



Allowable activities - Environmental Protection Works Ecological Thinning on Rural Regulated Land

This guideline has been developed for landholders considering the removal of native vegetation for ecological thinning activities under the Environmental Protection Works Allowable Activity on Rural Regulated Land¹. The Environmental Protection Works Allowable Activity allows for works associated with the rehabilitation of land towards its natural state or any work to protect land from environmental degradation and includes re-vegetation or bush regeneration works, wetland protection works, erosion protection works and dune restoration works². This includes ecological thinning activities that meet the intent of this guideline.

Allowable Activities cover a range of routine land management activities associated with agriculture and other common practices in rural areas and do not require approval under the *Local Land Services Act 2013*. Clearing for an allowable activity must be carried out by the landholder or on the landholder's behalf to the minimum extent necessary.

Ecological thinning is the selective removal of individual trees or shrubs to improve the biodiversity and ecological function of vegetation communities. It has been identified as a potential management activity that may be considered under certain circumstances in specific ecosystems. It may be suitable to address land rehabilitation or management issues relating to environmental degradation due to dense regeneration.

Ecological thinning under the Environmental Protection Works Allowable Activity is not suitable for all sites or circumstances. Specific criteria must be met for works to constitute Environmental Protection Works.

Where is the use of the Environmental Protection Works Allowable Activity not permitted?

- the primary outcome is for production purposes
- the intent is to change the use of the land, for example, from grazing to cropping
- the intent is not for rehabilitation purposes towards its natural state or to protect the land from environmental degradation
- the clearing method does not meet the principles of ecological thinning as outlined in this guideline

- for bushfire hazard reduction purposes
- the management actions do not result in the minimisation of erosion risk to soil and groundcover (e.g. cultivation activities, mechanical removal, paddock scale spraying, etc)
- where there are impacts to adjacent native species from the clearing method
- thinning for private native forestry, and/or any commercial harvesting.

For thinning native vegetation (or other land management activities) on Rural Regulated Land that does not meet the intent of the Environmental Protection Works Allowable Activity, landholders may be required to apply for approval under the *Local Land Services Act 2013*. Other alternative approval pathways include thinning under the Land Management (Native Vegetation) Code 2018 (Part 2) or approval from the Native Vegetation Panel for thinning activities on Category 2 Sensitive Regulated Land.

Local Land Services staff can assist with guidance on best practice ecological thinning activities on your property. Your nearest Local Land Services office can be found at www.lls.nsw.gov.au and ask for a Land Management Officer.

¹ The Environmental Protection Works Allowable Activity (Ecological Thinning) does not apply on RU5 zoned land.

² Clearing under this allowable activity does not extend to coastal protection works as defined by the Coastal Protection Act 1979.

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Photo 1 - *Allocasuarina luehmannii* (Buloke) - Area subject to previous and further thinning activities (source LLS).

Regulatory context under the *Local Land Services Act 2013*

The Environmental Protection Works Allowable Activity applies to Rural Regulated Land under the *Local Land Services Act 2013*. For further details, refer to Appendix 1.

Why could ecological thinning be useful?

Land management practices such as land clearing and grazing and changes to fire and flood regimes have changed the structural condition of our woodlands and forests. This change has created the requirement for more adaptive management models like ecological thinning to assist in the control of dense tree and shrub regeneration, which may have otherwise remained naturally dense due to the absence of disturbance from fire and flood events.

Although 'recruitment' events of woody vegetation are a natural response to disturbance, dense regrowth over large areas can have negative impacts on vegetation structure and habitat for wildlife.

At the site scale, large areas of dense woody regrowth can simply reduce the variety of habitats available to wildlife (BCT 2020)³.

While areas of dense regrowth will naturally thin over time, the timeframe can be very long (decades or centuries). Ecological thinning aims to speed up natural stand development processes to restore greater structural diversity of habitat types in the landscape (BCT 2020).



Photo 2- Dense woody regrowth in a *Eucalyptus blakelyi* and *E. melliodora* open woodland (source LLS).

Principles of Ecological Thinning

- Ecological thinning is designed to achieve a patchy mosaic of stand structures with different tree and shrub densities, species and ages across the ecological thinning area
- Retain all large (>25cm Diameter at Breast Height (DBH)) and significant habitat trees
- Significant habitat trees have any of the following characteristics:
 - the largest age-class trees in the patch
 - standing dead trees, or dying trees
 - contain tree hollows
 - contain mistletoe
 - signs of current or recent occupation by native animals (e.g. stick nests of birds)⁴
- Thinning should not automatically remove all trees below a size class. Some young and maturing trees should be retained to replace older trees over time
- Thinning should not occur during large flowering events
- Only thin those species displaying dense regrowth
- Thinning should not focus on the removal of all of a single species from the ecological thinning area as this could change the structure and composition of a vegetation community. Some of the target species (including various size classes of the species) are to remain within the ecological thinning area
- Retain some felled timber on-site to provide ground habitat
- Manage any temporary negative impacts of ecological thinning such as weed responses following treatment and soil erosion risks.

What should be thinned under the Environmental Protection Works Allowable Activity?

The Environmental Protection Works Allowable Activity supports landholders undertaking works associated with the rehabilitation of land towards its natural state or any work to protect land from environmental degradation on rural land.

This Ecological Thinning Guideline does not restrict thinning activities beyond what is outlined below – i.e. appropriate vegetation types, method, stem retention figures and suggested planning approaches. Instead, this guideline provides best management practice advice to landholders undertaking rehabilitation thinning works under the Environmental Protection Works Allowable Activity.

