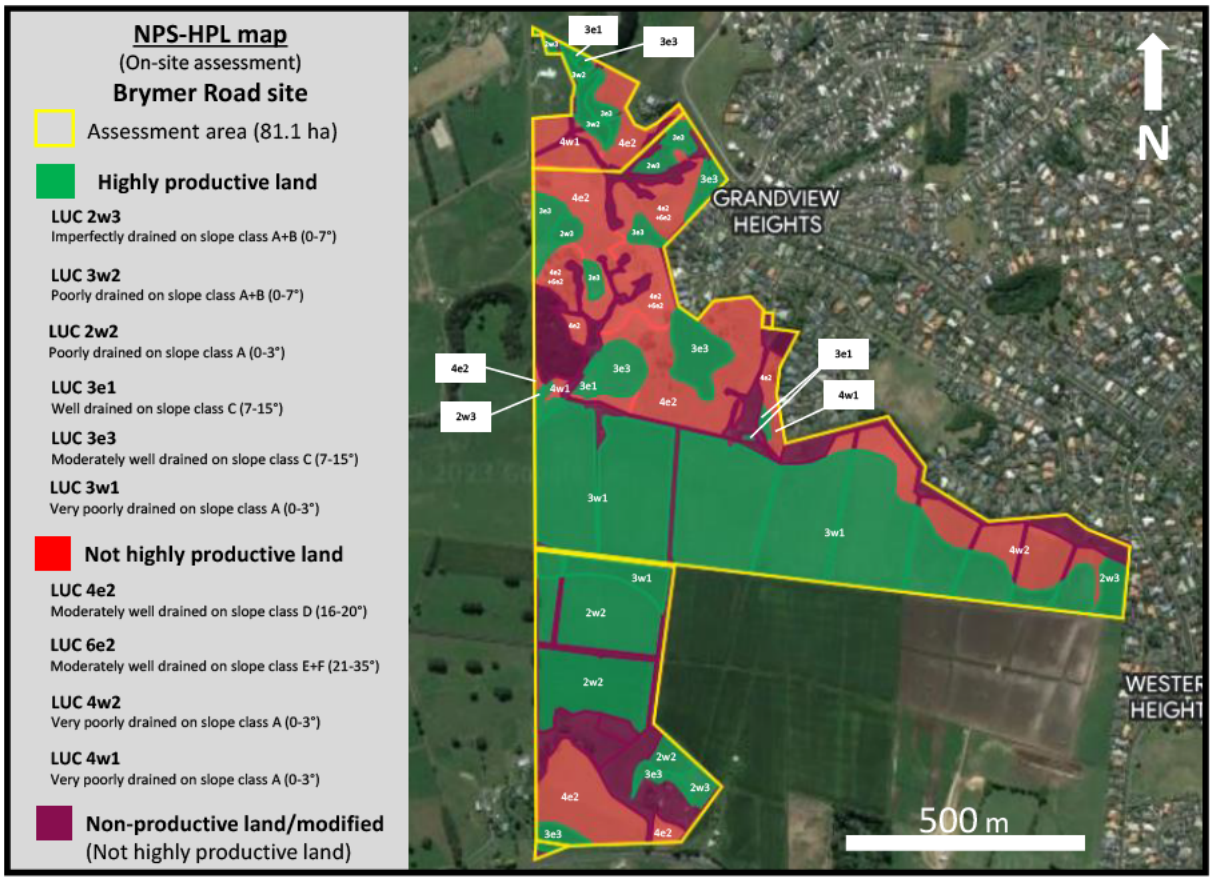


***Figure 7**. The distribution of NPS-HPL highly productive land, Brymer Road site.*

11. NPS-HPL comments

Although the land on the Brymer Road site does contain highly productive land when mapped at property scale, small areas of LUC 3e1, 3e3 and 2w3 are associated with the LUC 4e2 areas. In essence they are discrete areas of (LUC 1, 2, or 3) land separated from any large and geographically cohesive area of LUC 1, 2, or 3 land. Although not applicable while NPS-HPL Clause 3.5 is in place, NPS-HPL clause 3.4(5)(d) notes that these small, discrete areas of LUC 1, 2, or 3 land need not be included if they are separated from any large and geographically cohesive area of LUC 1, 2, or 3 land. Following completion of regional mapping and the implementation of Clause 3.4, these areas of LUC 3e1, 3e3 and 2w3 could be considered as not being NPS-HPL highly productive land.

