

Soil and Land Use Capability classification assessment

Brymer site, Rotokauri, Hamilton 3289



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Code of Conduct

Dr Reece Hill

Although this matter is not before the Environment Court, I confirm that I have read the Code of Conduct for Expert Witnesses outlined in the Environment Court's Practice Note (2023) (Code) and have complied with it in preparing this statement of evidence. If a hearing is held, I also agree to follow the Code when presenting evidence to the Panel.

I confirm that the issues addressed in this brief of evidence are within my area of expertise, except where I state that I rely upon the evidence of other expert witnesses. I also confirm that I have not omitted to consider material facts known to me that might alter or detract from my opinions.

1 Introduction

Landsystems undertook an on-site Land Use Capability (LUC) classification assessment of the Brymer site to confirm the soils and LUC units at property scale, the presence of Waikato District Plan-Operative in Part defined high class soils, and highly productive land as defined by the National Policy Statement for Highly Productive Land.

1.1 The Site and Project

The Brymer Site (the **Site**) covers approximately 81 hectares and is strategically located at the north-western urban edge of Hamilton City, immediately adjacent to the residential communities of Grandview Heights and Western Heights. The Site consists of five lots varying significantly in size, from 677m² to 57.917 hectares, cumulatively forming an extensive greenfield area intended for urban growth.

The Site is bordered to the northeast by Brymer Road and to the south by State Highway 23 (SH23) connecting Hamilton City to Raglan. It lies at the interface between Hamilton City's urban boundary and rural landscapes administered by the Waikato District Council.

The Site is characterised by challenging topography, with varied slopes that create a diverse but complex terrain. Slopes range from gentle gradients in the central-western and southern portions to steeper gradients elsewhere, necessitating specific geotechnical and structural engineering approaches.

Elevation ranges significantly across the Site, with areas of higher elevation providing potential panoramic views towards surrounding landscapes but also posing construction and servicing challenges.

The Site contains several prominent hydrological features including a major existing drain that runs east west across the Site, necessitating infrastructure solutions such as bridges or culverts.

There are also several existing natural wetlands and ponds, notably the central pond, which potentially would provide natural habitats that are ecologically sensitive, requiring protection and enhancement as part of urban development. Modified and ephemeral watercourses also traverse the Site, providing opportunities for ecological rehabilitation and biodiversity enhancement through careful design.

Accessibility to the Site is currently through Brymer Road and State Highway 23 currently provides limited vehicular access points into the Site.

The extent of the 81.0 ha Site is shown in the High-level Masterplan shown in **Figure 1**.



Figure 1: Site – High-level Masterplan for Brymer Site, Rotokauri, Hamilton 3289 (Brymer site indicated by red boundary).

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 Handbook¹ 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.

LUC Class	Arable cropping suitability†	Pastoral grazing suitability	Production forestry suitability	General suitability
1	High ↓ Low	High ↓ Low	High ↓ Low	Multiple use land
2				
3				
4				
5	Unsuitable	Low	Low	Pastoral or forestry land
6				
7				
8				
		Unsuitable	Unsuitable	Conservation land

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. 3rd edition. 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 National Policy Statement for Highly Productive Land 2022

The National Policy Statement for Highly Productive Land 2022 (NPS-HPL) came into force on the 17th of October 2022. The NPS-HPL was amended in December 2025, with amendments taking effect from 15 January 2026 (Ministry for the Environment, 2025).²

“Highly productive land” is defined as:

“...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).”

Landsystems' understanding is that 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. Under the December 2025 amendments, regional councils are not required to undertake mapping of highly productive land in regional policy statements prior to 31 December 2027 (clause 4.1(2)). Clause 3.5(7) (as amended) states:

(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:

(a) is

(i) zoned general rural or rural production at the commencement date; and

(ii) LUC 1, 2, or 3 land; but

(b) is not:

² Ministry for the Environment. 2022 (amended December 2025). National Policy Statement for Highly Productive Land 2022. New Zealand Government, Wellington.

- (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.*

The NPS-HPL includes the following definition of LUC 1, 2, or 3 land:

“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 in place at the commencement date that uses the Land Use Capability classification.”

For the Site, no council-accepted "more detailed mapping" was in place at the NPS-HPL commencement date of 17 October 2022. The relevant NZLRI mapping is therefore the NZLRI Land Use Capability 2021 accessed via the LRIS Portal³.

The December 2025 amendments added clauses 3.5(7)(b)(iii) and 3.6(6), both of which apply only to LUC 3 land. Clause 3.5(7)(b)(iii) excludes LUC 3 land from the interim highly productive land definition where it is subject to a resource consent application for subdivision, use or development for any activity other than rural lifestyle, lodged on or after 17 October 2022. Clause 3.6(6) provides that clauses 3.6(1) to 3.6(4) do not apply to urban rezoning of LUC 3 land.

Applying clause 3.5(7) to the Brymer Site, the relevant NZLRI mapping identifies LUC 2w2, LUC 2s5 and LUC 4e2 land, with no NZLRI-mapped LUC 3 land. The December 2025 amendments at clauses 3.5(7)(b)(iii) and 3.6(6), which are limited to LUC 3 land, therefore do not engage on the Site. The NZLRI-mapped LUC 2w2 and LUC 2s5 land is highly productive land for the purpose of clause 3.5(7). The NZLRI-mapped LUC 4e2 land falls outside the definition because it is not LUC 1, 2 or 3 land, and the NPS-HPL does not apply to that land.

The on-site assessment described in Sections 10 to 12 of this report was undertaken after the NPS-HPL commencement date. It is not relied on to redefine the extent of highly productive land under clause 3.5(7), which remains anchored to the NZLRI mapping in place at the commencement date. The on-site assessment is, however, a more detailed and current characterisation of the actual soils, slopes, drainage and other physical limitations across the Site, and is used in this report to support the WDP-OiP high class soil assessment and to inform the assessment of the Site's actual productive potential and limitations.

4 Waikato District Plan definition of high class soil

Under the Waikato District Plan-Operative in Part (WDP-OiP) definition, “High class soils” are defined as⁴:

³ <https://lris.scinfo.org.nz/layer/48076-nzlri-land-use-capability-2021/>

⁴ <https://eplan.waikatodistrict.govt.nz/>

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.

Note: The WDP-OiP definition uses Roman numerals (Classes I, II, III) consistent with the original Land Use Capability classification convention. This report uses Arabic numerals (Classes 1, 2, 3) consistent with the LUC Survey Handbook and most commonly used in LUC mapping now. The two are equivalent; for example, LUC Class IIIe1 in the WDP-OiP definition is the same as LUC 3e1 used elsewhere in this report.

5 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 where the soil has been modified by truncation, placement of fill or extensive mixing. Where these areas do not resemble a functioning soil, the areas are not considered to be available for primary production (i.e. they are non-productive land). Where these areas do resemble a functioning soil (such as the reinstatement of a soil profile following gravel extraction) the land can be assigned a LUC classification.

For this assessment the productive area of the Site (to which the LUC classification can be applied) is the Site area excluding non-productive land.