³ Biodiversity Conservation Trust Guidelines for Ecological Thinning for BCT Agreements (2020). Biodiversity Conservation Trust

⁴ Refer to Department of Planning, Industry and Environment (DPIE) website for further information (www.environment.nsw.gov.au)

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The vegetation formation types where ecological thinning may be appropriate are shown in Table 1 below. These vegetation types seek to align with other parts of the Land Management Framework settings under the *Local Land Services Act 2013*. If you are unsure what vegetation formation applies to you, contact your Local Land Services office for advice.

Table 1: Vegetation formations⁵ where the Environmental Protection Works Allowable Activity can be applied on Rural Regulated Land.

Vegetation Formation	Coastal/ Central/ Western Allowable Activity Zones in NSW
Arid Shrubland (Acacia sub-formation)	✓
Dry Sclerophyll Forests	✓
Grassy Woodlands	✓
Semi-arid Woodlands	✓
Wet Sclerophyll Forests (grassy and shrubby sub-formations)	✓
Forested Wetlands	X
Alpine Complex	X
Arid Shrublands (Chenopod sub-formation)	X
Freshwater Wetlands	X
Grasslands	X
Heathlands	X
Rainforest	X
Saline Wetlands	X

✓ Environmental Protection Works (Ecological Thinning) on Rural Regulated Land is appropriate

X Environmental Protection Works (Ecological Thinning) on Rural Regulated Land is not appropriate

How much can be thinned?

To meet the Environmental Protection Works Allowable Activity requirements, ecological thinning can be undertaken if it is to the minimum extent necessary, which should include the following considerations:

- No single species is to be removed entirely from the ecological thinning area
- Trees and shrubs should be thinned to no less than the minimum density of stems per hectare outlined for the specified vegetation formation in Table 2

- The area over which thinning takes place should be over no more than 80% of each ecological thinning area to maintain a mosaic of vegetation densities for habitat purposes
- No removal of large and significant habitat trees
- Trees and shrubs that equal or are above the thinning stem diameters in Table 3 should not be removed
- Trees or shrubs being cleared are not threatened species, which if present are kept as part of retained vegetation⁶
- Ensure that, as far as reasonably possible, stems retained within the ecological thinning area include a range of age and size classes
- Should not result in the introduction of non-native persistent exotic vegetation
- Some woody debris from ecological thinning should remain, evenly spread on-site unless there is a legitimate reason for its removal. This retains nutrients and soil structure, prevents erosion, promotes groundcover regeneration and creates habitat
- The numbers of stems retained for each stem diameter class (Table 2) are retained at that density on each one hectare of the treatment area
- Retained trees and shrubs in the ecological thinning area are, at least 2 meters in height and evenly spaced in the treatment area
- Incidental damage of non-target plants should be minimised
- Thinning should not result in retained stems forming any type of narrow or linear configuration (i.e. strip or alley thinning)
- Thinning should not result in the clearing of a structural layer of vegetation (i.e. underscrubbing to remove the shrub layer).



Photo 3 - White Cypress Pine prior to treatment (LLS 2020).

⁵ Refer to Appendix 3 – Keith Vegetation Formations for a description of each vegetation formation.

⁶ To identify threatened species that might occur in your local area refer to the Department of Planning, Industry and Environment (Energy, Environment and Science) Website (www.environment.nsw.gov.au) to undertake searches of potential records or contact Local Land Services for advice on threatened species in your local area.

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Table 2 – Suggested minimum required stem densities for each vegetation formation.

Vegetation Formation	Minimum stem retention requirement for the Vegetation Formation	Approximate spacing between retained stems
Arid Shrubland (Acacia sub-formation)	150 stems per hectare	8.2 metres
Dry Sclerophyll Forests	300 stems per hectare	5.8 metres
Grassy Woodlands	230 stems per hectare	6.6 metres
Semi-arid Woodlands	150 stems per hectare	8.2 metres
Wet Sclerophyll Forest (Grassy and shrubby sub-formations)	300 stems per hectare	5.8 metres

Table 3 - Thinning stem diameters (DBH) in all Allowable Activity zone areas is restricted by genus.

Thinning Genera - Genus ⁷	Maximum Diameter(cm) at Breast Height (DBH) that may be thinned
<i>Eucalyptus</i>	25
<i>Corymbia</i>	25
<i>Angophora</i>	25
<i>Melaleuca</i>	15
<i>Casuarina</i>	15
<i>Allocasuarina/Casuarina</i>	15
<i>Callitris</i>	15
<i>Acacia</i>	15
Other genera	15



Photo 4 - Brushcutter removal of small White Cypress Pine (North-west NSW) (source LLS).

⁷ Excludes threatened species – undertaking in depth record keeping and site-based assessment to ensure that the appropriate vegetation is being selected for thinning.

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How do I plan for Environmental Protection Works?

Every time you carry out works under the Environmental Protection Works Allowable Activity it is highly recommended that you have a plan of works. Local Land Services recommends that you plan ahead and retain relevant approvals and documentation when using the Environmental Protection Works Allowable Activity provisions. If you are unsure, contact your Local Land Services Office for advice.

