DEPARTMENT OF PLANNING, INDUSTRY & ENVIRONMENT

Field assessment guidelines for Monaro and Werriwa Cool Temperate Grassy Woodland critically endangered ecological communities

environment.nsw.gov.au

Cover photo: Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions. Rob Armstrong/DPIE

Published by:

Environment, Energy and Science
Department of Planning, Industry and Environment
59 Goulburn Street, Sydney NSW 2000
PO Box A290, Sydney South NSW 1232
Phone: +61 2 9995 5000 (switchboard)
Phone: 1300 361 967 (Environment, Energy and Science enquiries)
TTY users: phone 133 677, then ask for 1300 361 967
Speak and listen users: phone 1300 555 727, then ask for 1300 361 967
Email: info@environment.nsw.gov.au
Website: www.environment.nsw.gov.au

Report pollution and environmental incidents
Environment Line: 131 555 (NSW only) or info@environment.nsw.gov.au
See also www.environment.nsw.gov.au

ISBN 978-1-922318-06-0
EES 2019/0714
December 2019

Find out more about your environment at:

www.environment.nsw.gov.au

Contents

List of tables

List of figures

Shortened forms

AO	Local Land Services Assessment Officer
BAM	Biodiversity Assessment Method
CEEC	critically endangered ecological community
CTGW	Cool Temperate Grassy Woodland
E	exotic
EES	Environment, Energy and Science group
the Department	NSW Department of Planning, Industry and Environment
HTW	high threat weed
IGGAM	Interim Grasslands and other Groundcover Assessment Method
LLS	Local Land Services
LLS Act	*Local Land Services Act 2013*
Spreadsheet tool	Monaro and Werriwa CTGW Assessment Spreadsheet Tool
The Code	*Land Management (Native Vegetation) Code 2018*
TSSC	Threatened Species Scientific Committee

1. Introduction

1.1 Background

On 28 June 2019 the Threatened Species Scientific Committee (TSSC) published Final Determinations listing two grassy woodland communities as critically endangered ecological communities (CEECs) under the *Biodiversity Conservation Act 2016*. The two CEECs are:

- Monaro Tableland Cool Temperate Grassy Woodland (CTGW) in the South Eastern Highlands Bioregion
- Werriwa Tablelands CTGW in the South Eastern Highlands and South East Corner Bioregions.

The Minister for Agriculture and Western New South Wales and Minister for Energy and Environment agreed to:

- amend Schedule 5A of the *Local Land Services Act 2013* (LLS Act) to limit the range of Allowable Activities permitted on land containing these specific CEECs. These activities are listed in Part 4 of Schedule 5A of the LLS Act
- amend the *Land Management (Native Vegetation) Code 2018* (the Code) to enable Code activities to occur in areas where grassy woodland CEECs are assessed as unlikely to be viable in the long term
- agreed Local Land Services (LLS) officers making a determination using approved guidelines.

Guidelines for assessing the viability of the CEECs have been developed. These guidelines are informed by scientific knowledge of the CEECs and data-driven expert workshops run by the Environment, Energy and Science (EES) group and Biodiversity and Conservation Divisions within the Department of Planning, Industry and Environment (the Department), including participation of LLS officers (Appendix C).

This document outlines the assessment guidelines.

These guidelines should be used in conjunction with an advisory layer indicating the potential extent of the two CEECs (from here-on the ‘advisory layer’) and the Monaro and Werriwa CTGW Assessment Spreadsheet Tool (from here-on the ‘spreadsheet tool’).

If you have any questions about this document, please contact native.vegetation@environment.nsw.gov.au.

The information contained in this publication is based on knowledge and understanding at the time of publishing (December 2019); however, because of advances in knowledge, users are reminded of the need to ensure the information upon which they rely is up to date, and to check the currency of the information with the appropriate the Department officer or their independent adviser.

1.2 Purpose

These guidelines have been developed for LLS Assessment Officers (AO). The guidelines define a method to enable an appropriately qualified LLS AO to determine whether either of the CEECs are likely to be present and if so whether the vegetation is of low condition and non-viable.

