

General guide to the vegetation clearing codes

Accepted development vegetation clearing codes

June 2018

For landholders throughout Queensland

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Contents

About this guide	ii
Common abbreviations used in this document	ii
Further information	ii
Glossary	1
Part 1: General information	3
Vegetation management framework	3
Accepted development vegetation clearing codes	3
Vegetation management report	5
Notification process	5
Confirmation from DNRME	6
Landholder or third-party obligations	6
Part 2: Vegetation management mapping	8
Online maps	8
Essential habitat map	9
Regional ecosystems	9
Bioregions	10
Reading regional ecosystem maps	11
Part 3: Wetlands, watercourse and drainage features	12
Mapping	12
General descriptions	13
Part 4: Soil and water quality protections	15
Soil erosion and instability	15
Salinity	16
Acid sulfate soils	17
Part 5: Measuring heights and slopes	18
Measuring tree height	18
Measuring slope	20

About this guide

This guide has been developed to help landholders operate under the accepted development clearing codes. It refers to the requirements of the *Vegetation Management Act 1999* and the *Planning Act 2016*, which jointly regulate the clearing of vegetation for land use and development under the Queensland vegetation management framework.

The guide is not intended to be exhaustive. It provides supplementary information only, and is designed to be read in conjunction with the relevant codes. It includes:

- general supporting information that applies to all codes
- technical information that applies to all codes.



It is recommended that you familiarise yourself with the local, state and federal Acts and Regulations that apply to your operations. Be sure you have any permits or approvals that are required under other legislation.



For more detailed information about individual codes, see the following short guides (to be published throughout 2018):

- [Guide to using the fodder code](#)
- *others as they become available.*

The guides are also available through your local Queensland Government offices or see 'Further information' below.

Common abbreviations used in this document

- Act = *Vegetation Management Act 1999*
- code = accepted development vegetation clearing code
- DNRME = Department of Natural Resources, Mines and Energy
- encroachment code = Managing Encroachment Accepted Development Vegetation Clearing Code
- fodder code = Managing Fodder Harvesting Accepted Development Vegetation Clearing Code
- RE = regional ecosystem

Further information

For more information call **135 VEG (135 834)**

email vegetation@dnrme.qld.gov.au

or search 'Vegetation Management' on www.qld.gov.au.

Glossary

Term	Meaning	Relevant legislation
Category A area	an area which is: • a declared area • an offset area, an exchange area, an area that has been subject to unlawful clearing or an enforcement notice, an area subject to clearing as a result of a clearing offence OR • an area that the chief executive determines to be Category A Category A areas are colour-coded red on the regulated vegetation management map.	see <i>Vegetation Management Act 1999</i> , s 20AL.
Category B area	an area which is remnant vegetation or an area the chief executive determines to be Category B Category B areas are colour-coded dark blue on the regulated vegetation management map.	see <i>Vegetation Management Act 1999</i> , s 20AM.
Category C area	an area which is high-value regrowth vegetation on freehold land, Indigenous land or land the subject of a lease issued under the <i>Land Act 1994</i> for agriculture or grazing purposes or an occupation licence under that Act in an area that has not been cleared in the last 15 years which is also an endangered, of concern, or least concern regional ecosystem Category C areas may also be vegetation which the chief executive decides to show as Category C. Category C areas are colour-coded light blue on the regulated vegetation management map.	see <i>Vegetation Management Act 1999</i> , s 20AN.
Category R area	an area which is a regrowth watercourse and drainage feature area located within 50 metres of a watercourse located in the Burdekin, Burnett–Mary, Eastern Cape York, Fitzroy, Mackay–Whitsunday or Wet Tropics catchments identified on the vegetation management watercourse and drainage feature map Category R areas are colour-coded yellow on the regulated vegetation management map.	see <i>Vegetation Management Act 1999</i> , s 20ANA.
Category X area	all areas other than Category A, B, C and R areas Some Category X areas are also identified on a property map of assessable vegetation (PMAV) as 'locked in'. Category X areas are also known as 'exempt areas' because activity in Category X areas is not regulated by the <i>Vegetation Management Act 1999</i>. Category X areas are coloured-coded white on the regulated vegetation management map.	see <i>Vegetation Management Act 1999</i> , s 20A.
clear (vegetation)	to remove, cut down, ringbark, push over, poison or destroy in any way, including by burning, flooding or draining; but not including destroying standing vegetation by stock, or lopping a tree	see <i>Vegetation Management Act 1999</i> , Schedule.
code	accepted development vegetation clearing code	see <i>Vegetation Management Regulation 2012</i> , s 3.
DA	development approval	
DES	Department of Environment and Science	
Department/ DNRME	Department of Natural Resources, Mines and Energy	
DSITI	Department of Science, Information Technology and Innovation	

Term	Meaning	Relevant legislation
environmental offset	an activity undertaken to counterbalance or compensate for a lasting adverse impact on significant environmental matters (e.g. valuable species and ecosystems) on one site Offsets can be financial or property-driven (i.e. by securing land at another site and managing that land over time to replace those significant environmental matters that were lost); or a combination of both. Environmental offsets provide the flexibility to approve development in one place on the basis of a requirement to make an equivalent environmental gain in another place where there is not the same value to industry.	
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Qld)</i>	
essential habitat map	a map certified by the chief executive as showing areas of the state the chief executive reasonably believes are areas of essential habitat for protected wildlife	
fodder harvesting	the clearing of vegetation that predominantly consists of fodder species for use as a food source for livestock Used as a normal part of land management and during droughts, fodder harvesting is typically carried out in strips, blocks or other sections so as to leave a proportion of vegetation intact to conserve the area and broader regional ecosystem; and with the cleared vegetation remaining where it is cleared, for nearby stock to feed on.	
managing thickened vegetation	the selective clearing of vegetation at a locality that does not include clearing using a chain or cable linked between two tractors, bulldozers or other traction vehicles: • to restore a regional ecosystem to the floristic composition and range of densities typical of the regional ecosystem in the bioregion in which it is located; and • to maintain ecological processes and prevent loss of diversity	
NCA	<i>Nature Conservation Act 1992 (Qld)</i>	
Planning Act	<i>Planning Act 2016 (Qld)</i>	
PMVA	property map of assessable vegetation—a map certified by the chief executive as a PMVA for an area and showing the vegetation category areas for the area (e.g. Category C area, Category X area)	
RE	regional ecosystem	
Regrowth watercourse and drainage feature area	an area located within 50m of a watercourse or drainage feature located in the Burdekin, Burnett–Mary, Eastern Cape York, Fitzroy, Mackay–Whitsunday or Wet Tropics catchments identified on the vegetation management watercourse and drainage feature map	
regrowth vegetation	vegetation that is not remnant vegetation	
remnant vegetation	vegetation that: • is an endangered regional ecosystem, an of concern regional ecosystem, or a least concern regional ecosystem, and • forms the predominant canopy of the vegetation covering more than 50% of the undisturbed predominant capacity; averaging more than 70% of the vegetation's undisturbed height; and composed of species characteristic of the vegetation's undisturbed predominant canopy	
RPP	riverine protection permit	
SLATS	Statewide Landcover and Trees Study SLATS is a vegetation monitoring initiative of the Queensland Government with the primary objective of assessing the extent of woody vegetation in Queensland and assessing all woody vegetation change (clearing) in Queensland.	
VMA or Act	<i>Vegetation Management Act 1999 (Qld)</i>	
Water Act	<i>Water Act 2000 (Qld)</i>	

Part 1: General information

Vegetation management framework

The *Vegetation Management Act 1999*, in conjunction with the *Planning Act 2016* and subordinate legislation, regulates the clearing of vegetation for land use and development in Queensland. By providing an alternative path to development application and assessment processes, accepted development vegetation clearing codes provide opportunities for landholders to clear for low-risk property management activities, while ensuring the objectives of the Act are achieved.

