

Guide to State Development Assessment Provisions

State code 16: Native vegetation clearing (Control non-native plants or declared pests)

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Part 1: About this guide

The State Development Assessment Provisions (SDAP) provide assessment benchmarks for development applications involving the State Assessment and Referral Agency (SARA).


This guide has been developed to help prospective applicants and the broader community understand how a development application involving native vegetation clearing should address the requirements of the SDAP: State code 16 (the code).

This guide is not a statutory document and is not intended to be exhaustive. It provides supplementary information only and is designed to be read in conjunction with the code.

The SDAP, including the code, is available online at www.qld.gov.au—search ‘the [State Development Assessment Provisions](#)’ and then select ‘State code 16’.

 *It is recommended that you familiarise yourself with all local, state and federal laws that apply to developments involving vegetation clearing to ensure you are aware of any permits or approvals that are required under other legislation.*

More complex development proposals may benefit from a free pre-lodgement service provided by SARA before lodging a development application. This will identify any potential issues or requirements for additional information.

 *For more detailed information about the role of SARA and seeking pre-lodgement advice, visit <https://planning.statedevelopment.qld.gov.au/planning-framework/state-assessment-and-referral-agency>*

Vegetation management framework

The *Vegetation Management Act 1999* (VMA), in conjunction with other legislation such as the *Planning Act 2016* and the *Environmental Offsets Act 2014*, regulates the clearing of native vegetation in mapped regional ecosystems. A development approval is required for clearing native vegetation that is not Exempt Clearing Work, or clearing carried out under an Accepted Development Vegetation Clearing Code or Area Management Plan.

The contents of the code and this guide are consistent with, and are to be read and applied in accordance with, the purposes of the [VMA](#) and the [State Policy for Vegetation Management](#), Department of Natural Resources Mines and Energy, June 2019.

 *For detailed on the vegetation management framework, including Exempt Clearing Work and Accepted Development Vegetation Clearing Codes, visit www.qld.gov.au and search ‘vegetation management’. For further information on the vegetation management framework, phone **135 VEG (135 834)** or email vegetation@resources.qld.gov.au.*

Vegetation management mapping

The code is used to assess developments that involve clearing, or could result in future clearing, of native vegetation in regulated regional ecosystems or areas shown on the Regulated Vegetation Management Map and associated supporting maps current as at the time of lodging the development application¹.

To assist in planning your development and preparing your development application, it is recommended that you obtain a Vegetation Management Report (also known as a “Property Report”²). To obtain a Property Report, use the online request form at www.qld.gov.au (search for ‘vegetation management maps’). Alternatively, the layers can be viewed in or downloaded from <https://qldglobe.information.qld.gov.au>

The Property Report provides a suite of maps relevant to assessments under the code, including:

- Regulated Vegetation Management Map
- Vegetation Management Supporting Map which includes:
 - Regional ecosystem mapping³
 - Essential Habitat Map⁴
 - Vegetation Management Wetlands Map
 - Vegetation Management Watercourse and Drainage Feature Map

TIP *You will need a lot number and plan number to request a Property Report. These numbers can be obtained through QLD Globe by using the Parcel Label layer.*

The **Regulated Vegetation Management Map** 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 in an area that has been secured for a particular purpose or an area subject to particular requirements, for example, subject to a compliance notice, secured as an offset area or secured as a Declared Area (Voluntary)
- Category B area—remnant regional ecosystem
- Category C area—high-value regrowth vegetation
- Category R area—regrowth watercourse area
- Category X area—vegetation that is generally exempt from requirements under vegetation management framework dependent on the land tenure.

¹ Unless the *Planning Act 2016* provides otherwise.

² The Property Report may also include other related maps or information outside the vegetation management framework that may be of assistance e.g. protected plants flora survey trigger map under the *Nature Conservation Act 1992*. This information is supplementary information only and is not to be taken as advice on other laws that may apply to your proposed development. It is recommended that you familiarise yourself with all local, state and federal Acts and Regulations that apply to your proposed development.

³ Referred to in the Queensland Spatial Catalogue and Queensland Globe as ‘Vegetation management regional ecosystem map’.

⁴ Referred to in the Queensland Spatial Catalogue as ‘Vegetation management essential habitat map’.

The **Vegetation Management Supporting Map** includes regional ecosystem mapping that is colour-coded in accordance with the class of regional ecosystems prescribed under the vegetation management framework:

- Pink—Endangered regional ecosystem
- Orange—Of Concern regional ecosystem
- Green—Least Concern regional ecosystem.

Regional ecosystems are further categorised into **regional ecosystem structure categories** to indicate the expected density or composition of vegetation in its natural state. The five groups of vegetation structure categories are:

- dense
- mid-dense
- sparse
- very sparse
- grassland.

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 regional ecosystems 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.

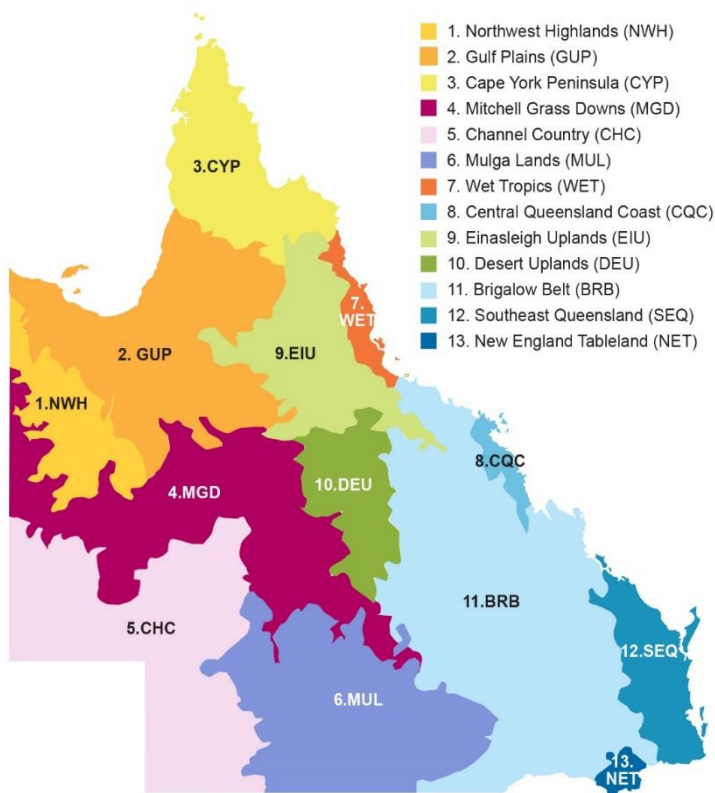


Figure 1: Queensland bioregions

Each identified area on regional ecosystem mapping is called a polygon. Each polygon is labelled with a **regional ecosystem number** (a three-number code) identifying the regional ecosystem:

- The first number indicates the bioregion in which the regional ecosystem 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 regional ecosystem 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 regional ecosystem number. The order in which the regional ecosystems are listed reflects the relative size and extent of these different regional ecosystems on the ground. If you have areas mapped as more than one regional ecosystem, you may need to determine precisely where on the ground each regional ecosystem is located.

Example

A mixed polygon labelled **6.5.1/6.5.2, 70/30** contains approximately 70 per cent of regional ecosystem 6.5.1 and 30 per cent of regional ecosystem 6.5.2.



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

The **Essential Habitat Map** under the vegetation management framework shows the habitat of Endangered, Vulnerable or Near-Threatened wildlife (protected wildlife) prescribed under the *Nature Conservation Act 1992*. 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 factors⁵
or
- the relevant species at any stage of its life cycle.

What if I think the vegetation on ground is different to the mapping?

If you think the Regulated Vegetation Management Map or regional ecosystem mapping for the development area is different from what is on ground, you may apply for a Property Map of Assessable Vegetation (PMAV). A PMAV is a property-scale map that shows the boundaries of vegetation categories on the property. An application for a PMAV must include sufficient information to demonstrate the proposed changes to the mapping should be made. Once the PMAV is made, it replaces the

⁵ Biological and 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.
Guide to State Development Assessment Provisions – State code 16: Native vegetation clearing, Department of Resources

Regulated Vegetation Management Map for determining the location and extent of the areas of vegetation regulated under the vegetation management framework on your property.

If applicable, it is recommended that you apply for and receive the PMAV before lodging your development application.

PMAVs can be used to:

- confirm the vegetation category areas as currently mapped; or
- amend the mapping (e.g. to refine a regional ecosystem or regional ecosystem boundary).



For more detailed information about PMAVs and applying for a PMAV, visit www.qld.gov.au and search 'Property Map of Assessable Vegetation'

Glossary of terms and common abbreviations used in this document

Terms used in this guide have the same meaning as defined in the *Vegetation Management Act 1999* and the Glossary of Terms within the code.

Some common abbreviations used within the guide include the following:

AO = Acceptable outcome

Code = State Development Assessment Provisions, State code 16: Native Vegetation Clearing

MCU = Material Change of Use

PO = Performance outcome

PMAV = Property Map of Assessable Vegetation

RaL = Reconfiguring a Lot

REDD = Regional Ecosystem Description Database

SARA = State Assessment Referral Agency

SRI = Significant Residual Impact

SDAP = State Development Assessment Provisions

VMA = *Vegetation Management Act 1999*

Key steps in the development assessment process

For an application proposing to undertake assessable development that requires assessment under the SDAP: State code 16, key steps in the process are as follows:

1. Determine location and extent of development footprint

It is important to ensure that you have determined all development and clearing areas to be assessed as part of the development application. This may include adding areas that could subsequently become Exempt Clearing Work as a result of the development approval—for example, adding areas to the development footprint for the firebreak exemption around infrastructure. See Appendix 1 'Avoid and Minimise' for further guidance on determining the development and clearing footprint including areas that will become exempt as a result of a MCU or RaL development application.

Details of the location and extent of the development and clearing footprint should be determined by providing:

- a. digital data in a format such as shapefile or .kml; or
- b. a map showing:
 - i. the boundary of the area on an image base; and
 - ii. 5 or more points visible in the image base that correspond to identifiable fixed features; and
 - iii. a description of the feature that each point represents; and
 - iv. the coordinates and zone references for each point, defined by reference to the geodetic reference framework prescribed for the [Survey and Mapping Infrastructure Act 2003, section 6\(4\)](#); or
- c. a description of the boundary of the area defined by reference to the geodetic reference framework prescribed for the [Survey and Mapping Infrastructure Act 2003, section 6\(4\)](#).

To facilitate prompt assessment, digital data is preferred.

2. Check mapping to determine the assessable clearing footprint for the application

Check the regulated maps and supporting maps to determine the assessable clearing areas for the development footprint. See guidance above 'Vegetation Management mapping'. This may include removing parts of the development footprint where the clearing is currently exempt under the VMA framework (e.g. clearing category X areas on freehold land) or accepted development (e.g. clearing under an Accepted Development Vegetation Clearing Code).

3. Seek pre-lodgement advice (optional)

You can arrange a pre-lodgement meeting with SARA before lodging the application. Understanding the precise location and extent of the development and clearing footprint to be assessed under a development application is vital to addressing the code. As such, it is recommended that you seek pre-lodgement advice from SARA if you have any uncertainty around the required development and clearing footprint to be assessed.



A pre-lodgement meeting is strongly recommended to assist with understanding the requirements for technical assessment. For more details on seeking pre-lodgement advice, visit <https://planning.statedevelopment.qld.gov.au/planning-framework/state-assessment-and-referral-agency>.

4. Lodge Relevant Purpose determination application (if applicable)

When applying for a MCU and / or Operational Works development approval you must first obtain a Relevant Purpose determination from the Department of Resources before lodging a development application. This Relevant Purpose determination will confirm whether the proposal will result in the clearing of regulated vegetation and whether the clearing is for a relevant purpose permitted under section 22A of the VMA.

Clearing that is not for a relevant purpose is prohibited development under the *Planning Act 2016*, and a development application cannot be accepted to the extent it involves prohibited development.

For example, clearing in any category C areas or category R areas on the Regulated Vegetation Management Map is not a relevant purpose under the VMA. Accordingly, clearing of vegetation

in these areas cannot be approved under a development approval, and is prohibited development under the *Planning Act 2016* unless the clearing can be undertaken as Exempt Clearing Work or in accordance with an Accepted Development Vegetation Clearing Code.



*Contact the Department of Resources, Veg Hub on **135 VEG (135 834)** to discuss the purpose of your clearing and whether a Relevant Purpose determination is required.*



For further information and to apply for a Relevant Purpose determination visit www.qld.gov.au and search 'Relevant Purpose determination'.

5. Lodge Development Approval application

Once the Relevant Purpose determination is approved, the development application can then be completed addressing all relevant assessment benchmarks under the *Planning Act 2016* framework. For vegetation management, this means assessing the proposed development against SDAP: State code 16 (the code). A response template for the assessment benchmarks for the code is available online at www.qld.gov.au (search 'State Development Assessment Provisions' and then select 'State code 16 response template').

A Development Approval application can be lodged with the relevant assessment manager. The relevant assessment manager is either local government or SARA.

If the assessment manager is SARA, you can apply online via MyDAS2 available at www.qld.gov.au (search 'Online planning services' and then select 'MyDAS2').

If the assessment manager is local government, local government will confirm whether the application will need to be referred to SARA (for one or more state interests).

6. Technical advice provided

Once a development application is lodged and accepted by the Assessment Manager or Referral Agency, the Department of Resources provides technical agency advice for proposals involving the clearing of native vegetation, and works closely with the Assessment Manager / Referral Agency on whether an application complies with the code, including any potential offset requirements under the Queensland environmental offsets framework⁶.

7. Decision Notice issued

If the proposal adequately addresses all relevant state codes, SARA either: issues a Decision Notice (with or without conditions) as Assessment Manager; or provides local government as the Assessment Manager, with a Referral Agency Response (recommending conditions be imposed where required to meet the assessment benchmarks under the relevant SDAP state codes).

Note: FastTrack5 referral and assessment process is also available for Operational Work development applications for Managing Thickened Vegetation. The FastTrack5 process allows for a reduced application fee, reduced assessment and decision-making time frames by SARA, and will not be subject to an information request. Standard conditions will generally be applied.



For further information on the FastTrack5 assessment process, visit www.qld.gov.au and search 'FastTrack5'.

⁶ If there is insufficient information to assess the application, you may be requested to provide further information.

Part 2: Assessment against the Performance Outcomes of the code

Application of code

The complete version of SDAP (sections 1 to 4) provides guidance on the application and interpretation of the state codes, how they are used in assessment and how multiple state codes or matters of state interest are managed etc.

The Purpose Statement of the code provides the overall intent of the code, for example, environmental values / outcomes the code seeks to manage and / or protect. Development will comply with the code if it can be shown to meet the code's Purpose Statement.

Performance outcomes (POs) set the benchmarks for achieving the Purpose Statement of the code. Generally, your application must meet all of the POs relevant for your application. If the application does not meet one or more of these POs, those aspects of the application will then be assessed against the Purpose Statement of the code⁷.

Some POs may provide for an Acceptable Outcome (AO). AOs identify one way a PO can be met. An application that complies with all applicable AOs for a corresponding PO is considered to satisfy that PO.

In some cases there will be two corresponding POs for a particular environmental value / outcome whereby the first PO will provide for the assessment benchmark and the corresponding second PO will provide for rehabilitation and / or provision of an environmental offset. For example, PO5 and PO6 for wetlands. These corresponding POs are to be assessed in conjunction with each other. The assessment must address the first PO (eg PO5). If the proposal meets the first PO (eg PO5), then the second PO (eg PO6) is automatically met. If you have adequately demonstrated that the proposal cannot meet the first PO (eg PO5), only then can you address the second PO (eg PO6) and propose rehabilitation and / or an environmental offset (where relevant).

Where a development involves multiple development applications, thresholds considered under the code may be assessed having regard to **cumulative impacts** for any development approval applying to the premises⁸.

Table 16.1: Performance Outcomes relevant for each development type and clearing purpose

The code groups together all the POs for each application type and clearing purpose into numbered tables. This guide likewise follows the same order as the code, providing guidance per table (i.e. per clearing purpose). Additional guidance for some aspects may be provided within an appendix⁹.