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

Based on the available NZLRI map information⁵ 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.

Based on the available NZLRI LUC map information, and applying the WDP-OiP definition for high class soil, LUC 2w2, 2s5 and LUC 4e2 are not high class soil.

The distribution of the NZLRI LUC map units and their soils for the Site is shown in **Figure 3**.

⁵ <https://iris.scinfo.org.nz/layer/48136-fsl-north-island-all-attributes/>; <https://iris.scinfo.org.nz/layer/48076-nzlri-land-use-capability-2021/>.

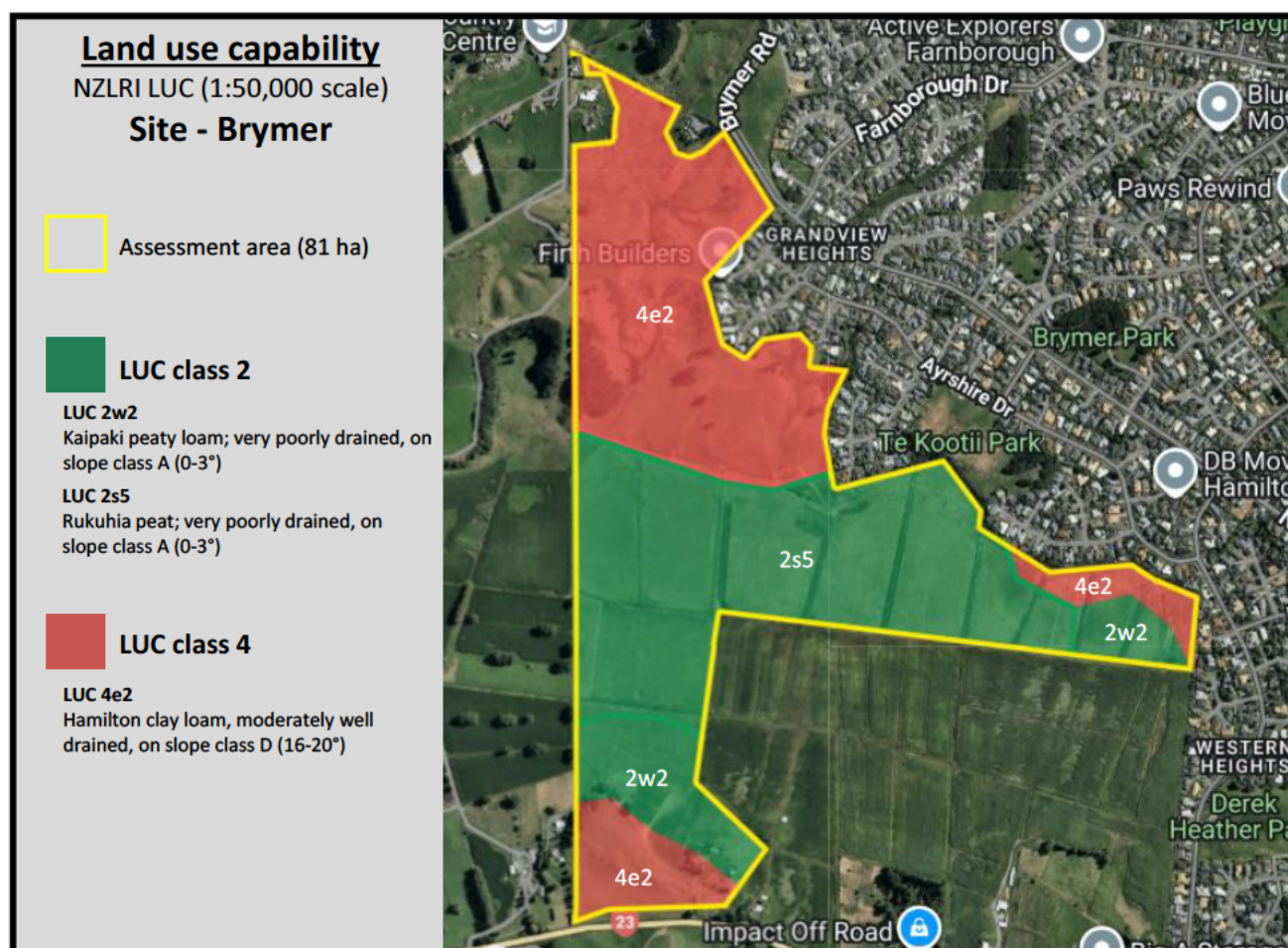


Figure 3: Distribution of the NZLRI LUC map units for the Site.

7 S-Map Online Soil map information

The S-Map soil map information is sourced from S-Map Online and is mapped at 1:50,000 scale. S-Map soil polygons are only available on the S-Map Online website. The soil names for each map unit are 'soil siblings', with a probability of occurrence (%) and certainty rating provided for each soil sibling in a map unit.

S-Map Online identified the majority of the soils for the Site as Gley Soil (31%), followed by Granular Soil (18%), Organic Soil (18%), Brown Soil (15%) and Allophanic Soil (less than 1%) (Figure 4 and Table 2).