Clearing on Rural Regulated Land – Category 2 Sensitive Regulated Land

The Environmental Protection Works Allowable Activity is permitted on Category 2 Sensitive Regulated Land under the *Local Land Services Act 2013*. These are areas that have been mapped for their sensitive biodiversity values such as critically endangered ecological communities. When planning your works consider how the proposed works may impact on these values and if other approvals are required (refer to Table 4 which contains a list of other approvals that may be necessary before ecological thinning being undertaken).

You are responsible for ensuring all approvals are obtained and records are maintained. Local Land Services can assist in providing access to resources and advice to help you develop a work plan for your ecological thinning proposal.

Recommendations for an Environmental Protection Works Allowable Activity (Ecological Thinning) Plan

Plan of Works

Seek best-practice management advice for ecological thinning and develop an ecological thinning management plan specific to your circumstances. Choose management options that are the best fit for your property and situation. There will be situations where the allowable activity pathway is not appropriate and your proposed treatment activities cannot be undertaken under this option. Other approval options may be applicable under the Land Management Code or Division 6 of the *Local Land Services Act 2013* instead. If you are unsure if your proposed activity meets the intent of the Environmental Protection Works Allowable Activity, please contact Local Land Services for advice.

It is recommended that the following are considered when planning your ecological thinning activities under the Environmental Protection Works Allowable Activity:

Define your goals - What do you want to achieve by undertaking ecological thinning activities? For example – activities that complement conserving sensitive environmental areas of your property, encourage more

wildlife, and/or restore the vegetation to its original condition.

Correct identification - Be careful that you have correctly identified the Vegetation Formation and Vegetation Genus before thinning it. Take photos. If unsure, you can contact your nearest Local Land Services office. See Appendix 3 for more detailed Vegetation Formation descriptions.

Implementation schedule - Over what period do you plan to undertake ecological thinning activities? Time activities for when they will be most effective or to manage seasonal conditions. Where possible, plan actions for when native flora and fauna will be least impacted - e.g. outside of plants' active growing season (generally spring and early summer).

Area of works map - Map the location of the area to be thinned, the location of native species/ ecological communities and/or areas that are to have certain control methods or constraints.

Methods - Control methods can include hand removal of seedlings, manual removal and chemical control. Required management method(s) should not result in >5% soil and groundcover disturbance or result in the long-term decline in the structure and composition of native groundcover.

Monitoring - Keeping records of the outcomes of control works is recommended (when, where, how, species thinned). For example, photo points can be used for regular monitoring and are an easy way to keep a long-term record. Mark photo points with something permanent and easily identifiable, such as a stake with yellow cap, whilst considering possible animal injury circumstances. Monitor and record the response of the vegetation and any maintenance undertaken. For example, there may be some regrowth of thinned species, other native species may start regenerating or weed species may establish in the thinned area.

Ongoing management - The results of monitoring can be used as a basis for continual improvement. The site can be monitored for results of ecological thinning and the management plan adapted accordingly if the response isn't meeting the thinning objectives. For example, in some cases, a second application of thinning may be required depending on the regenerative response of the thinned vegetation. Adaptive management options can be discussed with Local Land Services staff or other experienced professionals.

Other approvals

Removal of native vegetation using the Environmental Protection Works Allowable Activity does not require approval under the *Local Land Services Act 2013*. However, other approvals may be required from other organisations such as the Australian Government, NSW Office of Water and/or your local council. Refer to the approvals factsheet on the Local Land Services website for further information and contact details. See Table 4 for other suggested legislation to consider when determining if other approvals are required before undertaking thinning activities.

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Table 4 – Other suggested legislation to consider when determining if other approvals are required

Environmental Planning and Assessment Act 1979	Planning considerations under Local Environmental Plans (LEP's). Contact your local Council for advice.
State Environmental Planning Policy (Coastal Management) 2018	Approval for removing native vegetation for example in mapped coastal wetlands and littoral rainforest areas under the SEPP may require planning approval.
Biodiversity Conservation Act 2016	Thinning in accordance with the Allowable Activity is a defence to a prosecution for an offence under the <i>Biodiversity Conservation Act 2016</i> . If your activities are outside the requirements of the Allowable Activity and you don't have other necessary approvals under the <i>Local Land Services Act 2013</i> you may require a biodiversity conservation licence or risk being subject to compliance interest under the <i>Biodiversity Conservation Act 2016</i> .
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Are threatened species, populations or ecological communities listed under Commonwealth legislation likely to be present in the treatment area? Refer to the Agricultural Development and the EPBCA Factsheet and relevant contact details.
National Parks And Wildlife Act 1974	Are there known or potential Aboriginal values, sites, objects or places in the treatment area that may be impacted by ecological thinning activities?
Pesticides Regulation 2017	Commercial pesticide users (farmers and contractors) must keep records of their pesticide use e.g. must have AQF3 for application of chemicals
Water Management Act 2000	If ecological thinning is proposed in watercourses LLS recommends that landowners first get approval for a Controlled Activity (if that approval is required)
Agricultural and Veterinary Chemicals Code Act 1994	Compliance with the Code is required if landholders work with agricultural or veterinary chemical products.
Crown Land Management Act 2016	Approval may be required by Crown Lands as part of a landholder's Western Lands lease agreement.

Set-aside and Conservation Agreements

If the landholding is subject to set-aside, biodiversity offset or conservation agreement conditions, landholders should check to confirm with the relevant Government Agency if there are any specific ecological thinning requirements, as they may differ from the general information in this guideline.