It is only necessary to provide a response to the POs relevant for the application type and clearing purpose/s. Table 16.1 of the code specifies which tables of POs are relevant for each application type and clearing purpose. Tables that are not relevant to your application type and clearing purpose can be left blank or deleted. For example, a development application for operational works that involves

⁷ Refer to the complete version of SDAP (sections 1 to 4) for further information on assessments against the purpose statement.

⁸ See section 22(3)(d) of the Planning Regulation 2017.

⁹ A reference to an appendix is a reference to an appendix in this guide.

managing thickened vegetation, only Table 16.2 and Table 16.15 are relevant and therefore the remaining tables can be left blank or deleted.

Table 16.2: General

Table 16.2 of the code provides for the POs addressing general requirements applying to all development application types except an application for a MCU and / or RaL where there is no clearing as a result of the development (see Table 16.1 of the code). An application for a MCU and / or RaL where there is no clearing as a result of the development need only address the POs in Table 16.9.

Given there are no AOs for the POs within Table 16.2 of the code, the application will need to address each PO directly.

Performance outcome 1

See Appendix 12 'Better Environmental Outcomes' for guidance on identifying Notices of Compliance, meeting this PO and providing a Better Environmental Outcome.

To meet this PO the application will need to satisfy all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Demonstrate how the development meets one of the following:
 - a. No Notices Requiring Compliance apply to the proposed development or clearing footprint; or
 - b. One or more Notices Requiring Compliance apply to the proposed development or clearing footprint however:
 - i. the proposed development and clearing is consistent with the notice; or
 - ii. where the proposed development and clearing is not consistent with the notice, a Better Environmental Outcome is proposed to be achieved in accordance with the requirements and criteria in the code and Appendix 12 of this guide.

Performance outcome 2

See Appendix 12 'Better Environmental Outcomes' for guidance on identifying Particular Regulated Areas, meeting this PO and providing a Better Environmental Outcome.

To meet this PO the application will need to satisfy all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Demonstrate how the development meets one of the following:
 - a. No Particular Regulated Areas apply to the proposed development or clearing footprint; or
 - b. One or more Particular Regulated Areas apply to the proposed development or clearing footprint however:
 - i. the proposed development and clearing is consistent with the vegetation management requirements for the Particular Regulated Area; or
 - ii. where the proposed development and clearing is not consistent with the vegetation management requirements for the Particular Regulated Area, a Better Environmental Outcome is proposed to be achieved in accordance with the requirements and criteria in the code and Appendix 12 of this guide.

Performance outcome 3

See Appendix 13 ‘Significant Residual Impacts (SRIs) and Environmental Offsets’ for guidance on environmental offsets.

An area of land is a legally secured offset area (as defined under the *Environmental Offsets Act 2014*) if:

1. the area is:
 - a. an Environmental Offset Protection Area; or
 - b. an area declared as an area of high nature conservation value under section 19F of the VMA (Declared Area (Voluntary)); or
 - c. another area prescribed under a regulation; and
2. under the *Environmental Offsets Act 2014* or another Act, the area is subject to a delivery or management plan or agreement (however described in this Act or the other Act) to achieve a conservation outcome for a prescribed environmental matter.



To identify any areas that are Environmental Offset Protection Areas or another area prescribed under regulation contact the Department of Environment and Science by calling 13 QGOV (13 74 68) or email offset@des.qld.gov.au

To identify Declared Areas (Voluntary) undertake a current title search. Title searches can be purchased by contacting Titles Queensland online at www.titlesqld.com.au or by calling (07) 3497 4379.

Further information on Environmental Offsets under the environmental offsets framework is available online at www.qld.gov.au or by contacting the Department of Environment and Science by calling 13 QGOV (13 74 68) or email offset@des.qld.gov.au

To meet this PO the application will need to satisfy all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Demonstrate how the development will meet one of the following:
 - a. No legally secured offset area/s apply to the development or clearing footprint; or
 - b. One or more legally secured offset areas apply to the development or clearing footprint however:
 - i. the proposed development and clearing is consistent with the offset delivery plan or an agreement for the offset area; or
 - ii. where the proposed development and clearing is not consistent with the offset delivery plan or an agreement for the offset area, an Environmental Offset will be provided in accordance with the *Environmental Offsets Act 2014*.

Table 16.12: Control non-native plants or declared pests

The code contains requirements for the assessment of impacts caused by clearing for the control of non-native plants or declared pests.

Infestations of non-native plants and declared pests have significant impacts on primary industries, natural ecosystems, and human and animal health.

Controlling non-native plants is rarely achieved by a single method. Effective control usually requires a planned and integrated sequence of actions over time. Methods include:

- manual methods - hand pulling or using hand tools to pull, grub or fell;
- mechanical methods - using a tractor or other machine to slash, do brush cutting, or disturb the soil surface or uproot woody vegetation;
- chemical methods – including selective methods (stem injection, cut stump), and non-selective methods (foliar spray or soil applied herbicides);
- weed management burning - to reduce the infestation or provide access to the infestation.

Generally, an effective control / management method is one that ensures ecological processes for the native vegetation is maintained, and advances the restoration of the regional ecosystem.

Recommended effective control / management methods for particular non-native plant species are often published by local, state and federal government agencies.

You should plan your control / management program to be practical and effective while limiting the extent and impacts of clearing native woody vegetation. The method of non-native control / management program you choose is dependent upon a number of factors that include:

- the non-native plant species involved - for example its ecology and the recognised control methods;
- the nature of the infestation –control of a few isolated small bushes differs from tall, dense, prickly species that are climbing over the trees;
- the extent of the infestation – control of a small patch of groundsel bush differs from controlling weed spread across many hectares;
- the terrain and accessibility – steep, rough terrain or dense vegetation may limit the choices;
- economics and resources – the method must be matched to the economics of control; and
- integration with other land management e.g. integrating with grazing management.



For additional information on non-native plant identification and best practice methods for controlling a specific non-native plants contact your local council, your local natural resource management (NRM) body or Biosecurity Queensland at www.daf.qld.gov.au

Weed (non-native plant) fact sheets published by the Department of Agriculture and Fisheries provide information and some options for controlling different types of weeds / non-native plants. These fact sheets are available at www.daf.qld.gov.au (search 'invasive plant and animal fact sheets') or call Biosecurity Queensland on 13 25 23.

Clearing avoids and minimises impacts

Performance outcome 121

See Appendix 1 'Avoid and Minimise' for guidance on determining the location and extent of the development and clearing footprint; 'avoid and minimise' requirements; and meeting this PO.

As there are no prescribed AOs, the application will need to address the PO directly.

In addition to the information required to be provided under Appendix 1, applications should also include all of the following:

1. Details of the target species to be removed.
2. Details and evidence to support the extent of the infestation across the proposed management area. For example pre-clearing photographs and associated GPS coordinates, field data to support the estimated crown cover of the infestation (i.e. target species).
3. Provide reasons why clearing is necessary to control non-native plants or declared pests. Include the method/s proposed to eradicate the infestation and demonstrate why other methods that avoid clearing of native vegetation are not effective and / or reasonably possible or practical in the circumstances. For example, mechanical clearing of a large area of Prickly Acacia that also contains some native vegetation, could be considered reasonable. However mechanical clearing of native vegetation to control scattered individuals of a climbing weed species would not be considered reasonable. Similarly, mechanical clearing of native vegetation to control an herbaceous weed, such as Parthenium, would not be considered reasonable.
4. Details of whether the proposed method is an appropriate and effective method to eradicate the non-native plant or declared pest as published by a local, state or federal government agency?
5. Where chemical methods are proposed, the herbicide to be used and details of how, when and where it will be applied.

Clearing associated with wetlands

See Appendix 3 'Wetlands' for information on the intent of this PO; guidance to identify defining banks; further information sources; and contacts for further assistance.

If the entire clearing for the proposed development meets the requirements of the AOs (where relevant) for PO122, being AO122.1 through to AO122.5, the PO is met. If the entire clearing for the proposed development cannot meet the AOs (where relevant), a more robust assessment addressing the PO must be provided with the application.

Acceptable outcome 122.1

This AO is only relevant to clearing using mechanical clearing methods. Under the code, mechanical clearing means the clearing of vegetation using any of the following methods:

- slashing;
- brush cutting;
- machinery that disturbs the soil surface or uproots woody vegetation.

If no mechanical clearing is proposed, then the written application can merely state that the AO is not relevant as no mechanical clearing is necessary to undertake the works.

Where mechanical clearing is proposed, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Identify the defining bank of any natural wetland within 20 metres of the proposed clearing footprint.
3. Identify any clearing required for necessary access. Access will not be considered “necessary” where access can be reasonably gained via an alternate track that avoid clearing.
4. Provide detail on all proposed mechanical clearing method/s including how clearing will be undertaken (i.e. slashing), and location and extent of mechanical clearing per method/s.
5. Demonstrate that mechanical clearing, other than mechanical clearing for necessary access, will not occur inside the defining banks of a natural wetland or within 20 meters of the defining bank of any natural wetland.

Acceptable outcome 122.2

This AO is only relevant to clearing for necessary access. If no clearing for necessary access is required, then the written application can merely state that the AO is not relevant as no clearing is required for necessary access, and identify all existing access tracks or routes (that do not require clearing) on the plan that will be used to undertake the works.

Where clearing is required for necessary access, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Identify any existing access tracks.
3. Identify any clearing required for further necessary access.
4. Demonstrate why any existing access tracks cannot be used. Access will not be considered “necessary” where access can be reasonably gained via an alternate track that avoids clearing.
5. Identify all mature trees and habitat trees in the proposed clearing area¹⁰.
6. Demonstrate how clearing for necessary access tracks:
 - a. does not exceed 5 metres in width; and
 - b. retains all mature trees and habitat trees.
7. Demonstrate how all access tracks run parallel to a natural wetland and are not located within 10 metres of the defining bank of a natural wetland, unless the access track is required to provide access across the wetland.

Acceptable outcome 122.3

This AO is only relevant to clearing using chemical clearing methods. If no chemical clearing is proposed, then the written application can merely state that the AO is not relevant as no chemical clearing is necessary to undertake the works.

Where chemical clearing is proposed, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.

¹⁰ See definitions in code for ‘mature trees’ and ‘habitat trees’.

2. Provide information on the proposed chemical clearing, and the targeted non-native plant species for this method. This should include details of the herbicide to be used, and how, when and where it will be applied.
3. Identify all mature trees and habitat trees in the proposed clearing area¹¹.
4. Demonstrate how chemical clearing will retain:
 - a. all mature trees and habitat trees; and
 - b. 50 per cent of the immature trees¹² in each 50 metre by 50 metre area.

Acceptable outcome 122.4

This AO is only relevant to clearing methods using root-absorbed broad spectrum herbicides. Under the code, a root-absorbed broad spectrum herbicide means a broad spectrum herbicide that is primarily absorbed by the roots of plants, rather than the shoots. Examples of root-absorbed broad spectrum herbicides are hexazinone (Velpar) or tebuthiuron (Graslan). Glyphosate is not considered a root-absorbed broad spectrum herbicide.

If use of root-absorbed broad spectrum herbicides is not proposed, then the written application can merely state that the AO is not relevant as no root-absorbed broad spectrum herbicides will be used to undertake the works.

Where the use of root-absorbed broad spectrum herbicides is proposed, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Provide information on the proposed use of root-absorbed broad spectrum herbicides, and the targeted non-native plant species for this method. This should include details of the herbicide to be used, and how, when and where it will be applied.
3. Identify the defining bank of any natural wetland within 100 metres of the proposed clearing footprint (treatment area).
4. Identify the distance specified on the product label for separation from wetlands, water bodies or other environmentally sensitive areas.
5. Identify the distance specified in the safety and use conditions issued by the Australian Pesticides and Veterinary Medicines Authority for separation from wetlands, water bodies or other environmentally sensitive areas.
6. Identify which of the following is the greater distance from the defining bank of a natural wetland:
 - a. 100 metres;
 - b. the distance specified on the product label; or
 - c. the distance specified in the safety and use conditions issued by the Australian Pesticides and Veterinary Medicines Authority.

¹¹ See definitions in code for 'mature trees' and 'habitat trees'.

¹² See definition in code for 'immature trees'.

7. Demonstrate that application of a root-absorbed broad spectrum herbicide will not be applied within the greatest distance from the defining bank of any natural wetland (i.e. the greater distance as identified in 6 above).

Acceptable outcome 122.5

This AO is only relevant to clearing methods using aerial application¹³ of a foliar herbicide. Under the code, foliar herbicide means a herbicide primarily absorbed by the foliage of plants. For example, spraying using glyphosate.

If aerial application of a foliar herbicide is not proposed, then the written application can merely state that the AO is not relevant as no aerial application of a foliar herbicide will be undertaken.

Where aerial application of a foliar herbicide is proposed, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Provide information on the proposed aerial application of foliar herbicides, and the targeted non-native plant species for this method. This should include details of the herbicide to be used, and how, when, where and under what conditions it will be applied.
3. Identify the defining bank of any natural wetland within 50 metres of the proposed clearing footprint (treatment area).
4. Identify the distance specified on the product label for separation from wetlands, water bodies or other environmentally sensitive areas.
5. Identify the distance specified in the safety and use conditions issued by the Australian Pesticides and Veterinary Medicines Authority for separation from wetlands, water bodies or other environmentally sensitive areas.
6. Identify which of the following is the greater distance from the defining bank of a natural wetland:
 - a. 50 metres
 - b. the distance specified on the product label
 - c. the distance specified in the safety and use conditions issued by the Australian Pesticides and Veterinary Medicines Authority.
7. Demonstrate that aerial application of a foliar herbicide will not occur within the greatest distance from the defining bank of any natural wetland (i.e. the greater distance as identified in 6 above).

Performance outcome 122

If the entire clearing for the proposed development cannot meet the AOs where relevant (AO122.1 to AO122.5), the application will need to address the PO directly. The application should include all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Identify the defining bank of any natural wetland within 100 metres of the proposed clearing footprint.

¹³ Aerial application under the code means application by way of aircraft (i.e. fixed wing or helicopter) or drone.

3. Identify all areas of clearing within any natural wetland, or within 100 metres of the defining bank of any natural wetland.
4. Identify any areas of clearing within 100 metres of the defining bank of any natural wetland that are not considered regional ecosystems associated with a natural wetland. For example: regional ecosystems that rely on permanent or temporary inundation by water to remain in the landscape; vegetation within a jump up or hill immediately adjacent a natural wetland that does not contribute to the ecological functioning or stability of the natural wetland¹⁴. Examples of significant changes in elevation immediately adjacent to natural wetland areas include:
 - Simpson Desert and lower Channel Country (“natural wetland” to “dune field”);
 - Cape York Peninsula (wetlands associated with rivers); and
 - Areas in northern and western Queensland where vegetation does not extend more than a few metres from the defining bank.

5. Demonstrate how clearing in any natural wetland, or within 100 metres of the defining bank of any natural wetland, maintains the composition, structure and function of the regional ecosystem. This should include details of the proposed clearing and management methods, and use of any best practice methods.

See Appendix 2 ‘Composition, structure and function of regional ecosystems’ for guidance, further information sources and contacts for further assistance.

6. Where clearing in any natural wetland, or within 100 metres of the defining bank of any natural wetland, does not maintain the composition, structure and function of the regional ecosystem, then clearing is likely to impact one or more of the following:
 - a. bank stability by protecting against bank erosion;
 - b. water quality by filtering sediments, nutrients and other pollutants;
 - c. aquatic habitat;
 - d. terrestrial habitat.

Whilst unlikely, where no impacts to any of the above will result despite the composition, structure and function of the regional ecosystem/s not being maintained, the application must also include all information and evidence to demonstrate how there will be no impact to bank stability, water quality and habitat (aquatic and terrestrial) for any natural wetlands.

Clearing associated with watercourses or drainage features

See Appendix 4 ‘Watercourses and Drainage Features’ for information on: the intent of this PO; guidance to identify defining banks and stream orders; further information sources; and contacts for further assistance.

If the entire clearing for the proposed development meets the requirements of the AOs (where relevant) for PO123, being AO123.1 through to AO123.5, the PO is met. If the entire clearing for the proposed development cannot meet the AOs (where relevant), a more robust assessment addressing the PO must be provided with the application.

¹⁴ Contributions to ecological functioning include leaf litter deposits or by filtering runoff.

