

Protecting Queensland's strategic cropping land

Proposed criteria for identifying strategic cropping land

To be used in drafting the new strategic cropping land legislation

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Overview

Agricultural land resources are important to Queensland as they support regional communities and provide a resource base for food and fibre production.

The Queensland Government is committed to protecting the best of Queensland's cropping land resources. This land—strategic cropping land—is a finite resource that must be conserved and managed for long-term food production and regional growth. It includes the best land currently being cropped as well as the best cropping land resources that could be cropped in the future. Currently, the state's strategic cropping land resources are subject to a range of competing land-use activities, including agriculture, mining and urban development. Some of these activities can result in permanent alienation or unavailability of this land for cropping.

In early 2010, the Queensland Government released a discussion paper outlining a proposed new policy and framework to protect the state's most important food growing land for the future. A consultation report was produced, analysing the results of the public submissions received. Both documents are available at www.dlpg.qld.gov.au.

At the same time, the Queensland Government established a stakeholder advisory committee to help further develop the framework to protect strategic cropping land. The committee includes representatives from the agricultural, resource and urban development sectors, as well as representatives from local government and natural resource management groups.

On 23 August 2010, the Queensland Government released *Protecting Queensland's strategic cropping land: A policy framework (SCL framework)*, outlining the Queensland Government's approach to protecting strategic cropping land.

This new approach involves developing and implementing legislative and planning tools, including a specific Act of Parliament for strategic cropping land resources and a new State Planning Policy under the *Sustainable Planning Act 2009*. The SCL framework highlighted that on-ground assessment against the criteria would be necessary to identify strategic cropping land, and the criteria would be released as the SCL framework was further developed and implemented.

Therefore, the release of the proposed criteria is a significant milestone in the implementation of the SCL framework. This document sets out the criteria for identifying strategic cropping land—criteria that will inform drafting of the new Act of Parliament for strategic cropping land to be introduced in 2011.

These criteria have been developed to reliably and consistently identify the state's best cropping land—land that is suitable for a range of crops in most seasons—and to minimise the assessment burden and costs to landholders and developers.

Department of Environment and Resource Management (DERM) soil scientists, Department of Employment, Economic Development and Innovation agronomists, and independent soil science consultants developed and refined these criteria. Collectively, the group have over 100 years of soil science experience across the state's key cropping areas.

The feedback received in response to the SCL framework and the feedback from the stakeholder advisory committee was also extremely valuable and informed the development of these criteria.

In response, a technical assessment was undertaken involving detailed checking of 128 sites across the five strategic cropping land zones; Granite Belt, Wet Tropics, Coastal Queensland, Eastern Darling Downs and Western Cropping. The sites covered a broad range of landscapes and cropping systems to assess the likely results across cropping areas of the state. While a few changes to the criteria were recommended to better define the strategic cropping land resource, it indicated the effectiveness of the approach and gave the government confidence that the proposed criteria would reliably, identify Queensland's best cropping land. The technical report, *Protecting Queensland's strategic cropping land: A technical assessment of the proposed criteria for identifying strategic cropping land*, is available on the DERM website at <www.derm.qld.gov.au>.

An expert review was also undertaken to provide independent advice to the government on the criteria. The review examined the appropriateness of the process used to develop the criteria, the thresholds and their suitability for the proposed framework, and evaluated the scientific basis for the criteria and thresholds. The report on the findings of the expert review, *Protecting Queensland's strategic cropping land: An independent expert review of the criteria for identifying strategic cropping land*, provides additional transparency about the science underpinning the criteria. The report is available on the DERM website at <www.derm.qld.gov.au>.

The knowledge base of the soil scientists, agronomists and soil science consultants—together with the stakeholder feedback, technical assessment of 128 sites and independent expert review—provide confidence that these criteria will identify Queensland's best cropping land.

DERM is currently finalising guidelines that will provide information for applying the proposed criteria at a property level, including the process for on-ground assessments, field sampling and how to measure the proposed criteria. The guidelines will be released in May 2011.

The release of a Regulatory Assessment Statement (RAS) and draft State Planning Policy (SPP) is the next step in the implementation of the SCL framework. The RAS and draft SPP will be released for public consultation as soon as possible, and will be followed by the introduction of new strategic cropping land legislation in 2011.