Accepted development vegetation clearing codes

The accepted development vegetation clearing codes are:

- Managing Fodder Harvesting (dated 14 May 2018)
- Managing Category C Regrowth (dated 8 March 2018)
- Managing Encroachment (dated 2 December 2013)
- Managing Category R Regrowth Vegetation (dated 2 December 2013)
- Necessary Environmental Works (dated 8 August 2014)
- Property Infrastructure (dated 2 December 2013)
- Weed Control (dated 2 December 2013)
- Extractive Industry (dated 8 August 2014)
- Native Forest Practice (dated 8 August 2014)
- Improving Operational Efficiency of Existing Agriculture (dated 2 December 2013)

Each code outlines the requirements for clearing vegetation for particular purposes and to achieve the desired environmental outcomes.

Each accepted development vegetation clearing code:

- describes the scope of the activities covered by that code
- outlines the compulsory notification process to be followed before undertaking the clearing activity (section 2 of the code)
- stipulates the compliance requirements (section 3 of the code)
- prescribes the clearing practices.

Any clearing conducted in accordance with the requirements of the applicable code qualifies as exempt clearing work (under schedule 21 of the Planning Regulation 2017), which means that it is not classified as assessable development under the Planning Act.

If clearing does not comply with the relevant code, it is classified as assessable development, meaning that:

- you must apply for a development approval under the Planning Act
- you may be committing an offence under the Planning Act (section 163) if you undertake the clearing without appropriate approval.

Scope

Each accepted development vegetation clearing code broadly defines the activities, locations and other requirements that must be met for that code to apply. If your proposed clearing activity does not fall within the scope, then you cannot operate under that particular code, and you won't need to read any further into the code.

The scope generally lists requirements for issues including:

- land tenure (e.g. freehold, Indigenous, leasehold)
- vegetation categories, as defined in the Vegetation Management Act and displayed on the regulated vegetation management maps (e.g. Category B remnant vegetation)—see Part 2 of this guide
- regional ecosystems (some clearing activities are only permitted in certain regional ecosystems).

The following decision tree may help you determine your options for lawfully clearing native vegetation under the Queensland vegetation management framework.

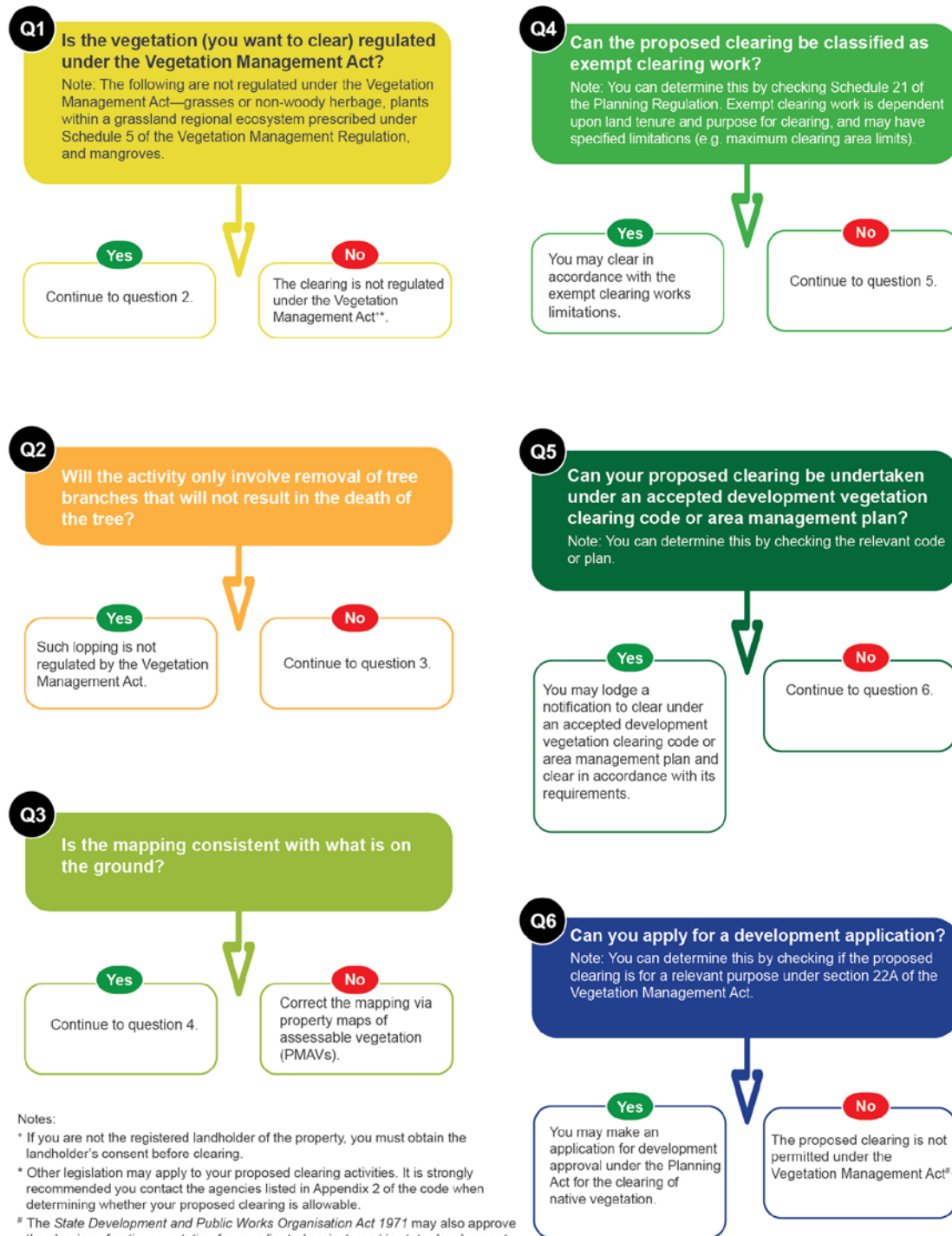


Figure 1: Decision tree for determining approvals required for clearing native vegetation

Vegetation management report

For relevant information about your property, you should obtain a vegetation management report (also known as a property report) and accompanying maps. To do this, use the online request form at www.qld.gov.au (search for 'vegetation management maps').



You will need a lot number and plan number before you start.

The report will give you a series of maps and supporting information about vegetation categories and regional ecosystems on your property. This information will help you determine whether your proposed activities are within the scope of a particular code and will also provide some necessary information about the notification process you will need to follow.

Notification process

Before operating under a code, you must notify DNRME of your intention and provide particular supporting information. Two different types of entities may be responsible for undertaking the clearing and lodging a notification:

- landholders undertaking their own work
- third parties undertaking work on the landholder's land, with the consent of the landholder.

Either the landholder or the third party may authorise another person to lodge the notification on their behalf. Anyone who lodges the application, other than the landholder, will need to certify that they have the landholder's consent to lodge the application.

Examples

A machinery contractor may be authorised by a landholder to notify DNRME on the landholder's behalf.