Acceptable outcome 123.1

This AO is only relevant to clearing using mechanical clearing methods. Under the code, mechanical clearing means the clearing of vegetation using any of the following methods:

- slashing
- brush cutting
- machinery that disturbs the soil surface or uproots woody vegetation.

If no mechanical clearing is proposed, then the written application can merely state that the AO is not relevant as no mechanical clearing is necessary to undertake the works.

Where mechanical clearing is proposed, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Identify the defining bank of any watercourse or drainage feature within 20 metres of the proposed clearing footprint.
3. Identify any clearing required for necessary access. Access will not be considered “necessary” where access can be reasonably gained via an alternate track that avoid clearing.
4. Provide detail on all proposed mechanical clearing method/s including how clearing will be undertaken (i.e. slashing), and location and extent of mechanical clearing per method/s.
5. Determine the stream order for all identified watercourses and drainage features.
6. Demonstrate that mechanical clearing, other than mechanical clearing for necessary access, will not occur inside the defining banks of any watercourse or drainage feature or within the following distance from the defining bank of any watercourse or drainage feature:
 - a. 10 metres from the defining bank of any watercourse or drainage features that is a stream order 1 or 2 watercourse or drainage feature;
 - b. 15 metres from the defining bank of any watercourse or drainage features that is a stream order 3 or 4 watercourse or drainage feature; and
 - c. 20 metres from the defining bank of any watercourse or drainage features that is a stream order 5 or more watercourse or drainage feature.

Acceptable outcome 123.2

This AO is only relevant to clearing for necessary access. If no clearing for necessary access is required, then the written application can merely state that the AO is not relevant as no clearing is required for necessary access, and identify all existing access tracks or routes (that do not require clearing) on the plan that will be used to undertake the works.

Where clearing is required for necessary access, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Identify any existing access tracks.
3. Identify any clearing required for further necessary access.
4. Demonstrate why any existing access tracks cannot be used. Access will not be considered ‘necessary’ where access can be reasonably gained via an alternate track that does avoids clearing.

5. Identify all mature trees and habitat trees in the proposed clearing area¹⁵.
6. Demonstrate how clearing for necessary access tracks:
 - a. does not exceed 5 metres in width; and
 - b. retains all mature trees and habitat trees.
7. Demonstrate how all access tracks run parallel to any watercourse or drainage feature and are not located within 10 metres of the defining bank of any watercourse or drainage feature, unless the access track is required to provide access across the watercourse or drainage feature.

Acceptable outcome 123.3

This AO is only relevant to clearing using chemical clearing methods. If no chemical clearing is proposed, then the written application can merely state that the AO is not relevant as no chemical clearing is necessary to undertake the works.

Where chemical clearing is proposed, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Provide information on the proposed chemical clearing, and the targeted non-native plant species for this method. This should include details of the herbicide to be used, and how, when and where it will be applied.
3. Identify all mature trees and habitat trees in the proposed clearing area¹⁶.
4. Demonstrate how chemical clearing will retain:
 - a. all mature trees and habitat trees; and
 - b. at least 50 per cent of the immature trees¹⁷ in each 50 metre by 50 metre area.

Acceptable outcome 123.4

This AO is only relevant to clearing methods using root-absorbed broad spectrum herbicides. Under the code, a root-absorbed broad spectrum herbicide means a broad spectrum herbicide that is primarily absorbed by the roots of plants, rather than the shoots. Examples of root-absorbed broad spectrum herbicides are hexazinone (Velpar) or tebuthiuron (Graslan). Glyphosate is not considered a root-absorbed broad spectrum herbicide.

If use of root-absorbed broad spectrum herbicides is not proposed, then the written application can merely state that the AO is not relevant as no root-absorbed broad spectrum herbicides will be used to undertake the works.

Where the use of root-absorbed broad spectrum herbicides is proposed, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.

¹⁵ See definitions in code for 'mature trees' and 'habitat trees'.

¹⁶ See definitions in code for 'mature trees' and 'habitat trees'.

¹⁷ See definition in code for 'immature trees'.

2. Provide information on the proposed use of root-absorbed broad spectrum herbicides, and the targeted non-native plant species for this method. This should include details of the herbicide to be used, and how, when and where it will be applied.
3. Identify the defining bank of any watercourse or drainage feature within 100 metres of the proposed clearing footprint (treatment area).
4. Identify the distance specified on the product label for separation from watercourses courses, drainage features, water bodies or other environmentally sensitive areas.
5. Identify the distance specified in the safety and use conditions issued by the Australian Pesticides and Veterinary Medicines Authority for separation from watercourses courses, drainage features, water bodies or other environmentally sensitive areas.
6. Identify which of the following is the greater distance from the defining bank of a watercourse or drainage feature:
 - a. 100 metres;
 - b. the distance specified on the product label; or
 - c. the distance specified in the safety and use conditions issued by the Australian Pesticides and Veterinary Medicines Authority.
7. Demonstrate that application of a root-absorbed broad spectrum herbicide will not be applied within the greatest distance from the defining bank of any watercourse or drainage feature (i.e. the greater distance as identified in 6 above).

Acceptable outcome 123.5

This AO is only relevant to clearing methods using aerial application¹⁸ of a foliar herbicide. Under the code, foliar herbicide means a herbicide primarily absorbed by the foliage of plants. For example, spraying using glyphosate.

If aerial application of a foliar herbicide is not proposed, then the written application can merely state that the AO is not relevant as no aerial application of a foliar herbicide will be undertaken.

Where aerial application of a foliar herbicide is proposed, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Provide information on the proposed aerial application of foliar herbicides, and the targeted non-native plant species for this method. This should include details of the herbicide to be used, and how, when, where and under what conditions it will be applied.
3. Identify the defining bank of any watercourse or drainage feature within 50 metres of the proposed clearing footprint (treatment area).
4. Identify the distance specified on the product label for separation from watercourses, drainage features, water bodies or other environmentally sensitive areas.

¹⁸ Aerial application under the code means application by way of aircraft (i.e. fixed wing or helicopter) or drone.

5. Identify the distance specified in the safety and use conditions issued by the Australian Pesticides and Veterinary Medicines Authority for separation from watercourses, drainage features, water bodies or other environmentally sensitive areas.
6. Identify which of the following is the greater distance from the defining bank of a watercourse or drainage feature:
 - a. 50 metres;
 - b. the distance specified on the product label; or
 - c. the distance specified in the safety and use conditions issued by the Australian Pesticides and Veterinary Medicines Authority.
7. Demonstrate that aerial application of a foliar herbicide will not occur within the greatest distance from the defining bank of any watercourse or drainage feature (i.e. the greater distance as identified in 6 above).

Performance outcome 123

If the entire clearing for the proposed development cannot meet the AOs where relevant (AO123.1 to AO123.5), the application will need to address the PO directly. The application should include all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Identify the defining bank of any watercourses or drainage features within 50 metres of the proposed clearing footprint.
3. Determine the stream order for all identified watercourses and drainage features.
4. Identify the assessable clearing areas under the PO for each watercourse and drainage feature based on the relevant distances listed in reference table 2 of the code, being:
 - a. For stream orders 1 and 2 – any clearing within the watercourse or drainage feature and any clearing within 10 metres of the defining bank of the watercourse or drainage feature.
 - b. For stream orders 3 and 4 – any clearing within the watercourse or drainage feature and any clearing within 25 metres of the defining bank of the watercourse or drainage feature.
 - c. For stream orders 5 and greater – any clearing within the watercourse or drainage feature and any clearing within 50 metres of the defining bank of the watercourse or drainage feature.
5. Identify any of these assessable clearing areas above that are not considered regional ecosystems associated with a watercourse or drainage feature. For example: regional ecosystems that rely on permanent or temporary inundation by water to remain in the landscape; vegetation within a jump up or hill immediately adjacent a watercourse or drainage feature that does not contribute to the ecological functioning or stability of the watercourse or drainage feature¹⁹.
6. Demonstrate how clearing in any watercourse or drainage feature, or within the relevant distance of the defining bank of any watercourse or drainage feature, maintains the composition, structure and function of the regional ecosystem. This should include details of the proposed clearing and management methods, and use of any best practice methods.

See Appendix 2 'Composition, structure and function of regional ecosystems' for guidance, further

¹⁹ Contributions to ecological functioning include leaf litter deposits or by filtering runoff.

information sources and contacts for further assistance.

7. Where clearing in any watercourse or drainage feature, or within the relevant distance of the defining bank of any watercourse or drainage feature, does not maintain the composition, structure and function of the regional ecosystem, then clearing is likely to impact one or more of the following:
 - a. bank stability by protecting against bank erosion;
 - b. water quality by filtering sediments, nutrients and other pollutants;
 - c. aquatic habitat;
 - d. terrestrial habitat.

Whilst unlikely, where no impacts to any of the above will result despite the composition, structure and function of the regional ecosystem/s not being maintained, the application must also include all information and evidence to demonstrate how there will be no impact to bank stability, water quality and habitat (aquatic and terrestrial) for any natural wetlands.

Soil erosion

See Appendix 8 'Soil Erosion' for information on: the intent of this PO; requirements for Erosion and Sediment Control Plans; further information sources; and contacts for further assistance.

If the entire clearing for the proposed development meets the requirements of the AOs (where relevant) for PO124, being AO124.1 through to AO124.3, the PO is met. If the entire clearing for the proposed development cannot meet the AOs (where relevant), a more robust assessment addressing the PO must be provided with the application.

Acceptable outcome 124.1

This AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Provide desktop and field data for soil erosion presence and future risk, both within the application area and on the land surrounding the application area.
3. Provide details of any potential increased soil erosion that may be caused by the proposed clearing, both within the application area and on the land surrounding the application area.
4. Identify recognised best practice methods that will be used to prevent and manage soil erosion.



Under the code, "recognised best practices method" means a method to mitigate accelerated soil erosion, recognised by any of the following:

- *a Federal or State government agency published advice or guide, such as the Soil Conservation Guidelines for Queensland (3rd edition) available online at www.qld.gov.au search "Soil Conservation Guidelines Queensland"; or*
- *the Best Practice Erosion and Sediment Control Document, IECA, 2008 available online at www.qld.gov.au.*

5. Demonstrate how the recognised best practice methods will:

- a. prevent soil erosion and instability resulting from the clearing. That is, prevent the increased occurrence of gully erosion greater than 30 centimetres in depth, landslips, a scarp, soil scalding or stream bank slumping resulting from the clearing;
- b. stabilise soil erosion and instability which would result from clearing. That is, stabilise gully erosion greater than 30 centimetres in depth, landslips, scarps, soil scalding or stream bank slumping resulting from the clearing; and
- c. prevent increased sediment run-off entering a wetland, watercourse or drainage feature as a result of the clearing.

Acceptable outcome 124.2

This AO is only relevant to clearing using mechanical clearing methods. Under the code, mechanical clearing means the clearing of vegetation using any of the following methods:

- slashing
- brush cutting
- machinery that disturbs the soil surface or uproots woody vegetation.

If no mechanical clearing is proposed, then the written application can merely state that the AO is not relevant as no mechanical clearing is necessary to undertake the works.

Where mechanical clearing is proposed, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Provide details (desktop and field data) on the ground cover for the proposed cleared areas, including any variation across the area. Under the code, “ground cover” means plant matter, either dead or alive, woody or non-woody, that covers the surface of the ground (either attached or detached). For example grasses, shrubs, tree and grass leaf litter, twigs, logs, branches etc.
3. Demonstrate how mechanical clearing will not occur on slopes²⁰ over 15 per cent.
4. Demonstrate how mechanical clearing will
 - a. retain 50 per cent of the ground cover in each 50 by 50 metre area (0.25 hectares); and
 - b. not disturb more than 50 per cent of the ground cover in each 50 by 50 metre area (0.25 hectares).

Preferably ground cover is living native ground cover vegetation exceeding 50 per cent of each 50 by 50 metre area, however, it can also be achieved by leaving dead vegetation matter (e.g. mulch).

Acceptable outcome 124.3

This AO is only relevant to clearing for necessary access. If no clearing for necessary access is required, then the written application can merely state that the AO is not relevant as no clearing is required for necessary access, and identify all existing access tracks or routes (that do not require clearing) on the plan that will be used to undertake the works.

Where clearing is required for necessary access, this AO can be met by satisfying all of the following:

²⁰ Under the code slope means a measure of the upward or downward incline of the land surface over any 30-metre length in the application area.

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Identify any existing access tracks.
3. Identify any clearing required for further necessary access.
4. Demonstrate why any existing access tracks cannot be used. Access will not be considered “necessary” where access can be reasonably gained via an alternate track that avoids clearing.
5. Where clearing of vegetation is proposed within or near to the defining bank of a watercourse or drainage feature, provide desktop and field data on the bank stability of the watercourse or drainage feature.
6. Demonstrate how clearing for necessary access tracks does not:
 - a. exceed 5 metres in width; and
 - b. de-stabilise the banks of any watercourse or drainage feature as a result of crossing, construction or use.

Performance outcome 124

Where the clearing does not meet all AOs (where relevant), the application must address PO124. The application should include all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Demonstrate that clearing will not result in accelerated soil erosion within or outside the land the subject of the development application.

“Accelerated soil erosion” means soil erosion that exceeds the natural level and that occurs as a direct result of human activity. See the code and Appendix 8 for further definitions associated with soil erosion and types of soil erosion.
3. To demonstrate that clearing will not result in accelerated soil erosion, all of the following should be provided:
 - a. Desktop and field data for soil erosion presence and future risk, both within the application area and on the land surrounding the application area.
 - b. Desktop and field data for chemical, physical and biological fertility characteristics of the soil within the application area and on the land surrounding the application area.
 - c. Details of any potential increased soil erosion that may be caused by the proposed clearing, both within the application area and on the land surrounding the application area.
 - d. Details of any potential impacts the proposed clearing may have on these characteristics.
 - e. The clearing methods and management strategies that will be employed to either prevent or rectify:
 - i. increased soil erosion caused by the clearing; and
 - ii. any associated loss of chemical, physical or biological fertility (both within and outside the land the subject of the development application).

Acid sulfate soils

See Appendix 9 'Acid Sulfate Soils' for information on: the intent of this PO; identifying land zones; sources for determining elevation; further information sources; and contacts for further assistance.

This PO does not apply where local government is the assessment manager for the development application. Where local government is the assessment manager, the requirements of the planning scheme will be used by the assessment manager to assess and condition the development in relation to soil erosion.

Where local government is not the assessment manager, this PO applies. If clearing for the proposed development meets the requirements of either AO125.1 or AO125.2, the PO (PO125) is met. However, if the clearing for the proposed development cannot meet either AO, a more robust assessment addressing the PO(s) must be provided in the application.

Acceptable outcome 125.1

See Appendix 9 'Acid Sulfate Soils' for guidance on meeting this AO.

Acceptable outcome 125.2

See Appendix 9 'Acid Sulfate Soils' for guidance on meeting this AO.

Performance outcome 125

See Appendix 9 'Acid Sulfate Soils' for guidance on meeting this PO.

Conserving remnant vegetation that is a regional ecosystem

If the entire clearing for the proposed development meets the requirements of the AOs (where relevant) for PO126, being AO126.1 through to AO126.6, the PO is met. If the entire clearing for the proposed development cannot meet the AOs (where relevant), a more robust assessment addressing the PO must be provided with the application.

Acceptable outcome 126.1

This AO is only relevant to clearing using mechanical clearing methods. Under the code, mechanical clearing means the clearing of vegetation using any of the following methods:

- slashing;
- brush cutting;
- machinery that disturbs the soil surface or uproots woody vegetation.

If no mechanical clearing is proposed, then the written application can merely state that the AO is not relevant as no mechanical clearing is necessary to undertake the works.

Where mechanical clearing is proposed, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Identify all habitat trees and mature trees²¹ in the proposed clearing area.
3. Demonstrate how mechanical clearing will result in all of the following

²¹ See definitions in the code for 'habitat trees' and mature trees'.

- a. only occurs within 1.5 metres from the edge of the canopy of individual non-native plants, unless the clearing is required to provide necessary access to control a non-native plant or declared pest
- b. does not occur using two machines linked by chain or cable
- c. retains all habitat trees and mature trees.

