

Soil and Land Use Capability classification assessment

SL1 Residential



Prepared for:	SL1 Consortium (SL1C)
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Introductory statements

This assessment has been prepared as an expert report for a substantive application under the Fast-track Approvals Act 2024. Dr Tanya O'Neill undertook the on-site soil and land use capability assessment on 5 and 6 June 2025, comprising 187 soil observations, and prepared the draft report. Dr Reece Hill undertook subsequent revisions, including the land use capability classification, the NPS-HPL clause 3.5(7) analysis, and the Waipā District Plan high class soil assessment. Both authors have reviewed this report in full. Each is responsible for the content within their area of expertise as set out in the statements below.

This report does not constitute a detailed highly productive land assessment. It provides the soil and LUC information that such an assessment relies on, including for the matters in clause 3.10 of the NPS-HPL: the productive capacity of the Residential Site and the physical constraints on that capacity.

Dr Tanya O'Neill

I am Dr Tanya O'Neill, soil and land consultant and director of Soil Synergy Limited, based in Hamilton. I am engaged by BeatsonHill Limited trading as Landsystems to undertake soil and land use capability assessment work, including the on-site assessment described in this report. I hold a PhD in Earth Sciences from the University of Waikato (2013), a Master of Science with First Class Honours in Earth Sciences from Massey University (2006), and a Bachelor of Science with First Class Honours in Earth Sciences from Massey University (2003).

I am a qualified pedologist. I lectured and taught in soil science at the University of Waikato from 2015 to 2023, latterly as a Senior Lecturer in the School of Science, including courses in soil science, soil and water management, and soil resources and risks. I have undertaken consultancy work since 2016 alongside my academic role, including ongoing environmental consultancy for the Scott Base Redevelopment in Antarctica since 2018, and have practised full-time as an independent soil and land consultant since 2023. My work covers soil characterisation and mapping, soil quality monitoring, land use capability assessment, and geographic information system mapping. I have undertaken property scale soil and LUC assessments in the Waikato, Auckland, Wellington, South Canterbury and Otago regions. I have been a member of the New Zealand Society of Soil Science since 2008 and an Executive Council member since 2018.

Dr Reece Hill

I am Dr Reece Hill, principal of BeatsonHill Limited trading as Landsystems, a soil science and land use capability consultancy based in Hamilton. I hold a PhD in Soil Science from Lincoln University (2000), a Master of Applied Science in Soil Science from Lincoln University (1994), and a Bachelor of Science from the University of Waikato (1988). I have 19 years' experience as a soil scientist at Waikato Regional Council and have practised as an independent soil consultant since March 2018. I am a current member and past President (2014 to 2016) of the New Zealand Society of Soil Science.

My work covers soil characterisation and mapping, land use capability assessment, highly productive land assessment under the National Policy Statement for Highly Productive Land 2022, and regional soil quality monitoring. I have undertaken property scale soil and LUC assessments in the Northland, Auckland, Waikato, Bay of Plenty, Hawke's Bay, Wellington, Tasman and Otago regions. I have prepared soil and land use capability reports supporting resource consent applications, plan changes and fast-track consenting applications, and have given expert evidence at council hearings and in the Environment Court.

Code of Conduct

Dr Tanya O'Neill

I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023 and referred to in the Fast-track Approvals Act 2024: Panel Convenors' Practice and Procedure Guidance. This assessment has been prepared in compliance with that Code. The information I present is within my area of

expertise, except where I state that I am relying on information provided by another party. I have not knowingly omitted facts or information that might alter or detract from opinions I express.

Dr Reece Hill

I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023 and referred to in the Fast-track Approvals Act 2024: Panel Convenors' Practice and Procedure Guidance. This assessment has been prepared in compliance with that Code. The information I present is within my area of expertise, except where I state that I am relying on information provided by another party. I have not knowingly omitted facts or information that might alter or detract from opinions I express.

1. Introduction

This report has been commissioned to understand the soil and Land Use Capability (LUC) classifications present on the Residential Site, the productive and non-productive capacity of the Residential Site and any modified soils present.

Landsystems undertook a soil and LUC classification assessment of a 46.0 ha area (Lot 1 DPS 51518, Part Lot 2 DP 25668, and Lot 2 DP 589463) Saxbys Road, Hamilton 3206, referred to in this report as the Residential Site (Figure 1). The purpose of the assessment was to confirm the soils and LUC units at property scale. The assessment included desktop and on-site assessment components.

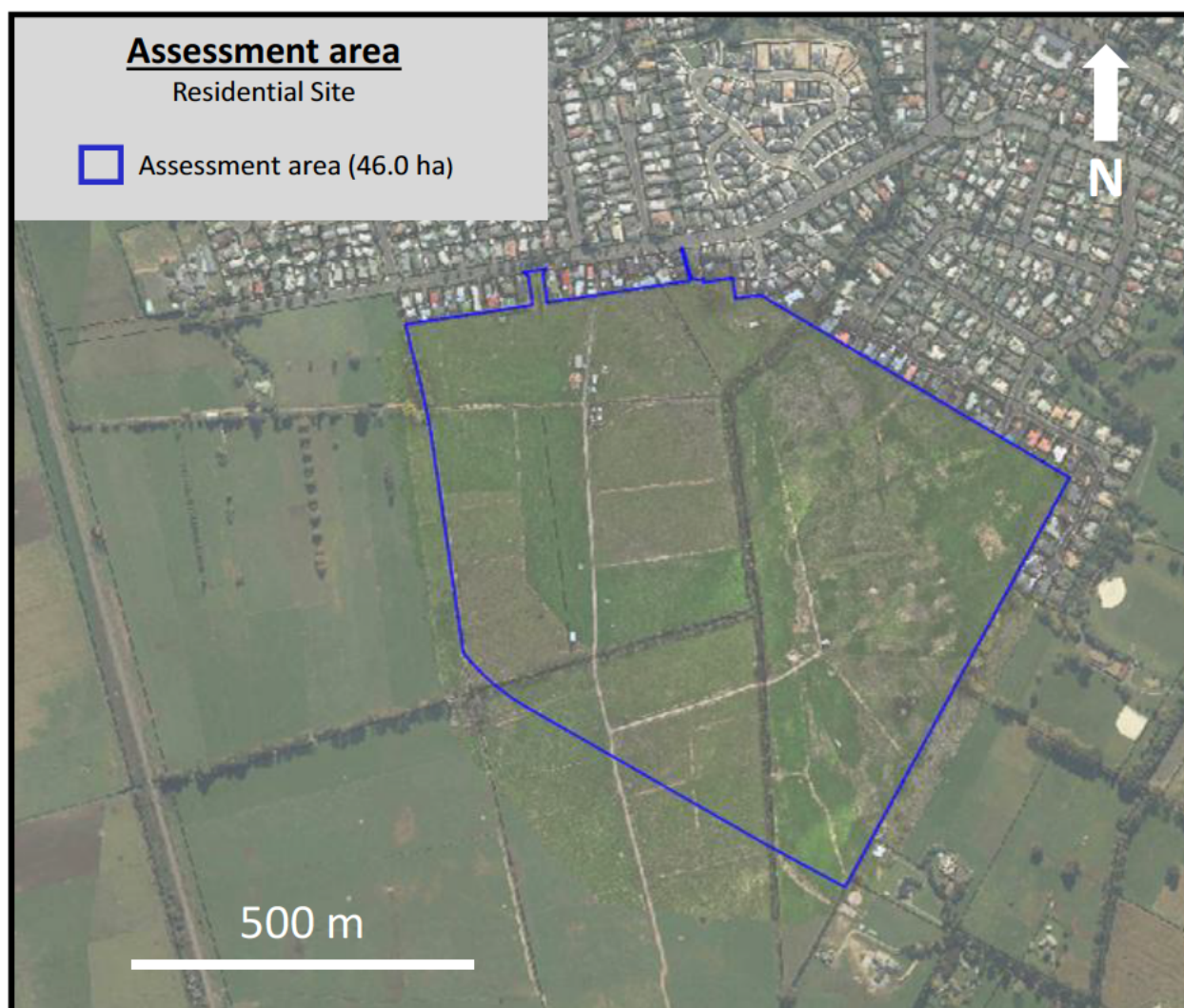


Figure 1. SL1 Residential (Residential Site) assessment area (46.0 ha).

Note: Two soil and Land Use Capability assessments have been prepared for the SL1 Consortium, one for the residential component and one for the industrial component. The LUC background in Section 3, the legislative and policy framework in Sections 4 and 5, the treatment of non-productive land and modified areas in Section 6, and the regional scale map information limitations in Section 9 are common to both reports. This material is repeated in each report so that either can be read on its own. Readers who have already read the other report do not need to read it again.