A resource company or natural resource management group may undertake their own work on a landholder's land (with the consent of the landholder).

Landholders and third parties are encouraged to notify DNRME [online](https://vegetation-apps.dnrm.qld.gov.au/#/) <<https://vegetation-apps.dnrm.qld.gov.au/#/>>. Notification forms are also available at DNRME offices, and may be lodged in person or by post. There is no notification fee.

If you have been authorised by a landholder or a third party to notify on their behalf, you must provide written evidence of the landholder's consent.

Before notifying

Make sure you read and understand the relevant accepted development vegetation clearing code/s before completing the notification form.

Collect all the required data and information you will need to supply as part of the code. You will be required to supply GPS coordinates using the Map Grid of Australia 1994 (MGA 94) format. Alternatively, you can upload an attachment with this data and attach it to the form.

If you intend to clear native vegetation on leasehold land or land subject to a forest consent area contact the [Department of Agriculture and Fisheries](#) to ensure the state has no commercial interest in the timber.

If your [property report](#) identifies any part of the intended clearing area as a high-risk area for protected plants (i.e. all native plants), read the [protected plants information](#) for further requirements.

Preparing and submitting your notification

You are required to provide the following details when you notify DNRME:

- contact details
- lot on plan on which the clearing is proposed
- tenure of the property (i.e. freehold, leasehold or other)
- landholder's details
- your details and evidence of the landholder's consent if notifying on behalf of a landholder or third party
- map or GPS coordinates identifying the area to be cleared
- estimate (in hectares) of the area to be cleared
- regional ecosystem/s in which the clearing is proposed.¹

TIP *Notifications are not transferable when a property is sold. If you have recently purchased a property, you will need to notify DNRME of your intention to clear under a clearing code.*

Confirmation from DNRME

If you complete an online notification form, you should receive confirmation by email shortly after you complete the notification. If you do not receive a confirmation email, your notification **has not been received**. For more information call **135 VEG** (135 834), email vegetation@dnrme.qld.gov.au or search 'vegetation management' on www.qld.gov.au

If you complete a hard-copy notification form, we will confirm receipt of your notification by email or post.

TIP *Do not commence clearing until you receive confirmation of your notification from DNRME.*

Landholder or third-party obligations

The landholder or third party whose name appears on the notification is legally liable for any clearing activity undertaken. This is the case even if the application was lodged by a contractor, employee or another agent.

If you have lodged a notification and another person will undertake clearing on your behalf, you should:

- ensure they view a copy of the notification confirmation provided by DNRME before commencing any on-ground clearing activity
- document and retain your instructions to contractors, employees or other agents
- supervise any clearing activity undertaken to ensure that it is done in accordance with the code
- keep a record of the name, address and contact details of the person clearing on your behalf.

Record-keeping requirements

Additional record-keeping requirements, including any that are code-specific, are detailed in the compliance requirements of each code.

TIP *We strongly recommend that you keep copies of any invoices provided by agents, such as a clearing contractor.*

¹ DNRME collects this information to meet its obligations under the Vegetation Management Act. Only the location and the purpose of the notified activity are included on the public register. Your personal information will not be disclosed to any other parties unless authorised or required by law.

Self-auditing

To help you monitor your compliance with the clearing codes, we recommend that you (or the person clearing on your behalf) self-audits after operating within a small portion of the total area that you propose to clear.

Before re-lodging a subsequent notification under some codes, you must complete a self-audit to ensure that the clearing already undertaken has satisfied the code requirements. You are not required to provide the results of the self-audit to DNRME when you re-notify; however, as part of the compliance requirements, you must keep the results and make them available to DNRME upon request.

TIP *Keep your self-audit results on file!*

Landholders must use the relevant self-audit sheet for the clearing that has been undertaken. Self-audit sheets are provided at www.qld.gov.au. To obtain hard copies of self-audit sheets, call **135 VEG** (135 834), email vegetation@dnrme.qld.gov.au or search 'Vegetation Management' on www.qld.gov.au

TIP *Compliance with the code does not exempt you from requirements under other legislation. Landholders should contact other relevant agencies to discuss their proposed activities prior to clearing. Contact information is provided in Appendix 2 of each code.*

Part 2: Vegetation management mapping

Online maps

You can download a range of maps and reports to help you understand the vegetation types and categories that are relevant to the vegetation management framework over your area of interest:

- **Regulated vegetation management maps** show the vegetation categories needed to determine clearing requirements. More detail on these maps is provided in the section below. These maps are updated monthly to show new property maps of assessable vegetation (PMAVs).²
- A **vegetation management supporting map** is provided as an attachment to a regulated vegetation management map. This supporting map gives information on regional ecosystems, wetlands, watercourses and essential habitat.
- **Vegetation management reports** (also known as property reports) contain the maps detailed above plus a protected plants flora survey trigger map and a range of related information that may help in the self-assessment process.



To request a map or report, use the online request form at www.qld.gov.au (search for 'vegetation management maps').

Regulated vegetation management maps

Regulated vegetation management maps show the different vegetation categories that are present on your land. This information will help you determine the type of approval you need for vegetation clearing. Therefore, it is useful to understand the types of vegetation in each category:

- **category A area**—vegetation that is subject to compliance notices, offsets and voluntary declarations
- **category B area**—remnant vegetation shown on a regional ecosystem or remnant map as an endangered regional ecosystem, an of concern regional ecosystem or a least concern regional ecosystem
- **category C area**—high-value regrowth vegetation
- **category R area**—regrowth watercourse area
- **category X area**—non-remnant vegetation that is exempt from requirements under the Vegetation Management Act.

The vegetation management supporting maps are colour-coded to the status of vegetation shown:

- **pink**—endangered regional ecosystem
- **orange**—of concern regional ecosystem
- **green**—least concern regional ecosystem.



If you believe that the vegetation shown on the map doesn't match what's on the ground, please let us know by applying for a PMAV. For more information, visit www.qld.gov.au (search for 'vegetation management')

The supporting maps (provided as attachments to your requested property report) give you additional information such as the location of wetlands, watercourses and essential habitat on your property.

² If, after viewing the regulated vegetation management map for your property, you consider that the on-ground vegetation is not consistent with the mapped RE, you may choose to amend the map by applying for a PMAV. For more information, visit www.qld.gov.au (search for 'vegetation management').

Essential habitat map

Essential habitat is defined by the Vegetation Management Act as the habitat of endangered or vulnerable or near-threatened wildlife (protected wildlife) prescribed under the *Nature Conservation Act 1992*.

Essential habitat mapping is shown on the vegetation management supporting maps. The mapping relies on information sourced by a number of different government and non-government agencies and experts.

Essential habitat is mapped over areas of vegetation that are likely to contain either:

- three or more essential habitat factors³
or
- the relevant species at any stage of its life cycle.

The maps help to identify the essential habitat so that clearing of vegetation may be managed to prevent the loss of biodiversity.

Regional ecosystems

Regional ecosystems (REs) are vegetation communities that are consistently associated with a particular combination of geology, landform and soil in a bioregion. REs are shown on the vegetation management supporting map.

Using a combination of satellite imagery, aerial photography and on-ground investigation, the Queensland Herbarium has mapped the remnant extent of REs for much of the state.⁴ Each RE has been assigned a vegetation management status based on its current remnant extent—that is, how much of it remains in a bioregion.

Endangered status means:

- the area of remnant vegetation is less than 10% of the pre-clearing extent of the RE
or
- the area of remnant vegetation is 10–30% of the pre-clearing extent of the RE, and less than 10 000 hectares.