The method requires plot and patch-based assessment of vegetation composition and structure with specific reference to:

- the presence and cover of *Eucalyptus pauciflora* (snow gums) and/or tree stumps
- the number of characteristic species identified in Part 1 of the most closely aligned Final Determination (i.e. the Final Determination with the most characteristic species in common with the plot/site, providing the site is within the appropriate bioregion as defined in Part 2 of the Final Determination), and
- a botanical assessment consistent with that required for vegetation integrity under the Biodiversity Assessment Method (BAM).

These guidelines apply to the bioregions defined in Part 2 of the Final Determination within areas known as the Monaro (NSW Threatened Species Scientific Committee 2019) and Werriwa (NSW Threatened Species Scientific Committee 2019). These guidelines do not differentiate between the similar Werriwa and Monaro CTGW CEECs and the same assessment approach should be applied to both ecological communities.

This method must **not** be used to characterise vegetation for development assessment purposes; to assess vegetation for development assessment purposes, the BAM must be applied by an accredited assessor.

The assessment adopts principles of the Interim Grasslands and other Groundcover Assessment Method (IGGAM) and BAM, using transparent methods to determine condition thresholds.

1.3 Who will use this method?

This method must be used by an appropriately qualified AO competent in full-floristic survey methods and familiar with groundcover flora species characteristic of the Monaro and Werriwa CTGW CEECs and related vegetation communities. The AO should have a good working understanding of the relevant Final Determination(s).

2. Assessment process

The assessment involves the following steps, and as per Figure 1:

Step 1. Assessment against CTGW CEEC advisory layer

Step 2. Delineation of vegetation zones

Step 3. Broad assessment of the presence or absence of tree cover within the vegetation zone

Step 4a. Secondary grassland assessment – distance to nearest *Eucalyptus pauciflora*, the presence of logs and/or stumps, identification of characteristic species from Part 1 of the Final Determination(s)

Step 4b. CTGW CEEC assessment – *Eucalyptus pauciflora* foliage cover, identification of characteristic species from Part 1 of the Final Determination(s) and identification of non-characteristic tree species

Step 5. Low condition threshold assessment – plot level native species composition, structure and function.

The information collected in Steps 1–4 is used to determine whether the vegetation is likely to be one of the CTGW CEECs.

If found to be CTGW CEEC, information collected in Step 5 is used to determine whether the vegetation is low condition or not and a viable example of CTGW CEEC. If condition is found to be low, then the vegetation zone is considered unlikely to be a viable CTGW CEEC and can be managed under the Code.

If one of the CEECs are present, regardless of condition, a limited range of allowable activities are permitted. These are outlined in Schedule 5A of the LLS Act under *Part 4 – Special provisions applying to category 2-vulnerable regulated land and category 2-sensitive regulated land*.

Data gathered during the assessment process must be entered into the Monaro and Werriwa CTGW Assessment Spreadsheet Tool.

An overview of the assessment process is set out in Figure 1 below.

2.1 Timing of field assessments

Surveys should be conducted at a time when the native cover is likely to be at its highest proportion of native to exotic species and when natives are readily identifiable to species level.

In grasslands and grassy woodlands of the South East Highlands bioregion native perennial forbs are generally most evident in late-spring/early-summer (October – December), while grass species are typically best differentiated when they are fruiting during summer (December – February).

Recent benchmark modelling work has supported these observations but also highlighted the greater importance of preceding rainfall (Yen et al. 2019). Rather than specify fixed survey timeframes there should be a broader consideration of a range of factors, including:

- recent climatic conditions
- soil moisture (as affected by precipitation, soil type and position in landscape)
- seasonal growth habits of different species (e.g. C3 versus C4 grasses)
- grazing pressures (e.g. stocking rates, timing of grazing)
- other disturbances (e.g. flood, wildfire, native and feral herbivore grazing, etc.).

Assessments should **not be conducted when vegetation cover is low** (e.g. during or immediately after drought events or fire, or immediately following heavy grazing).