2. The Residential Site and Project

The Residential Site forms part of the residential component of the wider Southern Links 1 (SL1) Growth Cell, a circa 440 ha contiguous land area that stretches the south-western edge of Hamilton that is adjacent to the Hamilton Southern Links (RoNS) designation. The Residential Site forms part of the listed project, which includes both residential and industrial components and together comprises circa 106ha of the overall SL1 Growth Cell. The residential component comprises circa 46ha and is in single ownership and is currently used for rural farming activities. The landholding includes five land parcels legally described as Lot 2 DP 589463 (22.21 ha); Part Lot 2 DP 25668 and Part Lot 1 DP 25668 (33.64 ha); Lot 3 DP 394366 and Lot 1 DP South Auckland 51518 (7.58 ha); Lot 1 DPSA 69842, Lot 2 DPSA 11357, Lot 1 DPSA 75305 and Section 1 SO 60814 (26.13 ha); and Part Lot 1 DP 25668 (26.50 ha).

The project seeks approval for a Substantive Application under the Fast-track Approvals Act 2024 for a comprehensively master planned and staged residential development. This includes all necessary resource consents under the Resource Management Act 1991, including regional, district approvals where required.

The residential component provides for the establishment of circa 938 residential units, together with a neighbourhood commercial node, open spaces, waterbodies, and infrastructure devices including stormwater and roading. The proposed residential development is underpinned by a series of design principles, with a focus on creating a well-connected, legible, and diverse community on Hamilton's urban fringe. This is supported via a coordinated neighbourhood structure with a connected roading and pedestrian/cycle network, integrated open space and stormwater outcomes as well as varying housing typologies and densities (including single detached, duplex, and terraced apartments) which have been proposed to meet the growing and changing needs of the housing market to ensure there are options for future residents and thoughtfully located based on opportunities and constraints, with density ranging from terraced, duplex and detached dwellings to ensure integration with the adjoining urban footprint.

Located centrally within the Residential Development is a local neighbourhood commercial node that will provide a small-scale range of amenities, four to five small retail and food and beverage tenancies designed for convenience and support immediate local needs. This local node adjoins a neighbourhood reserve, adjacent to the north/south ecological corridor, providing neighbourhood park amenities to the Residential Development.

The proposal includes substantial enabling works to establish developable land, including bulk earthworks across the Residential Site. An integrated stormwater management system including detention/attenuation devices and treatment ponds are designed with the intent to discharge to ground water as relevant. Ecological restoration is integrated via riparian and corridor planting with appropriate design measures being adopted to enhance and protect key features including the upper tributaries of the Mangakōtukutuku Stream and associated drains.

Access and integration with the surrounding Hamilton area is provided through connected transport framework, including the establishment of intersections, roading, and walking and cycle networks, along with upgrades to existing transport infrastructure. The residential development is proposed to be serviced via a coordinated strategy, including the extension of public networks, upgrades, and installation of appropriate infrastructure.

3. 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 and Development for the National Water and Soil Conservation Organisation during the 1970s. In 2021, the 3rd Edition (revised & reprinted) of the LUC Survey Handbook¹ (LUC Handbook) 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 considering the physical limitations the land may have.

The LUC classification is specifically designed to provide an index of versatility. There are eight LUC 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.

Increasing limitations to use ↓	LUC Class	Arable cropping suitability†	Pastoral grazing suitability	Production forestry suitability	General suitability	Decreasing versatility of use ↓
	1	High ↓ Low	High ↓ Low	High ↓ Low	Multiple use land	
	2					
	3					
	4					
	5	Unsuitable	Low ↓ Unsuitable	Low ↓ Unsuitable	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.

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.

¹ Lynn IH, Manderson AK, Page MJ, Harmsworth GR, Eyles GO, Douglas GB, Mackay AD, Newsome PJF 2021. Land Use Capability Survey Handbook – a New Zealand handbook for the classification of land, 3rd ed. (revised & reprinted). Hamilton, AgResearch; Lincoln, Manaaki Whenua – Landcare Research New Zealand Ltd; Lower Hutt, GNS Science. 163p.

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 as a planning tool but is not always fit for purpose as a plan (map) unless undertaken at the correct scale. This assessment fulfils that purpose.

4. 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 2026.²

“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)).³ 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; but

(b) is not:

(i) identified for future urban development at the commencement date; or

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

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

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.

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

³ Clause 4.1(2), Ministry for the Environment. 2022 (amended December 2025). National Policy Statement for Highly Productive Land 2022. New Zealand Government, Wellington.

For the Residential 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 Portal.

A Strategic Land Agreement dated 3 October 2022 was entered into between Hamilton City Council and Waipā District Council⁴, which identified the SL1 Growth Cell (including the Residential Site) as an area of land intended to come within the Hamilton City Council boundary. On 26 January 2023, Hamilton City Council and landowners within the SL1 Growth Cell entered into a Memorandum of Understanding to work collaboratively to explore the urbanisation of the SL1 Growth Cell. The Strategic Land Agreement pre-dates the NPS-HPL coming into effect (17 October 2022) and outlines the agreed principles to support transfer and urbanisation of this land. Whether the Residential Site was identified for future urban development at the commencement date, within the meaning of clause 1.3 and clause 3.5(7)(b)(i) of the NPS-HPL, is a planning matter outside the scope of this soil and LUC assessment. It is addressed in the planning evidence prepared for the application. This report proceeds on the basis that the Residential Site is treated as highly productive land under the clause 3.5(7) interim definition, and identifies the extent of that land in Section 8.

The on-site assessment described in Sections 8 to 10 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 Residential Site, and is used in this report to support the Waipā District high class soil assessment and to inform the assessment of the Residential Site's actual productive potential and limitations.

5. Waipā District Plan definition of high class soil

'High class soils' means those soils of Land Use Capability classes 1 and 2 (excluding Peat Soils), and soils of Land Use Capability classes 3e1 and 3e5 classified as Allophanic Soils using the New Zealand Soil Classification.⁵

6. Non-productive land and modified areas

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 Residential Site (to which the LUC classification can be applied) is the Residential Site area excluding non-productive land.

⁴ https://www.fasttrack.govt.nz/__data/assets/pdf_file/0021/27822/Attachment-23-SL1-MOU-HCC-and-landowners.pdf

⁵ <https://www.waipadc.govt.nz/repository/libraries/id:26zg24o7s1cxbyk7hfo7/hierarchy/our-council/waipadistrictplan/Plan%20Changes/Plan%20Change%2019/Operative/Definitions%20-%20Operative>

7. Regional scale soil and LUC map information (1:50,000 scale)

An initial desktop LUC assessment was undertaken for the entire Residential Site. Available map information, soil reports and geospatial data included:

- New Zealand Land Resource Inventory (NZLRI) Land Use Capability 2021.⁶
- New Zealand Fundamental Soil Layers (NZFSL): Soil Drainage Class layer.⁷
- S-map Online (providing map units of Soil Siblings).⁸

Map information from S-map Online, the NZFSL and the NZLRI is presented at a regional scale (approximately 1:50,000).

NZLRI (1:50,000 scale) soil and LUC classification

Based on the available NZLRI and NZFSL map information the soils and LUC units for the Residential Site are mapped as shown in **Figure 3**.

Based on NZLRI map information, 74% (34.1 ha) of the Residential Site⁹ is mapped as very poorly drained moderately decomposed Kaipaki loamy peat or peaty loam on flat to gently undulating slopes (slope class A) with an LUC classification of 2w2. Twenty-three percent (10.4 ha) of the Residential Site is mapped as very poorly drained, weakly decomposed Rukuhia peat on flat to gently undulating slopes (slope class A) with an LUC classification of 2s5. The balance of the Residential Site, or 3% (1.5 ha), is classified as “town”.

Based on the available 1:50,000 scale NZLRI information and applying the NPS-HPL, LUC unit 2s5 and 2w2 land is considered highly productive land (**Figure 3**).

Table 1 gives the general characteristics of the soils, LUC units and the approximate % cover of these regional NZLRI derived LUC units as mapped in **Figure 3**. The estimates were made using Google My Maps.

Table 1. Summary of NZLRI soil and LUC map unit characteristics for the Residential Site.

Soil type (NZSC Soil Order)	Parent material	Soil drainage	Slope class	LUC unit (limitation)	Area of Site, ha (%)*
Kaipaki loamy peat or peaty loam (Organic Soil)	Peat and rhyolitic alluvium	Very poorly drained	A	2w2 (wetness)	34.1 (74)
Rukuhia peat (Organic Soil)	Peat	Very poorly drained	A	2s5 (soil)	10.4 (23)
Town	-	-	-	-	1.5 (3)

*% areas rounded to whole number.