Acceptable outcome 126.2

This AO is only relevant to clearing for necessary access. If no clearing for necessary access is required, then the written application can merely state that the AO is not relevant as no clearing is required for necessary access, and identify all existing access tracks or routes (that do not require clearing) on the plan that will be used to undertake the works.

Where clearing is required for necessary access, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Identify any existing access tracks.
3. Identify any clearing required for further necessary access.
4. Demonstrate why any existing access tracks cannot be used. Access will not be considered “necessary” where access can be reasonably gained via an alternate track that avoids clearing.
5. Demonstrate how access to control a non-native plant or declared pest does not exceed 5 metres in width.

Acceptable outcome 126.3


This AO is only relevant to clearing by way of regional ecosystem burning. Under the code, regional ecosystem burn means a burn that is planned and undertaken for the purpose of restoring the range of plant species, size classes, and vegetation densities typical of the regional ecosystem. A permit under the *Fire and Emergency Services Act 1990* is required for a regional ecosystem burn.

Note: A regional ecosystem burn is for purposes other than reducing hazardous fuel loads. Reducing hazardous fuel loads by fire under the *Fire and Emergency Services Act 1990*, is Exempt Clearing Work.

If no regional ecosystem burn is proposed, then the written application can merely state that the AO is not relevant as no regional ecosystem burn will be undertaken.

Where a regional ecosystem burn is proposed, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Identify the areas where the regional ecosystem burn will be undertaken.
3. Identify the regional ecosystems for the identified regional ecosystem burn areas. See Part 1 ‘Vegetation Management mapping’ for further information on and access to vegetation management maps and data.
4. Demonstrate how all regional ecosystem burns will be undertaken in accordance with fire guidelines for the regional ecosystem as outlined in the REDD.

 Access or download the database at www.qld.gov.au (search for ‘regional ecosystem description database’).

Acceptable outcome 126.4

This AO is only relevant to clearing using chemical clearing methods. If no chemical clearing is proposed, then the written application can merely state that the AO is not relevant as no chemical clearing is necessary to undertake the works.

Where chemical clearing is proposed, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Provide information on the proposed chemical clearing, and the targeted non-native plant species for this method. This should include details of the herbicide to be used, and how, when and where it will be applied.
3. Identify all mature trees and habitat trees in the proposed clearing area²².
4. Demonstrate how chemical clearing will retain:
 - a. at least 50 per cent of the immature trees²³ in each 50 metre by 50 metre area
 - b. all mature trees and habitat trees.

Acceptable outcome 126.5 and 126.6

These AOs are only relevant to clearing methods using root-absorbed broad-spectrum herbicides. Under the code, a root-absorbed broad-spectrum herbicide means a broad-spectrum herbicide that is primarily absorbed by the roots of plants, rather than the shoots. Examples of root-absorbed broad-spectrum herbicides are hexazinone (Velpar) or tebuthiuron (Graslan). Glyphosate is not considered a root-absorbed broad-spectrum herbicide.

If use of root-absorbed broad-spectrum herbicides is not proposed, then the written application can merely state that the AOs are not relevant as no root-absorbed broad spectrum herbicides will be used to undertake the works.

Where the use of root-absorbed broad spectrum herbicides is proposed, this AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Provide information on the proposed use of root-absorbed broad spectrum herbicides, and the targeted non-native plant species for this method. This should include details of the herbicide to be used, and how, when and where it will be applied.
3. Identify all mature trees²⁴ and habitat trees²⁵ within the proposed clearing footprint and within 30 metres of the proposed clearing footprint.
4. Identify the distance specified on the product label for separation from mature trees and habitat trees.

²² See definitions in code for 'mature trees' and 'habitat trees'.

²³ See definition in code for 'immature trees'.

²⁴ See definition in code for 'mature tree'.

²⁵ See definition in code for 'habitat tree'.

5. Identify the distance specified in the safety and use conditions issued by the Australian Pesticides and Veterinary Medicines Authority for separation from mature trees and habitat trees.
6. Identify which of the following is the greater distance from the mature trees and habitat trees:
 - a. 30 metres;
 - b. the distance specified on the product label; or
 - c. the distance specified in the safety and use conditions issued by the Australian Pesticides and Veterinary Medicines Authority.
7. Demonstrate that application of a root-absorbed broad spectrum herbicide will not be applied:
 - a. by way of aerial application²⁶; and
 - b. within the greatest distance from any mature tree or habitat tree (i.e. the greater distance as identified in 6 above).

Performance outcome 126

Where the clearing does not meet all AOs (where relevant), the application must address PO126. The application should include all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Identify all of the following for the proposed clearing area:
 - a. the regional ecosystems;

See Part 1 'Vegetation Management mapping' for further information on and access to vegetation management maps and data.
 - b. all habitat trees and mature trees²⁷.
3. Demonstrate how clearing activities will result in all of the following:

- a. maintains the natural floristic composition and range of sizes of each species of the regional ecosystem evenly spaced across the application area;

This should include details of the proposed clearing and management methods, and use of any best practice methods.

These requirements safeguard the ongoing existence and function of the regional ecosystem/s being treated. Accordingly, the application should demonstrate that the extent of treatment to remove the non-native plant or declared pest does not compromise the composition, structure or function of the regional ecosystem/s. See Appendix 2 'Composition, structure and function of regional ecosystems' for guidance, further information sources and contacts for further assistance.

- b. retains all habitat trees and mature trees.

Duration of clearing, preventing land degradation, and maintaining biodiversity, ecological processes and regional ecosystems

Weed management is clearing that is either:

²⁶ Aerial application under the code means application by way of aircraft (i.e. fixed wing or helicopter) or drone.

²⁷ See definitions in the code for 'habitat tree' and 'mature tree'.

- not intended to permanently remove the functioning regional ecosystem
- intended to allow for natural regeneration of the regional ecosystem once the weed management program is complete.

To prevent or minimise the effects of land degradation, and to maintain or minimise the impact on biodiversity, ecological processes and regional ecosystems, clearing should be limited to the shortest duration required to achieve the purpose of the clearing.

The duration that is required to complete clearing work will depend on the area to be cleared and the methods to be used, and may include a reasonable allowance of time to ensure favourable weather conditions. A period of five years is generally sufficient to complete a typical program of clearing; however, in some circumstances, a shorter period may be found to be adequate, or alternatively the application may demonstrate a longer period is required.

As there are no prescribed AOs, the application will need to address the PO directly.

Performance outcome 127

This PO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Identify the proposed duration of the clearing program to achieve the purpose. This should include any relevant time constraints associated with the proposed clearing program, any notable weather patterns, relevant periodic land uses that will impact the clearing program and any ecological processes that may impact on successful conservation or restoration of the regional ecosystem.
3. Identify the regional ecosystems for the proposed clearing areas. See Part 1 'Vegetation Management mapping' for further information on and access to vegetation management maps and data.
4. Provide details of the proposed clearing program including clearing method/s, how when and where these methods will be undertaken, use of any best practice methods, and monitoring program.
5. Demonstrate how the duration of clearing under the proposed clearing program will:
 - a. not contribute to land degradation;
See Appendix 'Soil Erosion' for further information.
 - b. ensure the ongoing maintenance of ecological processes and biodiversity; and
See Appendix 2 'Composition, structure and function of regional ecosystems' for further information.
 - c. maintain the regional ecosystem.
See Appendix 2 'Composition, structure and function of regional ecosystems' for further information.

Appendix 1: Avoid and minimise

(PO4, PO19, PO33, PO49, PO64, PO80, PO94, PO96, PO121)

The avoid and minimise hierarchy reflects a key feature within the Queensland State Policy for Vegetation Management to advance the purposes of the VMA.

To meet avoid and minimise requirements, the application must demonstrate that clearing, and the adverse impacts of clearing, will only occur where it has first been reasonably avoided, and then reasonably minimised.

'Clearing' under the VMA means to remove, cut down, ringbark, push over, poison or destroy in any way including by burning, flooding or draining, but does not include destroying standing vegetation by stock, or lopping a tree.

Under the code, **'adverse impacts of clearing'** includes but is not limited to:

- the loss of vegetation;
- the loss of biodiversity;
- land degradation;
- loss of connectivity;
- altered ecological processes; and
- contributions to greenhouse gas emissions.

Under the code, for the purpose of a MCU or RaL development application, any reference to "clearing" is taken to include "clearing as a result of a material change of use"²⁸ and "clearing as a result of reconfiguring a lot"²⁹ respectively.

"Clearing as a result of a material change of use" means both of the following:

1. Clearing of vegetation that will result from the change in use, consisting of any of the following:
 - a. clearing to construct built infrastructure – including buildings, stormwater management systems, water supply and sewerage systems – that are proposed as part of the material change of use application;
 - b. clearing for roads, vehicle parking, vehicle and pedestrian access, utilities corridors, services, fences, fire breaks and fire management lines;
 - c. clearing that may not be necessary for developing built infrastructure but is associated with the use applied for.
2. Clearing of vegetation that will become exempt clearing work³⁰ if the development application is approved. This includes any of the following examples:
 - a. clearing for routine management³¹ and essential management³² purposes associated with the approved development including clearing to maintain proposed infrastructure, facilities, roads,

²⁸ See definitions in the code for 'clearing' and 'clearing as a result of a material change of use'.

²⁹ See definitions in the code for 'clearing' and 'clearing as a result of reconfiguring a lot'.

³⁰ See schedule 21 of the Planning Regulations 2017.

³¹ See definition of 'routine management' in schedule 24 of the Planning Regulation 2017.

³² See definition of 'essential management' in schedule 24 of the Planning Regulation 2017.

access routes, utilities, services and fences, and clearing to maintain the safety of persons and property that will be associated with the development;

- b. clearing for necessary fire breaks³³, fire management lines³⁴ and associated with the development. This will be assessed as follows:
 - i. all built infrastructure other than underground services, roads and fences will be assessed as requiring clearing for fire breaks and safety buffers with a width of 20 metres or 1.5 times the height of the tallest adjacent tree to the infrastructure, whichever is the greater. The extent of clearing assessed will include any vegetation that may be required to be cleared for fire breaks distances and safety buffers on adjoining land;



See Appendix 15 'Measuring tree height and measuring slope' for guidance on measuring tree height.

- ii. all proposed allotment boundaries will be assessed as requiring clearing for fire management lines with a width of 10 metres constructed on either side of the allotment boundary unless written evidence from the relevant Area Commander of the Queensland Fire and Emergency Service which confirms an alternative fire management line width is required or acceptable;
- iii. in the case of evidence being presented which demonstrates constraints on clearing for fire management lines as being reasonably imposed in accordance with written evidence from the relevant Area Commander or equivalent officer of the Queensland Fire and Emergency Service, the development may be conditioned so that the full extent of exempt clearing work prescribed for essential management under schedule 21 of the Planning Regulation 2017 cannot be carried out by current or future landholders.

“Clearing as a result of reconfiguring a lot” means both of the following:

1. Clearing of vegetation that will result from reconfiguring a lot, consisting of any of the following:
 - a. clearing for boundary fence lines for each proposed allotment (whether or not the clearing is proposed as part of the application);
 - b. clearing to construct built infrastructure, including stormwater management systems, water supply and sewerage systems, roads, access routes or utilities corridors that are proposed as part of the reconfiguring a lot application or that will be required as a condition of approval by the assessment manager;
 - c. clearing for excavation and filling, for example, where the lots are to be levelled.
2. Clearing of vegetation that will become exempt clearing work³⁵ if the development application is approved. This includes any of the following examples:

³³ Under the code 'firebreak' means an area that has been cleared and maintained in a low fuel state to either stop or steady wildfire, or back burn against.

³⁴ Under the code, 'fire management line' means a pathway, track or road, including existing property tracks, or fence line clearings, which can be used to access water for fire-fighting, divide the property into sub-units to allow a fuel reduction burning program to be carried out, or divide the property into sub-units to allow for back burning in the event of a wildfire.

³⁵ See schedule 21 of the Planning Regulations 2017.

- a. clearing for a single residence and reasonably associated buildings and structures for each allotment to be created as a result of the reconfiguring a lot, where no such dwelling house already exists on the proposed allotment;
- b. all lots will be assessed as including clearing of two hectares for the purpose stated in 2a, or for lots smaller than two hectares the whole area of the lot, unless the application demonstrates that a greater or smaller area will be required and achieved – for example, building envelopes binding on title;
- c. clearing for routine management³⁶ and essential management³⁷ purposes associated with the approved development including clearing to maintain proposed infrastructure, facilities, roads, access routes, utilities, services and fences, and clearing to maintain the safety of persons and property that will be associated with the development;
- d. clearing for necessary fire breaks³⁸, fire management lines³⁹ and safety buffers associated with the development. This will be assessed as follows:
 - i. all built infrastructure other than underground services, roads and fences will be assessed as requiring clearing for firebreaks and safety buffers with a width of 20 metres or 1.5 times the height of the tallest adjacent tree to the infrastructure, whichever is the greater. The extent of clearing assessed will include any vegetation that may be required to be cleared for fire breaks and safety buffers on adjoining land;



See Appendix 15 'Measuring tree height and measuring slope' for guidance on measuring tree height.

- ii. all proposed allotment boundaries will be assessed as requiring clearing for fire management lines with a width of 10 metres constructed on either side of the allotment boundary unless written evidence from the relevant Area Commander of the Queensland Fire and Emergency Service which confirms an alternative fire management line width is required or acceptable;
- iii. in the case of evidence being presented which demonstrates constraints on clearing for fire management lines as being reasonably imposed in accordance with written evidence from the relevant Area Commander of the Queensland Fire and Emergency Service, the development may be conditioned so that the full extent of exempt clearing work prescribed for essential management under schedule 21 of the Planning Regulation 2017 cannot be carried out by current or future landholders.

Addressing performance outcomes (POs)

There are no acceptable outcomes prescribed for these POs. The application will need to address the PO directly. The application should include all of the following:

³⁶ See definition of 'routine management' in schedule 24 of the Planning Regulation 2017.

³⁷ See definition of 'essential management' in schedule 24 of the Planning Regulation 2017.

³⁸ Under the code 'firebreak' means an area that has been cleared and maintained in a low fuel state to either stop or steady wildfire, or back burn against.

³⁹ Under the code, 'fire management line' means a pathway, track or road, including existing property tracks, or fence line clearings, which can be used to access water for fire-fighting, divide the property into sub-units to allow a fuel reduction burning program to be carried out, or divide the property into sub-units to allow for back burning in the event of a wildfire.

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application. See guidance in Part 1 of this guide 'Key steps in Development Assessment process: Step 1- Determine location and extent of development footprint'.

For a development application that includes a MCU, the extent of the development and clearing footprint should include "clearing as a result of a material change of use". See guidance in this Appendix 1 above.

For a development application that includes RaL, the extent of the development and clearing footprint should include "clearing as a result of reconfiguring a lot". See guidance in this Appendix 1 above.

2. Identify all potential adverse impacts of clearing.
3. Demonstrate both of the following:
 - a. If and how clearing, and the adverse impacts of clearing, can be reasonably avoided.
 - b. Where clearing cannot be reasonably avoided, how clearing and the adverse impacts of clearing will be reasonably minimised.
4. Provide all of the following supporting information:
 - a. Any considerations in deciding the location of the development, including assessment of alternative sites, to minimise the clearing footprint.
 - b. Identify constraints and limitations on alternative areas. For example: land features (topography, slope, land degradation, soil attributes), land use requirements, construction standards, proximity to existing infrastructure / facilities / services, access constraints.
 - c. Where it is not reasonable to undertake the clearing entirely in category X areas or existing cleared areas, demonstrate how the following 'avoid and minimise' principles have been applied for the location and extent of clearing:
 - i. First – locate as much of the clearing in category X areas or existing cleared areas as reasonably possible.
 - ii. Second – locate as much of the remaining clearing in a category C area or category R area where reasonably possible.
 - iii. Third – where necessary to clear in a category B area, locate the clearing within least concern regional ecosystems where reasonably possible.
 - iv. Fourth – take all possible steps to avoid, or if avoidance is not possible, minimise to the greatest extent possible, clearing in the following areas:
 - Within 100 metres of the defining bank of a natural wetland.
 - Within 10 metres of the defining bank of a watercourse or drainage feature for a stream order 1 or 2 watercourse or drainage feature.
 - Within 25 metres of the defining bank of a watercourse or drainage feature for a stream order 3 or 4 watercourse or drainage feature.
 - Within 50 metres of the defining bank of a watercourse or drainage feature for a stream order 5 or greater watercourse or drainage feature.
 - Essential habitat.

