NPS HPL Assessment

FRUITION

9 Milford Downs, Masterton

Assessment of land productive capability.

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Summary

The Land Use Capability (LUC) categories for the assessed area was determined to be 3E 2 and 3S 1. The main limitations of the site arise from the presence of:

1. Poorly drained
2. Susceptibility to drought
3. Susceptibility to erosion

The soil conditions regarding poor subsoil drainage and the risk of drought in summer periods can be remediated through installation of adequate irrigation and drainage systems. The potential risk of erosion during/post cultivation can be reduced with careful attention to weather conditions (wind) during the earthwork process.

4. Irrigation constraint

There are no current consents suitable to horticultural or arable production allocated to this property. Given the need for irrigation for successful commercial horticultural production, this limitation renders the property unsuitable for commercial horticultural production.

Conclusion

The soils in the assessed area are suitable for intensive agricultural or horticultural production with the installation of irrigation and drainage. However, the combination of the lack of available water allocation and property size means that the site would not be conducive to economically sustainable commercial intensive agriculture or horticulture.

The Brief

- An assessment of the productive capacity of the land,
- Identification of any particular qualities that increase or decrease the value of the land from a productive perspective.

The Land

One title totalling 1.01 ha at 9 Milford Downs, Masterton was assessed for suitability for agricultural/horticultural production.

- Lot 5 DP 68587 Total Area: 1.01 ha

LUC Classification

LUC Classification is interpreted as an expression of three parts recorded in combination of "Class code, Subclass modifier, and unit identifier".

The LUC categories for the assessed area are 3E 2 and 3S 1:

3E 2

Class 3 – Land with moderate limitations for arable use, but suitable for cultivated crops, pasture or forestry.

Subclass E – Erosion susceptibility, deposition or the effects of past erosion damage first limits production

Unit 2 – This unit occurs on rolling slopes with significant potential erosion after cultivation.

3S 1

Class 3 – Land with moderate limitations for arable use, but suitable for cultivated crops, pasture or forestry.

Subclass S – Soil physical or chemical properties in the rooting zone such as shallowness, stoniness, low moisture holding capacity, low fertility, salinity, or toxicity first limits production.

Unit 1 – This unit occurs on flat river terraces with periods of severe soil moisture deficiency and poor drainage.

Source: LRIS – NZLRI Land Use Capability 2021

Noble, K. E. 1985: Land use capability classification of the Southern Hawke's Bay – Wairarapa Region. Water & Soil Miscellaneous Publication 74. Wellington, New Zealand, National Water and Soil Conservation Authority. 128p.

Desktop Soils Assessment

Landcare's on-line soil mapping service, S-maps, was used for a desktop analysis.

The main soil present are:

- Claremont *(4a.1)*: A silt textured soil. (100% - 1 ha)

Figure 1 - Land Title on S-maps soil map

Soil Analysis

S-Maps describes the three main different soil types present:

- Claremont *(4a.1)* soil is of the Pallic soil order and is of loess origin. The soil profile texture is silt.
    - The topsoil horizon can extend 10-20cm and has rapid permeability.
    - The subsoil horizon extends 15-25cm and has moderate permeability. This horizon is a weak loam.
    - The third horizon extends 15-35cm and has moderate permeability. This horizon is a slightly firm fine loam.
    - The fourth horizon extends 40-50cm and has impermeable permeability. This horizon is a firm coarse loam.
    - The potential rooting depth extends between 50-70cm due to low penetrable soil materials. The profile available water is moderate through the 100cm profile (93mm). The soil has a moderate clay percentage and a moderate cation exchange capacity.

S-maps Pictogram (Appendix)

Assessment of Productive Capability

Soils

Most of the property has a LUC category of 3E 2 (97%), the main limitations of this category are:

1. Susceptible to erosion
2. Susceptible to period of drought

The slope of this area is dominantly rolling between 8-15^{o} but with some undulating slopes of 4-7^{o}.

