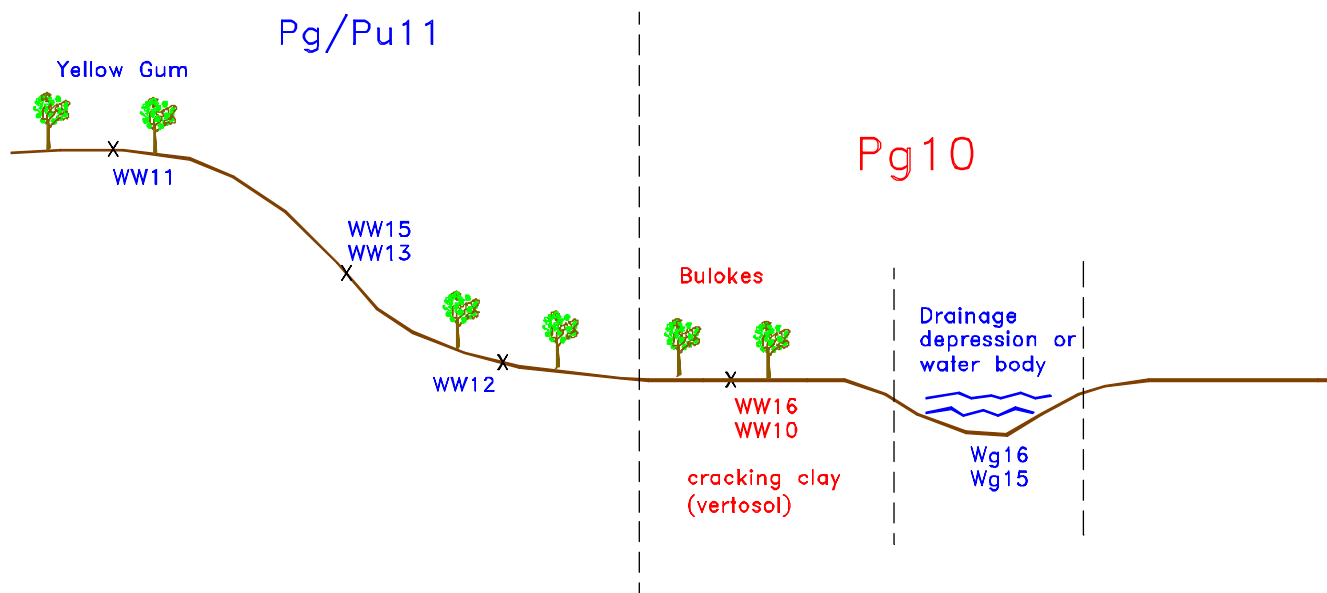


6.2.10 SOUTHERN CRACKING CLAY PLAINS -10 LAND SYSTEM

Map unit Pg10



Landscape

This land system comprises large areas of fairly flat clay plains, notably around Neuarpuurr, and flat to gently undulating plains that occur between the rises (WW16) or at the edge of lakes (WW10). The plains can be quite small in places, almost occurring as drainage depressions between the rises. Where they do not represent a sizeable area on the map they were not mapped due to restrictions of scale in mapping.

The landscape commonly has gilgai micro-relief due to the high shrink/swell characteristic of the clay.

Native Vegetation

Buloke is the main tree species occurring on the clay plains. The lower depressions support Black Box and Lignum Bush, and show surface soil cracking.

Soil Types

Grey vertisol is the dominant soil type. The soils are clay throughout the profile and seasonally crack due to the high shrink/swell of the clay. This causes the distinct gilgai micro-relief.

The soil profile shows considerable movement of the soil. This results in variable depth of the horizons (wavy appearance) and particularly of any calcium carbonate horizons. The presence of slickensides at depth also indicates high movement of the clay.

Some profiles, such as WW16, have a discontinuous bleached A2 horizon that indicates the uneven drainage of the soil.

The surface condition is slightly self-mulching, although once cultivated the surface becomes strongly self-mulching.

Around Neuarpurr, there is a large area of this soil type. Also evident are patches of solodised solonetz (Pg11) and Ferric Sodosols (Pg12), which are intermixed with redder cracking soils. Due to restrictions of scale these soils have not been individually mapped.