There may be instances in which an accurate assessment of vegetation can be made out-of-season, and in these instances, the AO is required to justify in the report declaration why an out-of-season assessment is appropriate and will deliver reliable results.

2.2 Step 1. Assessment of paddock against Cool Temperate Grassy Woodland critically endangered ecological communities advisory layer

The AO should determine whether part or all of the paddock to be assessed occurs within the advisory layer. If so, the AO should proceed with the application of the guidelines.

Examples of the CEECs may occur outside the modelled extent shown within the advisory layer. In such instances these should be assessed with reference to Parts 1, 2 and 4 of the Final Determination(s) in addition to application of the spreadsheet tool (see Section 3. Assessment outside of advisory layer).

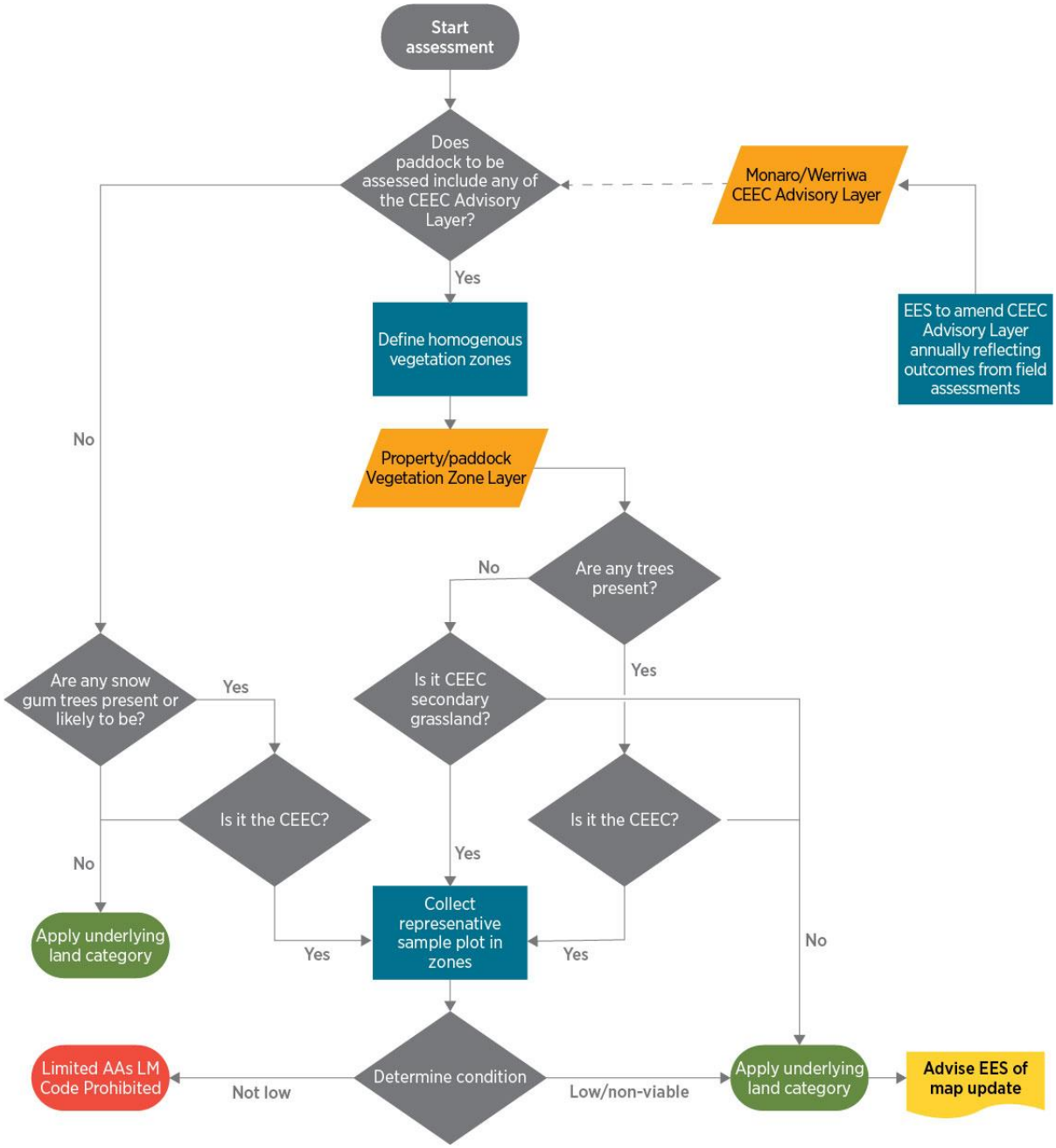

Figure 1 **Monaro and Werriwa Cool Temperate Grassy Woodland critically endangered ecological community assessment process overview**

2.3 Step 2. Delineation of vegetation zones

A 'vegetation zone' means an area of native vegetation within the subject area that is the same vegetation type and has a similar broad condition state. In most cases vegetation type refers to plant community types (PCTs), but in this instance all PCTs that could be the CTGW CEEC should be treated as a single entity. For example, if two or more PCTs of the same condition state are present within a single paddock and they are all likely to be CTGW CEEC, they should be treated as a single vegetation zone.

Areas of equivalent vegetation type that are in different condition states **must** be stratified into different vegetation zones. Condition states may vary based on tree cover, ground layer disturbance, geology and position in the landscape. It is possible to have adjacent areas of

identical vegetation types that are different vegetation zones. Each vegetation zone should be assessed independently.

A vegetation zone may comprise a number of discontinuous areas within the overall subject area, provided the vegetation within the zone is the equivalent vegetation type and in a similar broad condition state. Vegetation zones must represent differences in vegetation and must not be manipulated to create desired results.

In many cases paddocks will contain a single vegetation zone; however, in the Monaro and Werriwa more than one vegetation zone may be present within a single paddock owing to variation in rockiness, topography, aspect and disturbance history (tree clearing, pasture sowing, fertilisation).