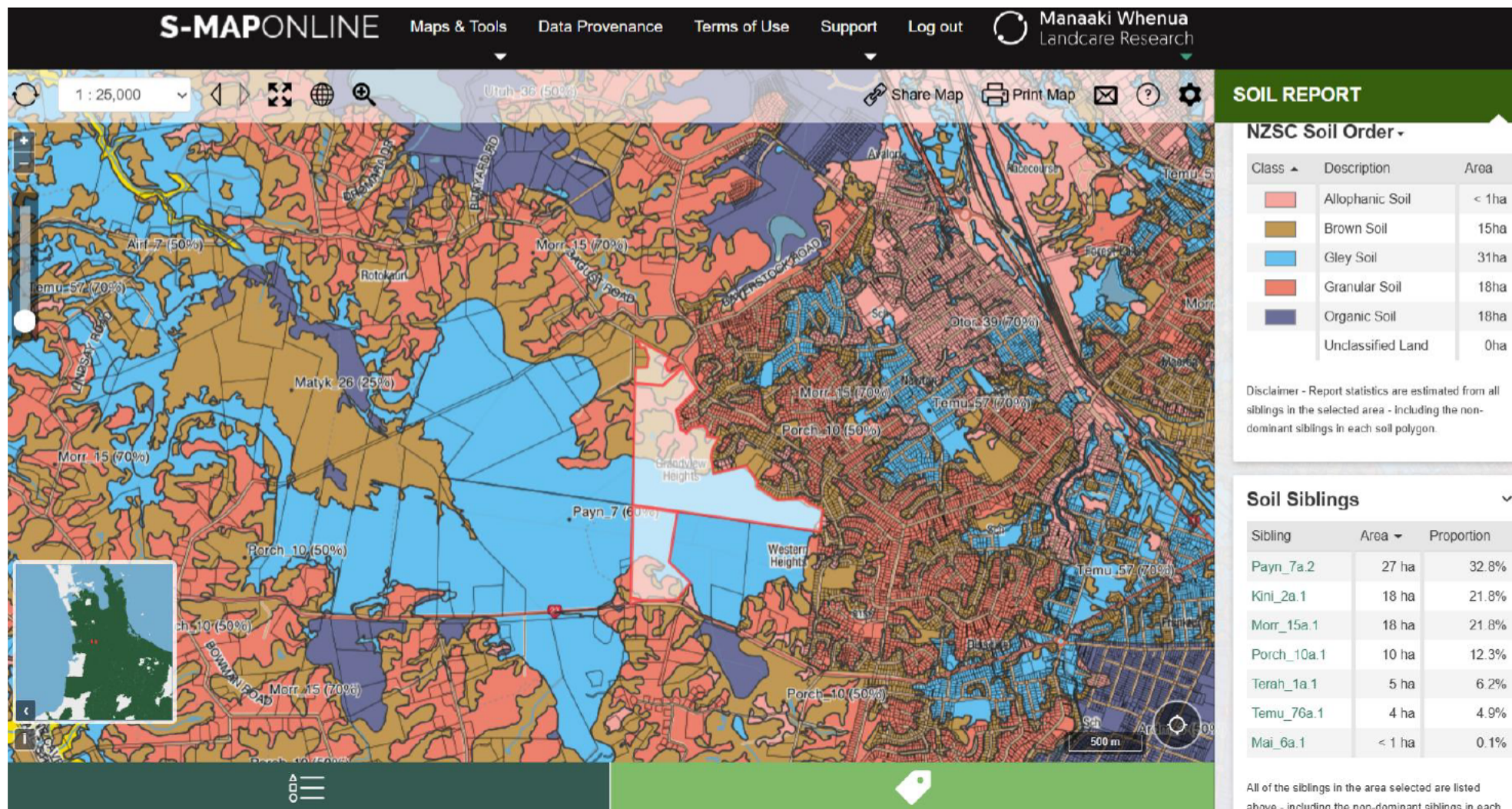


Figure 4: S-Map soil (Soil Order and soil sibling) distributions for the Site.

Table 1 provides a summary of the S-Map soil sibling map unit characteristics, including S-Map Family, S-Map Sibling, correlating Soil Series name, NZSC Soil Order, soil drainage, and their approximate proportions, for the Site. All soils are deep (> 100 cm), have either silt loam or clay loam textures, with variable drainage. This information is derived from S-Map Online factsheets and can be sourced from the S-Map Online website⁶.

Table 1. S-Map soil sibling map unit characteristics for the Site.

S-Map Family	S-Map Sibling	Soil Series name	NZSC (Soil Order)	Soil drainage	Proportion (%)
Paynter	Payn_7a.2	Te Rapa	Gley (GOO)	Very poorly drained	32.8
Kini	Kini_2a.1	Kaipaki	Organic (OMA)	Very poorly drained	21.8
Morrinsville	Morr_15a.1	Hamilton	Granular (NOT)	Moderately well drained	21.8
Porchester	Porch_10a.1	Rotokauri	Brown (BOM)	Imperfectly drained	12.3
TeRahu	Terah_1a.1	Ohaupo	Brown (BOT)	Moderately well drained	6.2
Temuka	Temu_76a.1	Rotokauri	Gley (GOT)	Poorly drained	4.9
Mairoa	Mai_6a.1	Ohaupo	Allophanic (LOT)	Well drained	0.1

The S-Map soil map information provides a more spatially detailed representation of the soils on the Site than the NZLRI 1:50,000 soil map information. However, because of the absence of land characteristics information (e.g. slope) for the soil map units, there is currently no direct correlation with LUC units. Some, but not all, of the S-Map soil map units correlate to the soil series identified by the NZLRI map information. In this report, we have retained the DSIR's soil nomenclature (e.g. soil type and series names) in preference to the S-Map soil sibling nomenclature to allow for direct correlation of the soils with the LUC units provided by the NZLRI map information and associated NZLRI Extended Legends.

8 NPS-HPL assessment based on regional map information

Based on the available 1:50,000 scale NZLRI information and applying the NPS-HPL, LUC 2w2 and 2s5 land is considered highly productive land (**Figure 5**). The NPS-HPL does not apply to the areas of LUC 4e2 land.

⁶ <https://smap.landcareresearch.co.nz/maps-and-tools/app/>

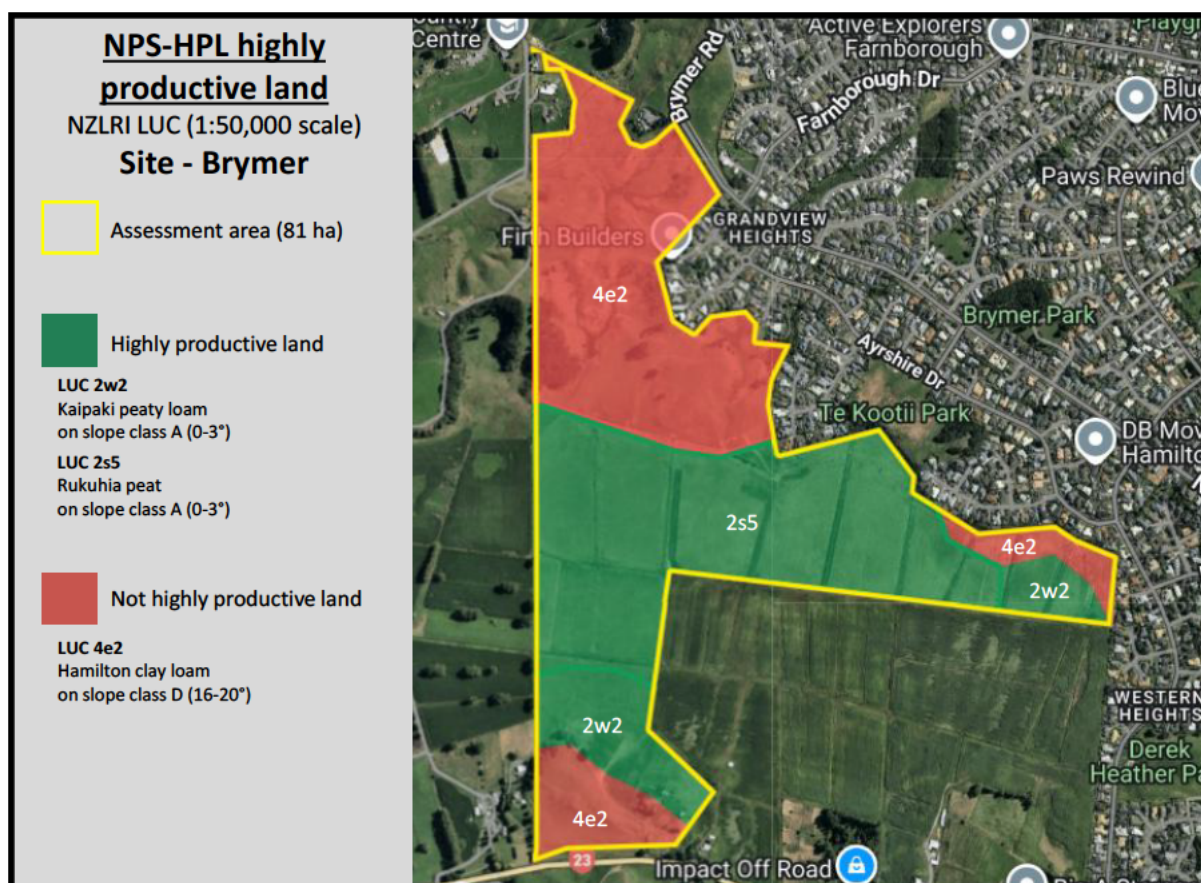


Figure 5: The distribution of NPS-HPL highly productive land for the Site (green), based on regional scale NZLRI LUC map information⁷.