Example Case Studies – Ecological Thinning

Case Studies where the Environmental Protection Works Allowable Activity is applicable

Case Study 1 – Sifton Bush - Invasive Native Species in a Critically Endangered Ecological Community (CEEC)

Approximately 3ha of *Cassinia arcuata* (Sifton Bush) has regenerated thickly in an area that has been previously grazed by stock. The Sifton Bush is acting as an invasive native species or regenerating thickly and is in an area assessed by Local Land Services as a viable Box Gum Grassy Woodland (a Critically Endangered Ecological Community). The landholder is no longer grazing the area but would like to manage the Sifton Bush to improve the overall condition of the bushland area. The landholder has identified that the most effective control measure is to use a chemical

treatment on individual stems. As the landholder's intentions are consistent with the Environmental Protection Works Allowable Activity (Ecological Thinning) on Regulated Rural Land, the landholder can use this allowable activity to manage the Sifton Bush.

Case Studies where the Environmental Protection Works Allowable Activity is not applicable

Case Study 2 – White Cypress Pine Regrowth in a Critically Endangered Ecological Community (CEEC)

Approximately 1ha of *Callitris glaucophylla* (White Cypress Pine) has regenerated thickly in an area that has been previously grazed by sheep. The White Cypress Pine regrowth is all the same size and age and has now 'locked up'. The White Cypress Pine is in an area assessed by Local Land Services as a viable Box Gum Grassy Woodland (a Critically Endangered Ecological Community), and hence mapped as Category 2 – Sensitive Regulated Land.

The landholder would like to manage the area by clearing (using machinery) all the White Cypress Pine that is 'locked up' as it is impacting on the amount of native pasture available and reducing productivity of the area. The larger trees will not be cleared.

As the landholder's intent is for production purposes

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only and they are using machinery to clear the regrowth, the Environmental Protection Works Allowable Activity (Ecological Thinning) is not applicable in this instance. The landholder would have to consider whether this is an appropriate method on other parts of their property that are not mapped as Category 2 – Sensitive Regulated Land.

Case Study 3 – Wattle Regeneration in Category 2 – Regulated Rural Land

Approximately 10ha of *Acacia* species is regenerating thickly due to a previous bushfire on an area of as Category

2 – Regulated Rural Land. The landholder would like to thin out the *Acacia* species to improve the native pasture and productivity in this area. The landholder has identified that the most effective control measure is to use a chemical treatment on individual stems. As the landholder's intent is for production purposes the Environmental Protection Works Allowable Activity (Ecological Thinning) is not applicable in this instance. The landholder would have to consider other treatment options available under the *Local Land Services Act 2013* including Part 3 of the Land Management Code (Native Vegetation) 2018.



Photo 5 - Area that has been subject to ecological thinning NSW North Coast (source LLS).

Definitions

In this guide, terms have the same meaning as in the *Local Land Services Act 2013*, Land Management (Native Vegetation) Code 2018, and the Local Land Services Regulation 2014 unless otherwise defined below.

Diameter at breast height (DBH) means the diameter over the bark of the stem at 1.3 metres above the ground. If there are multiple stems on a tree the diameter is measured on the largest stem.

Groundcover means any type of herbaceous vegetation

Herbaceous vegetation means plant or plant types that are non woody; herb like

Keith Vegetation Formation – A general NSW based classification of the type of vegetation structure against which the thinning benchmarks are applied. Vegetation Formations are further classified into Vegetation Classes within the NSW Bionet Vegetation Classification.

Land degradation means temporary or permanent decline in the productive capacity of land and ecosystem services caused by its improper use or poor management.

Minimisation of soil erosion risk means no greater than 5% of the soil surface and existing groundcover is disturbed (total area) as a result of the clearing.

Native vegetation means any of the following types of plants

native to New South Wales—

- a. trees (including any sapling or shrub or any scrub),
 - b. understorey plants,
 - c. groundcover (being any type of herbaceous vegetation),
 - d. plants occurring in a wetland.
2. A plant is native to New South Wales if it was established in New South Wales before European settlement. The regulations may authorise conclusive presumptions to be made of the species of plants native to New South Wales by adopting any relevant classification in an official database of plants that is publicly accessible.
 3. Native vegetation extends to a plant that is dead or that is not native to New South Wales if—
 - a. the plant is situated on land that is shown on the native vegetation regulatory map as Category 2 - Vulnerable Regulated Land, and
 - b. it would be native vegetation for the purposes of this Part if it were native to New South Wales.
 4. Native vegetation does not extend to marine vegetation (being mangroves, seagrasses or any other species of plant that at any time in its life cycle must inhabit water other than fresh water). A declaration under section 14.7 of the [Biodiversity Conservation Act 2016](#) that specified vegetation is or is not marine vegetation also has effect

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for the purposes of this Part.

Private Native Forestry means the management of native vegetation on privately owned land or Crown land that is not Crown-timber land within the meaning of the *Forestry Act 2012* for the purpose of obtaining, on a sustainable basis, timber products (including sawlogs, veneer logs, poles, girders, piles and pulp logs).

Stem density or densities means the number of individual plants per hectare.

Soil disturbance means the turning, digging or disrupting of the soil surface, usually by an implement or machinery or by pushing or pulling of trees and shrubs.