Current land Use

Grey vertosol soil is commonly cropped with wheat, peas and beans. During the summer months safflower is also sown. Irrigation of white clover for seed production is a common land use when the groundwater is available.



Plate 19 The clay plains around Neuarpurr are commonly irrigated for white clover seed production

Representative soil type of land unit

As a large part of this land unit occurs just south of the Little Desert, WW10 is the most appropriate soil type to represent this unit as the soil is still alkaline throughout, which is common to the soils in this area. WW16 is an associated soil type to show the difference in pH further south, where the top of the subsoil is often more acidic.

REPRESENTATIVE SOIL TYPE OF THE SOUTHERN CRACKING CLAY PLAINS - 10 -Pg10 LAND UNIT

MAP UNIT: Pg10

Site No.: WW10

Position in Landscape: Flat **Grid Ref:**518 696 E, 5936 191 N;
Aust. Soil Class.: Endocalcareous-Endohypersodic, Self-mulching Grey VERTOSOL
Northcote Factual Key: Ug5.2 **Great Soil Group:** grey clay

General Landscape Description:

These cracking soils are often found in association with lakes or on the flats between rises of land systems 11 and 12. As a large part of this land unit occurs just south of the Little Desert, this land unit is regarded as the most appropriate soil type to represent the gently undulating clay plains (Pg10) land unit. A large area occurs around Neuarcurr where irrigated white clover is grown for seed production.



Soil Profile Morphology:

Topsoil

A1 0-10 cm Dark grey (10YR4/1) *light clay*; moderate blocky structure (peds 20-50 mm), very firm consistence when dry. pH 7.8. Clear transition to:

Subsoil

B21 10-75 cm Dark grey (10YR4/1) *medium clay*; strong blocky structure, (peds 20-50 mm), smooth fabric, strong consistence when dry. pH8.6 Gradual but tongued transition to:

B22K 75-100 cm Light grey (2.5Y7/2) *light medium clay*; strong blocky structure, (peds 20-30 mm), very strong consistence when slightly moist, many (10-30%) soft and semi-hard calcium carbonate segregations. pH 9.4. Salinity increases to 7.7 ECe.

B23 100-200 cm+ Light grey (2.5Y7/2) *medium heavy clay*; a few red mottles, prismatic structure breaking down to strong polyhedral structure, (peds 10-20 mm), with patches of soft calcium carbonate segregations and a few hard calcium carbonate and iron/carbonate/silica segregations. pH 9.4.