2.4 Step 3. Presence or absence of native tree cover

Secondary grasslands and woodlands require separate assessment to determine if they are likely to be CTGW CEEC.

The AO should determine whether native trees are present (of any size or age class) within each vegetation zone. If trees are absent, they should proceed to Step 4a. Secondary grassland assessment (Subsection 2.5.1). If present, they should proceed to Step 4b (Subsection 2.5.2).

2.5 Step 4. Vegetation zone assessment – is it Cool Temperate Grassy Woodland critically endangered ecological communities?

2.5.1 Step 4a. Secondary grassland critically endangered ecological communities vegetation zone assessment

The AO needs to determine whether the vegetation zone is likely to be secondary grassland that is consistent with the CEECs. This assessment should consider:

- the distance from the edge of the vegetation zone to the nearest *E. pauciflora* in a similar landscape position
- the presence or absence of stumps and/or logs within the vegetation zone, and
- the number of characteristic species from the Final Determination (see Appendix A for a full list of characteristic species). The likelihood that the vegetation zone is a secondary grassland example of the CEEC CTGW decreases with increasing distance to the nearest *E. pauciflora*, but increases if stumps and/or logs are present and multiple characteristic species are present.

Within each vegetation zone the AO must identify whether stumps and/or logs are present, the distance from the vegetation zone to the nearest *E. pauciflora* and count the number of characteristic species from Part 1 of the Final Determination (see Appendix A for full list of characteristic species).

The distance to the nearest *E. pauciflora* should be estimated in metres from the *edge* of the vegetation zone. This distance must be the shortest distance to any edge but should only include *E. pauciflora* individuals that are in similar landscape positions. The distributions of woodland and grassland in the Monaro and Werriwa are strongly influenced by soil type, underlying substrate and topography. Broadly, grasslands are more likely to occur in lower landscape positions and on soils with greater clay content where plant available soil moisture is lower (one exception being *Poa labillardierei* flats, which are generally high in soil moisture but treeless).