⁶ <https://iris.scinfo.org.nz/layer/48076-nzlri-land-use-capability-2021/>

⁷ <https://iris.scinfo.org.nz/layer/48104-fsl-soil-drainage-class/>

⁸ <https://smap.landcareresearch.co.nz/maps-and-tools/app/>

⁹ <https://iris.scinfo.org.nz/layer/48134-nzlri-north-island-edition-2-all-attributes/>

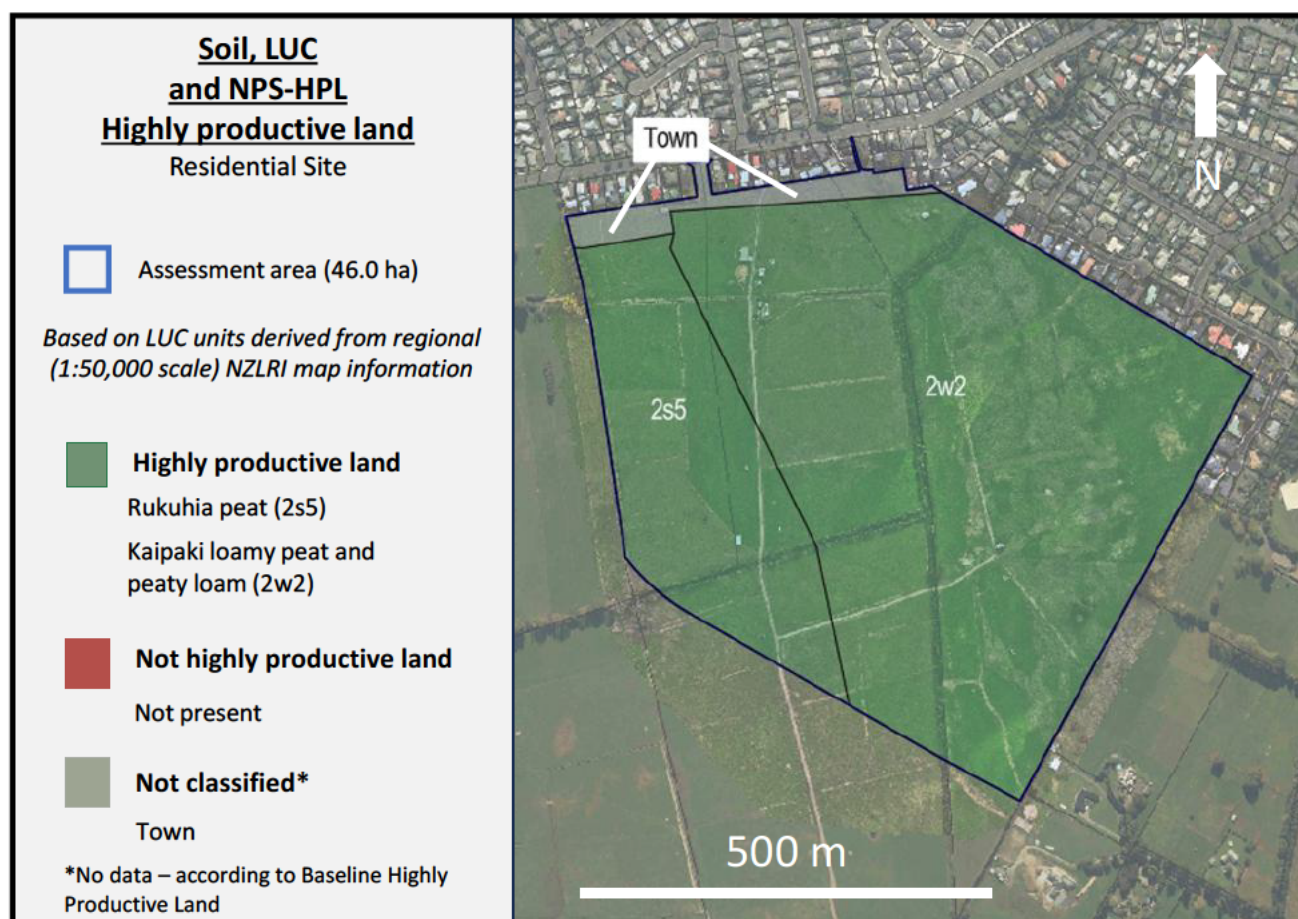


Figure 3. Soil, LUC units and the distribution of NPS-HPL highly productive land for the Residential Site, derived from available regional scale NZLRI LUC map information.

S-map Online

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 soils for the Residential Site as 68% Organic Soil, close to 14% Brown Soil, just under 10% Gley Soil and just over 8% Allophanic Soil.

A simplified S-map soil classification map for the Residential Site is provided in Figure 4 with S-map soil sibling information and the estimated proportion of each soil sibling in the map unit. S-map soil siblings identified for the Residential Site indicate that 68% of the area is very poorly drained, just over 9% poorly drained, close to 12% imperfectly drained, close to 3% moderately well drained, and just over 8% well drained (Figure 5, Table 2).

Note: S-map Online does not accept an imported boundary file, so the Residential Site extent was drawn on screen, and S-map statistics include non-dominant siblings. The Table 2 proportions are therefore indicative; the on-site mapping in Tables 3 to 5 is unaffected.

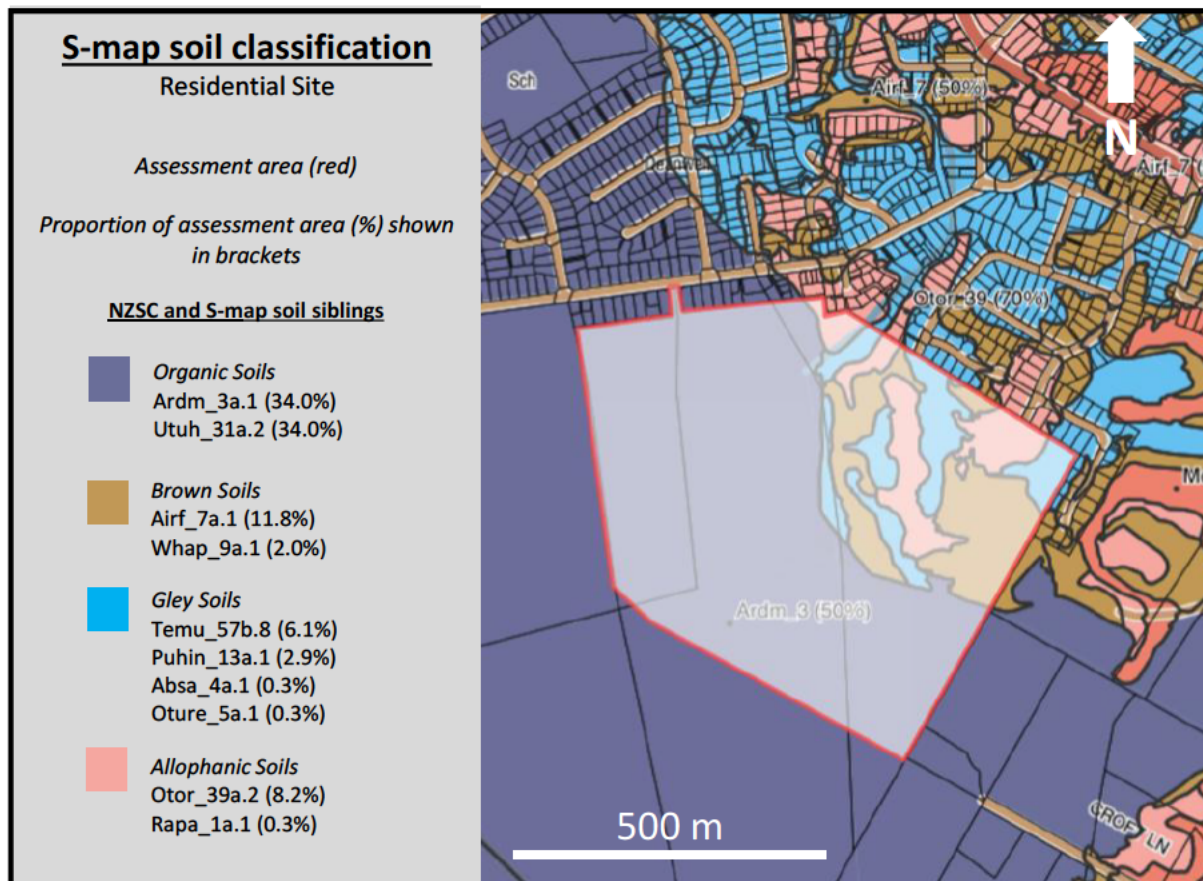


Figure 4. S-map derived soil classification for the Residential Site.