The Queensland Government will continue to work with the strategic cropping land stakeholder advisory committee and consider public feedback as the SCL framework is further developed and implemented.

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Introduction

A key part of the SCL framework is identifying areas of strategic cropping land on-ground.

The trigger maps provide a landscape-scale indication of where strategic cropping land is expected to exist. These maps are based on the best soil, land and climate information currently available, and will be the starting point for determining whether an area is strategic cropping land. The current trigger maps are available on the DERM website at <www.derm.qld.gov.au>.

While the trigger map is a broadscale indicator of likely cropping land, it is the on-ground assessment against the criteria that will define the extent of strategic cropping at a property level.

When a landholder whose land is not on the trigger map can demonstrate it meets the criteria, they can apply to have the land considered strategic cropping land.

The criteria have been deliberately designed to be simple to apply and cost-effective to assess, while ensuring they reliably identify the best cropping land in the state.

To achieve this, eight criteria have been developed that are inclusionary and have clear threshold levels (i.e. when one criterion is not met, then the site area is not strategic cropping land and further assessment at that site ceases). The criteria, outlined in Table 1, are ordered from simple 'above ground' measures like slope and rockiness, which are easily determined, to more complex measures like salinity and soil water storage capacity, which may require laboratory analysis. Only when all of the criteria are met is the site deemed strategic cropping land (see Table 2).

This structure minimises assessment requirements for landholders and developers alike. It maintains the technical integrity of the system but ensures it can be applied as easily and efficiently as possible.

Before applying the criteria, developers and landholders should first determine which zone the property is

located in. Once the zone is identified, the criteria for that zone can be applied (see Figure 1 for a map of the zones).

While the criteria are consistent across the cropping areas, there are different threshold values that define the specific soil and landscape features within each zone. The five zones accommodate regional differences in climate, land forms and cropping systems.

Each criterion and the specific thresholds in each zone have been selected using existing science to identify the best land, but leave out unsuitable or poor quality cropping areas. For example, the rockiness criterion includes areas that can be productively cropped but excludes areas where rockiness would affect normal cropping practices.

The zones only apply to the key cropping landscapes of Queensland. The SCL framework does not apply outside these areas.

The criteria also set minimum size limits to ensure that areas classed as strategic cropping land are able to be productively cropped using standard practices. These minimum areas have been determined for each zone by agronomists and land resource specialists, and are consistent with the intent of the SCL framework to protect Queensland's best cropping land resources. The SCL framework will not apply to areas that are below these minimum size limits.