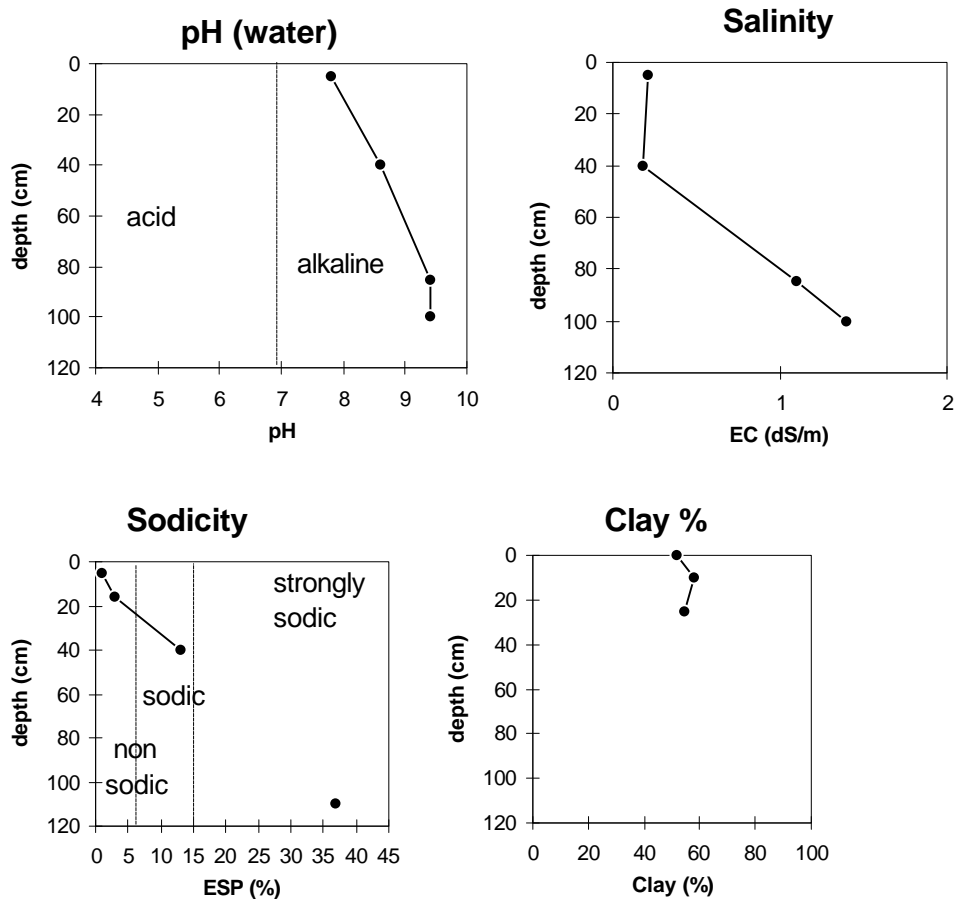


Soil Profile Characteristics:

Horizon	pH	Salinity	Sodicity	Dispersion	Internal Drainage	Hydrophobicity
Surface (A1 horizon)	slightly alkaline	low	non-sodic	nil	moderately well drained	nil
Subsoil (B21 horizon)	strongly alkaline	low	sodic	slight ¹		
Deeper subsoil (at 1 metre)	very strongly alkaline	high-very high	strongly sodic	none ²		

1 Moderate-strong dispersion after remoulding

2 Possible due to the high levels of soluble salts



Key Profile Features:

- Sodic clay subsoil
- Subsoils will disperse following cultivation when wet
- Presence of a carbonate horizon
- Alkaline subsoil
- High soil salinity at 75 cm
- Plant Available Water Capacity (PAWC) is considered to be very high (estimated at 230 mm) for this site profile based on an Effective Rooting Depth of 75 cm. Rooting depth will be restricted by subsoil conditions, such as; strongly sodic (Exchangeable Sodium Percentage >20%), high soluble salt levels (Chloride >0.1%), poor structure (eg. massive or very coarse, columnar or prismatic), very high carbonate (lime) content (not applicable to all plant species) or hard rock.
- Surface condition slightly self-mulching. Surface becomes more self-mulching following cultivation.
- Gilgai characteristics results in uneven depth of carbonate
- Uniform clay throughout profile

Soil Restrictions and Management Prescriptions

Feature	Result	Management Prescription
Sodic clay subsoil	Poor water and air movement into the subsoil resulting in waterlogging (impeded internal drainage). Poor root growth into the subsoil reducing the volume of the soil able to be exploited.	Gypsum applications if the subsoil is close to the surface and topsoil textures are light. <i>Dryland cropping</i> - include deep rooted crops in the rotation, minimum tillage and stubble retention. <i>Horticulture</i> - deep ripping with gypsum, install tile drainage (if appropriate).
Dispersion when reworked	Indication of soil sodicity. Soil structure collapses following tillage and wetting Results in poor soil structure that reduces water movement and plant root growth (see sodic subsoil) Increases water erosion hazard.	Do not cultivate wet soil (cultivate when moist.) Apply gypsum if growing high value crops.
Carbonate layer (lime)	Highly alkaline layer. Can restrict root growth of sensitive plant species. Potential for nutrient imbalance. May restrict water movement if layer is hard rock.	Grow alkaline tolerant species. Supply trace elements ie zinc. Considered sub-surface drainage (if appropriate).
Alkaline subsoil	Potential nutrient imbalance. Unsuitable for alkaline intolerant plants. May indicate subsoil sodicity.	Grow shallow rooted species. Grow alkaline tolerant plants.
Soil salinity at depth	Poor or no plant growth for deeper rooted species. Indication of waterlogging (impeded internal drainage) or high water table.	Grow shallow rooted species. Increase plant water use throughout the catchment. Install subsoil drainage (if appropriate). Minimise irrigation water loss below the root zone (improve irrigation efficiency).