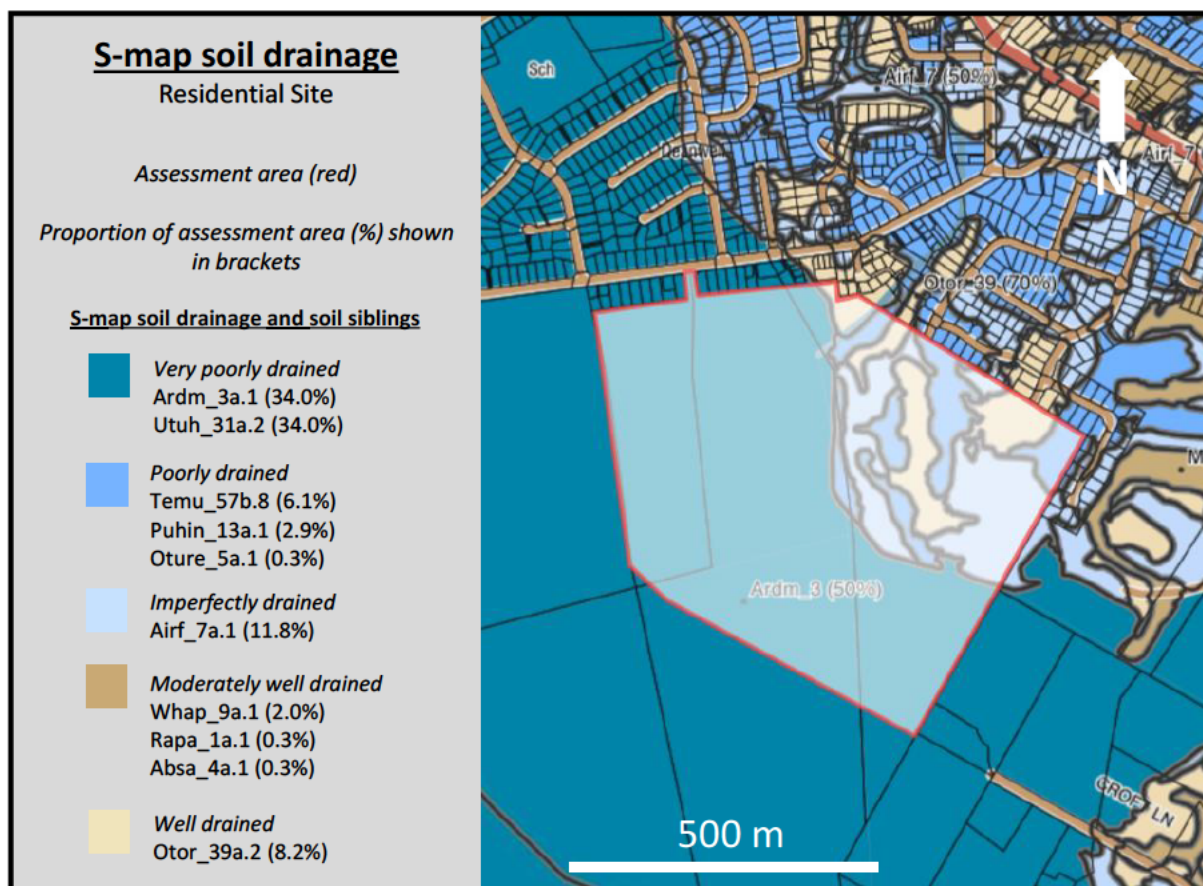


Figure 5. S-map derived soil drainage for the Residential Site.

Table 2 provides a summary of the S-map soil sibling map unit characteristics, including parent material, soil depth, soil texture and drainage, and their approximate proportions, for the Residential Site. All soils are deep (> 100 cm) and potential rooting depth is unlimited on five of the ten siblings. On Ardm_3a.1, Utuh_31a.2, Puhin_13a.1, Absa_4a.1 and Oture_5a.1, which together account for approximately 72% of the Residential Site, it is restricted to between 30 cm and 100 cm by anoxic conditions. This information is derived from S-map Online factsheets and can be sourced from the S-map Online website.¹⁰

Table 2. S-map soil sibling map unit characteristics for the Residential Site.

S-map soil sibling	Soil Order ¹¹ (Subgroup code)	Correlated soil series name ¹²	Parent material origin	Soil material	Soil texture	Soil drainage	Potential rooting depth	Proportion (%)
Ardm_3a.1	Organic (OFA)	Rukuhia	Peat	Not applicable	Peat	Very poorly drained	30–60 cm	34.0
Utuh_31a.2	Organic (OHM)	Te Rapa	Alluvium	Rhyolitic rock	Loamy peat over loam	Very poorly drained	50–70 cm	34.0
Airf_7a.1	Brown (BOM)	Whatawhata	Alluvium	Soft mudstone and soft sandstone rock	Clay	Imperfectly drained	Unlimited	11.8
Otor_39a.2	Allophanic (LOT)	Horotiu	Alluvium	Rhyolitic and andesitic rock	Loam over sand	Well drained	Unlimited	8.2
Temu_57b.8	Gley (GOT)	Mangapiko	Alluvium	Soft mudstone and soft sandstone rock	Clay	Poorly drained	Unlimited	6.1
Puhin_13a.1	Gley (GOT)	Te Kowhai	Alluvium	Rhyolitic rock	Silt over clay	Poorly drained	60–80 cm	2.9
Whap_9a.1	Brown (BOT)	Silverdale	Alluvium	Rhyolitic rock	Silt over sand	Moderately well drained	Unlimited	2.0
Absa_4a.1	Gley (GAH)	Te Rapa	Peat on alluvium	Rhyolitic rock	Loamy peat over silt	Moderately well drained	70–100 cm	0.3
Oture_5a.1	Gley (GOO)	Te Rapa	Alluvium	Rhyolitic rock	Loam	Poorly drained	40–70 cm	0.3
Rapa_1a.1	Allophanic (LGO)	Te Rapa	Alluvium	Rhyolitic rock	Loamy peat over silt	Moderately well drained	Unlimited	0.3

Proportions as reported by S-map Online; total 99.9% due to rounding.

The S-map soil map information provides a more spatially detailed representation of the soils on the Residential 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

¹⁰ <https://smap.landcareresearch.co.nz/maps-and-tools/app/>

¹¹ NZSC – New Zealand Soil Classification: Hewitt AE (2010) New Zealand Soil Classification. 3rd ed. Landcare Research Science Series No. 1. Lincoln, Manaaki Whenua Press.

¹² <https://smap.landcareresearch.co.nz/maps-and-tools/app/>

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 LUC map information and applying the NPS-HPL clause 3.5(7) interim definition (Section 4), 44.4 ha of the Residential Site is LUC class 2 land (refer Table 1) and is therefore highly productive land under the NPS-HPL transitional definition. The 1.5 ha area of the Residential Site classified as "Town" is not highly productive land under the NPS-HPL transitional definition as it is not classified as LUC Class 1, 2 or 3 land.

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 of 1:10,000, while catchment and regional maps are mapped at 1:15,000 to 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 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, on-site assessment using the LUC classification criteria described in the LUC Handbook would be required.

The purpose of this background information is to illustrate and emphasise that the 1:50,000 scale 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. Therefore, the on-site assessment in this report is considered more appropriate (and accurate) for providing soil and LUC information for the purpose of assessing the presence of high class soil and soil resources as a function of productive capacity and informing land productivity.

10. On-site LUC classification assessment

Method

Landsystems undertook an on-site property scale LUC assessment of the 46.0 ha Residential Site, according to standard methods (Milne et al., 1995¹³ and Lynn et al., 2021¹⁴). The on-site assessment was undertaken on Thursday 5th and Friday 6th of June 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 Residential Site. However, recorded soil properties are used to identify limitations that may affect the productivity of the Residential Site.

The on-site assessment included soil observations by hand auger across the Residential Site using a free survey approach. Approximately 187 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 Residential Site area with potential highly productive land.

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 provide clearer correlation with LUC units provided by the regional NZLRI LUC map information. LUC classification was assigned based on the criteria provided in the LUC Handbook LUC units were assigned based on the closest fitting LUC unit provided by the regional NZLRI LUC map information.

Mapping scale

The number of soil auger observations across the 46.0 ha Residential Site equated to an observation density of 4.1 observations per hectare (or one observation per 0.25 ha). Considering the Residential Site area as a whole, this density of observations (using conventional mapping techniques) is sufficient to support a map scale of between 1:5,000 and 1:10,000¹⁵.

11. On-site LUC assessment

The Waikato Plains consist of volcanogenic alluvium deposited by the Waikato River during its fan building stage which ended about 12,000 years ago. The volcanogenic alluvium, known as the Hinuera Formation, consists of rhyolitic sands, silts and gravels, which infilled the existing hilly ash covered landscape and in the present day only low rolling ridge crests protrude through the alluvium. The emplacement of alluvium altered the original drainage patterns and caused formation of lakes. Peat subsequently formed in many of the lakes, back swamp areas, and adjacent low-lying land. As a result, the Waikato Plains comprise two distinct sub-patterns; a mineral soil pattern based on the volcanogenic alluvium deposited by the Waikato River and an organic soil pattern, with intergrades between the two¹⁶.

¹³ Milne JDG, Clayden B, Singleton P.L, Wilson AD. 1995. Soil Description Handbook. Lincoln, New Zealand, Manaaki Whenua Press. 157p.

¹⁴ Lynn IH, Manderson AK, Page MJ, Harmsworth GR, Eyles GO, Douglas GB, Mackay AD, Newsome PJF 2021. Land Use Capability Survey Handbook – a New Zealand handbook for the classification of land, 3rd ed. (revised & reprinted). Hamilton, AgResearch; Lincoln, Manaaki Whenua – Landcare Research New Zealand Ltd; Lower Hutt, GNS Science. 163p.

¹⁵ Page 12 - Grealish G. 2017. New Zealand soil mapping protocols and guidelines. Envirolink Grant: C09X1606. Manaaki Whenua – Landcare Research.

¹⁶ Singleton, P. 1991. Soils of Ruakura – a window on the Waikato. DSIR Land Resources, Scientific Report No. 5.

The main landform units and soils of the Residential Site include mineral soils formed on the plains (Horotiu-Te Kowhai soil complex), organic soils formed on the plain (Motumaoho Series) and peaty gley soils found on peat margins (Te Rapa Series); low hills and fans in the Hamilton Basin (Silverdale Series), recent soils on floodplains of streams and modified soil areas (not shown in **Figure 6**).