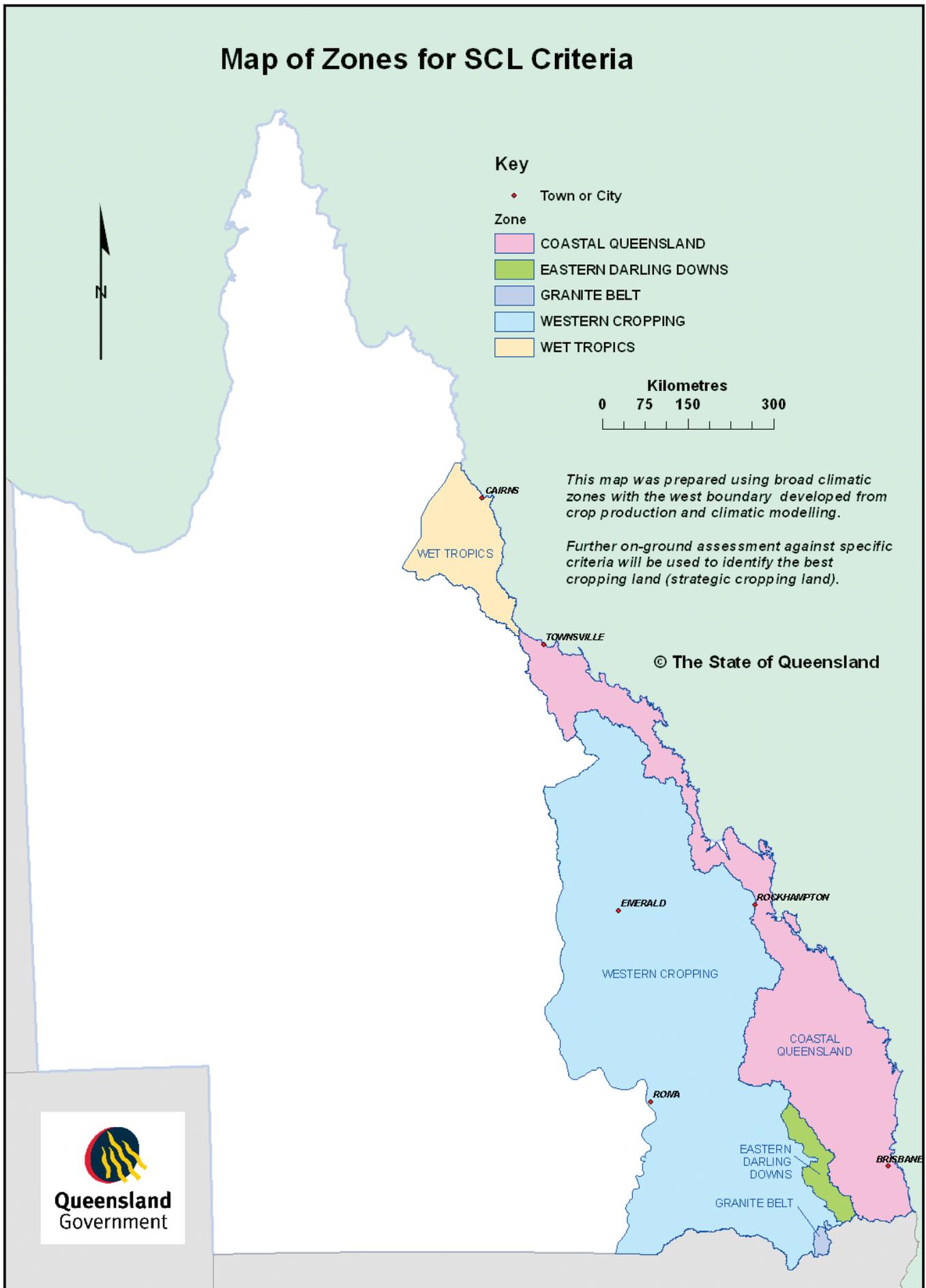
Table 1. Summary of criteria for identifying strategic cropping land

| Criteria | Criteria and thresholds | | | | |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------|---------------------------|
| | Western Cropping | Eastern Darling Downs | Coastal Queensland | Wet Tropics | Granite Belt |
| 1. Slope | ≤3% | ≤5% | | | |
| 2. Rockiness | ≤20% for rocks >60 mm diameter | | | | |
| 3. Gilgai microrelief | <50% of land surface being gilgai microrelief of >500 mm in depth | | | | |
| 4. Soil depth | ≥600 mm | | | | |
| 5. Soil wetness | Has favourable drainage | | | | Has satisfactory drainage |
| 6. Soil pH | For non-rigid soils, the soil at 300 mm and 600 mm soil depth must be greater than pH 5.0. For rigid soils, the soil at 300 mm and 600 mm soil depth must be within the range of pH 5.1 to pH 8.9, inclusive. | | | | |
| 7. Salinity | Chloride content <800 mg/kg within 600 mm of the soil surface | EC _{1:5} <0.56 dS/m within 600 mm of the soil surface | | | |
| 8. Soil water storage | ≥100 mm to a soil depth or soil physico-chemical limitation of ≤1000 mm | ≥75 mm to a soil depth or soil physico-chemical limitation of ≤1000 mm | ≥50 mm to a soil depth or soil physico-chemical limitation of ≤1000 mm | ≥25 mm to a soil depth or soil physico-chemical limitation of ≤1000 mm | |

Table 2: Example of the order of an on-ground assessment

| Criteria | Site 1 | Site 2 | Site 3 |
|-----------------------|--------------|--------------|----------|
| 1. Slope | ✓ | ✓ | ✓ |
| 2. Rockiness | ✗ Not SCL | ✓ | ✓ |
| 3. Gilgai microrelief | | ✓ | ✓ |
| 4. Soil depth | | ✓ | ✓ |
| 5. Soil wetness | | ✓ | ✓ |
| 6. Soil pH | | ✓ | ✓ |
| 7. Salinity | | ✓ | ✓ |
| 8. Soil water storage | | ✗ Not SCL | ✓ SCL |

Figure 1: Map of strategic cropping land zones



Criteria and thresholds for each strategic cropping land zone

Note: The terms highlighted in bold are defined in the 'Definitions and terminology' section.