Land Suitability Rating Table

LAND USE	SUITABILITY CLASS	MAJOR LIMITING COMPONENT
Wheat	2	Climate, soil
Canola	2	Climate, soil
Chickpeas	2	Climate, soil
Lentils	2	Climate, soil
White clover seed	2	Soil
Lucerne for seed production	2	Soil
Viticulture	2	Climate, soil
Apples	3	Soil
Potatoes	3	Soil
Carrots	3	Soil
Onions	3	Soil
Sweet corn	2	Climate, soil
Radiata Pine	3	Climate
Blue Gum	3	Climate

Land Suitability Assessment and Primary Limitations

Wheat	<i>Climate</i>	2	Moderate frost risk, slightly high rainfall
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly alkaline subsoil pH
Canola	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly alkaline subsoil pH
Chickpeas	<i>Climate</i>	2*	Moderate to high rainfall, moderate frost risk
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly impeded internal drainage, subsoil texture, slightly alkaline subsoil pH, soil salinity
Lentils	<i>Climate</i>	2	Slightly high rainfall, moderate frost risk
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly impeded internal drainage, subsoil texture, slightly alkaline subsoil pH, soil salinity
White clover seed	<i>Climate</i>	1	No major limitation
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly alkaline pH, soil salinity

<i>Viticulture</i>	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly alkaline subsoil pH, soil salinity, slightly impeded internal drainage
<i>Apples</i>	<i>Climate</i>	2	Slight frost risk, slightly high mean maximum January temperature
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Alkaline subsoil
<i>Potatoes</i>	<i>Climate</i>	2	Slightly high mean maximum January temperature
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Alkaline topsoil pH
<i>Lucerne for seed production</i>	<i>Climate</i>	1	No major limitation
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly alkaline subsoil pH, slightly impeded internal drainage
<i>Carrots</i>	<i>Climate</i>	1	No major limitation
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Alkaline topsoil pH
<i>Onions</i>	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Alkaline topsoil pH
<i>Sweet corn</i>	<i>Climate</i>	2	Slightly low mean monthly temperature (October - March)
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly alkaline topsoil pH, slightly impeded internal drainage
<i>Radiata Pine</i>	<i>Climate</i>	3	Low rainfall
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Depth of topsoil, slightly alkaline pH
<i>Blue Gum</i>	<i>Climate</i>	3	Low rainfall
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Depth of topsoil, slightly alkaline pH
*	Some areas may have higher rainfall		

**ASSOCIATED SOIL TYPE FOR THE SOUTHERN CRACKING CLAY PLAINS
-10 GENTLY UNDULATING PLAIN-Pg10**

MAP UNIT: Pg10

Site No.: WW16

Position in Landscape: Flat/Level plain **Grid Ref:** 501 568 E, 5918 899 N;
Aust. Soil Class.: Endocalcareous Endohypersodic, Self-Mulching, Grey
VERTOSOL
Northcote Factual Key: Ug5.2 **Great Soil Group:** grey clay

General Landscape Description:

This soil type occurs on the clay flats below the low rises of the gently undulating plains of land systems 11 and 12. It is a variation of the soil found on the Southern Cracking Clay Plains (Pg10) land system, and WW10 has been used to represent the whole unit on the map. Note rise with Yellow gum in background of photograph, where the land system changes to Yellow Gum Plains and Rises -11.



Soil Profile Morphology:

Topsoil

A1 0-10 cm Dark greyish brown (10YR4/2) *light clay*, moderate polyhedral structure, (peds 20-50 mm). Self-mulching surface condition (particularly evident after cultivation), strong consistence when dry. pH 8.6.

Subsoil

B21 10-20 cm Grey (10YR5/1) with slight brownish yellow (10YR6/8) mottles *medium clay*; moderate prismatic structure, (peds 50-100 mm), breaking to moderate blocky structure, (peds 20-50 mm), smooth faced peds, strong consistence when dry, complete dispersion when worked. pH 8.4.