The 'avoid and minimise' assessments will be considered at an appropriate scale dependant on the nature and size of the proposed development. However generally, the scale of most 'avoid and minimise' assessments may be considered from a property / lot perspective.

Rehabilitation - having minimised the area of clearing, the adverse impacts of clearing may be further minimised by rehabilitating cleared areas that are only temporarily required for the establishment / construction phase of the proposed development. Whilst rehabilitation may not necessarily be required to meet "avoid and minimise" PO requirements, there may still be a requirement under further POs in the code to rehabilitate or provide an environmental offset in order to meet assessment benchmarks of the code⁴⁰. For further information on rehabilitation requirements see Appendix 11 'Rehabilitation'.

Wind farms - for wind farm developments, applications proposing to later micro-site areas following further detailed technical analysis will not satisfy avoid and minimise principles. Applications must demonstrate how the proposed clearing areas and the adverse impacts of clearing have been avoided and minimised notwithstanding any future intentions for micro-siting. Accordingly, any proposed clearing study corridor will be assessed in its entirety for the clearing of native vegetation. Applications for a proposed wind farm development must also include an analysis of the study corridor to identify:

1. the location and extent of the proposed:
 - a. study corridor;
 - b. necessary areas of clearing within the study corridor which will require technical investigation to determine the final location and extent of clearing;
 - c. necessary areas of clearing within the study corridor where the final location and extent of clearing is known; and
2. why it is necessary to locate the study corridor in the proposed location.

Information resources to assist in assessment

The following resources may be appropriate:

- Imagery: to demonstrate the presence of vegetation (free online resources include [Queensland Globe](#), [QImagery](#)). Access the imagery at www.qld.gov.au (search for 'Queensland Globe' and 'QImagery').
- Regulated Vegetation Management Map and supporting maps. See Part 1 "Vegetation Management mapping" for guidance to access maps and data.

Need more help?

- Seeking pre-lodgement advice with the SARA before lodging a development application is strongly recommended. This will identify any potential issues or additional information requirements.



For more detailed information about the role of SARA and seeking pre-lodgement advice, visit <https://planning.statedevelopment.qld.gov.au/planning-framework/state-assessment-and-referral-agency>

⁴⁰ For example, where a proposed development involves clearing for areas temporarily required to enable construction of infrastructure, in order to demonstrate clearing conserves the regional ecosystem.

- For assistance with vegetation management queries, including assistance with obtaining accessing information resources such Queensland Globe, please contact the Veg Hub on phone 135 834 or email vegetation@resources.qld.gov.au

Appendix 2: Composition, structure and function of regional ecosystems

Maintaining the composition, structure and function of regional ecosystems: PO5 – PO8, PO12 – PO17, PO20 – PO23, PO27 – PO30, PO34 – PO37, PO42 – PO45, PO50 – PO53, PO58 – PO61, PO65 – PO68, PO73 – PO78, PO81 – PO84, PO88 – PO91, PO97 – PO104, PO111 – PO114, PO116 – PO119, PO122 – PO123, PO128, PO136 – PO137, PO140 – PO141, PO149 – PO150.

Conserving remnant vegetation or restoring regional ecosystems generally: PO126, PO134, PO145 and PO153.

Some POs in the code require assessment of impacts to regional ecosystems to protect biodiversity, for example, to demonstrate the proposed development:

- maintains the composition, structure and function of regional ecosystems;
- conserve remnant vegetation or restore regional ecosystems; or
- maintains connectivity.

Accordingly, where the assessment benchmark is to maintain the composition, structure and function of regional ecosystems, the application must demonstrate how the proposed development will maintain the composition, structure and function of regional ecosystems that will in turn result in protecting the relevant environmental value/s (e.g. wetlands, watercourses, areas of essential habitat). The assessment should consider whether there are any significant on-ground conditions that may vary how the expected composition, structure and function of any regional ecosystem is impacted by the proposed clearing.

Likewise, where the assessment benchmark is to conserve remnant vegetation or allow for restoration of the regional ecosystems, the application must demonstrate how the proposed development will achieve the required outcomes e.g. maintain the natural floristic composition and range of sizes of each species of the regional ecosystem evenly spaced across the application area; retain mature trees; retain habitat trees. Again, by conserving the remnant vegetation or allowing the restoration of the regional ecosystems, the relevant environmental value will be protected (e.g. conserving remnant vegetation that is a regional ecosystem; restoring the regional ecosystem).

TIP See part 1 of this guide 'Vegetation Management mapping' for information on Vegetation Management mapping, Vegetation Management class for the regional ecosystem, interpreting regional ecosystem labels, regional ecosystem structure categories, bioregions, mixed polygons, PMAVs etc.

Regional ecosystems are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.

Biodiversity means the variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part, and includes:

- diversity within species and between species; and
- diversity of ecosystems.

Accordingly biodiversity is ‘...the variety of life, its composition, structure and function, at a range of scales’⁴¹.

‘Composition’ means the variation in species, populations and gene pools.

‘Structure’ means the physical variation of habitat and ecosystem components, such as tree, shrub and ground layers.

‘Function’ is the way it all works together including important ecological processes such as carbon, nutrient and water cycling.

The REDD provides basic regional ecosystem information including:

- Regional ecosystem code / label (i.e. bioregion, landzone, plants);
- VMA status (i.e. Least Concern, Of Concern and Endangered);
- Short description of the regional ecosystem – basic information such as the predominant canopy species, canopy cover structure (e.g. grassland, open woodland, woodland, open forest etc.);
- Structure category (e.g. sparse, dense);
- Long description of the regional ecosystem – more detailed information, mostly regarding understorey species and variants of the regional ecosystem; and
- Supplementary data – references to documentation that has been used to create the regional ecosystem technical descriptions provide a detailed description of the normal range in structure and floristic composition of remnant regional ecosystems and their component vegetation communities. They should be used in conjunction with the other fields from the REDD for a normal description of the regional ecosystem. Technical descriptions include the attributes of tree canopy height and cover, and native plant species composition of the predominant layer, which are used to assess the remnant status of vegetation under the VMA. However, as technical descriptions reflect the normal range in structure and floristic composition across the climatic, natural disturbance and geographic range of the regional ecosystem, local reference sites should be used where possible.



A full description of each regional ecosystem is available on the Regional Ecosystem Description Database (REDD). Access or download the database at www.qld.gov.au (search for ‘regional ecosystem description database’).

The Queensland Herbarium also publishes bio-condition benchmarks that are specific to each regional ecosystem or vegetation community in Queensland and are based on the average or median value of condition attributes assessed at reference and best-on-offer sites. The setting of benchmarks aims to account for the natural variability in structure and floristic composition under a range of natural disturbance regimes throughout the geographic extent of the regional ecosystem. Benchmarks are quantitative values derived from data collected from field-based reference sites for each site condition attribute assessed in bio-condition. These benchmarks have been developed to be used with the BioCondition vegetation condition assessment framework and are available to download in excel spreadsheet format at www.qld.gov.au (search ‘BioCondition’).

⁴¹ Freudenberger, D & Harvey, J 2003, *Assessing the benefits of vegetation enhancement for biodiversity: A draft framework*, Report for Environment Australia, CSIRO Sustainable Ecosystems, Canberra.

The BioCondition vegetation condition assessment framework is a framework that provides a measure of the capacity of a terrestrial ecosystem to maintain biodiversity values at a local or property scale⁴². It is a site-based, quantitative and repeatable assessment procedure that provides a numeric score to reflect functional, through to dysfunctional, vegetation condition states for biodiversity.



[BioCondition Site Assessment Manual](#): provides an assessment protocol to measure how well an area of vegetation is functioning for the maintenance of biodiversity values; and helpful in determining functionality / dysfunctionality of a regional ecosystem. Access the manual at www.qld.gov.au (search for 'BioCondition Site Assessment Manual').

For further information, publications, research or data on plant species and regional ecosystems in Queensland may be available from the Queensland Herbarium. Go to www.qld.gov.au (search 'Queensland Herbarium'), email Queensland.Herbarium@qld.gov.au or call 3199 7699.

Information resources to assist in assessment

The following resources may be appropriate:

- Imagery: to demonstrate the presence of vegetation (free online resources include [Queensland Globe, QImagery](#)). Access the imagery at www.qld.gov.au (search for 'Queensland Globe' and 'QImagery').
- Topographic mapping and regional ecosystem mapping: to confirm the location and extent of riparian wetland vegetation associated with a mapped wetland (free online resources include [Queensland Globe](#), and [QSpatial](#)). Access the mapping at www.qld.gov.au (search for 'Queensland Globe' and 'QSpatial').
- [Regional Ecosystem Description Database](#): Access or download the database at www.qld.gov.au (search for 'regional ecosystem description database').
- Geology mapping: to identify any geological features that may verify changes in water flow, constriction, or vegetation types (free online resources include [Queensland Globe](#), and [QSpatial](#)). Access the mapping at www.qld.gov.au (search for 'Queensland Globe' and 'QSpatial').
- [BioCondition Site Assessment Manual](#): helpful in describing the composition, structure and function of regional ecosystems. Access the manual at www.qld.gov.au (search for 'BioCondition Site Assessment Manual').
- See Appendix 11 'Rehabilitation'.
- See Appendix 13 'Significant Residual Impacts (SRIs) and Environmental Offsets'.
- [PMAV Application Guide](#): where the vegetation on ground is considered to be different to the mapped regional ecosystems, it is recommended you apply for a PMAV prior to lodging the development application. The PMAV application guide contains valuable guidance on the evidence that should be provided with a PMAV application. The guide also provides valuable links to Queensland Herbarium support material including technical description data and how to

⁴² This framework includes advice on the appropriate scale and sampling requirements for a BioCondition assessment dependent on the circumstances—for example, i.e. regional ecosystem, area, any natural conditions.

record site data and observations. The PMAV Application Guide is available online at www.qld.gov.au (search 'PMAV Application Guide').



Providing information to verify on-ground vegetation within a development application will not result in changes to statutory vegetation management mapping. The only process for requesting statutory vegetation mapping changes is to request a PMAV. Where the development application material does not adequately represent the vegetation impacted by the proposed clearing, SARA's assessment will be undertaken using the statutory vegetation management mapping.

Need more help?

- Seeking pre-lodgement advice with the SARA before lodging a development application is strongly recommended. This will identify any potential issues or additional information requirements. This is particularly important for those applications that are likely to require rehabilitation or environmental offsets to meet the POs.



For more detailed information about the role of SARA and seeking pre-lodgement advice, visit <https://planning.statedevelopment.qld.gov.au/planning-framework/state-assessment-and-referral-agency>

- For further information, publications, research or data on plant species and regional ecosystems in Queensland may be available from the Queensland Herbarium. Go to www.qld.gov.au (search 'Queensland Herbarium'), email Queensland.Herbarium@qld.gov.au or call 3199 7699.
- It may be appropriate to hire an environmental or planning consultant to assist in preparing this assessment. Further information on finding and choosing the right consultant is available online at www.qld.gov.au search 'Finding an environmental consultant'.
- If it is likely that the proposal is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999*, early advice should be sought from the relevant Commonwealth agency.
- For assistance with vegetation management queries, including assistance with obtaining accessing information resources such Queensland Globe, please contact the Veg Hub on phone 135 VEG (135 834) or email vegetation@resources.qld.gov.au.

Appendix 3: Wetlands

(PO5, PO6, PO20, PO21, PO34, PO35, PO50, PO51, PO65, PO66, PO81, PO82, PO97, PO98, PO99, PO100, PO122, PO128, PO136, PO149)

A wetland is defined as an area of land that supports plants or is associated with plants that are adapted to and dependent on living in wet conditions for at least part of their life cycle, and are shown on the Vegetation Management Supporting Map.

When undertaking an assessment, it is important to note the assessment relates to the clearing of vegetation in a regional ecosystem that is associated with a natural wetland. The purpose of this assessment benchmark is to ensure the clearing for the proposed development maintains the composition, structure and function of the regional ecosystem associated with the natural wetland. Maintaining the composition, structure and function of the regional ecosystem associated with the natural wetland ensures protection of bank stability, water quality, aquatic habitat and terrestrial habitat. Information on regional ecosystems under the vegetation management framework are shown on the Vegetation Management Supporting Map.

TIP See Part 1 above 'Vegetation Management mapping' for guidance how to access and apply these vegetation management maps.

Wetlands can be threatened by changes in both surface water and groundwater levels from changes to vegetation within and surrounding the wetland.

The wetland POs focus on clearing that is within a wetland, or within 100 metres of the defining bank of a wetland. This is because the regional ecosystems within this proximity are the most significant for maintaining the ecological function of the wetland.

In many cases, the defining bank of a wetland 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 (i.e. 100 metres).

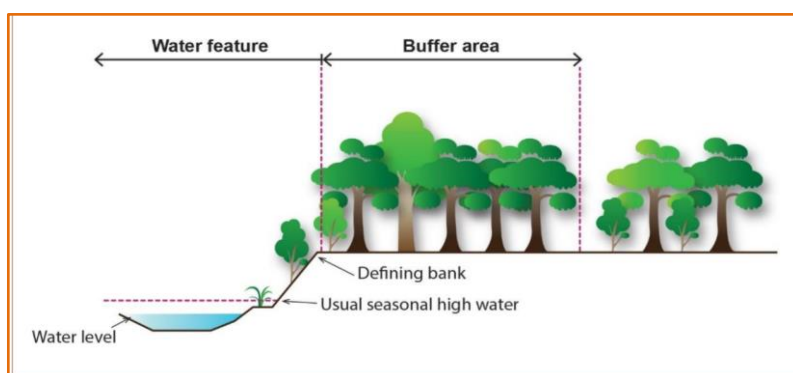


Figure 2: Defining bank of water feature

Information resources to assist in assessment

To verify your assessment, the following resources may be appropriate:

Guide to State Development Assessment Provisions – State code 16: Native vegetation clearing, Department of Resources

- Imagery: to demonstrate the presence of vegetation (free online resources include [Queensland Globe](#), [QImagery](#)). Access the imagery at www.qld.gov.au (search for 'Queensland Globe' and 'QImagery').
- Topographic mapping and regional ecosystem mapping: to confirm the location and extent of riparian wetland vegetation associated with a mapped wetland (free online resources include [Queensland Globe](#), and [QSpatial](#)). Access the mapping at www.qld.gov.au (search for 'Queensland Globe' and 'QSpatial').
- [Regional Ecosystem Description Database](#): The long description of a regional ecosystem may identify whether the vegetation is riparian vegetation, or a palustrine or lacustrine regional ecosystem. Access or download the database at www.qld.gov.au (search for 'regional ecosystem description database').
- Geology mapping: to identify any geological features that may verify changes in water flow, constriction, or vegetation types (free online resources include [Queensland Globe](#), and [QSpatial](#)). Access the mapping at www.qld.gov.au (search for 'Queensland Globe' and 'QSpatial').
- [BioCondition Site Assessment Manual](#): helpful in describing the composition, structure and function of regional ecosystems. Access the manual at www.qld.gov.au (search for 'BioCondition Site Assessment Manual').
- Erosion and Sediment Control: for further guidance on developing an erosion and sediment control plan:
 - Information about erosion and preventing and managing erosion can be found on the Queensland State Government website:
 - Refer to federal or state government agency published advice or guides such as the Soil Conservation Guidelines for Queensland (3rd edition), Queensland Soil and Land Resource Survey Information Guideline or Best Practice Erosion and Sediment Control, IECA, 2008.
- See Appendix 11 'Rehabilitation'.
- See Appendix 13 'Significant Residual Impacts (SRIs) and Environmental Offsets'.

Need more help?

- Seeking pre-lodgement advice with the SARA before lodging a development application is strongly recommended. This will identify any potential issues or additional information requirements. This is particularly important for those applications that are likely to require rehabilitation or environmental offsets to meet the POs.



For more detailed information about the role of SARA and seeking pre-lodgement advice, visit

<https://planning.statedevelopment.qld.gov.au/planning-framework/state-assessment-and-referral-agency>

- If it is likely that the proposal is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999*, early advice should be sought from the relevant Commonwealth agency.
- For information on environmental offsets see Appendix 13 'Significant Residual Impacts (SRIs) and Environmental Offsets'.