Western Cropping zone

To be classified as strategic cropping land, the area must meet all of the following criteria.

Criterion 1

Slope is less than or equal to 3 per cent.

Criterion 2

The average density of **rocks** of greater than 60 millimetres (mm) diameter in the soil surface is less than or equal to 20 per cent.

Criterion 3

The average density of **gilgai microrelief** of greater than 500 mm depth is less than 50 per cent of the land surface.

Criterion 4

The **soil depth** is greater than or equal to 600 mm.

Criterion 5

The site has **favourable drainage**.

Criterion 6

For non-**rigid soils**, the soil at 300 mm and 600 mm soil depth must be greater than **pH 5.0**.

For **rigid soils**, the soil at 300 mm and 600 mm soil depth must be within the range of **pH 5.1 to pH 8.9**, inclusive.

Criterion 7

Soil at 600 mm depth or shallower contains a **chloride content** of less than 800 milligrams per kilogram mg/kg.

Criterion 8

The **soil water storage** of the soil is 100 mm or greater to a **soil depth** or **soil physico-chemical limitation** of up to 1000 mm.

Minimum area requirements

Mapping of strategic cropping land will be based upon the soil resource. In the Western Cropping zone, an area of soil that meets the site assessment criteria (above) must be **100 hectares or greater and at least 80 metres wide** to be defined as strategic cropping land.

Eastern Darling Downs zone

To be classified as strategic cropping land, the area must meet all of the following criteria.

Criterion 1

Slope is less than or equal to 5 per cent.

Criterion 2

The average density of **rocks** of greater than 60 mm diameter in the soil surface is less than or equal to 20 per cent.

Criterion 3

The average density of **gilgai microrelief** of greater than 500 mm depth is less than 50 per cent of the land surface.

Criterion 4

The **soil depth** is greater than or equal to 600 mm.

Criterion 5

The site has **favourable drainage**.

Criterion 6

For non-**rigid soils**, the soil at 300 mm and 600 mm soil depth must be greater than **pH 5.0**.

For **rigid soils**, the soil at 300 mm and 600 mm soil depth must be within the range of **pH 5.1 to pH 8.9**, inclusive.

Criterion 7

Soil at 600 mm depth or shallower contains a **chloride content** of less than 800 mg/kg.

Criterion 8

The **soil water storage** of the soil is 100 mm or greater to a **soil depth** or **soil physico-chemical limitation** of up to 1000 mm.

Minimum area requirements

Mapping of strategic cropping land will be based upon the soil resource. In the Eastern Darling Downs zone, an area of soil that meets the site assessment criteria (above) must be **50 hectares or greater and at least 50 metres wide** to be defined as strategic cropping land.

Coastal Queensland zone

To be classified as strategic cropping land, the area must meet all of the following criteria.

Criterion 1

Slope is less than or equal to 5 per cent.

Criterion 2

The average density of **rocks** of greater than 60 mm diameter in the soil surface is less than or equal to 20 per cent.

Criterion 3

The average density of **gilgai microrelief** of greater than 500 mm depth is less than 50 per cent of the land surface.

Criterion 4

The **soil depth** is greater than or equal to 600 mm.

Criterion 5

The site has **favourable drainage**.

Criterion 6

For non-**rigid soils**, the soil at 300 mm and 600 mm soil depth must be greater than **pH 5.0**.

For **rigid soils**, the soil at 300 mm and 600 mm soil depth must be within the range of **pH 5.1 to pH 8.9**, inclusive.

Criterion 7

Soil at 600 mm depth or shallower has an **electrical conductivity** of less than 0.56 deci-siemens per metre.

Criterion 8

The **soil water storage** of the soil is 75 mm or greater to a **soil depth** or **soil physico-chemical limitation** of up to 1000 mm.

Minimum area requirements

Mapping of strategic cropping land will be based upon the soil resource. In the Coastal Queensland zone, an area of soil that meets the site assessment criteria (above) must be **10 hectares or greater and at least 30 metres wide** to be defined as strategic cropping land.

Wet Tropics zone

To be classified as strategic cropping land, the area must meet all of the following criteria.

Criterion 1

Slope is less than or equal to 5 per cent.

Criterion 2

The average density of **rocks** of greater than 60 mm diameter in the soil surface is less than or equal to 20 per cent.