The site has areas of non-productive land including wetlands, native vegetation, buildings and curtilage, tracks and earthworked areas with no remaining soil. These areas are classed as non-productive land and have been excluded from the classification of NPS-HPL highly productive land as they are no longer available for primary productive use.

Much of the highly productive land has soil wetness limitations that restrict the long term land use options for the site to summer cropping and pastoral use. Although drainage has been put in place, the land remains wet at least seasonally and in places where water drains from surrounding steep slopes, the wetness limitation is likely to be present throughout most of the year. Increased drainage of the Organic Soils (peat) can improve the soil drainage and provide increased availability of the land for productive use throughout a greater part of the year. However, over the long term, placement and deepening of drains

will cause increased subsidence of the peat land (loss of the peat soil and lowering of the soil surface).

The Brymer Road site does not contain any LUC class 1 land and the LUC class 2 land present has soil wetness limitations that reduce its productive capacity and range of land use options. The Brymer Road site could be considered for rural residential subdivision in preference to other land in the Waikato District with predominantly LUC classes 1-3 land which have higher productive capacity [mentioned in NPs-HPL clause 3.6(2)(c)].

12. Conclusions

The soils on the Brymer Road site consist of moderately well drained Hamilton clay loam formed in Hamilton ashes on rolling to steep slopes, imperfect to poorly drained Rotokauri clay loam on flat to undulating slopes, Kaipaki peaty loam, Rukuhia peat and an un-named humic silt loam on flat to gently undulating slopes. The balance of the site is classed as non-productive land.

Hamilton soils on rolling slopes (7-15°) are classified as LUC 3e3, on strongly rolling slopes (16-20°) LUC 4e2, and on steep slopes (21-35°) LUC 6e2.

Imperfectly drained Rotokauri soils on flat to undulating slopes (0-7°) is classified as 2w3 and poorly drained Rotokauri clay loam on the same slopes is classified as LUC 3w2.

Kaipaki soils with poor drainage on flat to gently undulating slopes (0-3°) are classified as LUC 2w2, and with very poor drainage (and prone to receiving water from the surrounding slopes) are classified as LUC 4w2.

Rukuhia peat with very poor drainage on flat to gently undulating slopes (0-3°) are classified as LUC 3w1.

The un-named humic silt loam with very poor drainage on flat to gently undulating slopes (0-3°) and prone to flooding is classified as LUC 4w1.

Applying the Proposed Waikato District Plan - Decisions Version definition for high class soil, the LUC 2w3 and 3e1 land is classified as high class soil. The LUC 2w2, 3w1, 3w2, 4e2, 4w1 and 6e2 land, and the non-productive land are not high class soil.

Applying the Operative Waikato District Plan definition for high class soil, the LUC 2w2, 2w3, 3e1 and 3e3 land is classified as high class soil. The LUC 2w3, 3w1, 3w2, 4e2, 4w1 and 6e2 land, and the non-productive land are not high class soil.

Applying the National Policy Statement for highly productive land, the LUC 2w2, 2w3, 3w1, 3e1 and 3e3 land is defined as highly productive land. The LUC 4e2, 4w1, 4w2 and 6e2 land and the non-productive land are not highly productive land.

Although the land on the Brymer Road site does contain highly productive land when mapped at property scale, the small areas of LUC 3e1, 3e3 and 2w3 are associated with the LUC 4e2 areas and individually have limited productive capacity.