Within the upper subsoil there is a discontinuous bleached A2 horizon with a fine sandy clay loam texture.

B22 20-40 cm *Medium clay*, with a lenticular structure and some slickensides, smooth faced peds. pH 8.7.

B23 40-60 cm *Medium clay*, with a lenticular structure and some slickensides, smooth faced peds, complete dispersion. pH 8.8.

B24 60-80 cm *Medium clay*, smooth faced peds. pH 9.0.

B25 80-130 cm *Medium heavy clay*, strong lenticular structure (peds 10-20 mm breaking to 2-5 mm), smooth faced peds. pH 9.3.

B26 130-180 cm+ *Heavy clay*, some slickensides, smooth faced peds, a few (2-5%) soft and hard calcium carbonate/silica and carbonate nodules.



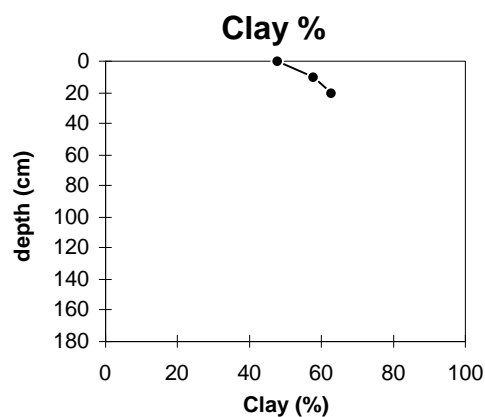
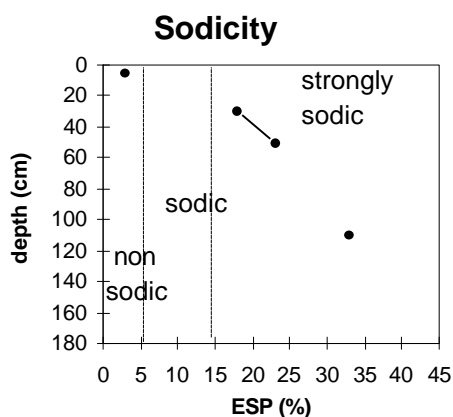
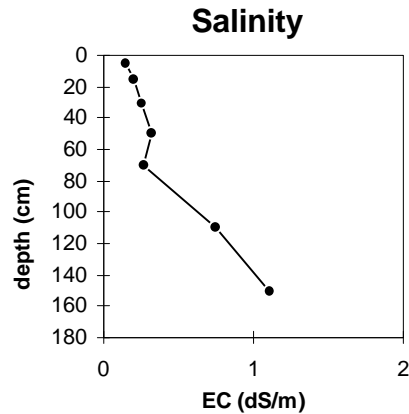
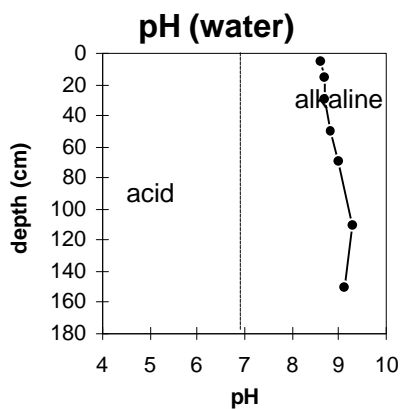
Soil Profile Characteristics:

Horizon	pH	Salinity	Sodicity	Dispersion	Internal Drainage	Hydrophobicity
Surface (A1 horizon)	strongly alkaline	low	non-sodic	nil	imperfectly drained [#]	nil
Subsoil (B21 horizon)	strongly alkaline	low	sodic [*]	moderate ¹		
Deeper subsoil (at 1 metre)	very strongly alkaline	medium-high	strongly sodic	strong		

1 complete dispersion after remoulding

* estimate

some areas may be better drained



Key Profile Features:

- Strongly sodic subsoil at depth
- Alkaline pH
- Soil salinity increased at depth
- Plant Available Water Capacity (PAWC) is considered to be low (estimated at 70 mm) for this site profile based on an Effective Rooting Depth (ERD) of 40 cm. Rooting depth will be restricted by subsoil conditions, such as; strongly sodic (Exchangeable Sodium Percentage >20%), high soluble salt levels (Chloride >0.1%), poor structure (eg. massive or very coarse, columnar or prismatic), very high carbonate (lime) content (not applicable to all plant species) or hard rock
- Uniform clay throughout profile
- Self-mulching surface when cultivated
- Uneven drainage, due to gilgai micro-relief
- Lenticular structure and slickensides indicate high shrinking and swelling of the clay subsoil, which results in surface cracking and gilgai micro-relief.