Evidence of stumps includes dead standing trees, sawn/cut stumps or remnants thereof, and depressions consistent with pulled/fallen trees. Logs are all dead woody material greater than 10 centimetres in diameter and 50 centimetres in length that is entirely or partly on the ground. The presence or absence of any stumps or logs should be recorded.

The number of characteristic species present within the vegetation zone should be recorded. Characteristic species are listed in *Part 1 Assemblage of Species* within the Final Determinations (also see Appendix A). Depending on whether the vegetation zone is more closely aligned with the Monaro or Werriwa, the appropriate list of characteristic species should be consulted.

The presence or absence of stumps and/or logs, distance to nearest *E. pauciflora* and number of characteristic species should be entered into the Secondary Grassland CEEC Assessment Spreadsheet Tool. This provides an estimate of the likelihood that the vegetation zone is one of the CEECs. If it is found that the vegetation zone is potentially the CEEC then the AO should proceed to plot-based assessment (see Section 2.6).

2.5.2 Step 4b. Woodland critically endangered ecological communities vegetation zone assessment

The AO needs to determine whether the vegetation zone is likely to be woodland that is consistent with the CEECs.

The likelihood that the vegetation zone is CEEC CTGW generally increases when multiple characteristic species are present, *E. pauciflora* has a very sparse to sparse tree cover and no non-characteristic tree species are present.

Within each of the vegetation zones the AO should:

1. visually estimate the percentage foliage cover of *E. pauciflora*
2. count all characteristic species from Part 1 of the Final Determination(s)
3. count the number of non-characteristic tree species (Appendix B).

Percentage foliage cover must follow the definition of Walker and Hopkins (1990) and includes leaves, twigs, branchlets and branches, as well as canopy overhanging the plot, even if the stem is outside the plot. Foliage cover estimates for each species must draw from the following number series: 0.1, 0.2, 0.3, …1, 2, 3, …10, 15, 20, 25, …100%.

The percentage foliage cover of *E. pauciflora*, the richness of characteristic species and the richness of non-characteristic tree species should be entered into the CTGW Assessment tab of the spreadsheet tool. If the vegetation zone is potentially likely to support the CTGW CEEC (Possible CEEC, Likely CEEC or Highly Likely CEEC) the AO should proceed with plot assessment of condition and viability (see Section 2.6).

2.6 Step 5. Plot assessment and low condition threshold

Step 5 is a more detailed examination of the structure and composition of the vegetation using plot-based assessment. The approach requires data collection of floristics and identification of plant growth forms (within 20 metre x 20 metre plots), and collection of limited functional attributes (within 20 metre x 50 metre plots). While these data can also contribute to estimates of vegetation integrity under the BAM, it is not the intent to do so under these guidelines.

Data collected from the plot assessments are entered into the Low Condition Assessment tab in the spreadsheet tool to determine the likelihood that the vegetation zone is a viable example of the CEEC.

The plot-based assessment requires the establishment of one or more nested 20 metre x 20 metre and 20 metre x 50 metre plots within each zone. Within the 20 metre x 20 metre plot all plant species are recorded and their visual foliage cover estimated. Foliage cover (Walker & Hopkins 1990) includes leaves, twigs, branchlets and branches overhanging the plot, even if the stem is outside the plot. Within the 20 metre x 50 metre plot the number of large trees is counted. Large trees are those with a diameter at breast height (DBH, over bark measured at 1.3 metres above ground level) greater than or equal to 50 centimetres (Travers et al. 2018).

Plots should be representative of the vegetation composition and structure within the broad condition class.

2.6.1 Survey effort: number of plots

For vegetation zones more than two hectares in area, multiple survey plots are required.

Table 1 details the minimum number of nested survey plots required within each vegetation zone. Note that this is a minimum number. The AO can choose more locations if they require greater certainty in the results, or if the broad vegetation zone is variable.