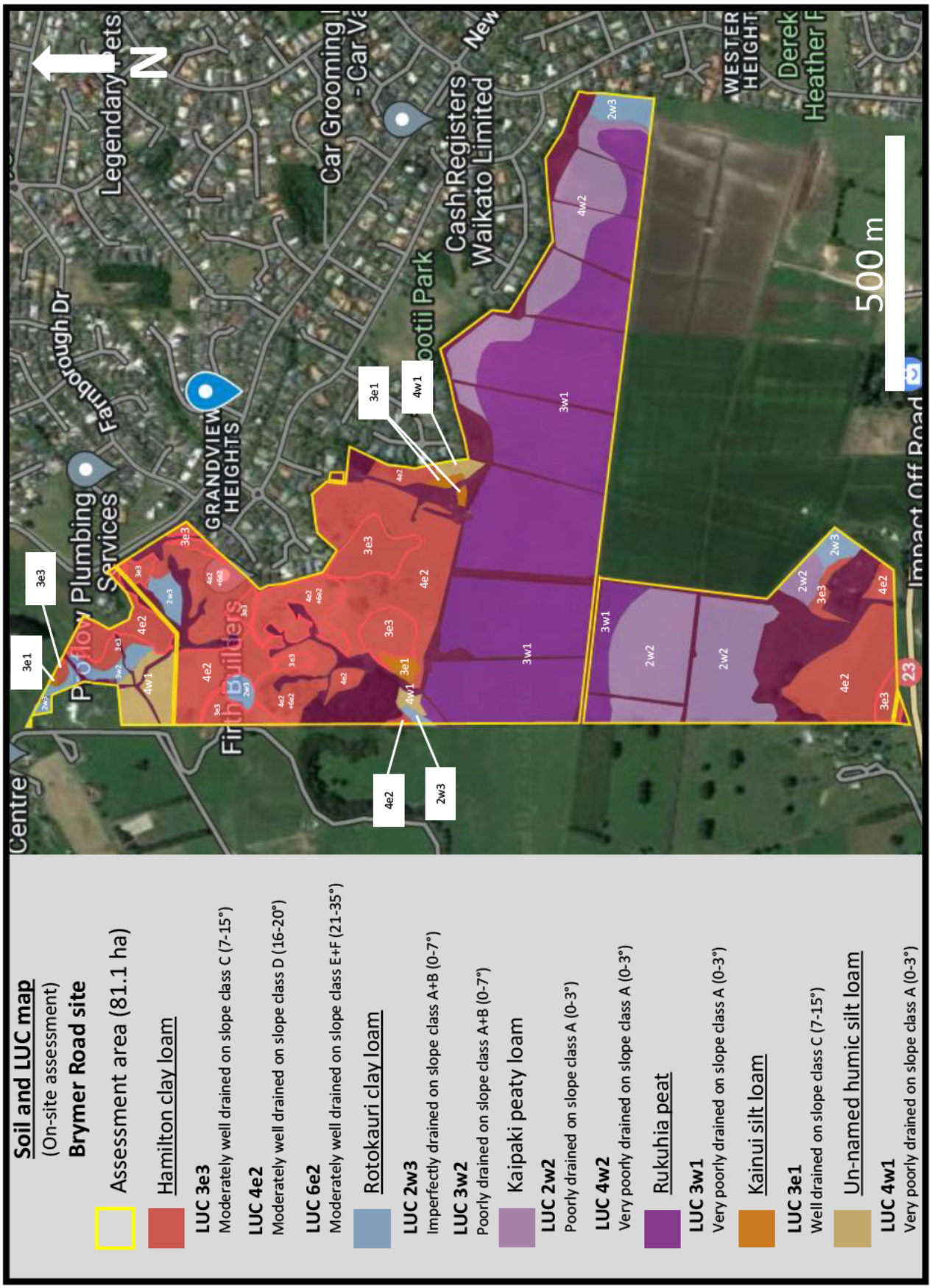
The site has areas of non-productive land including wetlands, native vegetation, buildings and curtilage, tracks and earthworked areas with no remaining soil. These areas are no longer available for primary productive use and are not considered highly productive land.

Much of the highly productive land has soil wetness limitations that restrict the long term land use options for the site to summer cropping and pastoral use. Although drainage has

been put in place, the land remains wet at least seasonally and in places where water drains from surrounding steep slopes, the wetness limitation is likely to be present throughout most of the year. Increased drainage of the Organic Soils (peat) over the long term, will cause increased subsidence of the peat land (loss of the peat soil and lowering of the soil surface).

The Brymer Road site could be considered for rural residential subdivision in preference to other land in the Waikato District with predominantly LUC classes 1-3 land which have higher productive capacity.

13. Enlarged map from Figure 4.



14. Enlarged map from Figure 5.

15. Enlarged map from Figure 6.

16. Enlarged map from Figure 7.