Of concern status means:

- the area of remnant vegetation is 10–30% of the pre-clearing extent of the RE
or
- the area of remnant vegetation is more than 30% of the pre-clearing extent of the RE, and less than 10 000 hectares.

Least concern status means:

- the area of remnant vegetation is more than 30% of the pre-clearing extent of the RE
and
- more than 10 000 hectares.

REs are further categorised into the following five groups based on vegetation structure—dense, mid-dense, sparse, very sparse and grassland. These structural categories are indicative of the expected density or composition of vegetation in its natural state.

³ Biological and/or non-biological requirements of a species that are necessary or desirable for the wildlife at any stage of its life cycle, including vegetation community, altitude, soils, position in landscape, or regional ecosystem.

⁴ Science, Information Technology and Innovation, Queensland Government 2016, 'Regional ecosystem framework', viewed 21 December 2016, <<https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/framework/>>.

Bioregions

Queensland has been divided into 13 bioregions, each of which represents a broad landscape pattern that is the result of the interplay between factors including geology, climate and biota. Within each bioregion, there are a number of REs that make up the diversity of landscapes across the region. As each bioregion is different in nature, the vegetation management requirements under the framework differ.

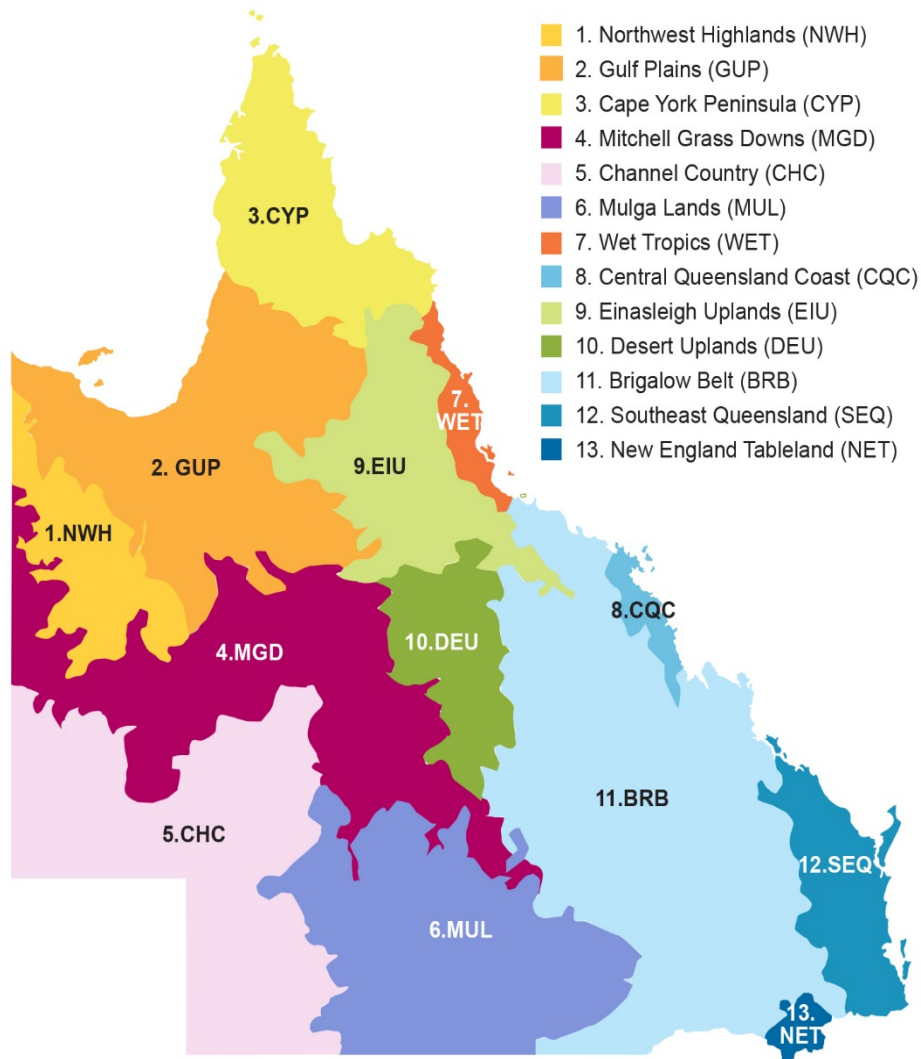


Figure 2: Queensland bioregions

Reading regional ecosystem maps



A full description of each ecosystem is available on the **Regional Ecosystem Description Database**—download the database at www.qld.gov.au (search for 'regional ecosystem description database').



Regional ecosystem mapping can also be viewed through the **Queensland Globe** at www.qld.gov.au (search 'Queensland globe').

Each identified area on the map is called a polygon. Each polygon is labelled with a three-number code identifying the RE:

- The first number indicates the **bioregion** in which the RE is situated.
- The second number refers to the **land zone** in which the ecosystem occurs.
- The third number refers to the **specific ecosystem** and denotes **vegetation type**.

Example

In the RE code **6.3.21**:

- 6** is the code for the Mulga Lands bioregion
- 3** indicates alluvial systems such as creeks, rivers and floodplains
- 21** indicates low woodlands of mulga on low alluvial sand dunes.

Most regional ecosystem maps show polygons with more than one RE code. The order in which the REs are listed reflects the relative size and extent of these different ecosystems on the ground.

Example

A mixed polygon labelled **6.5.1/6.5.2, 70/30** contains approximately 70% of RE 6.5.1 and 30% of RE 6.5.2.

If you have areas mapped as more than one RE, you may need to determine precisely where on the ground each occurs.

Part 3: Wetlands, watercourse and drainage features

Accepted development vegetation clearing codes apply additional restrictions to clearing in or near wetlands, watercourses and drainage features.

While each of these water features is described generally below, their proper definition is contained in the Vegetation Management Act. This definition requires that each water feature:

- is displayed on a relevant map (see details below in 'Mapping') that has been certified by the chief executive of the Vegetation Management Act
- adheres to the written definition in the Vegetation Management Act (paraphrased below in 'General descriptions').

The use of certified maps gives landholders certainty about which wetlands, watercourses and drainage features are regulated by the codes.

 *If you believe the maps to be incorrect, call **135 VEG** (135 834), email vegetation@dnrme.qld.gov.au or search 'Vegetation Management' on www.qld.gov.au*

Mapping

The certified map that displays each regulated water feature is described in Table 2 below.

Table 2: Certified maps that display regulated water features

Feature	Certified map under Vegetation Management Act
Wetlands	Vegetation management wetlands map
Watercourse	Vegetation management watercourse and drainage feature map
Drainage feature	

These maps are displayed as layers on the vegetation management support map. To request a map, use the online request form at: www.qld.gov.au (search 'vegetation management maps'). You can also view the layers on Queensland Globe at www.qld.gov.au (search 'Queensland globe').

When implementing the codes on the ground, you are likely to need more detail than is shown on the certified map. For example, if the requirement is 'no mechanical clearing within 20 metres of a wetland', you will need to determine the edge of the wetland from on-ground observations rather than using the map.

Therefore, you will still need to understand and apply the written definitions from the Vegetation Management Act. To assist you to apply the definitions, they are paraphrased in the 'General descriptions' that follow.