Information sources

- Allowable Activities – Environmental Protection Works Factsheet on the Local Land Services website (www.lls.nsw.gov.au)
- NSW Bionet Atlas – www.bionet.nsw.gov.au
- Threatened Species data - www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species
- Land Management Framework – What other approvals may be required Factsheet on the Local Land Services website (www.lls.nsw.gov.au)
- Native Vegetation Regulatory Map - Native Vegetation Regulatory Map
- Local Land Services Website - www.lls.nsw.gov.au
- Local Land Services Act 2013 www.legislation.nsw.gov.au/#/view/act/2013/51
- Local Land Services Regulation 2014: www.legislation.nsw.gov.au/#/view/regulation/2014/1
- Native Vegetation Panel (Division 6) – www.nvp.nsw.gov.au or info@nvp.nsw.gov.au

Local Land Services staff can assist with guidance on best practice ecological thinning activities on your property. Your nearest Local Land Services office can be found at www.lls.nsw.gov.au and ask for a Land Management Officer.

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Appendix 1 - Regulatory context under the *Local Land Services Act 2013*

Rural Zoned Land

Category 1 – Exempt Land

Native vegetation can be removed without approval on Category 1 – Exempt Land under the *Local Land Services Act 2013*. Landholders need to be aware that other legislation may be still relevant and further approvals may be required.

Category 2 – Regulated Land

Clearing of native vegetation is permitted on Category 2 – Regulated Land where it is consistent with the Land Management (Native Vegetation) Code 2018. A broad suite of allowable activities are permitted on Category 2 – Regulated Land, including undertaking works in accordance with the Environmental Protection Works Allowable Activity.

Category 2 – Vulnerable Regulated Land

Category 2 – Vulnerable Regulated Land mainly relates to watercourses and steep land. Clearing of native vegetation is permitted on Category 2 – Vulnerable Regulated Land where it is consistent with the Land Management (Native Vegetation) Code 2018. A limited suite of allowable activities are permitted on Category 2 – Vulnerable Regulated Land, including undertaking works in accordance with the Environmental Protection Works Allowable Activity.

Category 2 – Sensitive Regulated Land

Clearing under the Land Management (Native Vegetation) Code 2018 is not permitted on Category 2 – Sensitive Regulated Land. A limited range of allowable activities are permitted on Category 2 – Sensitive Regulated Land, including undertaking works in accordance with the Environmental Protection Works Allowable Activity. Additional mapping advisory or provisional layers may indicate the likely presence of particular biodiversity values. If you plan to undertake land management code activities within these areas, please contact Local Land Services who can assist in confirming that the values are present through an onsite check.

For thinning activities that do not meet the criteria of the Environmental Protection Works Allowable Activity Guideline (Ecological Thinning) on Regulated Rural Land, landholders may be required to apply for approval under the *Local Land Services Act 2013*.

Refer to the [Native Vegetation Regulatory Map](#) to determine Category 2 – Sensitive Regulated Land and Category 2 – Vulnerable Regulated Land under the *Local Land Services Act 2013* or contact Local Land Services for further guidance on the categorisation of rural land.

Non-rural Land

The *Local Land Services Act 2013* and this guideline do not apply to non-rural zoned land or land to which Part 5 A of the Local Land Services Act does not apply. This is displayed as “excluded” land on the Native Vegetation Regulatory map. For clearing native vegetation on non-rural zoned land, contact your local council for advice.

Refer to Figure 1 to assist with identifying when the Environmental Protection Works Allowable Activity Guideline (Ecological Thinning) on Regulated Rural Land can be used.

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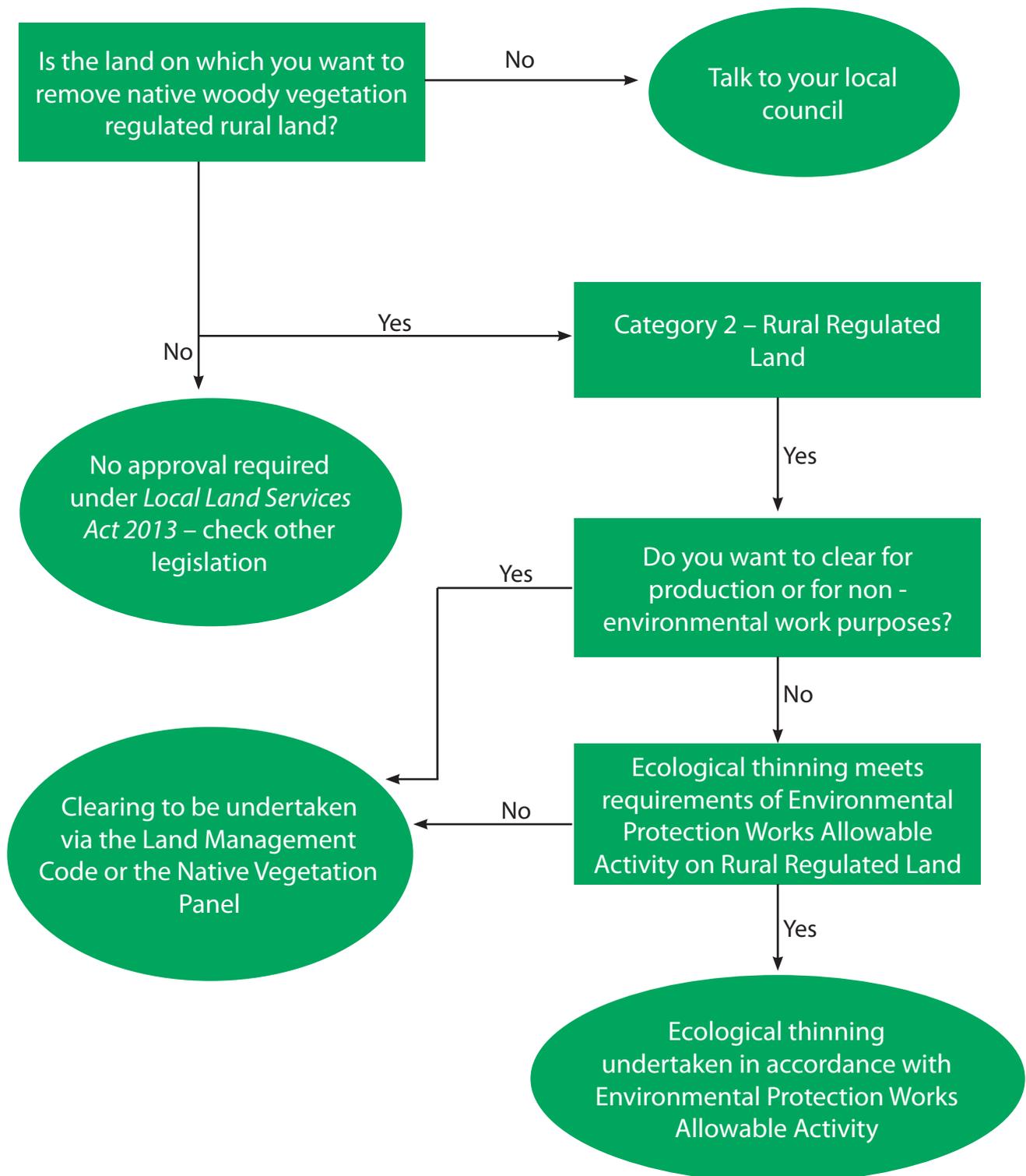