9 Regional scale map information limitations

The LUC classification can be applied (mapped) at any scale and regional scale LUC map units can differ from those identified at property scale. Property scale mapping is typically mapped at a scale between 1:5,000 and 1:15,000, while catchment and regional maps are generally mapped at 1:50,000 scale. The LUC Handbook sets out recommended mapping scales for inventory surveys and LUC mapping (p100).

Mapping LUC at a property scale can identify different LUC units (and map units) than depicted by regional scale LUC mapping. This is because property scale mapping includes more observations compared with regional scale mapping.

Soil and LUC maps are usually drawn at a specific scale depending on the smallest area of interest for a particular use and the density of field observations. For example, a 1:5,000 scale map requires on average four observations/ha while a 1:50,000 scale map requires 0.04 observations/ha (or four observations per 100 ha). With GIS tools and geospatial databases, it has become easy to manipulate maps, creating the temptation to rescale a map beyond its original scale of collection. Enlarging maps from their original scale will not provide the same

⁷ <https://lris.scinfo.org.nz/layer/48136-fsl-north-island-all-attributes/>; <https://lris.scinfo.org.nz/layer/48076-nzlri-land-use-capability-2021/>

accuracy or contain more detail than a coarse scale map. This is because they are not based on sufficient field observations to delineate soil map units at the finer scales portrayed. For the regional scale LUC map information, map unit boundaries may not align with the topography (slope) and other geographic features (such as rivers or terraces). Therefore, to correctly identify and map the LUC units at property scale, assessment using the LUC classification criteria described in the LUC Handbook is required.

The 1:50,000 scale NZLRI data provides good foundational physical information for regional planning. However, its use as a definitive map requires an appropriate scale. For the objective of assessing soil resources, land use capability, and informing land productivity, the on-site assessment is the most accurate and fit-for-purpose method for providing the necessary soil and LUC information.

10 On-site soil and LUC classification assessment

10.1 Method

Landsystems undertook a detailed on-site soil and LUC assessment of the 81 ha Site according to standard methods (Milne et al., 1995⁸ and Lynn et al., 2009⁹). The on-site assessment was undertaken on 8-9th December 2022, with an additional assessment undertaken on 8th November 2025.

The on-site mapping does not constitute a detailed soil survey rather the focus is on characterisation of soil and land properties to apply the LUC classification, in turn used to determine the extent of NPS-HPL highly productive land on the Site. However, recorded soil properties are used to identify limitations that may affect the productivity of the Site.

The on-site assessment included soil observations by hand auger across the Site using a free survey approach. Approximately 40 soil auger observations (excluding additional observations for checking boundaries) were used to determine the LUC map units. A higher proportion of observations were undertaken on the Site area with potential high class soils.

Observations of slope angle, topography and soil parent material were made over the relevant area. Soil augering up to 100 cm depth was used to assess soil properties such as soil horizons, drainage, plant root depths, depth to gravels, soil texture, structure, and colour.

All soils were assessed in current condition and areas with modified soils and areas considered to be non-productive land were identified and mapped. Soil series and types have been used for this report (as opposed to S-Map Soil Siblings) to provided clearer correlation with LUC units provided by the regional NZLRI LUC map information. LUC classification was assigned based on the criteria provided in Lynn et al. (2009). LUC units were assigned based on the closest fitting LUC unit provided by the regional NZLRI LUC map information.

⁸ Milne JDG, Clayden B, Singleton P.L, Wilson AD. 1995. Soil Description Handbook. Lincoln, New Zealand, Manaaki Whenua Press. 157p.

⁹ 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.

10.2 Mapping scale

The number of soil auger observations across the 81 ha Site equated to an observation density of one observation per 2 ha. Considering the Site area as a whole, this density of observations (using conventional mapping techniques) is sufficient to support an approximate map scale of 1:10,000 to 1:15,000.¹⁰

11 On-site soil and LUC classification

The soils in the northern part of the Site consisted of moderately well drained Hamilton clay loam formed in Hamilton ashes and small inclusions of moderately well drained Kainui silt loam on the rolling to steep slopes (LUC 3e1, 3e3, 4e2 and 6e2), with imperfect to poorly drained Rotokauri clay loam on the lower flat to undulating slopes (LUC 2w3 and 3w2).

The central to southern flat to gently undulating topography within the Site was predominantly Organic soils (Kaipaki loamy peat and Rukuhia peat) with LUC classifications of LUC 2w2, 3w1 and 4w2 with poorer soil drainage. The very poorly drained soil of the LUC 4w2 unit was classified as a shallow variant of Kaipaki loamy peat, with very reduced (often blue-green) colours in the subsoil indicating very poor and impeded drainage, possibly accentuated by surface and subsurface water from the surrounding hills.

Hamilton and Rotokauri soils formed in Hamilton ashes were also present on the southern undulating to strongly rolling topography of the Site. Small areas of a 'humic' Gley soil (LUC 4w1) and an area of shallow modified (Anthropic) soils (LUC 4s) were also present, but were very localised.

The balance of the Site was classed as non-productive land, comprising a mix of buildings and curtilage, excavated drains, wetlands and seeps, ponds, tracks, native vegetation and earthworked areas. A summary of the on-site mapped LUC units and dominant soils for the Site is provided in **Table 2**.

¹⁰ Grealish G. 2017. New Zealand soil mapping protocols and guidelines. Envirolink Grant: C09X1606. Manaaki Whenua –Landcare Research.

Table 2. Summary of the LUC units and dominant soils identified for the Site.