Criterion 3

The average density of **gilgai microrelief** of greater than 500 mm depth is less than 50 per cent of the land surface.

Criterion 4

The **soil depth** is greater than or equal to 600 mm.

Criterion 5

The site has **favourable drainage**.

Criterion 6

For non-**rigid soils**, the soil at 300 mm and 600 mm soil depth must be greater than **pH 5.0**.

For **rigid soils**, the soil at 300 mm and 600 mm soil depth must be within the range of **pH 5.1 to pH 8.9**, inclusive.

Criterion 7

Soil at 600 mm depth or shallower has an **electrical conductivity** of less than 0.56 deci-siemens per metre.

Criterion 8

The **soil water storage** of the soil is 50 mm or greater to a **soil depth** or **soil physico-chemical limitation** of up to 1000 mm.

Minimum area requirements

Mapping of strategic cropping land will be based upon the soil resource. In the Wet Tropics zone, an area of soil that meets the site assessment criteria (above) must be **10 hectares or greater** and **at least 30 metres wide** to be defined as strategic cropping land.

Granite Belt zone

To be classified as strategic cropping land, the area must meet all of the following criteria.

Criterion 1

Slope is less than or equal to 5 per cent.

Criterion 2

The average density of **rocks** of greater than 60 mm diameter in the soil surface is less than or equal to 20 per cent.

Criterion 3

The average density of **gilgai microrelief** of greater than 500 mm depth is less than 50 per cent of the land surface.

Criterion 4

The **soil depth** is greater than or equal to 600 mm.

Criterion 5

The site has **satisfactory drainage**.

Criterion 6

For non-**rigid soils**, the soil at 300 mm and 600 mm soil depth must be greater than **pH 5.0**.

For **rigid soils**, the soil at 300 mm and 600 mm soil depth must be within the range of **pH 5.1 to pH 8.9**, inclusive.

Criterion 7

Soil at 600 mm depth or shallower has an **electrical conductivity** of less than 0.56 deci-siemens per metre.

Criterion 8

The **soil water storage** of the soil is 25 mm or greater to a **soil depth** or **soil physico-chemical limitation** of up to 1000 mm.

Minimum area requirements

Mapping of strategic cropping land will be based upon the soil resource. In the Granite Belt zone, an area of soil that meets the site assessment criteria (above) must be **10 hectares or greater** and **at least 30 metres wide** to be defined as strategic cropping land.

Definitions and terminology

Bedrock

Bedrock is a continuous mass of consolidated rock that is little weathered and which may underlie a soil profile or outcrop at the surface. It is usually too hard to dig with hand tools, even when moist. Bedrock is distinguished from hardpans in not being underlain by unconsolidated soil material but may be underlain by other layers of softer rock. It is defined as an 'R' horizon, in the *Australian soil and land survey field handbook* (The National Committee on Soil and Terrain 2009).

Calcium to magnesium (Ca:Mg) ratio

The Ca:Mg ratio is used as an indication of soil dispersion, in addition to exchangeable sodium percentage (ESP). It is the ratio of exchangeable calcium to exchangeable magnesium. The measurement of exchangeable calcium and exchangeable magnesium is determined using the method from Rayment and Lyons (2011).

Chloride content

Chloride is a soluble salt that contributes to soil salinity. Chloride content is measured on a 1:5 soil to water suspension in accordance with method '5A2' described in Rayment and Lyons (2011).

Drainage

Favourable drainage

Favourable drainage is where the soil profile *does not* contain any **waterlogged layers**. The soil profile is assessed to a depth of 1000 mm or to the soil depth, whichever is the shallowest.

Satisfactory drainage

Satisfactory drainage is where the soil profile *does not* contain any **waterlogged layers** within 300 mm of the ground surface.

A **waterlogged layer** (horizon) within the soil profile must be identified by the presence of:

- a) a dominant soil colour that is gleyed¹; or
- b) a dominant soil colour that is grey² *and* has at least 10 per cent distinct or prominent mottles³ (by visual estimation) that have an orange⁴ or rusty⁵ colour; or
- c) any other dominant soil colour that has at least 10 per cent distinct or prominent mottles (by visual estimation) which have a gleyed colour; or
- d) presence of a conspicuous bleach⁶ that is at least 100 mm thick and does not directly overlie bedrock or weathered rock.