General descriptions

Wetlands

In general, wetlands are described as areas of land that:

- support plants that are adapted to and rely on inundation of water for at least part of their life cycle
- can include fresh, brackish and marine environments
- can be dry for long periods of time between inundations (even 10 years or longer)
- include lakes, lagoons, estuaries, rivers, floodplains, swamps, bogs, billabongs, marshes, coral reefs and seagrass beds.

Watercourse

A watercourse:

- is a river, creek or stream, including an anabranch, in which water flows permanently or intermittently, regardless of how frequently flows occur
- includes natural and artificial channels
- includes in-stream islands or bars
- extends to the outer banks of the watercourse
- does not include drainage features (see the definition of 'drainage feature' below).

Drainage feature

A drainage feature is a natural gully, drain, drainage depression or similar erosion feature that:

- contains overland-flow water during and immediately after rain
- only flows for a short period of time after rain
- generally does not have enough continuing flow to create a riverine environment.

Defining bank

The defining bank (as referred to in the codes) is the bank that confines the seasonal flows, but which may be inundated by flooding from time to time. The defining bank can be either of the following:

- the bank or terrace that confines the water before the point of flooding
or
- where there is no bank, the seasonal high water line that represents the point of flooding.

The **seasonal high water line** is defined as a zone that represents the usual peak seasonal flow level, identifiable by deposits, debris or characteristic vegetation zonation.

The defining bank is used by the codes as a starting point to measure riparian buffers away from the water feature.

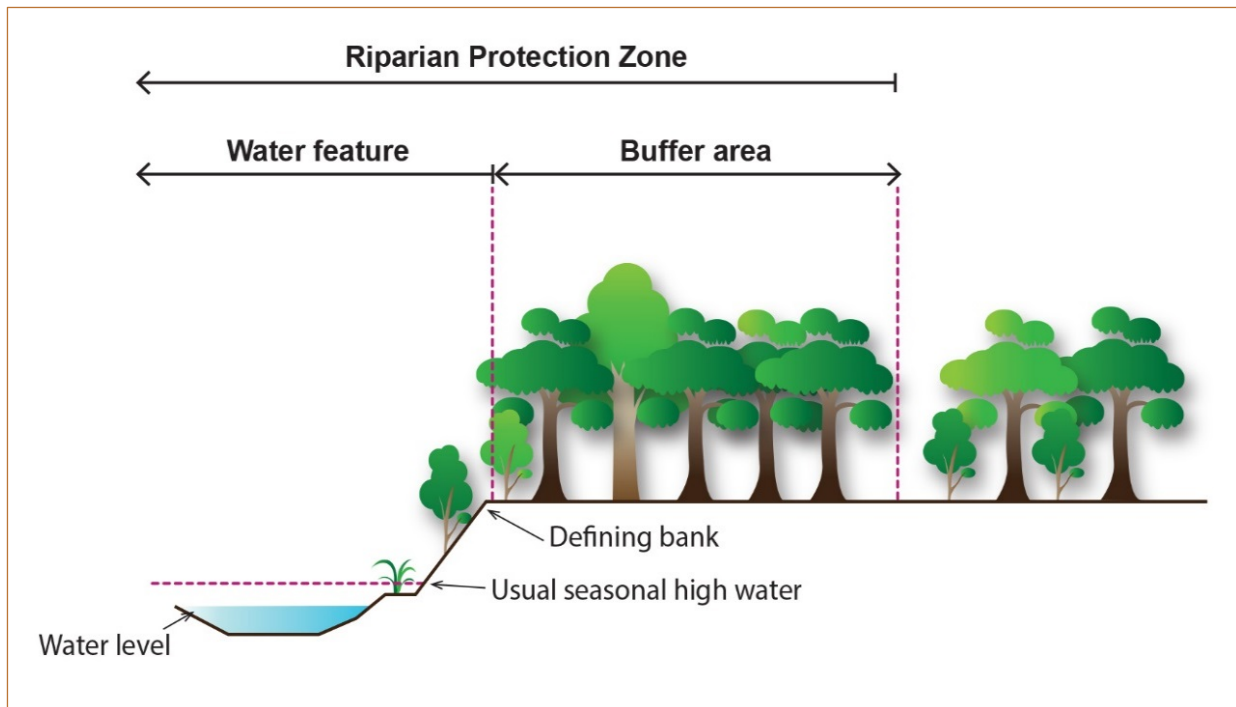


Figure 3: Example of a defining bank and buffer area—the width of the buffer is dependent on the stream order

Locating the defining bank on the ground

In many cases, the defining bank of a wetland, watercourse or drainage feature is reasonably clear by observing the ground topography. If there are several defining banks, with each corresponding to higher flows, the highest defining bank is normally used. The only exception may be if local knowledge indicates that this highest bank corresponds to infrequent large flood events, in which case the next lower defining bank may be appropriate to use instead.

If no defining bank is evident, look for any evidence of a seasonal high water line such as the deposition of sediment, build-up of debris or a characteristic vegetation zonation. This area is used as a surrogate for the defining bank when measuring buffer distances.

Part 4: Soil and water quality protections

All codes contain soil and water quality protections to avoid potential land degradation and its secondary impacts. The primary land degradation issues dealt with by the codes are:

- soil erosion and instability
- salinity
- acid sulfate soils.

These issues can all lead to reduced water quality. Some codes include practices to deal with all three, while others may only deal with two, due to the types of activities authorised by the code or types of REs in which clearing may occur. For example, the Managing Fodder Harvesting code does not cover acid sulfate soil issues because there are minimal acid sulfate soil issues in regional ecosystems in which fodder harvesting can occur.

Soil erosion and instability

Soil erosion and instability is defined in the codes as the occurrence of gully erosion greater than 30 centimetres in depth, landslips, a scarp, soil scalding or stream-bank slumping.

Landslips are normally obvious where the earth slides away from an adjacent piece of earth, sometimes with only minor movement. A scarp is a steep bank or slope resulting from movement of adjacent earth. Soil scalding is an area bare of vegetation due to extremely adverse growing conditions, such as loss of topsoil and/or being too salty or acidic.

The codes require that for areas subject to clearing, 'recognised best practice methods' must be employed to:

- prevent increased soil erosion and instability
- stabilise any soil erosion and instability caused by clearing
- prevent increased sediment run-off entering a wetlands, watercourse or drainage feature.

'Recognised best practice methods' may include activities such as clearing methods, stock management strategies, timing, revegetation and infrastructure location. Further options and details on recognised methods can be obtained from a range of sources, including federal, state and local government publications.

Soil conservation



*A useful state government publication is the **Soil conservation guidelines for Queensland** (3rd edition)—download the guide at www.qld.gov.au (search 'soil conservation guidelines for Queensland').*

The methods described in *Soil conservation guidelines for Queensland* apply to a wide range of scenarios. While specific reference may not be made to vegetation clearing activities, many of the methods described will be applicable, depending on your own individual situation and clearing activities.

The guidelines describe a range of things to consider in the management of your land to prevent and rectify soil erosion and instability from clearing activities. They include:

- slope of the land cleared
- placement of access tracks
- maintenance and growth of vegetative ground cover
- grazing pressure
- working along the contour

- control of stock access
- species selection
- fence locations
- off-stream watering points
- preventing run-off water from concentrating.