Soil type (NZSC Soil order)	Parent material	Soil drainage	Slope class	LUC unit	(LUC limitation) and comment
Kaipaki loamy peat (Organic)	Peat over alluvium	Poorly drained	A (0 - 3°)	2w2	(w) Poor drainage despite drains, prone to high water table
Rotokauri clay loam (Gley)	Hamilton ashes colluvium	Imperfectly drained	A+B (0 - 7°)	2w3	(w) Seasonal wetness limitation
Kainui silt loam ¹ (Allophanic) ²	Tephra on Hamilton ashes	Well drained	C (8 - 15°)	3e1	(e) Rolling slopes with slight to moderate erosion potential when cultivated
Hamilton clay loam (Granular)	Hamilton ashes	Moderately well drained	C (8 - 15°)	3e3	(e) Rolling slopes with slight to moderate erosion potential when cultivated
Rukuhia peat (Organic)	Peat	Poorly drained	A (0 - 3°)	3w1	(w) Poor drainage despite drains, prone to high water table
Rotokauri clay loam (Gley)	Hamilton ashes colluvium	Poorly drained	A+B (0 - 7°)	3w2	(w) Annual wetness limitation, prone to high water table and runoff from hills
Hamilton clay loam (Granular)	Hamilton ashes	Moderately well drained	D (16 - 20°)	4e2	(e) Steep slopes with moderate to high erosion potential
Un-named humic (Gley) soil	Mixed alluvium	Very poorly drained or winter inundation	A (0 - 3°)	4w1	(w) Prone to surface water or flooding, rushes
Kaipaki loamy peat (Organic)	Peat over alluvium	Poorly drained (impeded)	A (0 - 3°)	4w2 ³	(w) Poor drainage despite drains, surface ponding, prone to high water table and runoff from hills
Hamilton hill soil (Granular)	Hamilton ashes	Moderately well drained	E+F (0 - 7°)	6e2	(e) Steep slopes with variable soil depth and severe erosion potential
(Anthropic) soil	Mixed fill	Imperfectly drained	A+B (0 - 7°)	4s	Minimal topsoil over mixed fill including gravel
Non-productive land/modified soil	-	-	-	-	Buildings and curtilage, excavated drains, wetlands and seeps, ponds, tracks, native vegetation areas, earthworked areas.

¹ McLeod M. 1984. Soils of the Waikato Lowlands. Soil Bureau District Office Report HN 11. DSIR, New Zealand; ² Based on field classification; ³Jessen, MR. 1992. Waikato LUC units correlated. Unpublished file note, Land Resources Division, DSIR.

Example soil profiles observed for the Site are shown in **Figure 6**. The soil profiles should be considered example soil profiles (modal soil profiles) as the actual soil observed in the field at any given point may differ slightly from the example shown.

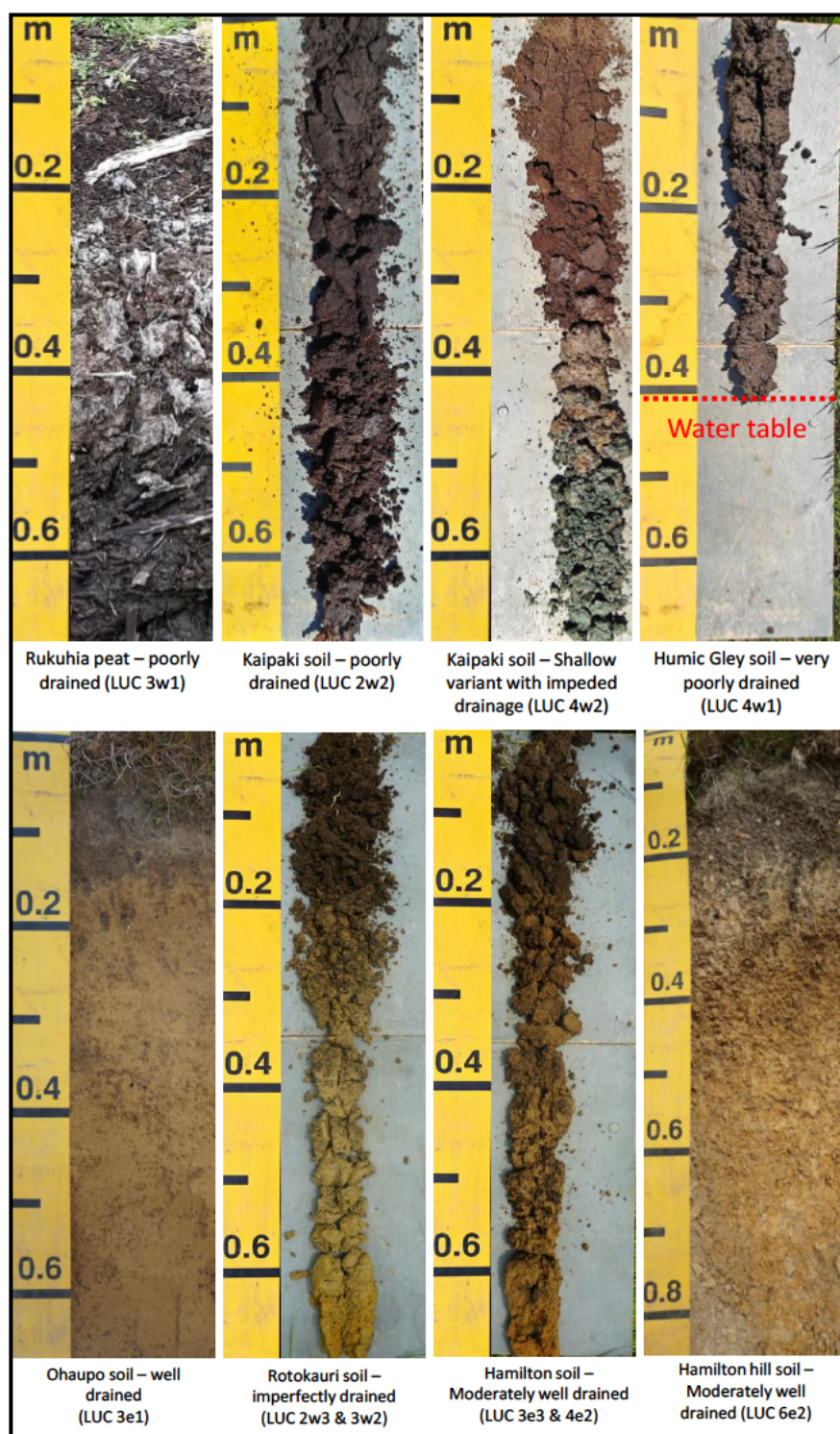


Figure 6: Example soil profiles of the dominant soils identified for the Site.

Figure 7 shows examples of the dominant LUC units and areas of non-productive land for the Site.