- For assistance with vegetation management queries, including assistance with obtaining accessing information resources such Queensland Globe, please contact the Veg Hub on phone 135 834 or email vegetation@resources.qld.gov.au
- It may be appropriate to hire an environmental or planning consultant to assist in preparing this assessment. Further information on finding and choosing the right consultant is available online at www.qld.gov.au search 'Finding an environmental consultant'.

Appendix 4: Watercourses and Drainage Features

(PO7, PO8, PO22, PO23, PO36, PO37, PO52, PO53, PO67, PO68, PO83, PO84, PO101, PO102, PO103, PO104, PO123, PO129, PO137, PO150)

Under the VMA framework, watercourses are identified on the Vegetation Management Watercourse and Drainage Feature Map and in general, is a feature that:

- 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.

Under the VMA framework, drainage features are identified on the Vegetation Management Watercourse and Drainage Feature Map and in general, is a feature that:

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

When undertaking an assessment, it is important to note the assessment relates to the clearing of vegetation in a regional ecosystem that is associated with a watercourse or drainage feature. The purpose of this assessment benchmark is to ensure the clearing for the proposed development maintains the composition, structure and function of the regional ecosystem associated with the watercourse or drainage feature. Maintaining the composition, structure and function of the regional ecosystem associated with the watercourse or drainage feature ensures protection of bank stability, water quality, aquatic habitat and terrestrial habitat. Information on regional ecosystems under the vegetation management framework are shown on the Vegetation Management Supporting Map.



See Part 1 above 'Vegetation Management mapping' for guidance how to access and apply these vegetation management maps.

The watercourse and drainage feature POs focus on clearing that is within a watercourse or drainage feature, or within a prescribed distance of the defining bank of a watercourse or drainage feature dependent on the stream order. This is because the regional ecosystems within this proximity are the most significant for maintaining the ecological function of the watercourse or drainage feature.

Watercourse and drainage feature mapping outside of South East Queensland is at a 1:100,000 scale (with stream orders), whilst SEQ watercourse and drainage feature mapping is at a finer 1:25,000 scale (without stream orders). Stream ordering is a numerical ordering classification of each stream segment according to its position within a catchment, as shown below. Where the mapping does not include the stream order number, then the assessment will need to determine the numbers using the methodology shown in Figure 3 below.

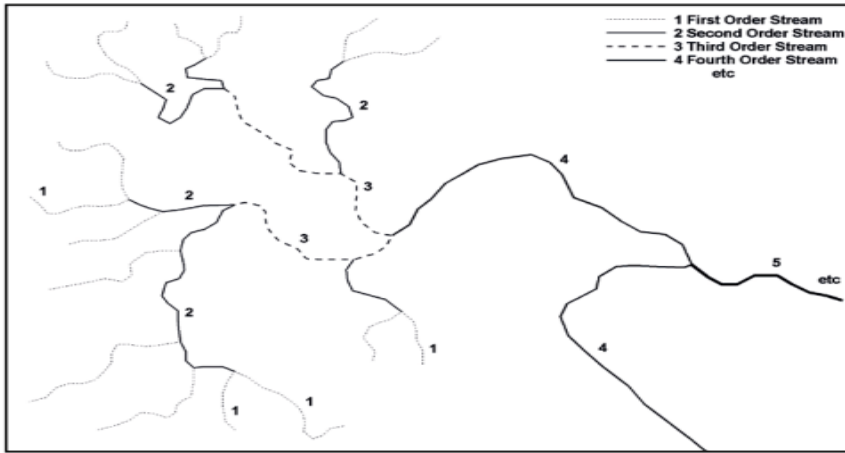


Figure 3: Diagrammatic view of stream ordering

When two streams of the same order join, the resulting stream becomes one stream order larger. If two streams of different orders join, the resulting stream order is that of the larger stream.

The Vegetation Management Watercourse and Drainage Feature map shows watercourses and drainage features with a blue line. This is an indication of the presence of a watercourse or drainage feature, and it does not demonstrate the location of its defining banks.

In many cases, the defining bank of a 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 (i.e. the prescribed distance listed in reference table 2 of the code).

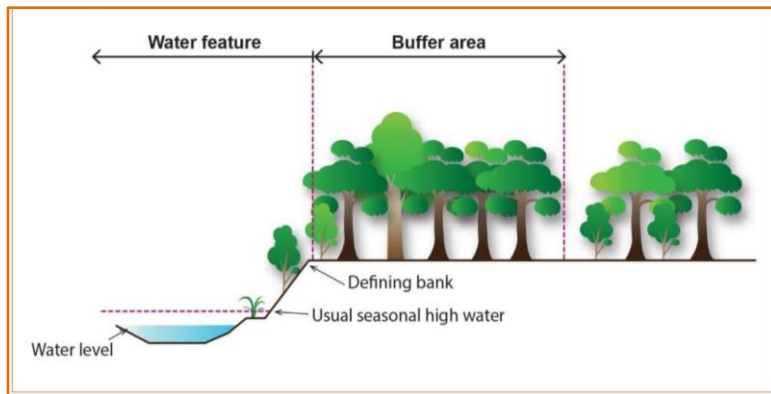


Figure 4: Defining bank of water feature

Developments involving clearing that impacts on multiple watercourse and drainage features must provide an analysis of impacts for each watercourse and drainage feature.

Information resources to assist in assessment

The following resources may be appropriate:

- Imagery: to demonstrate the presence of vegetation (free online resources include [Queensland Globe](#), [QImagery](#)). Access the imagery at www.qld.gov.au (search for 'Queensland Globe' and 'QImagery').
- Queensland Elevation DEM Public Time Series Service (free online from [QSpatial](#)). This data is an elevation service that displays the latest, highest resolution, ortho Digital Elevation Model (DEM) data captured by remotely piloted aircraft systems (drones), piloted aircraft, and the Shuttle Radar Topography Mission (SRTM) over areas of Queensland. Elevation layers available for free within [Queensland Globe](#) may also be useful (Contours, Hillshade and Mountains). These layers may be beneficial to demonstrate changes in surface level and may provide evidence of the defining banks of watercourses and drainage features. However, depending on the location of clearing, the available data, the topography and density of vegetation, the data may not capture changes in elevation that would enable the detection of the defining bank. Accordingly, some ground truthing may be required. Access the data at www.qld.gov.au (search for 'Queensland Globe' and 'QSpatial').
- Topographic mapping and regional ecosystem mapping: to confirm the location and extent of riparian wetland vegetation associated with a mapped watercourse and drainage features (free online resources include [Queensland Globe](#), and [QSpatial](#)). Access the mapping at www.qld.gov.au (search for 'Queensland Globe' and 'QSpatial').
- [Regional Ecosystem Description Database](#): The long description of a regional ecosystem may identify whether the vegetation is riparian vegetation, or a palustrine or lacustrine regional ecosystem. Access or download the database at www.qld.gov.au (search for 'regional ecosystem description database').
- Geology mapping: to identify any geological features that may verify changes in water flow, constriction, or vegetation types (free online resources include [Queensland Globe](#), and [QSpatial](#)). Access the mapping at www.qld.gov.au (search for 'Queensland Globe' and 'QSpatial').
- [BioCondition Site Assessment Manual](#): helpful in describing the composition, structure and function of regional ecosystems. Access the manual at www.qld.gov.au (search for 'BioCondition Site Assessment Manual').
- See Appendix 8 'Soil Erosion'.
- Erosion and Sediment Control: for further guidance on developing an erosion and sediment control plan:
 - Information about erosion and preventing and managing erosion can be found on the Queensland State Government website:
<https://www.qld.gov.au/environment/land/management/soil/erosion/guidelines>
 - Refer to federal or state government agency published advice or guides such as the Soil Conservation Guidelines for Queensland (3rd edition), Queensland Soil and Land Resource Survey Information Guideline or Best Practice Erosion and Sediment Control, IECA, 2008.
- See Appendix 11 'Rehabilitation'.
- See Appendix 13 'Significant Residual Impacts (SRIs) and Environmental Offsets'.

Need more help?

- Seeking pre-lodgement advice with the SARA before lodging a development application is strongly recommended. This will identify any potential issues or additional information requirements. This is particularly important for those applications that are likely to require rehabilitation or environmental offsets to meet the POs.



For more detailed information about the role of SARA and seeking pre-lodgement advice, visit

<https://planning.statedevelopment.qld.gov.au/planning-framework/state-assessment-and-referral-agency>

- If it is likely that the proposal is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999*, early advice should be sought from the relevant Commonwealth agency.
- For information on environmental offsets see Appendix 13 'Significant Residual Impacts (SRIs) and Environmental Offsets'.
- For assistance with vegetation management queries, including assistance with obtaining accessing information resources such Queensland Globe, please contact the Veg Hub on phone 135 834 or email vegetation@resources.qld.gov.au
- It may be appropriate to hire an environmental or planning consultant to assist in preparing this assessment. Further information on finding and choosing the right consultant is available online at www.qld.gov.au search 'Finding an environmental consultant'.

Appendix 8: Soil Erosion

(PO10, PO25, PO40, PO56, PO71, PO86, PO109, PO124, PO130, PO138, PO151)

All soils are subject to erosion, but in nature the rate of erosive soil loss broadly equates to the rate of soil formation. Activities that increase the exposure of the soil surface to rainfall, runoff or wind are likely to accelerate the rate of soil erosion in excess of the rate of soil formation. The scenario whereby the soil becomes progressively shallower is not sustainable, particularly as the lost surface soil is the main source of most plant nutrients. Reductions in soil depth will affect the capacity of the soil to store water for plant use. Both of these outcomes will have significant, adverse effects on crop or pasture growth and yields, and general soil health.

Soils differ in their susceptibility to erosion, which is commonly referred to as their erodibility. The erodibility of a soil will depend on a wide range of factors, such as the particle size distribution in the soil, the organic matter content, the mineralogy of the clay fraction, the soil permeability, and soil structure and cohesiveness.

Due to certain intrinsic chemical and physical attributes, subsoils are generally more erodible than surface soils. Hence, once the surface soils are lost, the rate of soil loss will often accelerate. This can result in serious land management issues, such as the formation of large gullies.

Where there are highly dispersible subsoils present, subsoil erosion can occur even without the removal of surface soil. Anything that may allow the rapid ingress of water into the subsoil, such as the installation of underground services or fence posts, or where the surface soil remains attached to the root bole during clearing operations, can provide conditions that may result in tunnel erosion or piping. These forms of erosion often occur in association with a single rainfall event, and can be extensive.

The fate of eroded soil is also important. In the erosion process the soil components become entrained in runoff, either in suspension or as bedload material. At some point between the site of that erosion and the sea, the transported material will be deposited, either temporarily or permanently.

While some of that deposition might initially take place in close proximity to the source, the movement of sediment across the landscape and into watercourses can affect other land and will inevitably impact on water quality. Thus the impacts of soil erosion are not confined to the site of that erosion.

In relation to the clearing of native vegetation, the reduction in protective ground cover (e.g. cover foliage, leaf litter etc.) post-clearing is the most significant factor affecting accelerated rates of erosion and sedimentation.

The code ensures that measures are employed to prevent or rectify the accelerated rates of soil loss and sediment movement resulting from the clearing of native vegetation.

Relevant definitions under the code include:

- “accelerated soil erosion” means soil erosion that exceeds the natural level and that occurs as a direct result of human activity.
- “soil erosion” means mass movement, gully erosion, rill erosion, sheet erosion, tunnel erosion, stream bank erosion, wind erosion, or scald; and any associated loss of chemical, physical or biological fertility – including, but not limited to water holding capacity, soil structure, organic matter, soil biology, and nutrients.
- “mass movement” is a landslip, earthflow, landslide, rock avalanche or soil creep

- “gully erosion” means the removal of soil by water creating large incised channels more than 30 centimetres in depth.
- “rill erosion” means the removal of soil by runoff water to create small channels up to 30 centimetres deep.
- “sheet erosion” is the removal of a relatively uniform layer of soil from the surface with generally no obvious channel created.
- “stream bank erosion” means the removal of soil from a stream bank, typically during periods of high stream flow.
- “wind erosion” means the movement of soil by wind.
- “scald” means a bare area formed when the surface soil is removed by wind or water erosion, exposing a more clayey subsoil which is devoid of vegetation and relatively impermeable to water.
- “soil erosion and instability” means the occurrence of gully erosion greater than 30 centimetres in depth, landslips, a scarp, soil scalding or stream bank slumping.

Some AOs require an Erosion and Sediment Control Plan (ESCP). The ESCP needs to adequately address the potential for and management of erosive soil loss and sediment movement and deposition in the context of:

- clearing operations;
- post-clearing or post development land use;
- on-site impacts; and
- off-site impacts.

Under the code, an ESCP must include all of the following:

1. The presence and location of any accelerated soil erosion within the proposed development area.
2. The rates of soil and sediment movement prior to the proposed development.
3. The estimated rates of soil loss and sediment movement after the proposed development.
4. The recognised best practice methods that will be employed to:
 - a. ensure rates of soil loss and sediment movement are the same or less than those prior to the proposed development; and
 - b. prevent increased soil erosion resulting from the clearing; and
 - c. prevent increased sediment run-off entering a wetland, watercourse or drainage feature as a result of the clearing; and
 - d. stabilise soil erosion which results from clearing.
5. A map showing where recognised best practice methods will be used within and around the proposed development area to address points 4(a) to 4(d) above.

TIP *Under the code, “recognised best practices method” means a method to mitigate accelerated soil erosion, recognised by any of the following:*

- a Federal or State government agency published advice or guide, such as the *Soil Conservation Guidelines for Queensland (3rd edition)* available online at www.qld.gov.au (search “Soil Conservation Guidelines Queensland”); or
- the *Best Practice Erosion and Sediment Control Document*, IECA, 2008 available online at <https://www.austieca.com.au/publications/best-practice-erosion-and-sediment-control-bpesc-document>

The following provides some further guidance on the content and level of detail in a ESCP. The level of detail required within the ESCP will vary depending on the complexity of the development and the soil loss and sediment movement risk associated with the development application. The ESCP must provide sufficient detail to demonstrate that erosion control is feasible and practicable.

In the ESCP the **description of the existing environment** should include all the following:

1. Climatic conditions (both long term and those likely to be experienced during and immediately after the proposed clearing operations), including intensity frequency duration data tables for the site.
2. Site topography (in particular slope gradients, orientations and lengths).
3. Soil types, characteristics and attributes.
4. Site hydrology and drainage.
5. Existing vegetation.
6. Any existing soil erosion or similar soil or land degradation.

In the ESCP the **description of the proposed land clearing and future use of the land** should include all of the following:

1. The nature or method and staging of the proposed land clearing.
2. The proposed post-clearing land use(s).
3. The physical extents and characteristics of the area that will be disturbed during or in association with the proposed development.
4. A suitably detailed site plan showing:
 - a. disturbance areas.
 - b. existing slope gradients and orientations and/or elevation contours.
 - c. the extents of identified soil types and vegetation communities.
 - d. natural drainage lines and watercourses (including all first or higher order streams identified in departmental mapping).

In the ESCP an **erosion hazard and risk assessment** should include all of the following elements:

1. A spatial and temporal assessment of the erosion hazards associated with the proposed development,
2. A risk assessment complementing the hazard assessment, including a clear linkage between the assessed risk and the requisite control measures and design criteria that are to be applied to mitigate the identified risks.

3. An erosion risk map including zones differentiating the areas associated with different erosion risks and any areas where soil disturbance is to be avoided (i.e. areas where the erosion risk is too high to disturb).