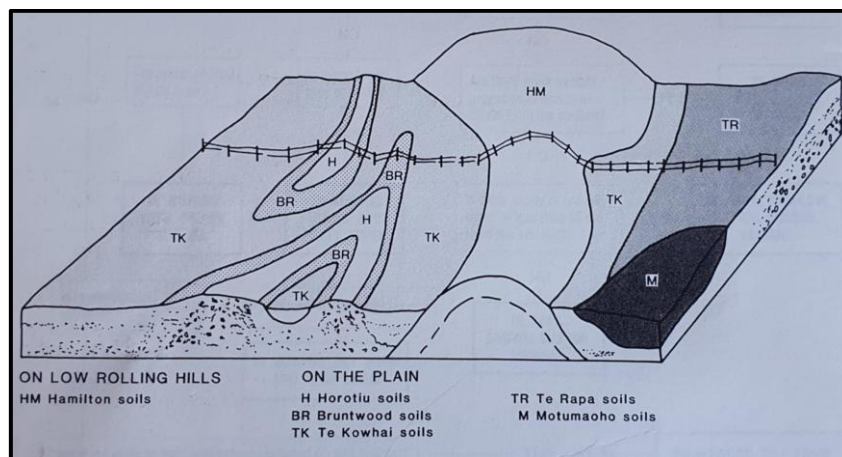


Figure 6. Schematic showing the position of main soils in the landscape (from Singleton¹⁷)

A summary of the soils and LUC units identified for the Residential Site is provided in **Table 3**. The main soils observed and examples of non-productive land for the Residential Site are shown in **Figures 7, 8 and 10** (a larger map of **Figure 10** is provided in **Appendix 1**). The soil profiles should be considered example soil profiles for each soil as the profile for actual soil observed in the field at any given point may differ slightly from the example shown.

¹⁷ Singleton, P. 1991. Soils of Ruakura – a window on the Waikato. DSIR Land Resources, Scientific Report No. 5. Image from pg. 30.

Table 3. Soils and dominant LUC units identified for the Residential Site (in order of increasing limitations).

Soil type (DSIR code+NZSC Soil Order)	Parent material	Texture profile	Slope class	Soil depth	Soil drainage	Dominant LUC unit (limitation)
Horotiu-Te Kowhai complex, <i>Horotiu silt loam dominant</i> (Allophanic Soil)	Rhyolitic alluvial deposits of the 'Hinuera Formation'	Silt loam over silt or sand	A+B (0 -6°)	Deep (100+ cm)	Well to imperfectly drained	2s1 (soil)
Silverdale silt loam (Brown Soil)	Clayey alluvial material and fan deposits associated with the 'Hinuera Formation'	Silt loam over silty clay loam	B+A (0 -6°)	Deep (100+ cm)	Moderately well drained	2e2 (erosion)
Motumaoho peaty silt loam (Organic Soil, drained)	Decomposed peat on rhyolitic alluvial deposits of the 'Hinuera Formation'	Peaty silt loam over silt	A (0 -3°)	Deep (100+ cm)	Moderately well to imperfectly drained	2w2 (wetness)
Te Rapa peaty silt loam (Gley Soil, drained)	Decomposed peat on rhyolitic alluvial deposits of the 'Hinuera Formation'	Peaty silt loam over sandy loam over silty clay loam	A (0 -3°)	Deep (100+ cm)	Imperfectly to moderately well drained	2w2 (wetness)
Te Kowhai silt loam (Gley Soil)	Rhyolitic alluvial deposits of the 'Hinuera Formation'	Silt loam over silt or sand	A (0 -3°)	Deep (100+ cm)	Poorly to imperfectly drained	3w1 (wetness)
Unnamed recent soil (Recent Soil)	Recent flood deposits + areas of modified soil and gravel	Coarse sand or gravel over original soil	A (0 -3°)	Shallow to very shallow (< 45 cm)	Poorly drained	4w* (wetness)
Unnamed modified soil (Anthropic Soil)	Fill and subsoil material over original deposits associated with the 'Hinuera Formation'	Fill material, ground tree stumps and buried tree limbs over original silt loam soils; or truncated soil with subsoil at the surface	A+B (0 -6°)	Shallow to very shallow (< 45 cm)	Poorly drained	4s* (soil)
Modified soil / non- productive land	Existing houses and curtilage, sheds, farm races, drains, concrete storage areas, and infilled sand pit.					-

*LUC class and limitation only as no corresponding LUC unit in NZLRI Extended Legend.

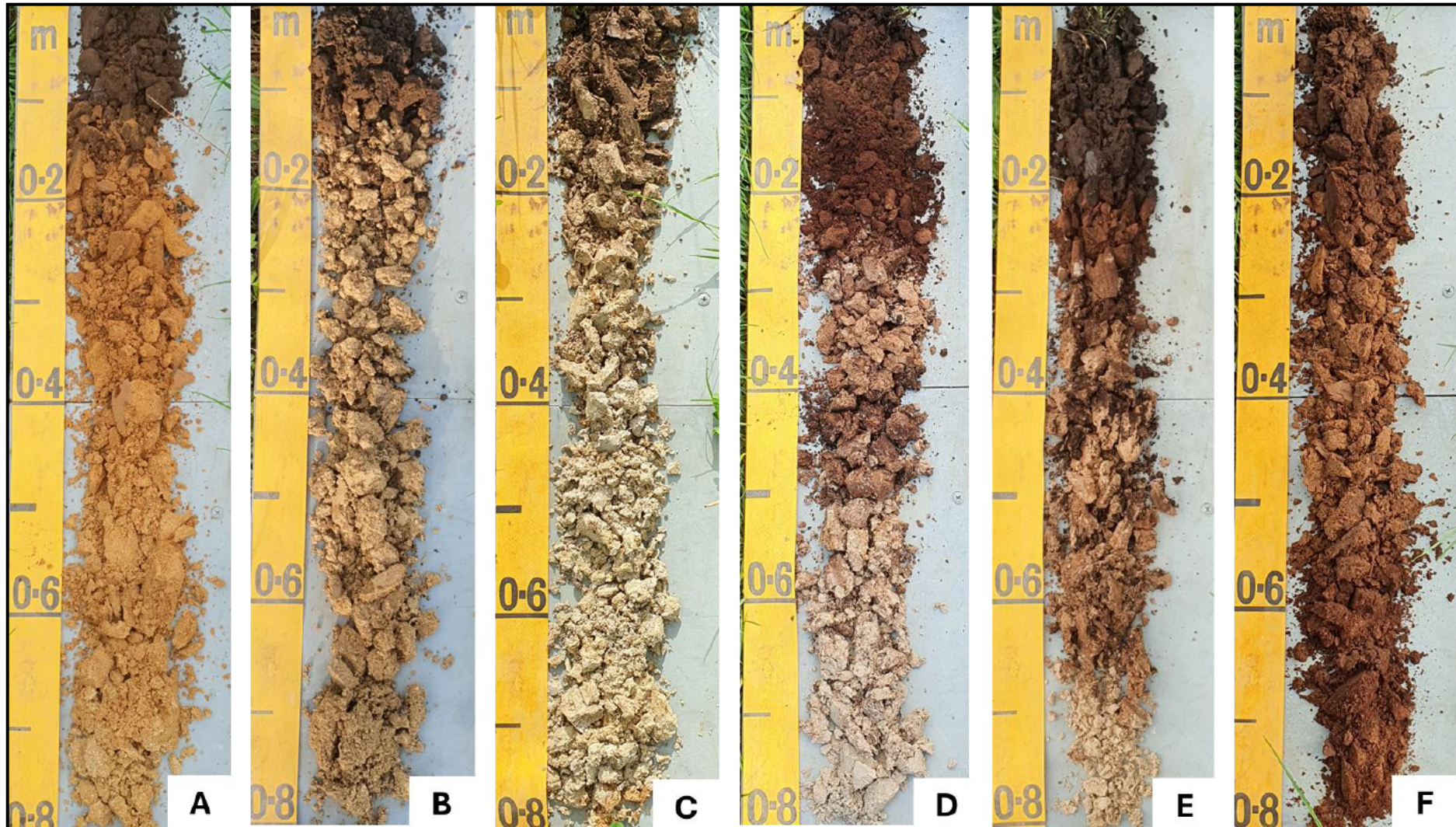


Figure 7. Example soil profiles of the dominant soils identified for the Residential Site. A) Horotiu silt loam, LUC 2s1 on A+B slopes; B) Bruntwood silt loam, LUC 2s1 on A+B slopes; C) Te Kowhai silt loam, LUC 3w1 on A slopes; D) Motumaoho peaty silt loam, LUC 2w2 on A slopes; E) Te Rapa peaty silt loam, LUC 2w2 on A slopes.; and F) Silverdale silt loam, LUC 2e2 on B+A slopes.



Figure 8. Example non-productive land and modified soil areas identified. A) Former building platform, gravelled areas and modified soil; B) Gravelled former farm race; C) Riparian planting of side waterway¹⁸; D) Existing house, curtilage, old shed and concrete areas; E) Isolated pockets of flood deposit and modified soil (right of white line) (LUC 4w) adjacent to the Mangakōtukutuku Stream; and F) ground down tree stump and buried tree limbs and debris (LUC 4s) from former hedges in eastern portion of Residential Site.