Notes:

1. A gleyed soil colour is bluish grey to greenish grey and has the closest visual match (when moist) to the following colour chips of a standard soil colour chart (Fujihira Industry Company 2001; Munsell Colour Company 2000):
 - a) any colour chip on the gley chart, or
 - b) any colour chip with a value of 7 or 8 and a chroma of 3 or less on the 2.5Y or 5Y chart.
2. A grey soil colour does not satisfy the conditions for a gley colour and has the closest visual match (when moist) to the following colour chips of a standard soil colour chart (Fujihira Industry Company 2001; Munsell Colour Company 2000):
 - a) any colour chip with a value of 4 or more and a chroma of 2 or less on any chart.
3. Mottles are clearly visible patches or streaks of sub-dominant colour within a differently coloured soil matrix. Distinct or prominent mottles are clearly visible and do not require close examination to differentiate their presence from the surrounding matrix.

4. An orange colour has the closest visual match (when moist) to the following colour chips of a standard soil colour chart (Fujihira Industry Company 2001; Munsell Colour Company 2000):
 - a) any colour chip with a value 6 or 7 and a chroma of 6 or more on the 5YR and 7.5YR charts.
5. A rusty colour has the closest visual match (when moist) to the following colour chips of a standard soil colour chart (Fujihira Industry Company 2001; Munsell Colour Company 2000):
 - a) any colour chip with a value 3 or more and a chroma of 3 or more on the 5R, 7.5R, 10R or 2.5YR charts.
6. A conspicuous bleach is a white or almost white colour that is the dominant colour for a soil layer and contains 10 per cent or fewer mottles. A conspicuous bleach has the closest visual match (when dry) to the following colour chips of a standard soil colour chart (Fujihira Industry Company 2001; Munsell Colour Company 2000):
 - a) any colour chip with a value of 7 or 8 and a chroma of 4 or less on the 5YR, 7.5YR or 10YR charts.

Electrical conductivity

Electrical conductivity (EC) is used as a measure of soil salinity. EC is measured in the field or in the laboratory using a 1:5 soil water suspension. The laboratory method is method '3A1' in Rayment and Lyons (2011).

Exchangeable sodium percentage (ESP)

ESP refers to the percentage of the total cation exchange capacity (CEC) that is due to exchangeable sodium. ESP is used as a measure of soil sodicity (and hence the tendency of a soil to disperse). Exchangeable cations (including CEC) are measured for a particular soil layer using the most appropriate method described in Table 15.2 of Rayment and Lyons (2011). In strongly acid soils, an alternative CEC known as effective CEC or ECEC is calculated according to method '15G1' in Rayment and Lyons (2011). ESP should not be calculated if the CEC or ECEC is very low (i.e. 3 milliequivalents per 100 grams (meq/100g) or less).

Gilgai microrelief

Microrelief refers to small changes in topography of up to a few metres above and below the general plane of the land surface. Gilgai microrelief is a natural soil feature associated with some clay soils that shrink and swell substantially with changing water content. Gilgai consist of mounds and depressions, sometimes separated by an almost planar ground surface. The area covered by depressions is measured as a percentage of the total area and the depth of the depression is measured in millimetres from the lowest point in the depression to the highest point on the adjacent mound or planar surface. A minimum of 10 gilgai depressions must be measured.

Gravel layer

A gravel layer is a continuous layer that extends beneath most of the soil surface and contains very abundant (> 90 per cent) unconsolidated rock fragments with a minimum size of 2 mm. The layer retards penetration by plant roots, stores very little water for plant use and **refuses entry by sampling equipment**.

Hard pan

A hard pan is a hardened layer of soil that **refuses entry by sampling equipment** and a small piece cannot be crushed underfoot by the weight of an average person, even after soaking in water for 1 hour. It represents either a strongly cemented or very strongly cemented pan as defined in the *Australian soil and land survey field handbook* (The National Committee on Soil and Terrain, 2009). A hard pan is formed by natural processes and does not include temporarily compacted zones created by farming operations.

pH

pH is a measure of soil acidity and alkalinity and is measured in a 1:5 soil to water suspension in accordance with method '4A1' in Rayment and Lyons (2011).

Refuses entry by sampling equipment

A layer is described as refusing entry by sampling equipment if it cannot be dug by hand-held tools (auger or spade) or by a soil coring machine that extracts an undisturbed solid core from a hydraulically driven push-tube.