In the ESCP the **description of the erosion and sediment control measures** should cover both the land clearing phase and the subsequent land use or uses to be undertaken in the cleared area. The description of the control measures should include all the following where applicable:

1. The associated performance criteria, such as design storm frequencies and durations, exceedance probabilities, recurrence intervals, maximum design velocities, maximum design discharges, flowpath roughness, bed slopes, settling velocities, analyse concentrations and other quantitative standards applicable to the various elements of the system design.
2. Engineering design calculations and suitably detailed design drawings for all permanent and temporary drainage, erosion and sediment control measures, including all of the following, where applicable:
 - a. clean water diversion banks.
 - b. runoff control ('contour') banks.
 - c. waterways and drains.
 - d. any sedimentation systems.
 - e. any other structures providing for the temporary or permanent impoundment of runoff water.
 - f. outlet structures, weirs, by-washes and spillways.
 - g. culverts, causeways and drains.
 - h. energy dissipation structures.
 - i. pre and post-clearing discharge hydrographs for the discharge points on the property boundary.
 - j. the construction materials used in any structures.
3. Details of any chemicals or ameliorants that might be applied to stabilise soil or to flocculate suspended particulates in any runoff, as well as applicable dosing or application methods and rates.
4. A suitably detailed site plan showing the locations of all of the following, where applicable:
 - a. all the structures – both temporary and permanent – identified above.
 - b. any soil stockpiles – either temporary or permanent.
 - c. the nominated discharge points for runoff from the site.
5. The nature and form of any revegetation, rehabilitation or re-stabilisation
6. Details and the scheduling for all of the following:
 - a. the removal of any temporary erosion and sediment control measures.
 - b. the undertaking of any proposed revegetation, rehabilitation or re-stabilisation measures.
7. Details of how the above measures address the identified hazards and risks, and how those measures align with the elements of the SECP.

In the ESCP the **description of the proposed monitoring program** should include all of the following, where applicable:

1. Timing or frequency and the locations of sites at which monitoring data and samples will be collected.
2. Pro forma checklists and forms to be used in the monitoring process.
3. The chemical and physical analyses proposed to be undertaken on any samples collected (including references to recognised standard laboratory methods).
4. The nature of the accreditation held by any chemical or physical analysis laboratory undertaking the specified tests.
5. The way in which monitoring data is to be used to determine the effectiveness of the ESCP, with particular reference to the metrics and measures that are to be in establishing the success or shortcomings of the ESCP.
6. The process by which the ESCP might be revised and modified to reflect any identified deficiencies.

Information resources to assist in assessment

The following resources may be appropriate:

- Imagery: to demonstrate the presence of vegetation (free online resources include [Queensland Globe, QImagery](#)). Access the imagery at www.qld.gov.au (search for 'Queensland Globe' and 'QImagery').
- Queensland Elevation DEM Public Time Series Service (free online from [QSpatial](#)). This data is an elevation service that displays the latest, highest resolution, ortho Digital Elevation Model (DEM) data captured by remotely piloted aircraft systems (drones), piloted aircraft, and the Shuttle Radar Topography Mission (SRTM) over areas of Queensland. Access the data at www.qld.gov.au (search for 'Queensland Globe' and 'QSpatial').
- Topographic mapping and regional ecosystem mapping: to confirm the location and extent of vegetation within the clearing area. Access the mapping at www.qld.gov.au (search for 'Queensland Globe' and 'QSpatial').
- [Regional Ecosystem Description Database](#): Access or download the database at www.qld.gov.au (search for 'regional ecosystem description database').
- Geology mapping: to identify any geological features that may verify changes in water flow, constriction, or vegetation types (free online resources include [Queensland Globe](#), and [QSpatial](#)). Access the mapping at www.qld.gov.au (search for 'Queensland Globe' and 'QSpatial').
- Erosion and Sediment Control: for further guidance on developing an erosion and sediment control plan:
 - Information about erosion and preventing and managing erosion can be found on the Queensland State Government website: <https://www.qld.gov.au/environment/land/management/soil/erosion/guidelines>
 - a Federal or State government agency published advice or guide, such as the Soil Conservation Guidelines for Queensland (3rd edition) available online at www.qld.gov.au (search "Soil Conservation Guidelines Queensland"); or
 - the Best Practice Erosion and Sediment Control Document, IECA, 2008 available online at <https://www.austieca.com.au/publications/best-practice-erosion-and-sediment-control-bpesc-document>

- See the *Queensland Soil and Land Resource Survey Information Guideline*, Department of Resources, 2021 available online at www.qld.gov.au (search 'Guidelines for coordinated projects involving clearing for agriculture').

Need more help?

- Seeking pre-lodgement advice with the SARA before lodging a development application is strongly recommended. This will identify any potential issues or additional information requirements.



For more detailed information about the role of SARA and seeking pre-lodgement advice, visit

<https://planning.statedevelopment.qld.gov.au/planning-framework/state-assessment-and-referral-agency>

- For assistance with vegetation management queries, including assistance with obtaining accessing information, please contact the Veg Hub on phone 135 VEG (135 834) or email vegetation@resources.qld.gov.au

Appendix 9: Acid Sulfate Soils

(PO18, PO31, PO46, PO62, PO79, PO92, PO115, PO125, PO132, PO152)

Acid sulfate soils are coastal soils and sediments containing iron sulfides (mainly pyrite), found on low lying coastal land, predominantly below 5 metres Australian Height Datum (AHD)⁴³. They can also be found in some inland areas at higher elevations.

Acid sulfate soils are environmentally benign if they remain in an anoxic (oxygen-free), water logged environment. If acid sulfate soils are dug up or drained and exposed to oxygen, the iron sulfides oxidise, releasing sulfuric acid and soluble iron. The acid can mobilise aluminium, lead or other heavy metals if present in the soil. Rainfall can then wash the acid and metals from the disturbed soil into the surrounding environment, degrading waterways and adversely affecting the built environment.

Acid sulfate soils occur as:

- potential acid sulfate soils: soil or sediment that contain iron sulfides which have not been exposed to air, and have not oxidised. These soils have potential to produce acid if oxidised.
- actual acid sulfate soils: soil or sediment containing highly acidic soil horizons (with a pH < 4) caused by some or partial oxidation of iron sulfides. These soils often exhibit straw or butter coloured mottles. These soils may have the potential to continue to oxidise.

The disturbance of acid sulfate soils should be avoided. Where avoidance is not practicable, the disturbance should be managed to prevent the release of acid and soluble iron to the surrounding environment. This is achievable by identifying areas with high probability of containing acid sulfate soils, conducting an site investigation, and devising and implementing an acid sulfate soils management plan to prevent the mobilisation and release of contaminants.

Due to this risk, some AOs prohibit mechanical disturbance to a depth greater than 30 centimetres in land zones 1, 2 and 3 at elevations less than 5 metres.

Land zones are categories that describe the major geologies and associated landforms and geomorphic processes in Queensland. The differences between land zones result in marked differences in the function of ecosystems and their associated biodiversity and this is due in part to the effects that geology (lithology, structure, alteration) has on landform, hydrology and landscape processes (geomorphology and soil formation). The land zone of an area can be identified by the middle number in the regional ecosystem code (e.g. for regional ecosystem 6.3.21 the land zone is 3). Regional ecosystems numbers can be found on the Vegetation Management Supporting Map. See Part 1 'Vegetation Management mapping' for further information on and access to vegetation management maps and data. Land zones are also described in more detail online at www.qld.gov.au (search 'land zone definitions').

Elevation information can be obtained from various sources, such as printed or online topographic maps or GPS units.

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').

⁴³ The Australian Height Datum sets the mean sea level for the Australian Coastline at zero metres. "Below 5 metres Australian Height Datum" effectively means land elevations that are less than 5 metres above sea level.

Addressing performance outcomes (POs)

If clearing for the proposed development meets the requirements of either AO, the PO is met. However, if the clearing for the proposed development cannot meet either AO, a more robust assessment addressing the PO(s) must be provided in the application.

Acceptable outcome (1)

This AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Identify the regional ecosystem/s for the proposed clearing areas. See Part 1 'Vegetation Management mapping' for further information on and access to vegetation management maps and data.
3. Identify the land zone for all proposed clearing areas.
4. Demonstrate how no clearing will occur in land zone 1, land zone 2 or land zone 3.

Acceptable outcome (2)

This AO can be met by satisfying all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.
2. Identify the regional ecosystem/s for the proposed clearing areas. See Part 1 'Vegetation Management mapping' for further information on and access to vegetation management maps and data.
3. Identify the land zone for all proposed clearing areas.
4. Where any clearing is proposed in land zone 1, land zone 2 or land zone 3, identify whether any of these areas are areas below 5 metres AHD.
5. Demonstrate how any clearing in land zone 1, land zone 2 or land zone 3 that is below 5 metres AHD only occurs where:
 - a. mechanical clearing⁴⁴ does not disturb the soil to a depth greater than 30 centimetres; and
 - b. acid sulfate soils are managed consistent with the *Queensland acid sulfate soil technical manual: Soil management guidelines*.



The Queensland acid sulfate soil technical manual: Soil management guidelines is available online in the Queensland Government library catalogue at www.qld.gov.au (search 'library catalogue').

Performance outcome

Where the clearing does not meet either AOs, the application must address PO. The application should include all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.

⁴⁴ Under the code, mechanical clearing means the clearing of vegetation using any of the following methods: slashing; brush cutting; machinery that disturbs the soil surface or uproots woody vegetation.

2. Identify the regional ecosystem/s for the proposed clearing areas. See Part 1 'Vegetation Management mapping' for further information on and access to vegetation management maps and data.
3. Identify any areas where acid sulfate soils have been mapped.



The Queensland Globe online mapping tool 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').

4. Identify the land zone for all proposed clearing areas.
5. Where any clearing is proposed in land zone 1, land zone 2 or land zone 3, identify whether any of these areas are areas below 5 metres AHD. An acid sulfate soils site inspection may be required to determine the acidity of the soil.
6. Demonstrate how any clearing of vegetation in area mapped as an acid sulfate soil area, or in land zone 1, land zone 2 or land zone 3 that is below 5 metres AHD, will not result in or accelerate, disturbance of acid sulfate soils or changes to the hydrology of the location that will result in either of the following:
 - a. aeration of horizons containing iron sulphides;
 - b. mobilisation of acid or metals.

This may be achieved by devising and implementing an acid sulfate soils management plan to prevent the mobilisation and release of contaminants. See resources below for assistance with compiling an acid sulfate soil management plan.

Information resources to assist in assessment

The following resources may be appropriate:

- The online Queensland Government library catalogue at www.qld.gov.au (search 'library catalogue') publishes the following guidelines:
 - *Queensland acid sulfate soil technical manual: laboratory methods guidelines V2.1, 2004.*
 - *Queensland acid sulfate soil technical manual: soil management guidelines V4.0, 2014.*
 - *Guidelines for sampling and analysis of lowland acid sulfate soils in Queensland 1998.*
 - *Queensland acid sulfate soil technical manual: legislation and policy guide V2.2, 2004.*
- Imagery: to demonstrate the presence of vegetation (free online resources include [Queensland Globe, QImagery](#)). Access the imagery at www.qld.gov.au (search for 'Queensland Globe' and 'QImagery').
- Queensland Elevation DEM Public Time Series Service (free online from [QSpatial](#)). This data is an elevation service that displays the latest, highest resolution, ortho Digital Elevation Model (DEM) data captured by remotely piloted aircraft systems (drones), piloted aircraft, and the Shuttle Radar Topography Mission (SRTM) over areas of Queensland. Access the data at www.qld.gov.au (search for 'Queensland Globe' and 'QSpatial').
- Topographic mapping and regional ecosystem mapping: to confirm the location and extent of vegetation within the clearing area, AHD elevation and land zone information. Access the mapping at www.qld.gov.au (search for 'Queensland Globe' and 'QSpatial').

- Soils data: access soil and land resources and information on interpreting data available online from www.qld.gov.au (search for 'soils data').
- See the *Queensland Soil and Land Resource Survey Information Guideline*, Department of Resources, 2021 available online at www.qld.gov.au (search 'Guidelines for coordinated projects involving clearing for agriculture').
- Geoscience and Soil mapping: helpful to identify geology, geomorphology, geophysics, land resources, soils and acid sulphate soils (free online resources include [Queensland Globe](#), and [QSpatial](#)). Access the mapping at www.qld.gov.au (search for 'Queensland Globe' and 'QSpatial').
- [Regional Ecosystem Description Database](#): Access or download the database at www.qld.gov.au (search for 'regional ecosystem description database').
- Geology mapping: to identify any geological features that may verify changes in water flow, constriction, or vegetation types (free online resources include [Queensland Globe](#), and [QSpatial](#)). Access the mapping at www.qld.gov.au (search for 'Queensland Globe' and 'QSpatial').

Need more help?

- Seeking pre-lodgement advice with the SARA before lodging a development application is strongly recommended. This will identify any potential issues or additional information requirements.



For more detailed information about the role of SARA and seeking pre-lodgement advice, visit <https://planning.statedevelopment.qld.gov.au/planning-framework/state-assessment-and-referral-agency>

- For assistance with vegetation management queries, including assistance with obtaining accessing information, please contact the Veg Hub on phone 135 VEG (135 834) or email vegetation@resources.qld.gov.au

Appendix 12: Better Environmental Outcomes

(PO1, PO2)

Where a development proposes to develop an area that is a Particular Regulated Area and / or an area subject to a Notice Requiring Compliance, PO1 and PO2 of the code requires a Better Environmental Outcome be provided in exchange for the impacted area where the proposed clearing is not consistent with any Notice Requiring Compliance or any vegetation management requirements for Particular Regulated Areas.

A “Better Environmental Outcome” means an environmental outcome provided on land in exchange for an area to be developed which is a Particular Regulated Area, or is subject to a Notice Requiring Compliance, and is legally secured using a Declared Area (Voluntary)⁴⁵ before:

1. the commencement of works; and
2. prior to any amendment, partial discharge or discharge of any Notice Requiring Compliance or instrument securing a Particular Regulated Area.

An area subject to a Notice Requiring Compliance is an area subject to one or more of the following:

- a Restoration Notice under the VMA;
- a Stop Work Notice under the VMA;
- a Land Act Notice under the *Land Act 1994*;
- a Trespass Notice under the *Land Act 1994* where the trespass related act is the clearing of vegetation; or
- an Enforcement Notice under the *Planning Act 2016*.

A Particular Regulated Area is an area that is one or more of the following:

- an Exchange Area under the VMA;
- an unlawfully cleared area under the VMA;
- a Declared Area (Voluntary) under section 19F of the VMA, other than to legally secure an environmental offset; and
- on a PMAV, shown to be a category A area, where the chief executive of the VMA reasonably believed that a vegetation clearing offence had been or was being committed.

Vegetation management requirements for Particular Regulated Areas means any conditions, restrictions, management requirements or outcomes identified in a particular regulated area which must be undertaken or complied with to achieve compliance with the particular regulated area. Sometimes these requirements will be evident, for example requirements or outcomes in a management plan. Other times the purpose of the Particular Regulated Area will need to be considered. For example, where the chief executive of the VMA made an area a category A area on a PMAV. In these circumstances, regulation of the area under the VMA framework is intended to restrict clearing in the area under the VMA framework for the purposes of the Act (i.e. to conserve remnant vegetation, prevent loss of biodiversity, maintain ecological processes etc.). A Better Environmental Outcome may be

⁴⁵ See section 19F of the *Vegetation Management Act 1999*.

appropriate in these circumstances where the proposed development is inconsistent with the intended purpose to afford greater protection to the environmental values (i.e. category A areas being areas subjected to greater regulation to conserve the environmental values and / or allow natural regeneration of the environmental values).

Some clearing purposes that are intended to improve the quality of the regional ecosystem, such as weed management and managing thickened vegetation, are more likely to be consistent with a Notice Requiring Compliance or vegetation management requirements for Particular Regulated Areas. Other clearing purposes intended to permanently remove vegetation, such as clearing for infrastructure, will likely be inconsistent requiring a Better Environmental Outcome be provided.

A Better Environmental Outcome is an environmental outcome provided on land in exchange for the development of an area that is a Particular Regulated Area, or an area subject to a Notice Requiring Compliance (impact area), and:

1. is located in a category X area;
2. contains a predominate vegetative layer which is at least two meters in height;
3. achieves the requirements for one of the applicable Better Environmental Outcome options below (see Table 1: 'Requirements and Options for Better Environmental Outcomes' below);
4. is legally secured using a Declared Area (Voluntary) before: the commencement of works; and prior to any amendment, partial discharge or discharge of any Notice Requiring Compliance or instrument securing a Particular Regulated Area;
5. is located within the same bioregion as the impacted area, or where it is not reasonably possible, located in an adjacent bioregion;
6. is configured in a way that maintains ecosystem functioning and remains in the landscape despite threatening processes;
7. is managed under a comprehensive management plan back to remnant vegetation (a category B area on the Regulated Vegetation Management Map) within a period of 20 years; and
8. is shown as a category A area on the Regulated Vegetation Management Map until the area becomes remnant vegetation and is mapped as a category B area on the Regulated Vegetation Management Map.