Soil Restrictions and Management Prescriptions

Feature	Result	Management Prescription
Sodic clay subsoil	Poor water and air movement into the subsoil resulting in waterlogging (impeded internal drainage). Poor root growth into the subsoil reducing the volume of the soil able to be exploited.	Gypsum applications if the subsoil is close to the surface and topsoil textures are light. <i>Dryland cropping</i> - include deep rooted crops in the rotation, minimum tillage and stubble retention.
Alkaline subsoil	Potential nutrient imbalance. Unsuitable for alkaline intolerant plants. May indicate subsoil sodicity.	Grow shallow rooted species. Grow alkaline tolerant plants.
Soil salinity at depth	Poor or no plant growth for deeper rooted species. Indication of waterlogging (impeded internal drainage) or high water table.	Grow shallow rooted species. Increase plant water use throughout the catchment.
Very low and low Plant Available Water Holding Capacity (PAWC)	Poor plant available water holding capacity. Indication of light soil texture or shallow effective plant rooting depth (ie presence of restrictive layers, salinity, pH or structure).	Improve organic matter through maintenance of vegetative cover and growing green manure crops. Increase effective rooting depth by reducing the effect of the restrictive layer.

Land Suitability Rating Table

LAND USE	SUITABILITY CLASS	MAJOR LIMITING COMPONENT
Wheat	2	Climate, soil
Canola	2	Climate, soil
Chickpeas	3	Soil
Lentils	3	Soil
White clover seed	3	Soil
Lucerne for seed production	3	Soil
Viticulture	3	Soil
Apples	3	Soil
Potatoes	3	Soil
Carrots	3	Soil
Onions	3	Soil
Sweet corn	3	Soil
Radiata Pine	3	Climate
Blue Gum	3	Climate

Land Suitability Assessment and Primary Limitations

<i>Wheat</i>	<i>Climate</i>	2	Moderate frost risk, slightly high rainfall
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly alkaline pH
<i>Canola</i>	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly alkaline pH
<i>Chickpeas</i>	<i>Climate</i>	2*	Moderate frost risk, moderate to high rainfall
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3 [#]	Impeded internal drainage
<i>Lentils</i>	<i>Climate</i>	2	Moderate frost risk, slightly high rainfall
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3 [#]	Impeded internal drainage
<i>White clover seed</i>	<i>Climate</i>	1	No major limitation
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Alkaline pH
<i>Lucerne for seed production</i>	<i>Climate</i>	1	No major limitation
	<i>Landscape</i>	1	No major limitation

	<i>Soil</i>	3 [#]	Impeded internal drainage
<i>Viticulture</i>	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3 [#]	Impeded internal drainage
<i>Apples</i>	<i>Climate</i>	2	Moderate frost risk, slightly high mean maximum January temperature
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Alkaline pH
<i>Potatoes</i>	<i>Climate</i>	2	Slightly high mean maximum January temperature
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Alkaline topsoil pH
<i>Carrots</i>	<i>Climate</i>	1	No major limitation
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Alkaline topsoil pH
<i>Onions</i>	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Clay topsoil, alkaline topsoil pH
<i>Sweet corn</i>	<i>Climate</i>	2	Slightly low mean monthly temperature (October - March)
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3 [#]	Impeded internal drainage
<i>Radiata Pine</i>	<i>Climate</i>	3	Low rainfall
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	2	Slightly impeded internal drainage
<i>Blue Gum</i>	<i>Climate</i>	3	Low rainfall
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	2	Slightly impeded internal drainage

* Some areas may have higher rainfall

Some areas may be better drained