Table 1 Minimum number of survey plots required per vegetation zone

Vegetation zone area (ha)	Minimum number of plots
< 2	1 plot
> 2–5	2 plots
> 5–20	3 plots
> 20–50	4 plots
> 50–100	5 plots
> 100–250	6 plots
> 250–1000	7 plots; more plots may be needed if the condition of the vegetation is variable across the zone
> 1000	8 plots; more plots may be needed if the condition of the vegetation is variable across the zone

2.6.2 Selection of survey locations

Plots must be located such that they provide a representative assessment of the vegetation integrity of the vegetation zone, accounting for the level of variation in the broad condition state of the vegetation zone.

Survey plots must not be placed near fence lines, ecotones or other features that may impact on the vegetation condition.

2.6.3 Establishment of nested plots

The AO must establish survey plots around a central 50 metre transect as follows:

a. one 400 square metre plot (standard 20 metre x 20 metre) used to assess the number and summed foliage cover of native growth form groups and summed foliage cover of high threat weeds (HTW)
b. one 1000 square metre (standard 20 metre x 50 metre) plot used to assess the number of large trees.

2.6.4 Growth form groups

The AO must assign each native plant species to a growth form group (Oliver et al. 2019) using the BAM growth form group tables (Excel file 2.8MB).

An assessor must allocate a species to one growth form group based on the adult/mature growth form of the species as per the BAM growth form table (Table 2 below). Allocations other than those found within the BAM growth form tables may not be valid and could lead to incorrect results.

Table 2 Growth form groups to which all native species should be allocated (Oliver et al. 2019)

Growth form	Code
Grass and grass-like	G
Forb	F
Fern	Fr
Other	O
Shrub	S
Tree	T

2.6.5 Floristic survey

The minimum vegetation survey data required to be recorded by the assessor for each 20 metre x 20 metre condition plot are:

a. full species name (*Genus species*) for the three dominant native species within each growth form group. 'Dominant native species' means those native species that contribute most to the total cover of the growth form group
b. genus name or the full species name where practicable for all other species. 'Practicable' means that sufficient plant material is present to make a species level identification and the assessor has sufficient skills and knowledge to make the identification in the field
c. whether each species is native, exotic, or high threat exotic (HTW; Dorrough et al. 2018)[1]
d. the growth form group to which each native species has been allocated.

The AO must record an estimate of the foliage cover for each native and exotic species present within the 20 metre x 20 metre plot. Foliage cover estimates for each species must draw from the following number series: 0.1, 0.2, 0.3,…1, 2, 3,…10, 15, 20, 25,…100%.

The AO must not use methods such as Braun-Blanquet (or other) classes, or a transect point intercept method to record the foliage cover score for a growth form group.

The cover of each growth form group for the 20 metre x 20 metre plot is recorded by the AO as the sum of all the individual foliage cover estimates of all native plant species recorded within each growth form group within each plot.

[1] A high threat weeds list available from the BAM Calculator webpage.

The richness of each growth form group for the 20 metre x 20 metre plot is recorded by the AO as the sum all native plant species recorded within each growth form group.

The AO must estimate foliage cover for each non-native (exotic) plant species and assign to either E (exotic) or HTW status. The cover of HTW is the sum of all the individual foliage cover estimates of all exotic HTW species.

2.6.6 Low condition and viability assessment

The low condition assessment provides an estimate of whether the vegetation zone is likely to be low condition and non-viable.

Data collected from plot assessments are entered by the AO into the Low Condition Assessment tab of the spreadsheet tool.

The data required from the plot-based assessment include: number of large trees within a 20 metre x 50 metre plot, the presence of *E. pauciflora* within any of the 20 metre x 20 metre plots, count of native forb growth form species, the count of native other growth form species, the summed individual percent foliage cover of native grass and grass-like species, and the sum of the individual species foliage cover of HTW.

3. Assessment outside of advisory layer

For the purposes of the streamlined assessment under these guidelines, areas outside the advisory layer mapped extent will only be considered for further assessment as one of the CEECs if *E. pauciflora* is within or reasonably expected to occur within the paddock. If *E. pauciflora* is present the AO should also consider the alignment with the floristic assemblage (Part 1) and distribution (Part 2) within the Final Determination(s) as a primary determinant. Associated information (Part 4) within the Final Determination(s) can also be drawn upon.