¹⁸ Photo taken from the main north to South race, where race crosses the side waterway joining the north-south drain to the east in central part of the Residential Site.

The detailed on-site assessment confirmed that the eastern part of the Residential Site is the alluvial surface of the Hinuera Formation, left by the ancestral Waikato River, which although relatively flat, contains ridges and swales of old levees and channels. Soils formed on this Hinuera Formation within the Waikato are known as the Horotiu-Te Kowhai soil complex¹⁹, a complex of poorly drained Te Kowhai soil series to imperfectly drained Bruntwood soil series to well drained Horotiu soil, often found in close proximity to one another.

The slightly elevated areas (ridges) contained the imperfectly to well drained, deep, Horotiu-Te Kowhai soil complex (Horotiu silt loam dominant, an Allophanic Soil within the New Zealand Soil Classification²⁰) (**Figure 7A and 10**) and were assigned LUC 2s1 (**Table 3**). Lower lying areas (swales) between ridges were occupied by poorly drained Te Kowhai silt loam (Gley Soil within the New Zealand Soil Classification²¹) and were assigned a LUC classification of 3w1 (**Figure 7C and 10**). Also, in the east of the Residential Site on undulating to gently undulating slopes there was an isolated pocket of moderately well drained Silverdale silt loam (**Figure 7F and 10**). These soils were assigned an LUC classification of 2e2 (**Table 3**).

Drained Organic Soils (Motumaoho Series) and drained peaty Gley Soils (Te Rapa Series) were observed in the flat western part of the Residential Site (**Figure 10**). These organic and organic rich soils formed after transport and deposition of material by the ancient braided river system (Ancestral Waikato River) dammed valleys, forming areas with a high water table in which peat was able to develop²². The Motumaoho peaty silt loam (**Figure 7D**) is an organic soil with a peat thickness between 40 cm and 100 cm, and the peat is completely to moderately decomposed in the topsoil and upper subsoil, with minor amounts of volcanic ash, on silty or sandy rhyolitic alluvium subsoils. In its natural state the Motumaoho Series are very poorly drained, however, these have been artificially drained to lower the high water table and consequently are moderately well to imperfectly drained. The Motumaoho peaty silt loam has a LUC classification of 2w2 (**Table 3**). The Te Rapa peaty silt loam forms in backswamp areas on plains and has a completely decomposed peaty top that is less than 40 cm thick, with a dark reddish brown humic layer occurring immediately below the topsoil (**Figure 7E**). A thin layer of coarse pumice sand is common at about 20 cm depth. In its natural state the Te Rapa peaty silt loam is poorly drained, but with artificial drainage, these soils are imperfectly to moderately well drained with a LUC classification of 2w2 (**Table 3 and Figure 10**). Due to artificial drainage of both the Te Rapa and Motumaoho soils, some soil boundaries were dictated by paddock drains.

The existing north-south farm drain through the Residential Site has been planted in riparian vegetation (**Figure 8C**). An unnamed Recent Soil is found in isolated pockets on the northern boundary and eastern boundary of the drain in areas that experience regular flooding. These soils are shallow with coarse sandy deposits at the surface, overlying original soil, and are poorly to very poorly drained. Adjacent to the drain there are also areas of modified soil, mounds of fill material (Fill Anthropic Soils within the New Zealand Soil Classification) (**Figure 8E**). These isolated areas of flood deposits and modified soil adjacent to the existing north-south farm drain have been assigned an LUC classification of 4w (**Table 3, Figure 10**).

Within the last 12 months, stands of large trees and extensive networks of hedges and shelterbelts have been removed from the eastern side of the Residential Site (refer to **Figure 9** for before and after).

¹⁹ Singleton P. 1991. Soils of Ruakura – a window on the Waikato. DSIR Land Resources Scientific Report No. 5.

²⁰ Hewitt AE. 2010. New Zealand Soil Classification. 3rd ed. Landcare Research Science Series No. 1. Lincoln, Manaaki Whenua Press.

²¹ Hewitt AE. 2010. New Zealand Soil Classification. 3rd ed. Landcare Research Science Series No. 1. Lincoln, Manaaki Whenua Press.

²² Singleton P. 1991. Soils of Ruakura – a window on the Waikato. DSIR Land Resources Scientific Report No. 5.

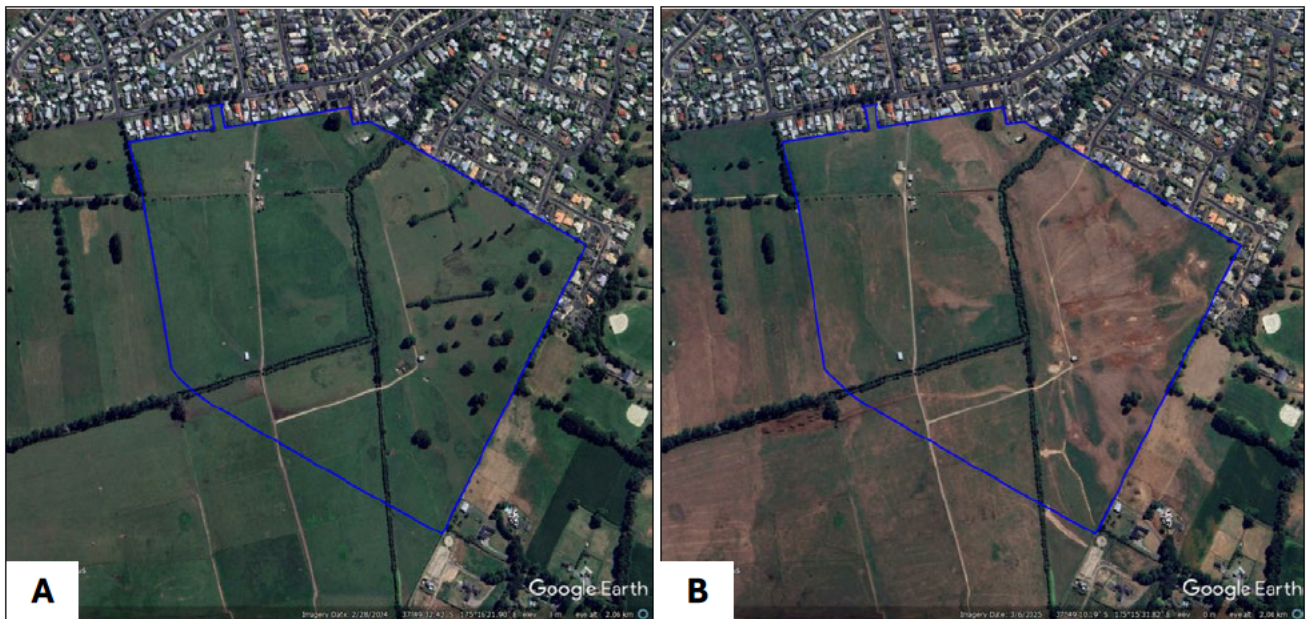


Figure 9. Modified soil areas as a result of removal of large trees/hedges/shelterbelts in the east of the Residential Site. A) Google Earth: 28 February 2024. Intact stands of trees and hedges; B) Google Earth: 6 March 2025. Darker orange areas show earth worked areas associated with tree removal. Note: other pale colours reflect the natural drainage differences of the Hinuera Formation in a particularly dry summer.

Trunks of some of the larger trees have been ground down to ground surface level and left in-situ (Figure 8F), and in other areas tree limbs were removed and buried in the upper soil. Consequently, areas formerly in hedges or stands of trees have a hummocky relief, subsoil is present at the surface and large tree limbs are half buried and protruding from the ground surface. Figure 9B shows dark orange areas where former trees resided. These are areas of modified soil, namely Fill Anthropic Soil, where subsoil or fill material has been mounded up at the surface, or Truncated Anthropic Soil where the topsoil has been removed. This practice has resulted in irreversible changes to the original soil (Horotiu silt loam and Silverdale silt loam) and with tree limbs still in-situ these areas are not considered available for primary production (i.e. they are non-productive land). These modified soil areas have therefore been mapped as shallow to very shallow LUC 4s areas.

There were areas of non-productive land within the Residential Site (Figure 8 and 10), including concrete platforms, gravelled areas and sheds (Figure 8A), an infilled sand pit area, gravelled races (Figure 8B), streams and drains (Figure 8C), and existing houses and curtilage (Figure 8D).