Figure 1 – Regulatory pathways for clearing native woody vegetation on Category 2 Regulated Rural Land under the *Local Land Services Act 2013*.

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Appendix 2 – Determining stems to be retained

To use the Environmental Protection Works Allowable Activity Guideline (Ecological Thinning) on Regulated Rural Land, the number of stems per hectare must exceed the minimum retention stem requirement of relevant to the vegetation formation in Table 2.

The recommended method for determining the on-site stem density per hectare is to select a plot and count the number of stems in that plot. This method is outlined below.

The plot sampling method

The observed stem density on-site can be determined as follows:

1. Mark out a 0.1 hectare plot (i.e. 50 x 20 metres) within the vegetation to be thinned.
2. Count all stems within the plot.
3. Multiply this counted value by 10 to give an average observed stem density per hectare.
4. Compare the observed stem density value and 75 per cent of benchmark stem density value for the relevant vegetation formation. If the observed stem density is greater, thinning may occur.

This process should be repeated several times in the area to be thinned to gain a more accurate assessment.

Note: If the target vegetation is very thick and numerous stems need to be counted per plot, it may be easier to effectively work backwards using this method. Begin with the 75 per cent of benchmark stem density value per hectare (for the relevant vegetation formation) and divide it by 10 to give you the minimum number of stems required (to be retained) for the 0.1 hectare test plot. Then, only the minimum number of stems needs to be counted to determine whether thinning may occur (i.e. the observed stem density value is greater).

The recommended practice is to mark the trees or woody shrubs that are to be retained (i.e. using flagging tape, spray paint). The next step is to remove all the remaining, non-marked stems per hectare. The alternative would be to reverse this process and mark only the trees to be removed, if this provided an easier process.

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Appendix 3 - Checklist – What do you need?

The checklist should be used to ensure you consider all the relevant factors when using the Environment Protection Works Allowable Activity (Ecological Thinning) on regulated rural land. It is recommended you keep the completed checklist on file with any other records relevant to the assessment. It is also very useful to keep photos of the clearing area taken before and after the clearing.

Checklist	Yes/No
Suitable vegetation	
The area contains vegetation in a suitable Keith Vegetation Formation (refer to Appendix 4).	
What should not be thinned?	
The area does not contain vegetation in a suitable Keith Vegetation Formation (refer to Table 1 and Appendix 4). If the vegetation is already at benchmark (refer to Table 2), the vegetation should not be thinned.	
The vegetation does NOT include threatened plant species (refer to the DPIE website (www.environment.nsw.gov.au) to undertake relevant searches for your property or local area or contact your Local Land Service office for advice).	
Ecological values identified under the “Principles of Ecological Thinning” section of the guideline (e.g. large and significant habitat trees)	
All of the target species to be thinned (some of the species and of different sizes must be retained)	
How much can be thinned?	
The stems to be retained have been identified and include the largest stems.	
Stems retained to the minimum required for the relevant vegetation formation.	
The retained stems will be approximately evenly spaced.	
No more than 80% of each ecological thinning area should be thinned.	
General conditions	
Clearing is to rehabilitate land towards its natural state or to protect it from environmental degradation.	
Clearing is not for productivity purposes, bushfire hazard reduction or result in a change of land use from grazing to cropping.	
Undertaking the ecological thinning using the correct method to target individual stem removal only.	
Ecological Thinning will not be undertaken for the purposes of private native forestry.	
Ecological Thinning will only be undertaken by clearing individual trees and woody shrubs.	
Ecological Thinning will result in nil disturbance to soil and groundcover.	
Incidental damage of non-target plants will be minimised.	
Cut stems or debris will NOT be stacked around or against retained mature trees or woody shrubs All woody debris from ecological thinning should remain, evenly spread on site unless there is a legitimate reason for its removal.	
Other approvals	
I have all the other approvals I need	
Notes	

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Appendix 4 – Keith Vegetation Formations⁸⁹

Alpine Complex – not suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Trees are absent or present only as scattered emergent individuals. Vegetation is dominated by plants that tolerate prolonged seasonal burial in snow. The Alpine Complex vegetation formation is restricted to the alpine zone of the southern tableland, above 1600-1800 metres elevation.