Rigid soil

A rigid soil has minimal capacity to shrink and swell with changing water content. A rigid soil is differentiated from soils with significant shrink and swell capacity by lacking:

- when dry, the presence of open cracks that are at least 5 mm wide and extend from at least 300 mm below the ground surface vertically upwards to the surface or to immediately below a plough layer or to immediately below a thin, natural surface layer; and/or
- gilgai microrelief.

Rockiness

Rockiness refers to unattached rock fragments on the ground surface and to consolidated outcrops of underlying bedrock that reaches the surface. The density of rock fragments and rock outcrop on the ground surface should be assessed using visual estimation charts in the *Australian soil and land survey field handbook* (The National Committee on Soil and Terrain, 2009).

Rocks

Rocks refer to unattached, rock fragments that are larger than 60 mm (average maximum dimension)—i.e. cobbles, stones and boulders as defined in the *Australian soil and land survey field handbook* (The National Committee on Soil and Terrain, 2009).

Slope

Slope is the upward or downward incline of the land surface. Slope is measured over an interval of at least 20 metres, straddling the point of the soil observation.

Soil physico-chemical limitation

A soil physico-chemical limitation to root growth is defined as:

- a **chloride content** of greater than 800 mg/kg in the Western Cropping zone and Eastern Darling Downs zone; or
- an **electrical conductivity** of greater than 0.56 dS/m in the Coastal Queensland zone, Granite Belt zone and Wet Tropics zone; or
- a **pH** equal to or less than 5.0; or
- an **exchangeable sodium percentage** of greater than 15 in rigid soils; or
- a **calcium to magnesium ratio** of 0.1 or less in rigid soils.

Soil depth

Soil depth refers to the depth of soil to a physical root barrier (**bedrock, hard pan, weathered rock** or continuous **gravel layer**) in all soils.

Soil water storage

Soil water storage is the proportion of total water stored in a soil that is available for plant use.

Soil water storage is expressed as millimetres of water over that part of the soil profile that can be accessed by plant roots. The depth of soil profile over which plant roots can access water is defined as the:

- **soil depth**; or
- depth to a **soil physico-chemical limitation**; or
- 1000 mm deep

(whichever is shallower).

Valid estimates of stored water in the soil can be obtained using the following:

1. The look-up table based on soil textures (Table 3 opposite) lists the average estimated amount of water expected to be stored in each 100 mm increment of soil. Individual values for each increment or soil layer are then summed to **soil physico-chemical limitation, soil depth** or a depth of 1000 mm or whichever is shallower, to derive the soil water storage.

Estimates of soil water storage based on the soil texture look-up table that are within ± 15 per cent of the threshold value, or at the discretion of the proponent, must be supported by direct laboratory and field measured stored soil water, as described in point 2 below.

2. A combination of laboratory measurement and direct field measurement. Depending on the existing data, the drained lower limit can be defined using a soil water potential of 1500 kPa, while a direct field measurement is used to determine the drained upper limit for the soil. The difference between these values provides an estimate of the soil water storage.

Table 3: Soil texture look-up table

| Soil texture | Estimated soil water storage per 100 mm of soil depth |
|----------------------------------------------|-------------------------------------------------------|
| sand; clayey sand; loamy sand | 4 mm |
| sandy loam | 5 mm |
| loam; silty loam; sandy clay loam | 6 mm |
| clay loam; clay loam, sandy; silty clay loam | 8 mm |
| light clay; light medium clay | 10 mm |
| medium clay; medium heavy clay; heavy clay | 12 mm |

Weathered rock

Weathered rock is loosely consolidated material in which there has been minimal biological activity and that is more like fresh, unweathered rock than the soil material above.

Features that distinguish weathered rock from soil are:

- a markedly increased occurrence of rock fragments compared with soil layers above; and/or
- presence of a ‘ghost rock’ structure in which the material has the outline of rock layers or fragments but is as soft as the overlying soil layers; and/or
- a predominance of ‘mealy’ material which has a characteristic gritty appearance similar to fine ‘crusher dust’ or ‘deco’.

Weathered rock for the purposes of this assessment may be either partially weathered rock, saprolite or decomposed rock as defined in the *Australian soil and land survey field handbook* (The National Committee on Soil and Terrain, 2009).

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