If the AO considers some or all of the vegetation to be consistent with the Final Determination of one of the CEECs, they should proceed to Step 2 and identify vegetation zones (see Section 2.5.2). Within each of the vegetation zones they should then proceed to Step 4b:

1. visually estimate the percentage foliage cover of *E. pauciflora*
2. count all characteristic species from Part 1 of the Final Determination(s)
3. count the number of non-characteristic tree species (Appendix B).

These data should be entered into the CTGW Assessment tab of the spreadsheet tool. If the vegetation zone is likely to support one of the CTGW CEECs the AO should proceed with plot assessment of condition and viability (see Step 5 in Section 2.6).

If the CTGW CEEC is found to have a reasonable probability of occurrence, advice should be provided back to the Department's EES Science Division to refine further iterations of the advisory layer.

4. Reporting

A consent form and privacy notice is provided to the landholder before the assessment is undertaken, and outlines the provision of the assessment data and its use within the Department (an excerpt follows).

4.1 What information does Local Land Services collect about the landholding when making an assessment?

4.1.1 Vegetation boundary data

LLS will collect information about the landholding being assessed. This includes accurate GPS location data, and a map showing the boundaries of the areas of vegetation assessed including defined vegetation zones.

This location data will not be linked to detailed vegetation data (plant species data).

4.1.2 Floristic data

LLS will collect floristic data when undertaking the assessment, including:

- all the names and proportions (percent foliage cover) of the flora species recorded in plots across the defined vegetation zones
- all ancillary data required by the tool, including: if stumps or logs are present within the vegetation zone (number/length); the distance from the edge of the vegetation zone to the nearest snow gum; and high threat weed cover
- photos taken during the assessment.

4.1.3 Plant species and location data

LLS will collect GPS location of the plots and the floristic data recorded within them.

4.2 What information about the landholding may Local Land Services share with the Department?

Following the assessment LLS will share de-identified floristic data with the Department. This data is not tied to location information or any other information from which you or your property could be identified.

The Department will use this information to determine if the guidelines are functioning as intended. Detailed plant species data will not be linked to location data but will be linked to prescribed vegetation zone and assessment outcome for each zone. The data will inform a regular 12-month review of the guidelines.

LLS also requests consent (further below) to provide the following information to the Department, for the following purposes:

1. **The outcome of the assessment and the vegetation boundary data for the landholding**

Purpose: The Department will use this information to update the advisory layer on the Native Vegetation Regulatory Map Viewer, informed by the outcome of the assessment (presence/absence of the two CEECs). To this extent, this would make the outcome of the assessment publicly available.

2. **Plant species and location data**

Purpose: The Department will upload this information to the NSW vegetation survey database. Currently this database holds over 60,000 plots across New South Wales and is used by a range of scientists to better understand the nature and geographic distribution of native plants. No other locational data is held against the survey plot records.

Providing consent to share this information with the Department is not a requirement for LLS to undertake an assessment.

5. References

Dorrough J, Oliver I, and Wall J 2018, Consensus when experts disagree: A priority list of invasive alien plant species that reduce ecological restoration success, *Management of Biological Invasions*, vol.9, pp.329–341.

NSW Threatened Species Scientific Committee 2019, *Final Determination: Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion*, Department of Planning, Industry and Environment, Sydney, viewed 19 December 2019, <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Scientific-Committee/Determinations/2019/monaro-tableland-final-determination-CEEC.pdf>.

NSW Threatened Species Scientific Committee 2019, *Final Determination: Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions*, Department of Planning, Industry and Environment, Sydney, viewed 19 December 2019, <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Scientific-Committee/Determinations/2019/werriwa-tableland-final-determination-CEEC.pdf>.

Oliver I, McNellie MJ, Steenbeeke G, Copeland L, Porteners MF and Wall J 2019, Expert allocation of primary growth form to the New South Wales flora underpins the biodiversity assessment method, *Australasian Journal of Environmental Management*, vol.26, pp.124–136, DOI:10.1080/14486563.2019.1595186.