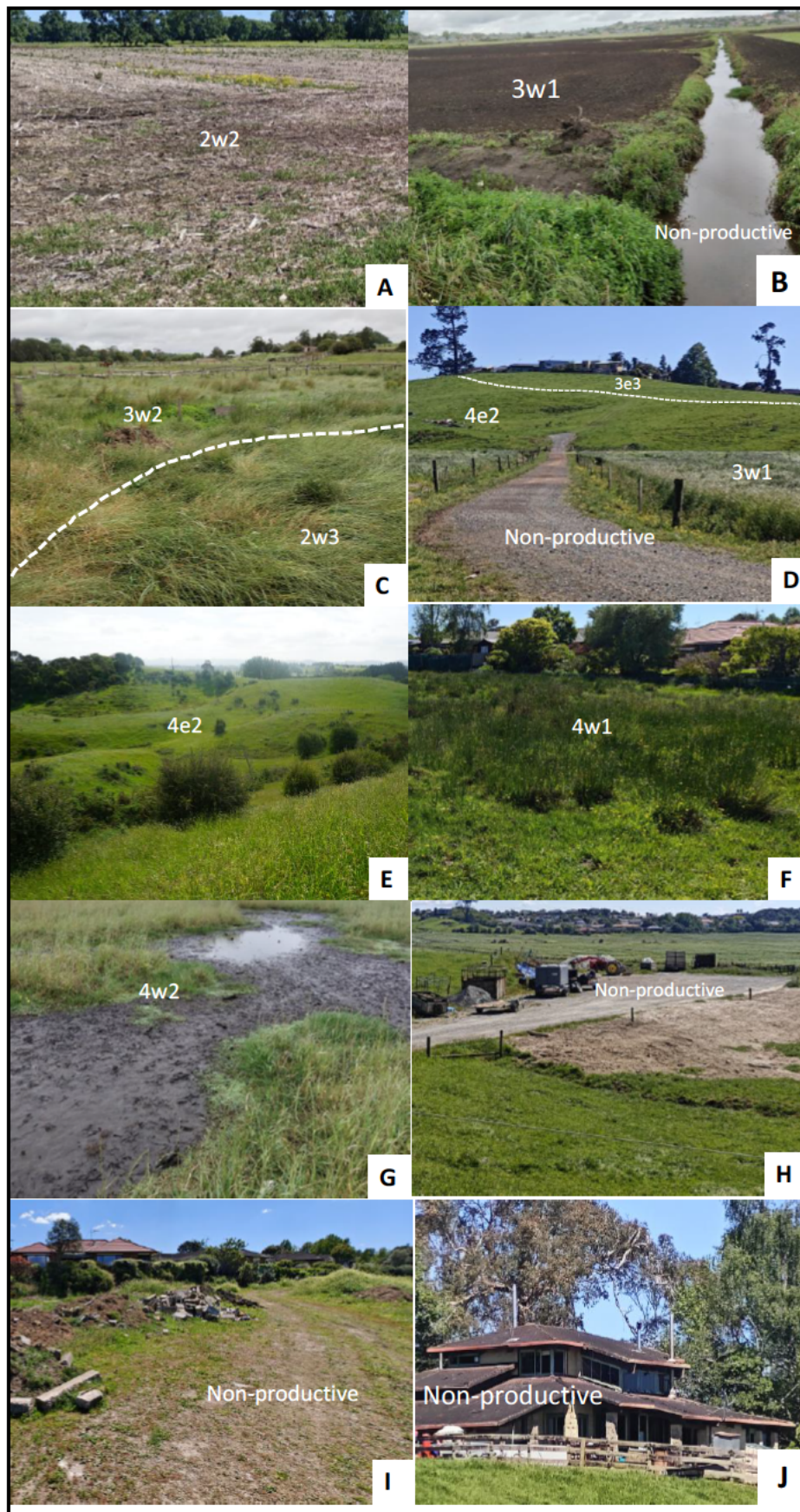


Figure 7: Examples of the LUC units and areas of non-productive land; A) 2w2; B) 3w1; C) 3w2 and 2w3; D) 3e3, 4e2 & 3w1; E) 4e2; F) 4w1; G) 4w2; H) to J) Non-productive land.

The on-site mapped distributions of soils and LUC units for the Site are shown in Figure 8 and Figure 9 respectively.

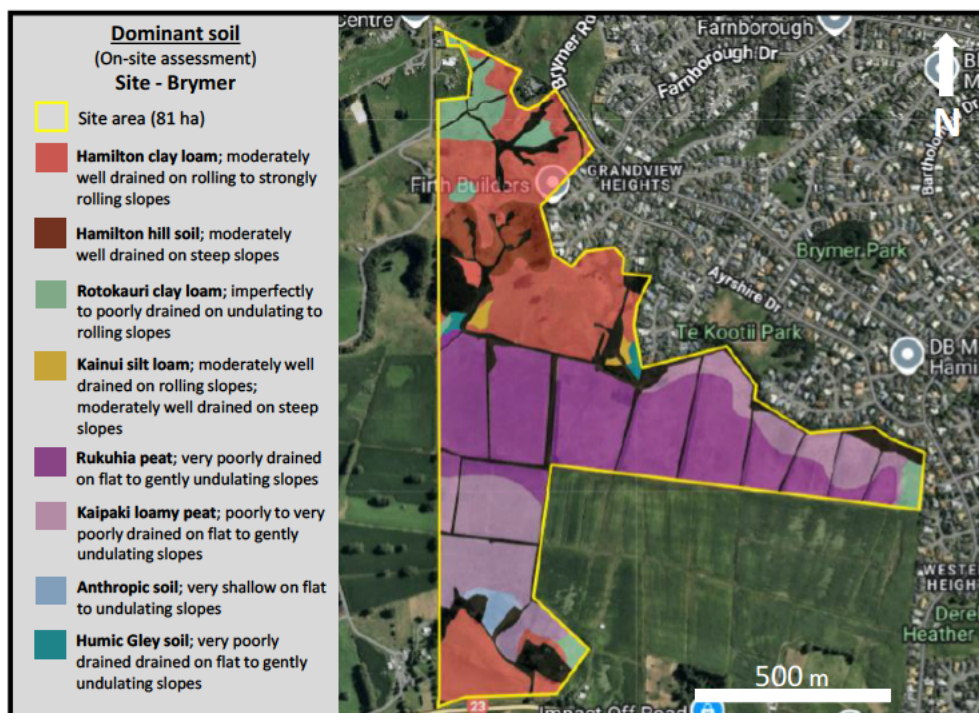


Figure 8: On-site mapped distribution of the dominant soils for the Site.¹¹

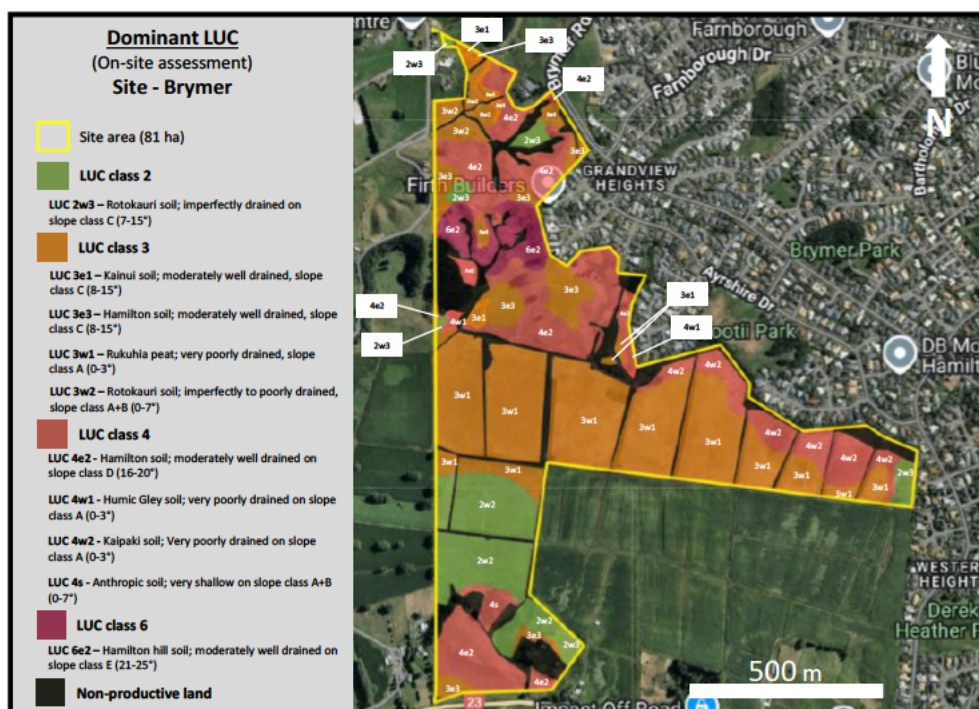


Figure 9: On-site mapped distribution of the dominant LUC map units for the Site.¹²

¹¹ A larger map image is provided in Appendix 1.