The rest of the property has a LUC category of 3S 1 (3%), the main limitations of this category are:

3. Poorly drained
4. Susceptible to period of drought

The slope of this area is dominant undulating between 4 and 7^{o}.

The soils are suited to multiple forms of arable and horticultural cropping. There is evidence based on the S-Maps analysis that they could sustain economically viable levels of production. A fragipan horizon (layer or dense cemented silt and/or fine sand) within the subsoils impedes permeability and leads to poor drainage, similarly this soil horizon also leads to periods of drought in summer. It is likely that the high capital investment required for horticultural growing systems could be justified considering these relatively minor limitations.

The limitations above could be mitigated to some degree with the installation of irrigation and drainage alongside careful attention to water and nutrient management. There is a potential for moderate sheet, rill and wind erosion during and after cultivation.

Water

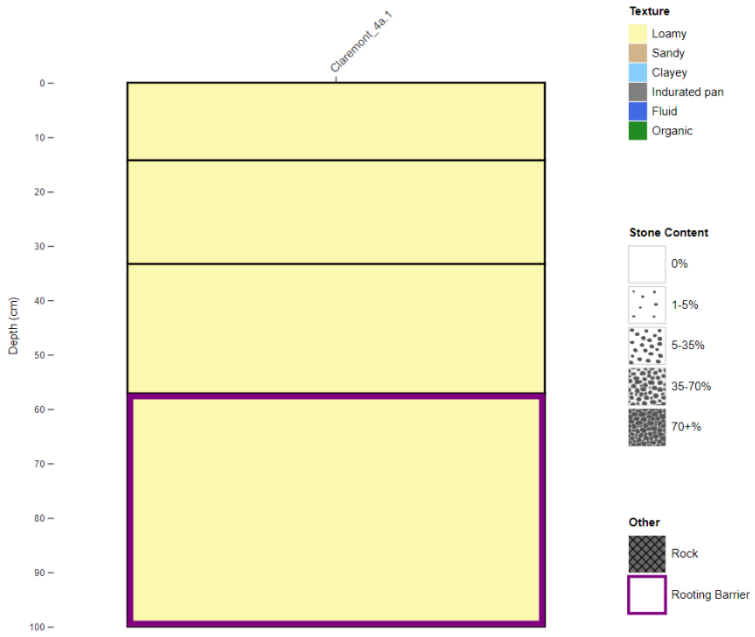
The no current resource consents allocated to this property.

Supplementary irrigation is considered essential for successful commercial horticultural production.

Conclusion

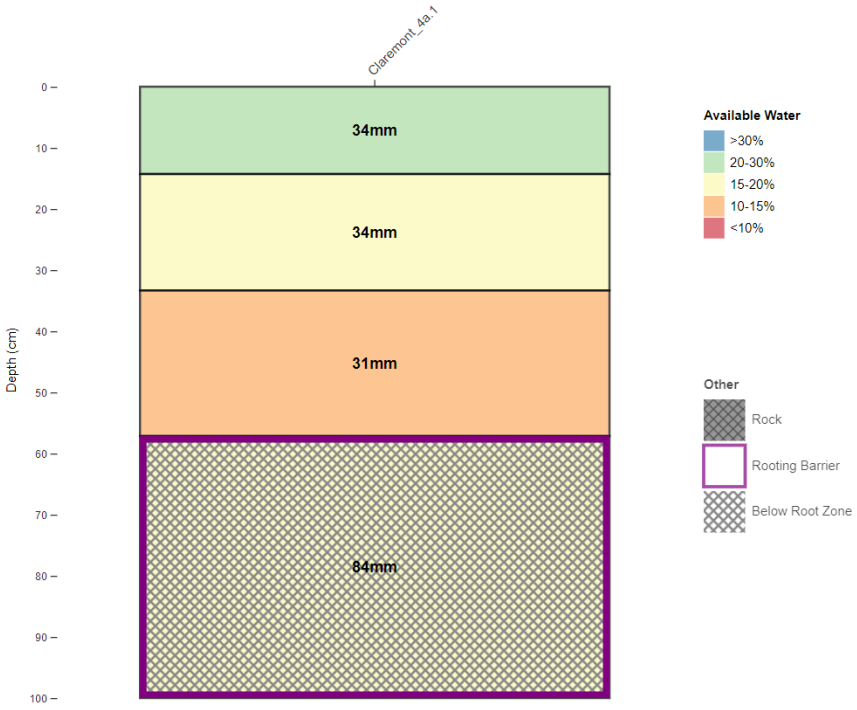
Considering these factors in combination means that this property in its entirety is **not suitable** for commercial agricultural or horticultural production.