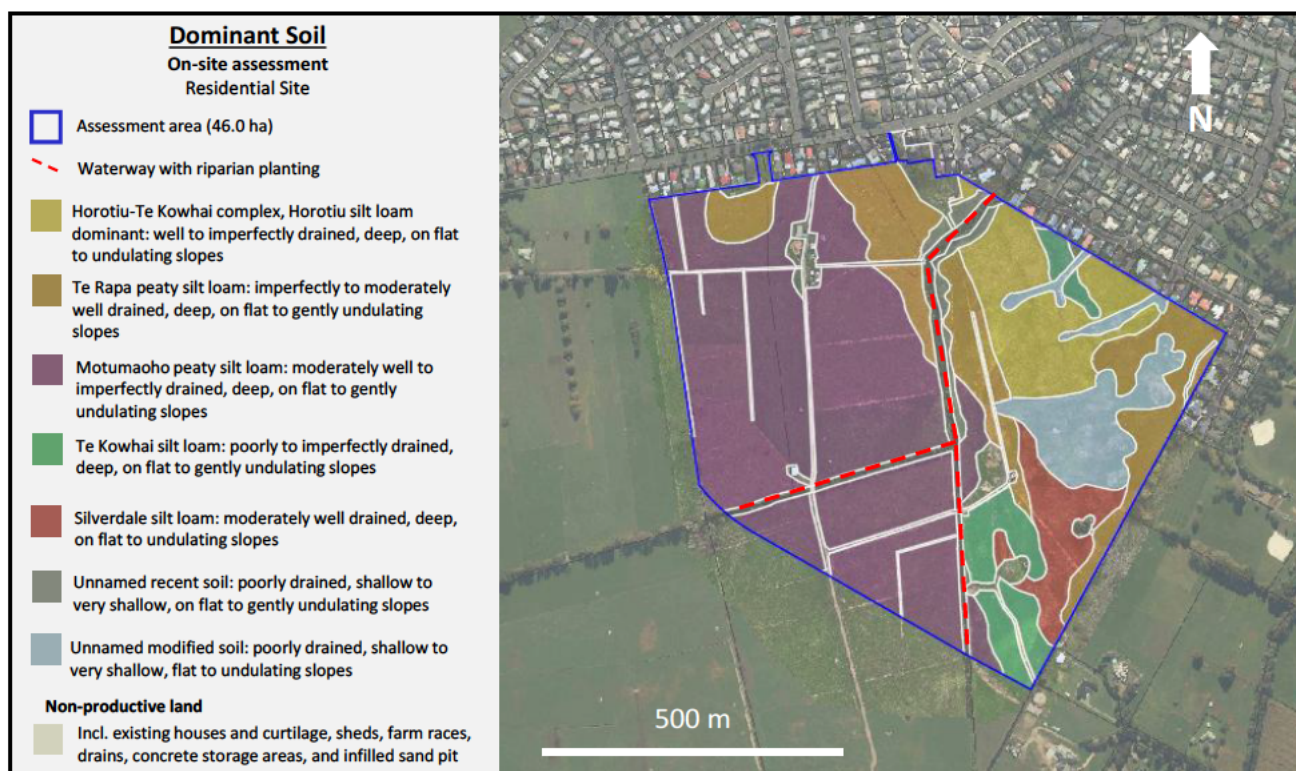


Figure 10. The distribution of dominant soils for the Residential Site.

The estimated distribution of LUC classes and LUC units are given in Figure 11 (a larger map is provided in Appendix 2).

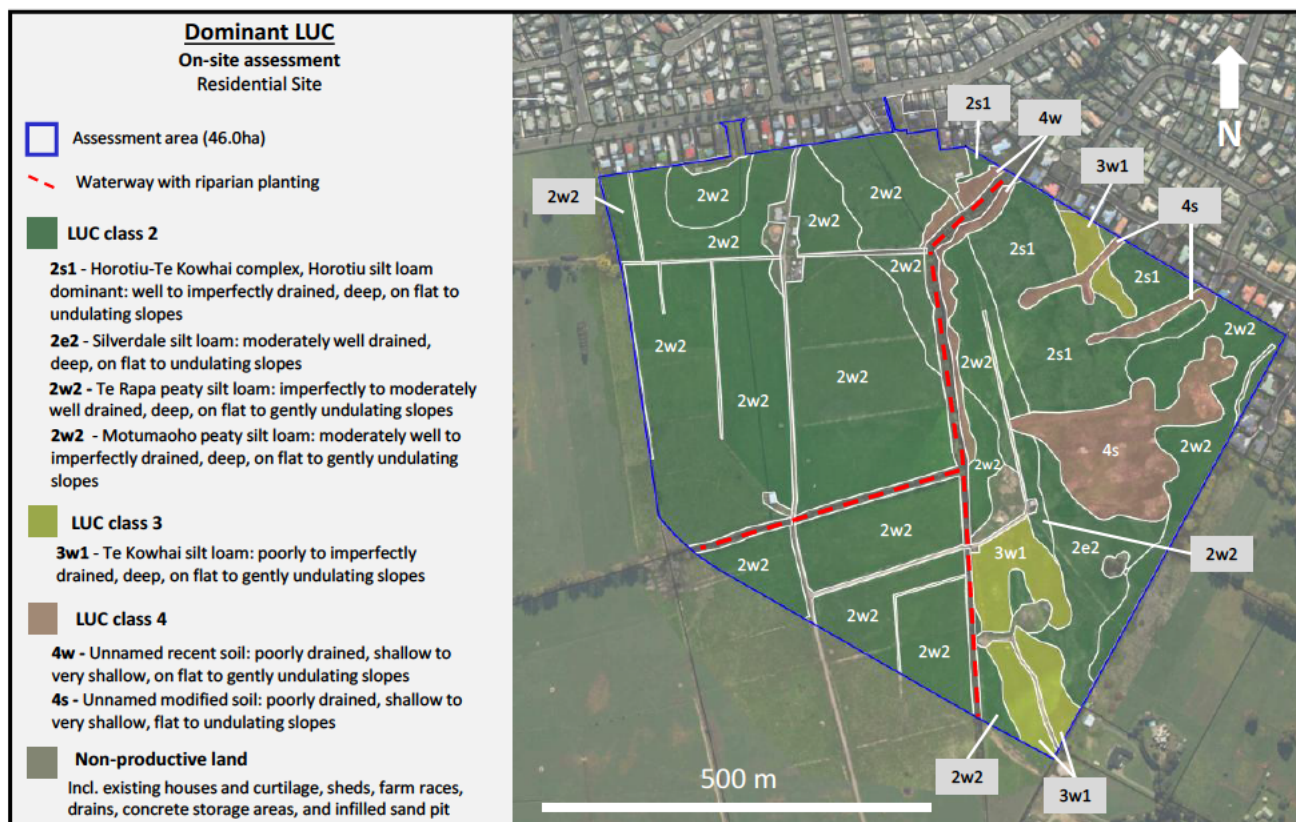


Figure 11. The distribution of LUC classes and units for the Residential Site.

12. Revised LUC classification

Based on the on-site assessment, aerial photographs of the Residential Site and surrounding areas and soil auger observations, the original NZLRI delineated LUC map units differ from the LUC map units identified and mapped in the on-site assessment.

Based on the available NZLRI and NZFSL map information (**Figure 3**) 74% of the Residential Site was mapped as very poorly drained moderately decomposed Kaipaki loamy peat or peaty loam on flat to gently undulating slopes (slope class A) with an LUC classification of 2w2. Twenty-eight percent was mapped as very poorly drained, weakly decomposed Rukuhia peat on flat to gently undulating slopes (slope class A) with an LUC classification of 2s5. The balance of the Residential Site, or 3% (1.5 ha), is classified as “town”.

However, detailed on-site mapping showed discrepancies in the extent of LUC class 2, 3 and 4 land, the extent of Organic Soils and drainage characteristics across the Residential Site (refer to **Table 4** below and **Figures 10** and **11**).

Specific comments are as follows:

- Regional scale NZLRI information had mapped 100% of the soils within the Residential Site as Organic (peat) Soils. On-site mapping revealed some peat soils but no instances of very poorly drained Rukuhia peat or very poorly drained Kaipaki loamy peat within the Residential Site.
- On-site mapping showed 76% of the land as LUC class 2, including both mineral and organic soils, however with better drainage than regional scale NZLRI information. Soils had been artificially drained. Soil types ranged from well drained (Horotiu silt loam, LUC 2s1) to imperfectly drained (Te Rapa peaty silt loam, LUC 2w2).
- Detailed on-site mapping showed 45% of the Residential Site was moderately well to imperfectly drained Motumaoho peaty silt loam (an Organic Soil). The Te Rapa peaty silt loam, a peaty Gley Soil, occupied 16% of the Residential Site and is often found around the margins of peat land within the Waikato. This soil was imperfectly to moderately well drained.
- Five-percent of the Residential Site was mapped as poorly drained Te Kowhai silt loam (LUC 3w1).
- Detailed on-site mapping showed 8% of the Residential Site contained LUC class 4 land, including areas of an unnamed Recent Soil adjacent to the north-south drain with a flooding limitation and LUC classification of 4w (2%). Pockets of modified soils were found within these shallow poorly to very poorly drained soils. Where large shelterbelts and extensive trees had been removed, areas of shallow to very shallow LUC 4s (7%), modified soil was found. Here buried tree limbs and large stumps remain and topsoil is generally absent, limiting the productive capacity of these areas.
- Ten-percent of the Residential Site was mapped as non-productive land, including mapped areas of existing houses and curtilage, sheds, farm races, drains, concrete storage areas, and infilled sand pit.

Table 4. LUC classes, LUC units and dominant soil type for the Residential Site, based on the LUC map units identified by the on-site assessment.