¹² A larger map image is provided in Appendix 2.

12 On-site WDP-OiP high class soil classification

The LUC map units for the Site are further classified according to the WDP-OiP high class soil definition (Table 5).

Table 5. WDP-OiP high class soil for the Site based on the on-site mapped LUC map units.

LUC unit (dominant)	High class soil (WDP-OiP)	Area ha*, (%) [§]
2w3	High class soil	2.1 (2.6)
3e1	High class soil	0.4 (0.6)
High class soil total		High class soil = 2.5 (3.2)
2w2 (Organic soil)	Not high class soil	8.6 (10.6)
3e3	Not high class soil	5.5 (6.8)
3w1 (Organic soil)	Not high class soil	25.5 (31.5)
3w2	Not high class soil	1.9 (2.3)
4e2	Not high class soil	15.1 (18.6)
4w1	Not high class soil	0.5 (0.6)
4w2 (Organic soil)	Not high class soil	4.8 (5.9)
4s	Not high class soil	0.7 (0.9)
6e2	Not high class soil	3.3 (4.1)
NPL [#]	Not high class soil	12.5 (15.4)
Not high class soil total		Not high class soil = 78.4 (96.8)

* Rounded to 1 decimal place; [§] % rounded to 1 decimal place; [#] NPL = Non-productive land.

Detailed on-site assessment showed 3.2% of the Site as high class soil (LUC 2w3 and 3e1) and 96.8% as not being high class soil. The Site area not classified as high class soil included LUC 2w2, LUC 3e3, LUC 3w1, LUC 3w2, LUC 4e2, LUC 4w1, LUC 4w2 and LUC 6e2, and non-productive areas.

Figure 10 shows the on-site mapped distribution of WDP-OiP defined high class soil for the Site.

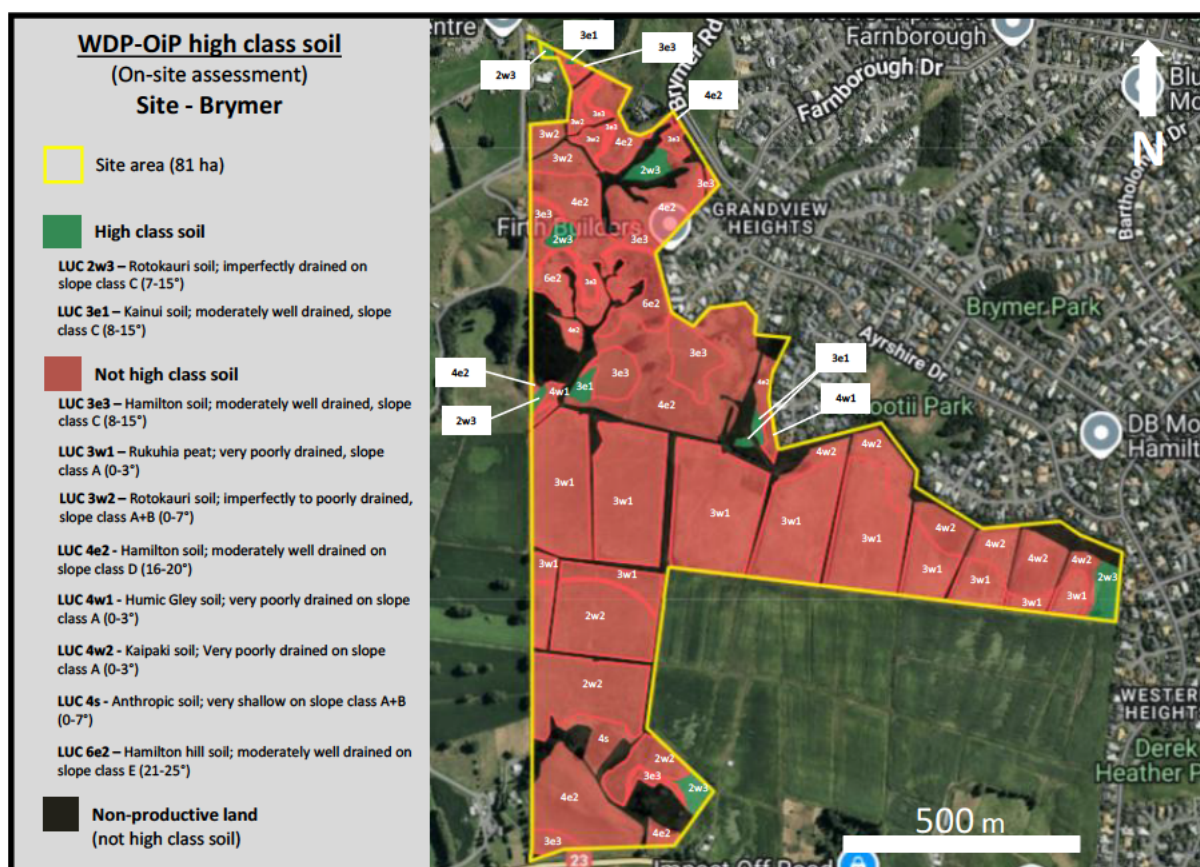


Figure 10: On-site mapped distribution of WDP-OiP defined high class soil for the Site.¹³

13 LUC limitations and productive capacity

13.1 High class soil

Although the land on the Site does contain WDP-OiP defined high class soil (LUC 2w3 and 3e1) when mapped at property scale, the areas of LUC 3e1 and 2w3 are either small in area or associated with the LUC 4e2 areas. In essence they are discrete areas of (LUC 2 or 3) land separated from any large and geographically cohesive area of high class soil. From a practical land use perspective, they are not sufficient in size to be separately managed any different to the surrounding LUC units, essentially, they are inclusions within the more extensive surrounding LUC units.

13.2 Soil wetness

Much of the land on the Site (48% of the Site area) has soil wetness limitations (LUC 2w2, 2w3, 3w1, 3w2, 4w1 and 4w2) that restrict the long term land use options for the Site to primarily pastoral land uses with lighter or no stocking during wetter periods, with rotational arable use only potentially viable in drier months. Although drainage has been put in place, the land remains wet at least seasonally (winter through spring) and in places where water drains from surrounding steep slopes, the wetness limitation is likely to be present

¹³ A larger map image is provided in Appendix 3.

throughout most of the year. Observations of the LUC 4w2 and 3w1 land (with drained Organic soils) and LUC 4w1 and 3w2 land in December 2023 (early summer), indicated that soil wetness was still preventing machinery access and arable use.