More detail is available in the various chapters of the guidelines. The following chapters may be relevant to your situation:

- Chapter 2 'Soil conservation planning' highlights the need for coordinated planning of soil conservation issues across the whole landscape, including consideration of clearing activities.
- Chapter 14 'Property infrastructure' deals with, among other things, access tracks and laneways that would be associated with clearing activities. This chapter may also be useful when considering stabilisation actions that may involve a change in infrastructure or property layout.
- Chapter 10 'Land management on flood plains' covers management issues on grazing lands (e.g. stocking rates, stock movements, fencing, off-stream water points) that may be relevant to your proposed clearing activities and any potential stabilisation actions.
- Chapter 11 'Stream stability' provides explanations of stream-bank erosion processes and considerations to reduce erosion, including the role of vegetation in stabilising land around streams.
- Chapter 13 'Gully erosion and its control' provides considerable detail on how to minimise, manage and rectify gully erosion on grazing lands.

Other considerations

Care must be taken to ensure that clearing does not expose subsoils that are highly erodible and prone to deep or extensive gully erosion. Such subsoils can also develop tunnel erosion beneath the surface if water flow is able to penetrate into the subsoil. These soils occur in some parts of the Burdekin and Fitzroy catchments, as well as in other zones with extensive areas of dispersive soils.

Extra care needs to be taken in sensitive areas, such as those within the defining bank of a wetlands, watercourse or drainage feature, or within various buffers around these areas. While mechanical clearing is not permitted in these areas, non-mechanical selective management and harvesting in these areas is permitted. Any such clearing in these areas need to be done with great care to avoid any increase in erosion or instability.

If you are undertaking controlled burning, you should consider the implications for subsequent erosion risk from reduced vegetative cover. Issues to consider include the location, extent, intensity and timing of the fire, along with any other management practices to reduce the erosive power of wind and water.

Salinity

When clearing vegetation, ensure the activity does not further contribute to any dryland salinity in the area. Salinity may be caused by rising groundwater tables that bring salts closer to the surface. There may be other surface expressions of saline water in the landscape caused by seepage due to local geology. Maintaining deep-rooted vegetation such as trees and shrubs in these areas helps to prevent the water table rising and other surface expressions of saline water.

The codes prevent or limit the extent of clearing within 100 metres of a salinity expression area, which is defined in the code as an area containing more than one of the following salinity indicators:

- plant species tolerant of saline conditions, shallow water tables or poor drainage (waterlogging)⁵
- wet areas in lower parts of the landscape or bare soil (soil scalding)

⁵ For example—*Melaleuca* spp. (in particular *Melaleuca bracteata* and *Melaleuca quinquenervia*), *Sporobolus* spp. (in particular saltwater or marine couch), *Salsola kali* (soft roly-poly), *Sclerolaena* spp. (in particular prickly roly-poly), *Cyperus* spp. (sedges), *Juncus* spp. (rushes), *Atriplex* spp. (saltbushes), *Halosarcia* spp. (samphires), *Chloris* spp. (Rhodes grasses), *Cynodon dactylon* (common couch), *Enchylaena tomentosa* (ruby saltbush), *Sesuvium portulacastrum* (purslane), *Tecticornia* spp. (samphires) and *Phragmites* spp.

- dieback of larger trees in low, wetter parts of the landscape (outside drought conditions or the effects of fire)
- salt accumulations on the surface (often white and powdery, sometimes crystalline)
- areas of shallow groundwater.⁶

Most of these indicators are self-explanatory and various resources can provide examples of these indicators and other relevant information on salinity.

 *The Queensland Government website provides information on identifying salinity areas and how to prevent and manage such areas—visit www.qld.gov.au (search 'salinity'). A useful reference from these web pages is the **Salinity management handbook**.*

Acid sulfate soils

Acid sulfate soils are soils containing iron sulfides. In Queensland, acid sulfate soils are frequently located in coastal areas at elevations of less than 5 metres above mean sea level. They can also be found in some inland areas at higher elevations. When they are disturbed and exposed to air, oxygen reacts with them to produce sulfuric acid and soluble iron.

The acid can mobilise aluminium, lead or other heavy metals if present in the soil, and the discharge water can degrade waterways and adversely affect the surrounding environment. Due to this risk, some codes prohibit mechanical disturbance to a depth greater than 30 centimetres in land zone 3 at elevations less than 5 metres. Acid sulfate soils may also occur in other land zones, but these zones are not covered by the codes.

Mechanical disturbance is the use of machinery (e.g. tractors, dozers, graders, rippers) that physically disturbs topsoil and potentially uproots vegetation.

Land zone 3 is termed 'alluvial river and creek flats'. Land zones are also described in more detail at www.qld.gov.au (search 'land zone definitions').

 *The land zone of an area can be identified by the middle number in the RE code (e.g. 6.3.21) from a vegetation management supporting map.*

Elevation information can be obtained from various sources, such as printed topographic maps, GPS units or online topographic maps on the QTopo website at qtopo.dnrm.qld.gov.au.

The Queensland Globe online mapping tool also contains an acid sulfate soil layer that displays areas where acid sulfate soils have been mapped.

 *Visit Queensland Globe at www.qld.gov.au (search 'Queensland Globe').*

For more information on the identification and management of acid sulfate soils, visit www.qld.gov.au (search 'acid sulfate soils').

⁶ A water table less than 5 metres from the surface would generally be considered as shallow for this purpose. One mechanism to identify this is from a nearby bore.

Part 5: Measuring heights and slopes

Measuring tree height

There are several methods you can use to measure the height of trees.

Using specialist tools

The clinometer is a tool commonly used by foresters to measure tree heights and slope angles. If you have a clinometer, please follow the manufacturer's instructions for use.

There are also many videos online that show how to make and use a simple clinometer, using a protractor, some string and a small weight. (Also see page 24.)

The heights of the crown can also be measured using a laser instrument called a hypsometer. If the top of the tree is not directly above the base of the trunk, it is important to also measure the point directly below the highest point of the tree canopy to get an accurate crown height.

Pencil (or stick) method

This is a very simple method requiring only a pencil (or small straight stick) and a tape measure. Take a pencil (or small stick) and move several metres or more away from the tree. (Refer to Figure 4.)

Outstretch your arm and hold the pencil so that you can measure the height of the tree on the pencil (e.g. line up the top of the pencil with the top of the tree and slide your thumb along the stick to correspond with the base of the tree). You may also need to move closer or further away from the tree to allow a length of the pencil to align with the height of the tree.

Keeping your thumb in the same position and lined up with the base of the tree (and your arm still outstretched), turn the pencil at the base of the tree by 90°. Note the location on the ground that lines up with the top of the pencil. Mark or note this point on the ground and then measure the distance from this point to the base of the tree. This is the height of the tree.