Appendices



Pictogram's detailing soil textures through the soil horizons.

Functional soil horizons. Soils Data reproduced with permission of Landcare Research NZ Ltd



Pictogram's detailing plant available water holding capacity through the soil horizons.

Functional soil horizons. Soils Data reproduced with permission of Landcare Research NZ Ltd

Map detailing Land Use Capability.

LUC map reproduced with permission of Land Resource Information Services NZ

Manaaki Whenua
Landcare Research

SOIL REPORT

Claremont_4a.1

Report generated: 10-Jul-2024 from https://smap.landcareresearch.co.nz

Clar_4a.1

This information sheet describes the typical average properties of the specified soil to a depth of 1 metre, and should not be the primary source of data when making land use decisions on individual farms and paddocks. S-map correlates soils across New Zealand. Both the old soil name and the new correlated (soil family) name are listed below.

Soil Classification

Soil Classification:
Fragic Perch-gley Pallic Soils (PPX)

Family Name:
Claremont (Clar)

Sibling Name:
Claremont_4a.1 (Clar_4a.1)

Soil profile material
Stoneless soil

Depth class (diggability)
Moderately deep (50 - 70 cm)

Profile texture
silt

Parent Material

Stones/rocks
not applicable

Soil material
hard sandstone rock

Origin
Loess

Soil Sibling Concept

This soil belongs to the Pallic soil order of the New Zealand soil classification. Pallic Soils have pale coloured subsoils, due to low contents of iron oxides, have weak soil structure and high density in subsurface horizons. Pallic Soils tend to be dry in summer and wet in winter. It is formed in a blanket deposit of silt sized windblown materials, from hard sandstone parent material.

The topsoil typically has silt texture and is stoneless. The subsoil has dominantly silt textures, with gravel content of less than 3%. The plant rooting depth is 50 - 70 (cm), due to soil material of high density and/or high penetration resistance.

Generally the soil is poorly drained with very high vulnerability of water logging in non-irrigated conditions, and has moderate soil water holding capacity. Inherently these soils have a very high structural vulnerability and a moderate N leaching potential, which should be accounted for when making land management decisions.

Allan Hewitt ©

Perch-gley Pallic

About this publication

- This information sheet describes the *typical average properties* of the specified soil.
- For further information on individual soils, contact Landcare Research New Zealand Ltd: www.landcareresearch.co.nz
- Advice should be sought from soil and land use experts before making decisions on individual farms and paddocks.
- The information has been derived from numerous sources. It may not be complete, correct or up to date.
- This information sheet is licensed by Landcare Research on an "as is" and "as available" basis and without any warranty of any kind, either express or implied.
- Landcare Research shall not be liable on any legal basis (including without limitation negligence) and expressly excludes all liability for loss or damage howsoever and whenever caused to a user of this factsheet.