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).

13.3 Slope and erosion

Land classified as LUC 3e3, 3e1, 4e2 has slopes posing a slight moderate or high erosion risk under cultivation. LUC 6e2 land has a moderate erosion hazard under perennial vegetation. Given the fragmented distribution of the LUC class 3 land with respect to the LUC 4e2 and LUC 6e2 land, cropping is not practically feasible and the land is best suited to pastoral use, production forestry or conservation.

13.4 Shallow soil

There is a small area of Anthropogenic (modified) soil (LUC 4s) with very shallow soil depth. This land is not suitable for cropping but is capable of supporting lower quality pasture.

13.5 Non-productive land

The Site has areas of non-productive land including buildings and curtilage, excavated drains, wetlands and seeps, ponds, tracks, native vegetation areas and earthworked areas with no remaining intact soil. These areas are classed as non-productive land and have been excluded from the productive land area of the Site as they are no longer available for primary productive use.

14 Conclusions

Applying the National Policy Statement for highly productive land, which relies on the regional scale NZLRI LUC map information, the LUC 2w2 land is defined as highly productive land and the LUC 4e2 land is not highly productive land (i.e. the NPS-HPL does not apply to the LUC 4e2 land).

Based on the on-site assessment, the soils on Site consist of moderately well drained Hamilton clay loam formed in Hamilton ashes on rolling to steep slopes, small occurrences of moderately well drained Kainui silt loam, imperfect to poorly drained Rotokauri clay loam on flat to undulating slopes, Kaipaki loamy peat, 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 and Kainui soils on rolling slopes (7-15°) are classified as LUC 3e3 and 3e1 respectively, Hamilton soils 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 (Organic soil) 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 (Organic soil) with very poor drainage on flat to gently undulating slopes (0-3°) are classified as LUC 3w1.

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

Based on the on-site LUC mapping, and applying the WDP-OiP definition for high class soil, the LUC 2w3 and 3e1 land is classified as high class soil. The LUC 2w2, 3w1, 3w2, 4e2, 4w1, 4w2 and 6e2 land, and the non-productive land are not high class soil.

Although the land on the Site does contain high class soil when mapped at property scale, the areas of LUC 2w3 and 3e1, individually, are small in size and from a practicable land use perspective, land use is limited by the limitations of the surrounding LUC units.

Much of the highly productive land (around half of the Site area) has soil wetness limitations that restrict the long term land use options to summer cropping and pastoral use. Although drainage has been put in place, the land remains wet at least seasonally and in places, 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).

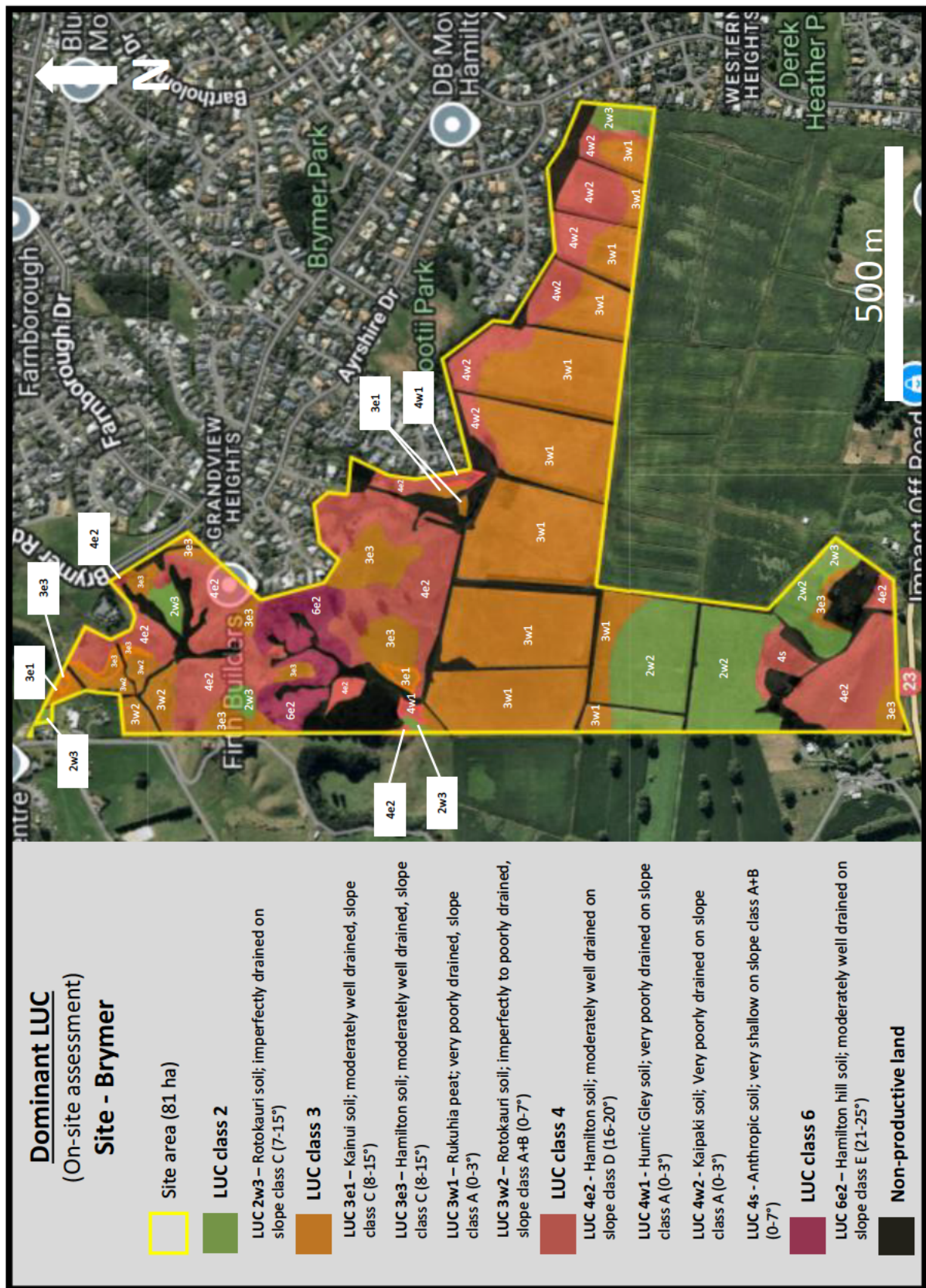
For the sloping land with moderate to high erosion risk (LUC 3e1, 3e3, 4e2 and 6e2), the most suitable long term land uses are pastoral use, production forestry, or conservation.

The areas of non-productive land include wetland areas and seeps, native vegetation, buildings and curtilage, tracks and earthworked areas. These areas are no longer available for primary productive use and are not considered productive land.

Appendix 1: Enlarged map from Figure 8.



Appendix 2: Enlarged map from Figure 9.



Appendix 3: Enlarged map from Figure 10.