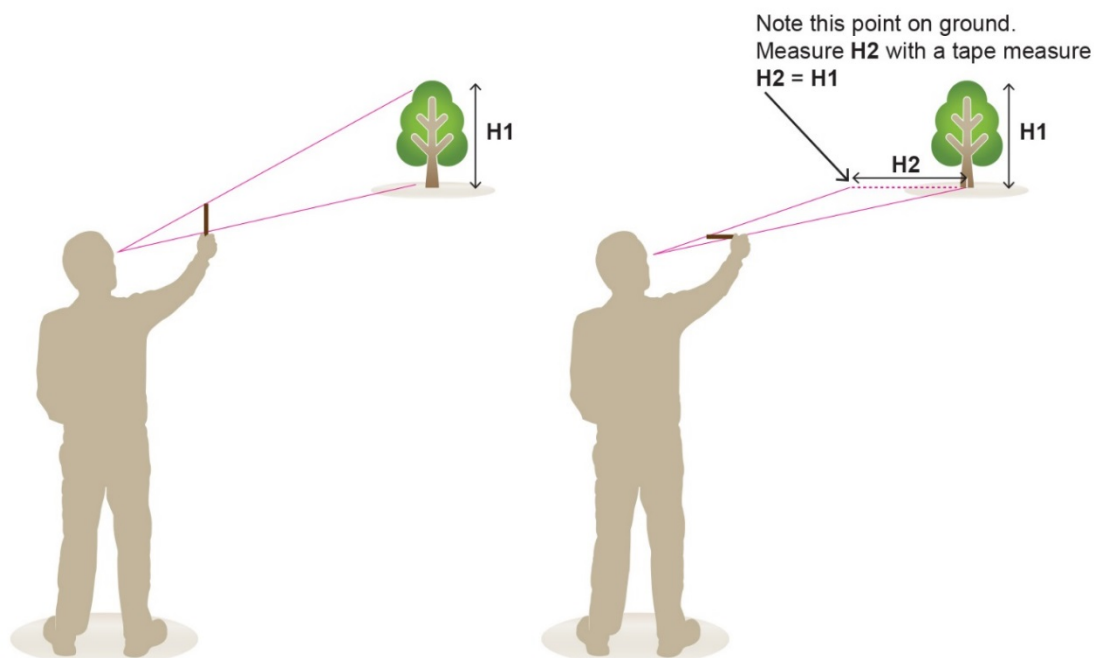


Figure 4: The pencil method

Stick and shadow method

For this method you will need to see the tree's shadow on the ground. You will also need a tape measure, a calculator and a stake of any height to hammer into the ground.

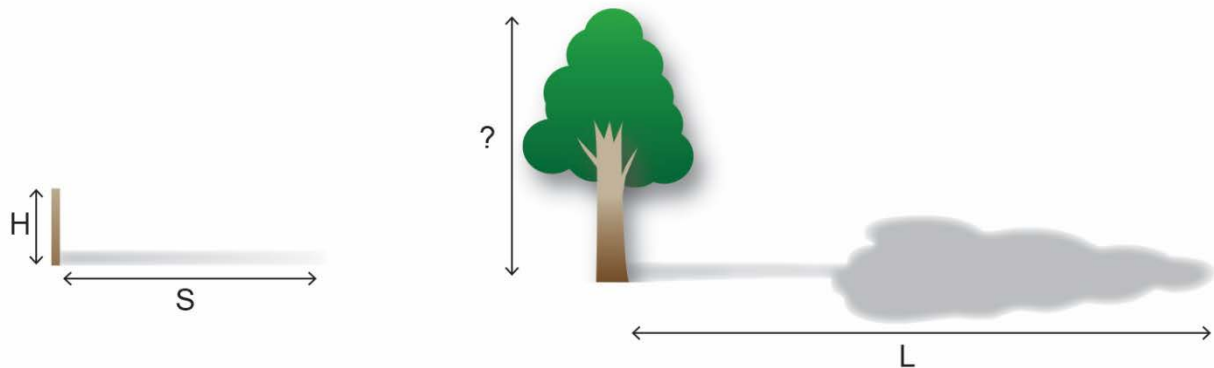


Figure 5: Stick and shadow method

1. Hammer a stake vertically into the ground so you can see its shadow. Record the height of the stake above ground (H) and the length of the stake's shadow (S) from the base of the stake.
2. Measure the length of the tree's shadow from the centre of the base of the tree (L).
3. Ensure that both shadow measurements are taken within a few minutes of each other, using the same units (e.g. metres).
4. The tree's height may be estimated using simple proportions:

$$\text{Height of tree} = \frac{\text{Height of stake above ground (H)}}{\text{Length of stake's shadow (S)}} \times \text{Length of tree shadow (L)}$$

Stick method 2

You can measure the height of trees by projecting a right-angled triangle (one that includes a 90° angle) using your arm, a stick and your line of sight (see Figure 6).

1. Find a straight stick or length of dowel about 750 mm long. Holding the stick upright in your outstretched hand and in front and level with your eye, measure the horizontal distance from your eye to the stick. Mark the same distance on the stick.
2. Grasp the stick at the mark and hold it out in front of you with your arm fully extended and at eye level. The stick must be held vertically pointing upwards. (The distance from your eye to the base of the stick should equal the length of the stick above your hand.)

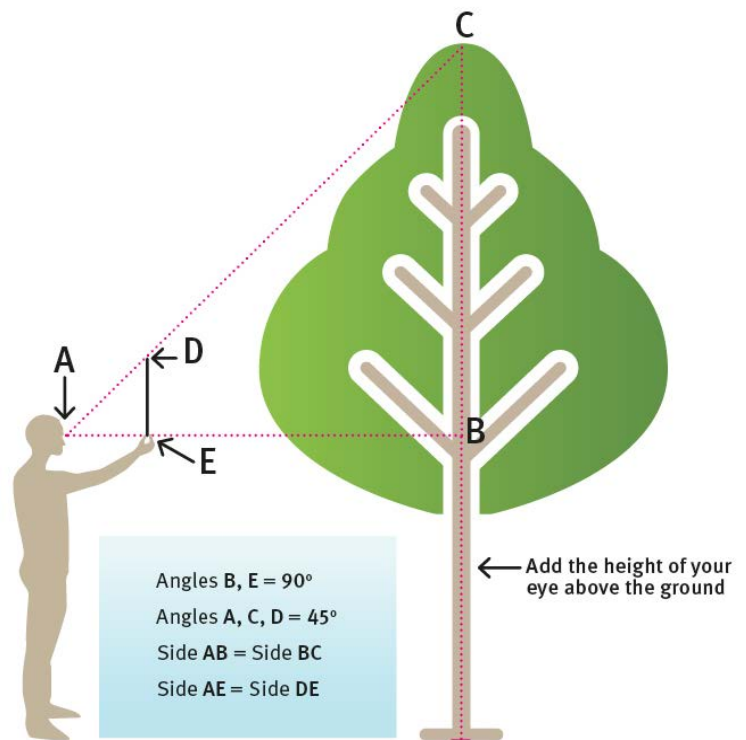


Figure 6: Diagrammatic representation of stick method 2

3. Walk toward or away from the tree until the tip of the stick is visually lined up with the top of the tree. It's often easiest to walk along the contour so the mark on the stick remains lined up with a point on the tree the same height as your eye. When sighting the top and bottom of the stick, move your eyes rather than your head.
4. The height of the tree will be the distance from your eye to the tree trunk (measure this distance with a measuring tape) plus the height of your eye above the ground.

$$\text{Height of tree} = \text{distance A to B} - \text{eye height}$$
5. If no long-distance measuring device is available, calibrate your step (the walking distance between your two feet) or pace (walking distance for two steps) over a known distance (e.g. 20 metres). Then measure the distance from A to B in paces or steps and convert to metres.

Smart phone apps

Various smart phone apps are available that claim to help measure tree height. Care should be taken if using these because:

- the accuracy may depend on the quality of your phone (and may require some manual calibration)
- some apps still require subsequent trigonometric calculations
- the reliability and accuracy of the app may not be proven.

If such apps are used, it is recommended to first verify the results with other methods before using the apps operationally.