LUC class	Dominant LUC unit	Dominant soil type	LUC unit area, ha, (%) [§]	LUC class area, ha, (%) [§]
2	2s1	Horotiu-Te Kowhai complex, Horotiu silt loam dominant	4.5 (10)	34.7 (76)
	2e2	Silverdale silt loam	2.2 (5)	
	2w2	Te Rapa peaty silt loam	7.2 (16)	
		Motumaoho peaty silt loam	20.8 (45)	
3	3w1	Te Kowhai silt loam	2.7 (6)	2.7 (6)
4	4w	Unnamed recent soil	0.7 (2)	3.8 (8)
	4s	Unnamed modified soil	3.1 (7)	
Non-productive land/modified soil			4.6 (10)	

[§]% areas rounded to whole number

13. On-site Waipā District Plan high class soil classification

Detailed on-site assessment showed 30% of the Residential Site as high class soil (LUC 2s1, 2e2, 2w2-Te Rapa Series) under the Waipā District Plan definition for high class soil (Table 5, Figure 12).

The balance, 70% of the Residential Site, was LUC 2w2-Motumaoho Series (Organic Soil), LUC 3w1, LUC 4w, and LUC 4s which are not high class soil. Non-productive areas (10% of the Residential Site) include mapped areas of existing houses and curtilage, sheds, farm races, drains, concrete storage areas, and infilled sand pit (Table 5, Figure 12).

Table 5. Waipā District Plan high class soil for the Residential Site, based on the LUC map units identified by the on-site assessment.

LUC unit (dominant)	High class soil	Area ha, (%) [§]
2s1	High class soil	4.5 (10)
2e2	High class soil	2.2 (5)
2w2* (Te Rapa Series)	High class soil	7.2 (16)
High class soil total		High class soil = 13.95 (30)
2w2@ (Motumaoho Series)	Not high class soil	20.8 (45)
3w1	Not high class soil	2.7 (6)
4w	Not high class soil	0.7 (2)
4s	Not high class soil	3.1 (7)
NPL [#]	Not high class soil	4.6 (10)
Not high class soil total		Not high class soil = 31.9 (70)

[§]% areas rounded to whole number; *Te Rapa Series = Gley Soil; @Motumaoho Series = Organic Soil; [#]NPL = Non-productive land.



Figure 12. On-site mapped distribution of Waipā District Plan defined high class soil for the Residential Site.²³

14. Soil and LUC constraints on productive capacity

The Residential Site is currently bounded to the north and north-west by existing residential development. The remainder of the Residential Site is predominantly bounded by rural pastoral land. The Hamilton Southern Links designation lies approximately 350 m to the south-west of the Residential Site.

The current dairy farm operation has a single milking shed, located outside the Residential Site within the Hamilton Southern Links designation footprint. The Residential Site therefore contains no milking infrastructure, and its current dairy use depends on a milking shed beyond its boundary.

The physical constraints on productive capacity identified by this assessment are:

- Organic Soils across 45% of the Residential Site, which are very poorly to imperfectly drained;
- LUC 4w land across 2% of the Residential Site, with flooding limitations;
- LUC 4s land across 7% of the Residential Site, with shallow soil limitations;
- division of the Residential Site from the milking shed serving the dairy operation, which lies within the Hamilton Southern Links designation footprint; and
- existing residential development along the northern and north-western boundaries.

The dominant physical constraint is soil wetness. Organic Soils occupy 45% of the Residential Site and are very poorly to imperfectly drained in their natural state, with high water tables that restrict trafficability and affect the yield and survival of water-sensitive crops. Artificial drainage improves versatility on these soils, but long-

²³ A larger map of Figure 12 is provided in Appendix 3).

term deepening of drains causes peat subsidence through oxidation and consolidation. That loss of soil volume is permanent and is not recoverable by land management.

The land use options available to each mapped LUC unit differ, and the extent and arrangement of the units limits the range of use practically available to any one part of the Residential Site.

LUC 2s1 and 2e2, 6.7 ha (15%): well to moderately well drained mineral soils on flat to undulating slopes. These are the most versatile soils on the Residential Site and are suited to arable cropping, horticultural use, pastoral grazing, tree crops or production forestry. They occur as several small separate areas in the eastern part of the Residential Site rather than as a single block.

LUC 2w2 Te Rapa Series, 7.2 ha (16%): imperfectly to moderately well drained peaty Gley Soil. Suited to pastoral grazing and to seasonal arable or horticultural use, subject to maintenance of artificial drainage.

LUC 2w2 Motumaoho Series, 20.8 ha (45%): moderately well to imperfectly drained Organic Soil. This is the largest contiguous area of the Residential Site. Suited to pastoral grazing and to seasonal arable use in drier months, requiring nutrient and drainage management, and with peat subsidence a consequence of deepening drains.

LUC 3w1, 2.7 ha (6%): poorly to imperfectly drained Te Kowhai silt loam. Arable use is restricted to drier months and pastoral management requires light stocking during wet periods to avoid soil damage.

LUC 4w, 0.7 ha (2%): poorly drained shallow to very shallow Recent soil adjacent to the drain, with a flooding limitation. Realistically limited to pastoral grazing within a wider system.

LUC 4s, 3.1 ha (7%): poorly drained shallow to very shallow modified soil where large trees and hedges have been removed. Buried stumps and limbs and the general absence of topsoil make cultivation impractical, so use is limited to pastoral grazing.

The soils able to support the widest range of uses, LUC 2s1 and 2e2, occupy 6.7 ha (15%) of the Residential Site and occur as several small separate areas. The largest contiguous area, 20.8 ha (45%), is Motumaoho peaty silt loam, an Organic Soil constrained by drainage and by peat subsidence where drains are deepened. The range of use practically available to any one part of the Residential Site is therefore narrower than the LUC class 2 total indicates.

The Residential Site has not been subject to bulk earthworks, unlike land in the industrial component of the SL1 Growth Cell where bulk earthworks authorised by resource consent have been given effect to. The soil profile remains largely intact across the productive area, and the productive capacity of the Residential Site is therefore higher than that of land where the soil profile has been modified or removed. On-site mapping identified 30% of the Residential Site as high class soil under the Waipā District Plan definition, and 76% as LUC class 2 land.

15. Summary

Applying the NPS-HPL clause 3.5(7) interim definition to the NZLRI LUC map information, 44.4 ha of the Residential Site is highly productive land (LUC Class 2), while the 1.5 ha 'Town' area is not highly productive land.

Regional scale NZLRI and NZFSL map information showed 74% of the Residential Site was mapped as LUC 2w2 (very poorly drained moderately decomposed Kaipaki loamy peat or peaty loam on flat to gently undulating slopes), and 23% of the Residential Site as very poorly drained, weakly decomposed Rukuhia peat on flat to gently undulating slopes with an LUC classification of 2s5. Both of these soils are classified as Organic Soils under the New Zealand Soil Classification. The balance of the Residential Site, or 3%, was classified as "town".

Detailed on-site mapping at property scale identified 37.4 ha (81%) of the Residential Site as LUC class 1 to 3 land. It showed discrepancies against the regional scale mapping in the extent and drainage status of LUC class

2 land and in the extent of Organic Soils, and identified LUC class 3 and 4 land that the regional scale mapping did not record.

- **LUC class 2, 34.7 ha (76%):** well drained to imperfectly drained mineral and organic soils, comprising LUC 2w2 Motumaoho Series 20.8 ha (45%), LUC 2w2 Te Rapa Series 7.2 ha (16%), LUC 2s1 4.5 ha (10%) and LUC 2e2 2.2 ha (5%).
- **LUC class 3, 2.7 ha (6%):** poorly drained Te Kowhai silt loam (LUC 3w1).
- **LUC class 4, 3.8 ha (8%):** 3.1 ha of LUC 4s and 0.7 ha of LUC 4w, with shallow soil and flooding limitations respectively.
- **Non-productive land and modified soil, 4.6 ha (10%):** existing houses and curtilage, sheds, farm races, drains, concrete storage areas and infilled sand pit. These areas are excluded when assessing productive land.

Detailed on-site assessment showed 30% of the Residential Site as high class soil (LUC 2s1, 2e2, 2w2-Te Rapa Series) under the Waipā District Plan definition for high class soil. The balance, 70% of the Residential Site, was LUC 2w2-Motumaoho Series (Organic Soil), LUC 3w1, LUC 4w, and LUC 4s, which are not high class soil. Non-productive areas (10% of the Residential Site) including mapped areas of existing houses and curtilage, sheds, farm races, drains, concrete storage areas, and infilled sand pit, are not high class soil.

The dominant physical constraint on productive capacity is poor to imperfect drainage. Organic Soils occupy 45% of the Residential Site and are very poorly to imperfectly drained in their natural state. Artificial drainage improves versatility on these soils, but long-term deepening of drains causes peat subsidence, and that loss of soil volume is permanent and not recoverable by land management. Further constraints are LUC 4s land across 7% of the Residential Site with shallow soil limitations, LUC 4w land across 2% with flooding limitations, and non-productive land across 10%.

The Residential Site has not been subject to bulk earthworks and the soil profile remains largely intact across the productive area. The Residential Site does not, however, contain any milking infrastructure, and its current dairy use depends on a milking shed located outside it within the Hamilton Southern Links designation footprint.