Arid Shrublands (Acacia sub-formation) - suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Vegetation dominated by drought-tolerant shrubs, predominantly Acacias (i.e. Wattles) in this sub-formation, and other hard-leaved (sclerophyllous) shrubs up to 5 m tall. Some perennial herbs and abundant ephemeral (i.e. plants with a short life cycle, but with long-lived seed banks that germinate after rain, flooding or fire) grasses and herbs after rain. Widespread on various soils on the western plains where average annual rainfall is less than 500 mm. Vegetation sometimes has abundant hummock grasses (i.e. commonly Spinifex grasses with dome-shaped structures and spreading leaf blades) in the groundcover.

Arid Shrublands (Chenopod sub-formation) - not suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Vegetation dominated by drought-tolerant shrubs, predominantly chenopods (such as saltbushes, bluebushes, copperburrs) up to 1.5 m tall. Some perennial herbs and abundant ephemeral (i.e. plants with a short life cycle, but with long-lived seed banks that germinate after rain, flooding or fire) grasses and herbs after rain. Widespread on various soils on the western plains where average annual rainfall is less than 500 mm. Arid Shrublands usually have perennial tussock grasses but never hummock grasses (such as spinifex grasses with dome-shaped structures and spreading leaf blades) in the groundcover.

Dry Sclerophyll Forests (Shrubby sub-formation) - suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Vegetation dominated by trees, usually occurring as forests or rarely as woodlands (rarely > 35 m tall), with an abundance of hard-leaved (sclerophyllous) shrubs in the understorey, but lacking plants that tolerate inundation or waterlogging. Only rarely dominated by 'box' Eucalypts (bark rough and persistent on trunk and larger branches). Groundcover often sparse and typically dominated by sclerophyllous sedges, but may include reasonably continuous swards of grasses. Confined to the coast, tablelands and the western slopes, where average annual rainfall exceeds 500 mm, largely on infertile sandy or loamy soils. The shrubby sub-formation has understoreys dominated by hard-leaved shrubs but very sparse grass cover.

Dry Sclerophyll Forests (Shrub/grass sub-formation) - suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Vegetation dominated by trees, usually occurring as forests or rarely as woodlands (rarely > 35 m tall), with an abundance of hard-leaved (sclerophyllous) shrubs in the understorey, but lacking plants that tolerate inundation or waterlogging. Only rarely dominated by 'box' Eucalypts (bark rough and persistent on trunk and larger branches). Groundcover often sparse and typically dominated by sclerophyllous sedges, but may include reasonably continuous swards of grasses. Confined to the coast, tablelands and the western slopes, where average annual rainfall exceeds 500 mm, largely on infertile sandy or loamy soils. The shrub/grass sub-formation has understoreys with a more continuous cover of grasses and herbs but a variable cover of hard-leaved shrubs.

Forested Wetlands - not suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Vegetation dominated by trees, usually occurring as forests or woodlands with short to moderately tall trees (rarely > 35 m tall), with an abundance of plant groups in the understorey that are able to tolerate periodic inundation or waterlogging, particularly sedges, rushes or reeds; but lacking in ferns and shrubs with broad, soft leaves. Widespread east and west of the Great Dividing Range, but confined to damp, low-lying parts of the coast, or adjacent to rivers, lakes or swamps in the inland.

⁸ Keith, D.A. (2004) From ocean shores to desert dunes: the vegetation of New South Wales and the ACT (Department of Environment and Conservation NSW: Hurstville).

⁹ A map of Keith Vegetation Formations (version 3) can be found at www.seed.nsw.gov.au or <https://datasets.seed.nsw.gov.au/dataset/vegetation-classes-of-nsw-version-3-03-200m-raster-david-a-keith-and-christopher-csimp0917>

Allowable activities - Environmental Protection Works Ecological Thinning on Rural Regulated Land

Freshwater Wetlands - not suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Trees are absent or present only as scattered emergent individuals. Vegetation is dominated by plants that cannot tolerate prolonged seasonal burial in snow and occur in landscapes below 1800 metres elevation. Freshwater Wetlands are dominated by plants that tolerate periodic inundation or waterlogging with fresh water. Vegetation is dominated by emergent sedges, rushes, reeds, grasses or succulent herbs, or in some cases by submerged or floating aquatic herbs. Soils are deep and often black or dark grey with partly decomposed organic matter. Freshwater Wetlands are restricted to swamps with humic or gleyed soils on the coast, tablelands, western slopes and plains.

Grasslands - not suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Trees are absent or present only as scattered emergent individuals. Vegetation is dominated by plants that cannot tolerate prolonged seasonal burial in snow and occur in landscapes below 1800 metres elevation. Grasslands contain few (if any) plants that tolerate periodic inundation. Vegetation is dominated by perennial tussock grasses and herbs. Shrubs rarely present. Sometimes sedges but never submerged or floating aquatic herbs. Generally found on clay soils on flat to undulating terrain on the coast, tablelands, western slopes and plains.