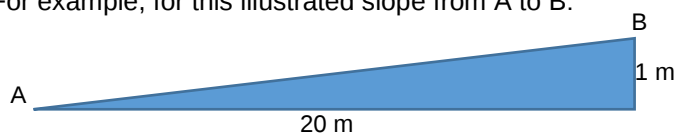
Measuring slope

Definition

For the purposes of the codes, slope is measured in percentages, and is defined as the change in vertical height relative to the change in horizontal distance multiplied by 100.

$$\text{Slope (\%)} = \frac{\text{Vertical distance}}{\text{Horizontal distance}} \times 100$$

For example, for this illustrated slope from A to B:



$$\text{Slope (\%)} = \frac{1}{20} \times 100 = 5\%$$

The location of points A and B should be selected so the line between them is representative of the slope in question. For example, don't choose high or low spots in the landscape for these points.

Using a clinometer

The Suunto clinometer ('clino') is a tool commonly used by foresters to measure tree heights and slope angles. There are many types of clinometers that are relatively inexpensive. If you can have access to one, ensure it has a scale to measure percentage slope.

Using a clinometer is one of the most accurate methods of measuring slope—differences in vertical height and horizontal distances may be measured accurately in order to calculate the slope. The exact measuring method will depend on the equipment used; please follow the manufacturer's instructions.



Figure 7: Surveyor's level

Homemade clinometer

You can also make your own clinometer using a large protractor with a hole drilled (as shown in Figure 8), string and a small weight.

Attach the string through the drilled hole and tie the small weight to the other end of the string. When the flat edge of the protractor is held horizontally, the string should hang down vertically and indicate 90° on the protractor.

To measure a slope, look along the flat edge of the protractor and line it up with a point in the distance (up or down slope) that is the same height above the ground as your eye. The aim is for the flat edge of the protractor to be parallel to the slope you are measuring.

Using the location of the string against the protractor's scale, read off the angle observed—that is, the angle between the 90° line on the protractor and the location of the string.

This angle is in degrees and needs to be converted to a percentage. To do this, use a scientific calculator to find the 'tan' of this number and then multiply by 100. For example, if you measured 3°, then:

$$\tan (3^{\circ}) \times 100 = 5.2\% \text{ slope}$$

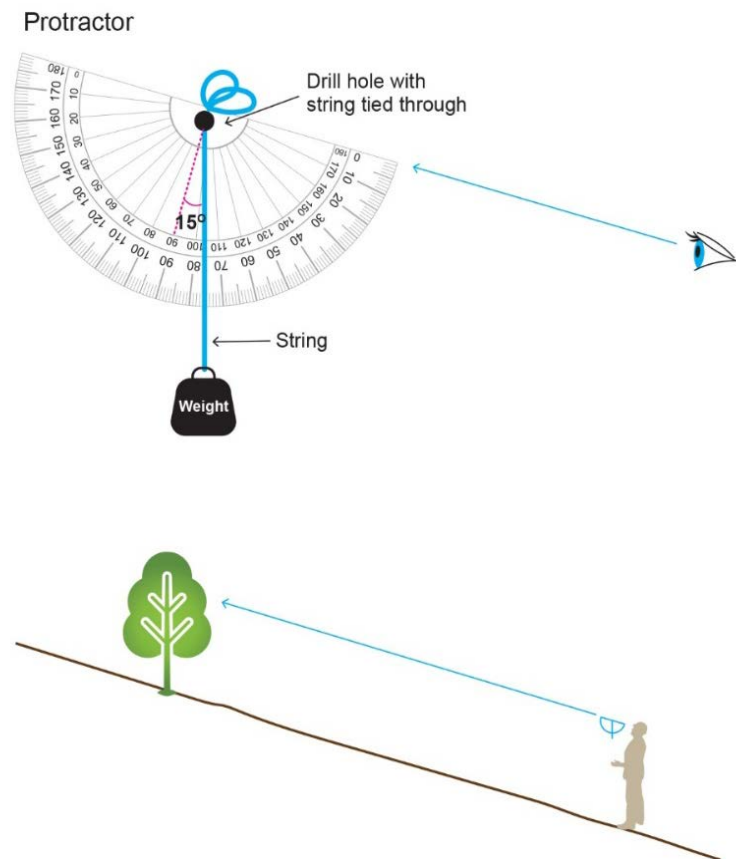


Figure 8: Home-made clinometer and its use in the field

Using a line level

You will need string, two stakes, a line level and a measuring tape.

Hammer one stake into the ground on the upper side of slope. Tie a long piece of string (e.g. 10 metres) to the base of the stake and lay the string out directly down the slope.

Walk down to near the end of the string. Hammer the second stake vertically into the ground and pull the string tight to the base of the second stake. Ensure both stakes are in locations that are representative of the overall slope. Raise the string up the second stake until it is perfectly horizontal, as indicated by using the line level along the top of the string.

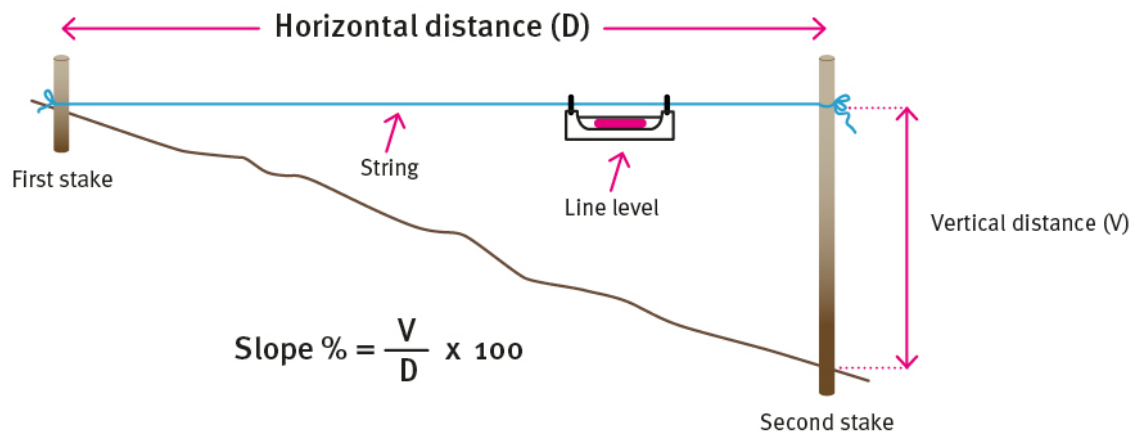


Figure 9: Using a line level to measure slope

Measure the second stake between the string and the ground. This is the vertical distance for the slope calculation. Keep the string tight and measure the length of string between each stake. This is the horizontal distance for the slope calculation.

Use these two distances to calculate slope as shown in Figure 9.

Topographic map

Topographic maps show contour lines that join points of equal elevation. Contour lines that are spaced evenly apart indicate a fairly uniform slope. If ground observations confirm a uniform slope, you can calculate the slope by determining vertical height from adjacent contour lines and the horizontal distance from the scale bar of the map.

For example, if the contour interval is 10 metres, this is the vertical height for the slope calculation. If the horizontal distance between the contour lines is 400 metres (using the scale bar on the map), the slope will be $(10 \div 400) \times 100 = 2.5\%$.

Care should be taken to ensure you locate yourself accurately on the map and that the land between the contour lines is of uniform slope. If not, other more reliable methods should be used.

Smart phone apps

Various smart phone apps are available that claim to measure slope. Care should be taken if using these because the:

- accuracy may depend on the quality of your phone's components
- reliability and accuracy of the app may not be proven.

If such apps are used, it is recommended to first verify their results with other methods before using the apps operationally.