For information on how to legally secure a Declared Area (Voluntary) visit the 'Development Approvals' webpage at www.qld.gov.au (search 'vegetation management').

Table 1: Requirements and Options for Better Environmental Outcomes		Size
Where the impact area does not include a Restoration Notice, Enforcement Notice or Compliance Notice:		
<p>Option 1:</p> <p>The area to be used as the Better Environmental Outcome contains at least one of the following:</p> <ul style="list-style-type: none"> the same pre-clear regional ecosystem/s as the impact area; <p>OR</p> <ul style="list-style-type: none"> a higher regional ecosystem status (e.g. Endangered or Of Concern) than the values of the impact area. 	Equal to double the impact area, or 1 hectare, whichever is the greater.	
<p>Option 2:</p> <p>The area to be used as the Better Environmental Outcome contains at least one of the following:</p> <ul style="list-style-type: none"> within 50 metres of the defining bank of a watercourse on the Vegetation Management Watercourse and Drainage Feature Map. <p>OR</p> <ul style="list-style-type: none"> within 50 metres of the defining bank of a wetland <p>OR</p> <ul style="list-style-type: none"> on the Vegetation Management Wetland Map. <p>OR</p> <ul style="list-style-type: none"> in a location that creates a corridor between regional ecosystems that are mapped as either a category A area and/or a category B area on the Regulated Vegetation Management Map, which are each at least 4 hectares in size. <p>OR</p> <ul style="list-style-type: none"> an area that adjoins either an area mapped as a category A area and/or a category B area on the Regulated Vegetation Management Map which is at least 4 hectares in size. <p>OR</p> <ul style="list-style-type: none"> Another area of environmental significance to flora or fauna under other State or Commonwealth legislation. 	Equal to four times the impact area, or 1 hectare, whichever is the greater.	
Where the impact area includes a Restoration Notice, Enforcement Notice or Compliance Notice:		
<p>The area to be used as the Better Environmental Outcome contains all of the following:</p> <ul style="list-style-type: none"> an area that is the same broad vegetation group and regional ecosystem status as the impact area. where the impact area is associated with a watercourse or wetland, associated with a watercourse or wetland. an area that is of suitable quality and can achieve a gain in habitat quality sufficient to compensate the impact area as assessed in accordance with the Guide to determining terrestrial habitat quality, Methods for assessing habitat quality under the Queensland Environmental Offsets Policy, 1.3 February 2020. 	Equal to four times the impact area, or 1 hectare, whichever is the greater.	

Addressing Performance Outcomes (POs)

There are no acceptable outcomes prescribed for the PO1 and PO2. The application will need to address each PO directly. The application should include all of the following:

1. Identify the location and extent of the development footprint including all areas of clearing to be assessed under the development application.

- Determine if the development or clearing footprint for the proposed development is a Particular Regulated Area or an area subject to a Notice Requiring Compliance.



Category A areas on the Regulated Vegetation Management Map or a PMAV may be indicative of some Particular Regulated Areas or some Notices Requiring Compliance.

- Obtain details of any relevant Particular Regulated Areas and / or Notices Requiring Compliance.



For information on any notice on title you can undertake a current title search. Title searches can be purchased by contacting Titles Queensland online at www.titlesqld.com.au or by calling (07) 3497 4379.

*To confirm if any Particular Regulated Areas or Notices Requiring Compliance apply to a lot call the Department of Resources, Veg Hub on **135 VEG (135 834)**.*

- Establish whether the proposed development is consistent with Notice Requiring Compliance and / or consistent with the vegetation management requirements for the Particular Regulated Area. That is, will the requirements for any Notice Requiring Compliance and / or vegetation management requirements for any Particular Regulated Area still be met / achieved notwithstanding the proposed development?
- If the proposed development and clearing is not consistent with all relevant Notices Requiring Compliance and all vegetation management requirements for Particular Regulated Areas, the application needs to demonstrate how a Better Environmental Outcome can be achieved to meet the PO. Where a Better Environmental Outcome is required, the application must provide details of the Better Environmental Outcome proposed (that complies with the requirements and criteria in the code and this guide), and to demonstrate how the Better Environmental Outcome will be managed and achieved under a Better Environmental Outcome Management Plan. The Better Environmental Outcome Management Plan should include, but not be limited to, all of the following:
 - Property owner's details.
 - Description of the area/s the subject of the Better Environmental Outcome, including a map showing the location and extent.
 - Description of the works / management actions that will be undertaken, including the methods, timing, frequency, intended benefits etc.
 - The environmental values (identified as POs in the code) that will be protected / achieved.
 - The management outcomes proposed to protect / achieve the environmental values.
 - The works / management actions proposed to achieve the management outcomes. This should include detail on where, how and when the works / management actions will be undertaken.
 - Details demonstrating how the works / management actions will not increase land degradation.
 - Details of who is responsible for all works / management actions, and the estimated length of time the area/s will be managed.
 - Monitoring and auditing processes including adaptive management approaches to rectify any negative results from the monitoring and auditing processes.

- j. Record keeping process to retain appropriate records for the progress and effectiveness of all works / management actions, and monitoring and auditing processes. These records are not required to be submitted, however they must be made available to the Department of Resources upon request.

The level of detail required in a management plan will depend on the nature and scale of the activity being undertaken.

Information resources to assist in assessment

The following resources may be appropriate:

- Regulated Vegetation Management Map and any PMAV that applies to the area the subject of the development and clearing footprint (in particular, any category A areas). For more information on mapping, refer to the earlier section in this guide titled “Vegetation Management mapping”.
- Undertake a current title search: Title searches can be purchased by contacting Titles Queensland online at www.titlesqld.com.au or by calling (07) 3497 4379.

Need more help?

- Seeking pre-lodgement advice with the SARA before lodging a development application is strongly recommended. This will identify any potential issues or additional information requirements.



For more detailed information about the role of SARA and seeking pre-lodgement advice, visit <https://planning.statedevelopment.qld.gov.au/planning-framework/state-assessment-and-referral-agency>

- For assistance with vegetation management queries, including assistance with obtaining accessing information, please contact the Veg Hub on phone 135 VEG (135 834) or email vegetation@resources.qld.gov.au

Appendix 15: Measuring tree height and measuring slope

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.

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 6).

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.

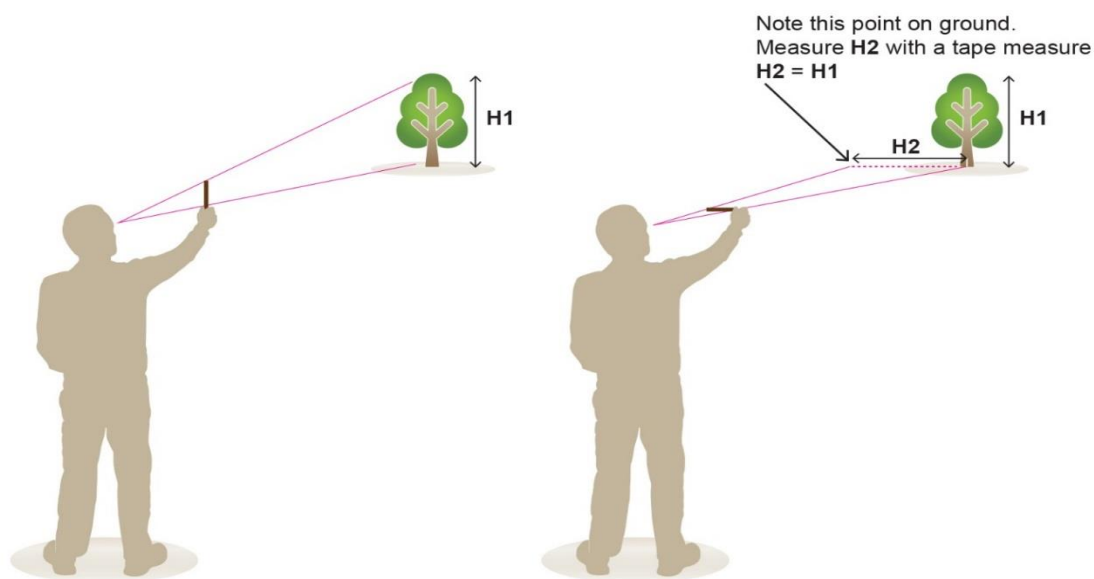


Figure 6: The pencil method

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. Refer to Figure 7.

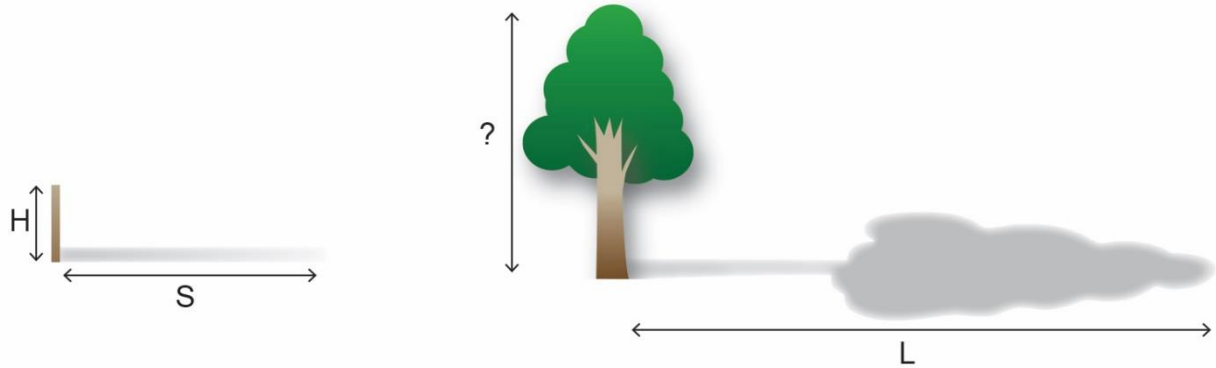


Figure 7: Stick and shadow method

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 (refer to Figure 8).

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.)

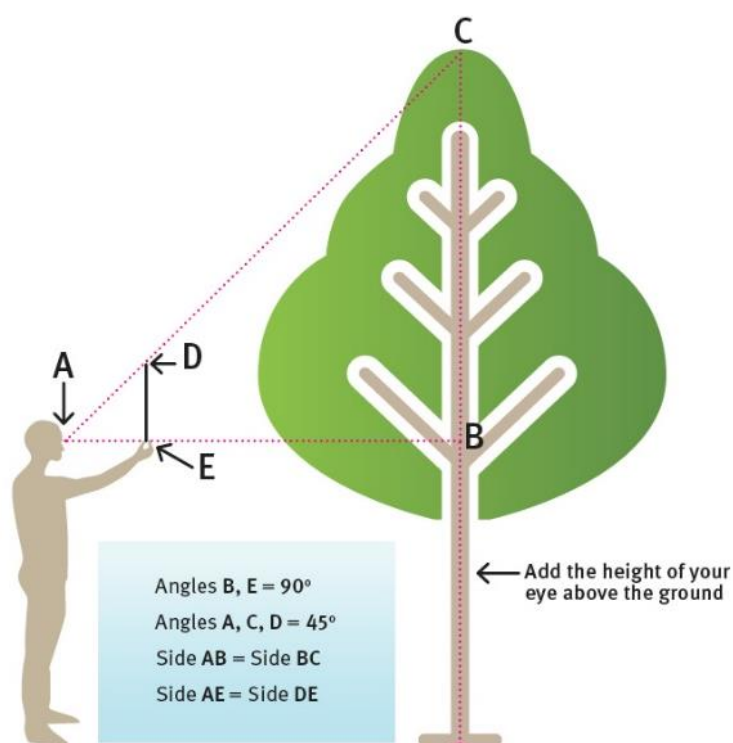


Figure 8: Diagrammatic representation of stick method 2

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.

Smartphone apps

Various smartphone 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.

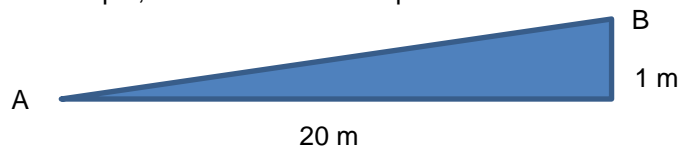
Measuring slope

Definition

For the purposes of the code, 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 9: Surveyor's level

Homemade clinometer

You can also make your own clinometer using a large protractor with a hole drilled (as shown in Figure 10), 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:

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

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 the 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.

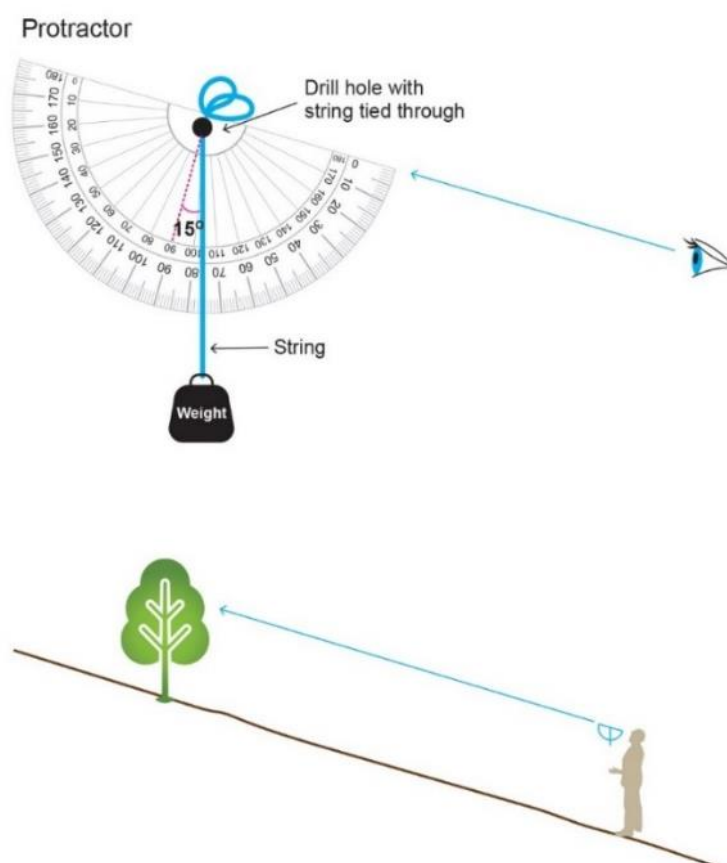


Figure 10: Home-made clinometer and its use in the field

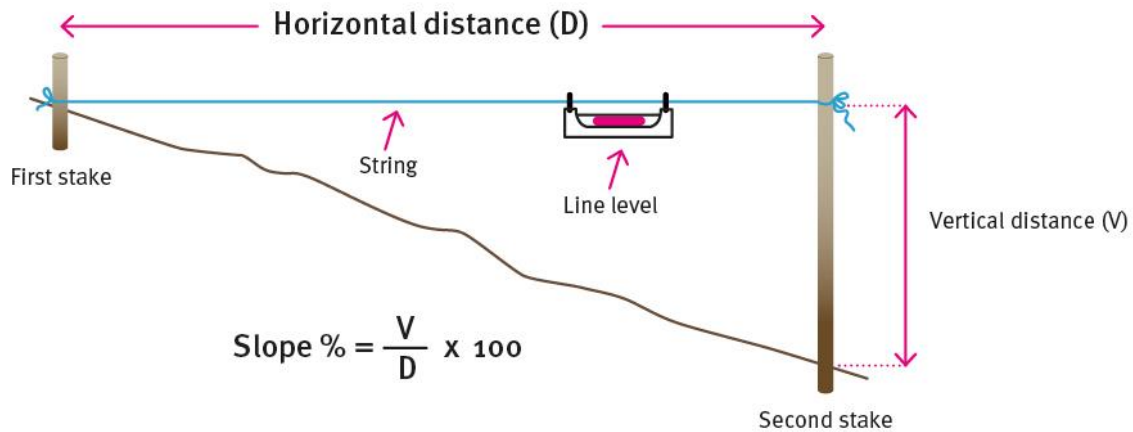


Figure 11: Using a line level to measure slope

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 11.

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.

Smartphone apps

Various smartphone 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.