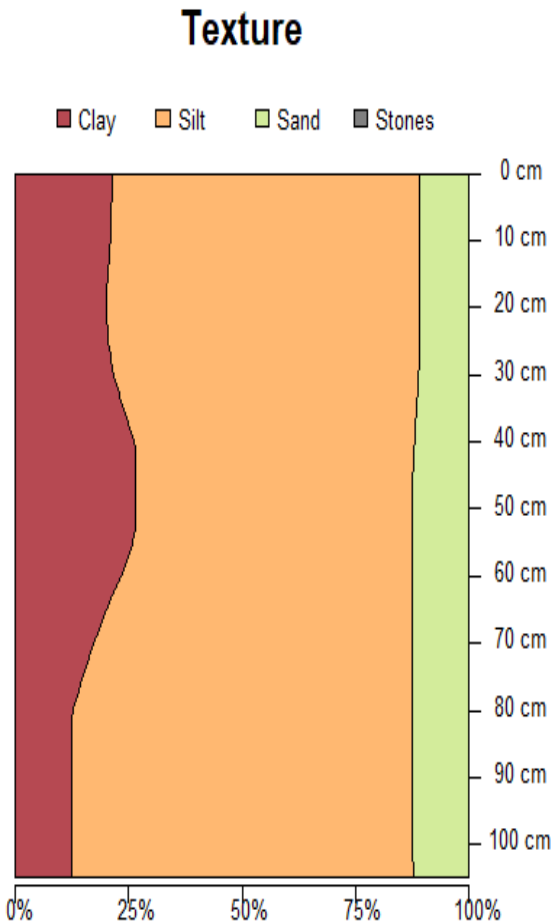
Claremont_4a.1

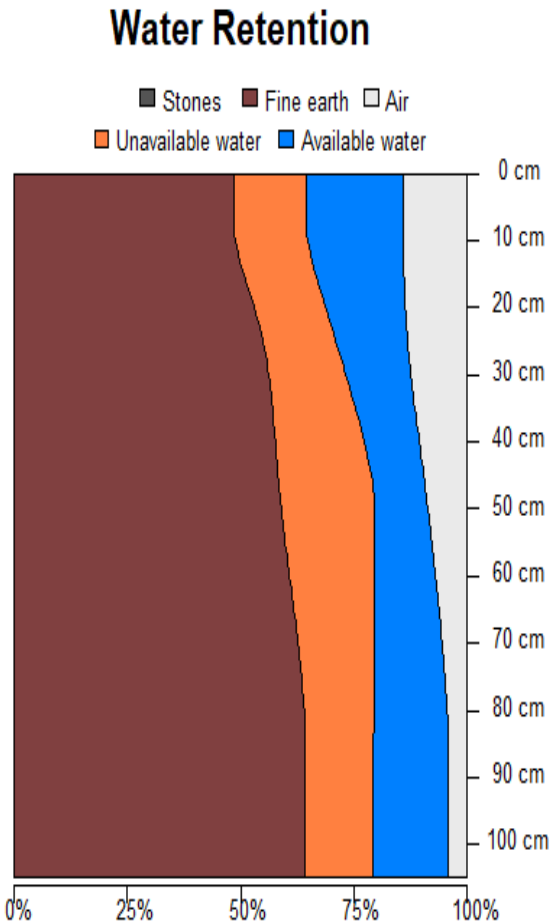
Soil horizons

Characteristics of functional horizons in order from top to base of profile:

Functional Horizon	Thickness	Stones	Clay*	Sand*	Permeability
Loamy Weak	10 - 20 cm	0 %	20 - 22 %	10 - 12 %	rapid
Loamy Weak	15 - 25 cm	0 %	20 - 22 %	10 - 12 %	moderate
Loamy Fine Slightly Firm	15 - 35 cm	0 %	25 - 28 %	10 - 15 %	moderate
Loamy Coarse Firm	40 - 50 cm	0 %	10 - 15 %	10 - 15 %	impermeable

* clay and sand percent values are for the mineral fines (excludes stones). Silt = 100 - (clay + sand)





The values for the graphs above have been generated from horizon and pedotransfer data. These values have then been splined to create continuous estimates of soil water holding capacity and particle size distribution the soil profile. These curves express the particle size distribution and water retention of the soil however there may be barriers to rooting depth that are not necessarily represented in these properties directly. It is advisable to check the potential rooting depth and rooting barrier fields in the soil physical properties section on page three of this factsheet.