Grassy Woodlands - suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Vegetation dominated by trees (typically 15-35 m tall), usually occurring as woodlands or rarely forests that lack an abundance of hard-leaved (sclerophyllous) shrubs in the understorey. 'Box' Eucalypts often dominant in the tree layer. Groundcover is continuous and dominated by perennial tussock grasses and interspersed perennial herbs including orchids and lilies, but few ephemeral herbs and grasses. Shrubs generally sparse and typically not including chenopods (i.e. saltbushes, copper burrs etc), or other drought-tolerant species. Widespread on various soils west of the Great Dividing Range, but typically on relatively fertile loams and clay loams on the coastal lowlands, the tablelands and the western slopes, where average annual rainfall exceeds 500 mm.

Heathlands - not suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Trees are absent or present only as scattered emergent individuals. Vegetation is dominated by plants that cannot tolerate prolonged seasonal burial in snow and occur in landscapes below 1800 metres elevation. Heathlands contain few (if any) plants that tolerate periodic inundation. Vegetation is dominated by hard leaved but not drought tolerant shrubs, usually with perennial sedges, herbs and grasses. Perennial tussock grasses are absent or occasional but never dominant. Heathlands are generally restricted to infertile sandy or loamy soils of the coast, tablelands and western plains, where annual rainfall exceeds 800 millimetres per year.

Rainforest - not suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Forests or woodlands not dominated by eucalypts, although these may be present as scattered individuals. Rainforests are dominated by trees with dense canopies touching those of adjacent trees (i.e. a 'closed' canopy), and with horizontally held leaves. Trees and shrubs typically have broad soft leaves. Rainforests primarily occur on the coastal lowlands, islands and escarpments extending to restricted locations on the north-western slopes. Rainforests occur on fertile to moderately fertile soils where average annual rainfall exceeds 1000 millimetres per year. There are limited occurrences in dry rocky gorges of the escarpment and dry hills of the north-western slopes. Rainforest trees are not tolerant to tidal inundation. The understorey is usually open to dense but never non-existent. Vines often occur in the tree canopies or understorey. Understorey typically includes ferns and herbs.

Saline Wetlands - not suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Forests or woodlands not dominated by eucalypts, although these may be present as scattered individuals. Saline wetlands are dominated by trees with dense canopies touching those of adjacent trees (i.e. a 'closed' canopy), and with horizontally held leaves. Trees and shrubs typically have soft leaves. Saline wetlands primarily occur on the coast where average annual rainfall exceeds 1000 millimetres per year. Trees are tolerant of tidal inundation. The understorey is sparse to non-existent. Saline wetlands are restricted to tidal estuaries along the coast.

Semi-arid Woodlands (Grassy sub-formation) - suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Vegetation dominated by trees (typically 15-35 m tall), usually occurring as woodlands or open woodlands (i.e. widely-spaced tree canopies) that lack an abundance of hard-leaved (sclerophyllous) shrubs in the understorey. 'Box' Eucalypts often dominant in the tree layer. Groundcover is sparse to continuous, usually with an abundance of ephemeral herbs and grasses

Allowable activities - Environmental Protection Works Ecological Thinning on Rural Regulated Land

apparent after rain and a variable cover of tussock grasses. Drought-tolerant shrubs prominent in the understorey, and often including chenopods. Widespread on a variety of soils west of the Great Dividing Range, particularly the western plains where average annual rainfall does not exceed 500 mm. The grassy sub-formation is found on floodplains occasionally exposed to inundation is often dominated by eucalypts more than 15 m tall and with an understorey predominantly of grasses and/or chenopod shrubs.

Semi-arid Woodlands (Shrubby sub-formation) - suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Vegetation dominated by trees (typically 15-35 m tall), usually occurring as woodlands or open woodlands (i.e. widely-spaced tree canopies) that lack an abundance of hard-leaved (sclerophyllous) shrubs in the understorey. 'Box' Eucalypts often dominant in the tree layer. Groundcover is sparse to continuous, usually with an abundance of ephemeral herbs and grasses apparent after rain and a variable cover of tussock grasses. Drought-tolerant shrubs prominent in the understorey, and often including chenopods. Widespread on a variety of soils west of the Great Dividing Range, particularly the western plains where average annual rainfall does not exceed 500 mm. The shrubby sub-formation is found on peneplains and hills not exposed to floodwaters, is dominated by eucalypts rarely more than 15 m tall and with open understoreies containing a variety of drought-tolerant shrubs and a variable cover of grasses.

Wet Sclerophyll Forests (Grassy sub-formation) - suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Vegetation dominated by trees (typically >30 m tall), usually occurring as tall forests, forests or woodlands and dominated by straight-trunked Eucalypts. The understorey is dominated by a more continuous cover of grasses and herbs in this sub-formation rather than by shrubs as per the shrubby sub-formation. Largely confined to moderately fertile soils in sheltered locations on the east coast escarpment, where average annual rainfall exceeds 900 mm.

Wet Sclerophyll Forests (Shrubby sub-formation) - not suitable for ecological thinning under the Environmental Protection Works Allowable Activity

Vegetation dominated by trees (typically >30 m tall), usually occurring as tall forests, forests or woodlands and dominated by straight-trunked Eucalypts. The understorey is dominated by soft-leaved shrubs but only sparse grass cover. Largely confined to moderately fertile soils in sheltered locations on the east coast escarpment, where average annual rainfall exceeds 900 mm.