Claremont_4a.1

Soil physical properties

Depth class (diggability)
Moderately deep (50 - 70 cm)

Potential rooting depth
50 - 70 (cm)

Rooting barrier
Low penetration soil material

Depth to hard rock
No hard rock within 1 m

Depth to soft rock
No soft rock within 1 m

Depth to stony layer class
No significant stony layer within

Texture profile
Silt

Topsoil stoniness
Stoneless

Topsoil clay range
20 - 22 %

Drainage class
Poorly drained

Permeability profile
Moderate over slow

Depth to slowly permeable horizon
50 - 70 (cm)

Permeability of slowest horizon
Slow (< 4 mm/h)

Aeration in root zone
Very limited

Profile available water

(0 - 30cm or root barrier)	(0 - 60cm or root barrier)	(0 - 100cm or root barrier)
High (56 mm)	High (93 mm)	Moderate (93 mm)

Dry bulk density

topsoil	subsoil
1.22 g/cm³	1.42 g/cm³

Soil chemical properties

Topsoil P retention
Low (22%)

Soil management factors

Vulnerability classes relate to soil properties only and do not take into account climate or management

Soil structure integrity

Structural vulnerability
Very high (0.72)

Contaminant management

N leaching vulnerability
Medium

P leaching vulnerability
not available yet

Water management

Water logging vulnerability
High

Drought vulnerability - if not irrigated
Moderate

Bypass flow
Medium

SINDI - Soil quality Indicators

SINDI - Soil Quality Indicators

A suite of soil quality indicators is available from http://sindi.landcareresearch.co.nz/

- Compare your soil with information from our soils databases.
- Assess the intrinsic resources and biological, chemical and physical quality of your soil
- See how your soil measures up against current understanding of optimal values.
- Learn about the effect each indicator has on soil quality and some general management practices that could be implemented to improve soil quality.

Claremont_4a.1

Soil information for OVERSEER

The following information can be entered in the OVERSEER® Nutrient Budget model. This information is derived from the S-map soil properties which are matched to the most appropriate OVERSEER categories. Please read the notes below for further information.

Soil description page

1. Select **Link to S-map**
2. Under S-map sibling data enter the S-map name/ref: **Clar_4a.1**

Considerations when using Smap soil properties in OVERSEER

- The soil water values are estimated using a regression model based on soil order, parent rock, soil functional horizon information (stone content, soil density class), as well as texture (field estimates of sand, silt and clay percentages). The model is based on laboratory - measured water content data held in the National Soils Database and other Manaaki Whenua datasets. Most of this data comes from soils under long-term pasture and may vary from land under arable use, irrigation, etc.

- Each value is an estimate of the water content of the whole soil within the target depth range or to the depth of the root barrier (if this occurs above the base of the target depth). Where soil layers contain stones, the soil water content has been decreased according to the stone content.

- S-map only contains information on soils to a depth of 100 cm. The soil water estimates in the > 60 cm depth category assume that the bottom functional horizon that extends to 100 cm, continues down to a depth of 150cm. Where it is known by the user that there is an impermeable layer or non-fractured bedrock between 100 and 150 cm, this depth should be entered into OVERSEER. Where there is a change in the soil profile characteristics below 100 cm, the user should be aware that the values provided on this factsheet for the > 60 cm depth category will not reflect this change. For example, the presence of gravels at 120 cm would usually result in lower soil water estimates in the > 60 cm depth category. Note though that this assumption only impacts on a cropping block, as OVERSEER uses soil data from just the top 60 cm in pastoral blocks.

- OVERSEER requires the soil water values to be non-zero integers (even though zero is a valid value below a root barrier), and the wilting point value must be less than the field capacity value which must be less than the saturation value. The S-map water content estimates supplied by the S-map web service have been rounded to integers and may be assigned minimal values to meet these OVERSEER requirements. These modifications will result in a slightly less accurate estimate of Available Water to 60 cm (labelled PAW in OVERSEER) than that provided on the first page of this factsheet, but this is not expected to lead to any significant difference in outputs from OVERSEER .