Travers SK, Dorrough J, Oliver I, Somerville M, Watson CJ and McNellie MJ 2018, Using tree hollow data to define large tree size for use in habitat assessment, *Australian forestry*, vol.81, pp.186–195.

Walker J and Hopkins MS 1990, 'Vegetation', in McDonald RC, Isbell RF, Speight JG, Walker J and Hopkins MS (eds), *Australian Soil and Land Survey Field Handbook* (2nd edition), CSIRO Publishing, Canberra, pp.58–86.

Yen JDL, Dorrough J, Oliver I, Somerville M, McNellie MJ, Watson CJ and Vesk PA 2019, Modeling biodiversity benchmarks in variable environments, *Ecological Applications*, in press.

Appendix A Characteristic species

Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion

Acacia dealbata
Acacia melanoxylon
Acaena echinate (echinata)
Acaena novae-zelandiae
Ajuga australis
Asperula conferta
Asperula scoparia
Austrostipa scabra
Bossiaea buxifolia
Carex breviculmis
Carex inversa
Chrysocephalum apiculatum
Chrysocephalum semipapposum
Cymbonotus lawsonianus
Desmodium varians
Dichondra repens
Elymus scaber (Anthosachne scabra)
Epilobium billardierianum
Eucalyptus pauciflora
Eucalyptus rubida subsp. *rubida*
Eucalyptus stellulata
Eucalyptus viminalis
Euchiton japonicus
Geranium antrorsum
Geranium solanderi
Glycine clandestina
Gonocarpus tetragynus
Haloragis heterophylla
Hovea linearis
Hydrocotyle laxiflora
Hypericum gramineum
Leptorhynchos squamatus
Melicytus angustifolius subsp. *divaricatus*
Microlaena stipoides var. *stipoides*
Mirbelia oxylobioides
Oxalis perennans
Panicum effusum
Plantago varia
Poa labillardierei
Poa sieberiana
Poranthera microphylla
Rubus parvifolius
Rumex brownie (brownii)
Rytidosperma laeve
Rytidosperma pilosum
Scleranthus biflorus
Solenogyne gunnii
Themeda triandra
Veronica gracilis
Viola betonicifolia
Wahlenbergia communis

Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions

Acaena ovina
Aristida ramosa
Asperula conferta
Austrostipa bigeniculata
Bothriochloa macra
Calocephalus citreus
Carex inversa
Chrysocephalum apiculatum
Convolvulus erubescens (angustissimus)
Desmodium varians
Dichelachne micrantha
Elymus scaber (Anthosachne scabra)
Eryngium ovinum
Eucalyptus pauciflora
Eucalyptus rubida subsp. *rubida*
Gonocarpus tetragynus
Goodenia hederacea subsp. *hederacea*
Goodenia pinnatifida
Haloragis heterophylla
Hydrocotyle laxiflora
Hypericum gramineum
Juncus filicaulis
Leptorhynchos squamatus
Lomandra filiformis
Microlaena stipoides var. *stipoides*
Oxalis perennans
Panicum effusum
Plantago varia
Poa sieberiana
Rytidosperma spp.
Schoenus apogon
Solenogyne dominii
Themeda triandra
Tricoryne elatior
Triptilodiscus pygmaeus
Vittadinia muelleri

Appendix B Non-characteristic tree species

The following tree species frequently occur within the South East Highlands Bioregion but tend not to be characteristic of the Monaro or Werriwa CTGW CEECs. This is not an exhaustive list. Any tree species present within a vegetation zone and not listed in Appendix A should be treated as a non-characteristic tree species. The presence of any one or more of these species is not evidence alone that the CTGW CEEC is not present, but in conjunction with other evidence can be indicative.

Non-characteristic tree species – Monaro or Werriwa Cool Temperate Grassy Woodland critically endangered ecological communities

Acacia decurrens

Allocasuarina littoralis

Allocasuarina verticillata

Eucalyptus blakelyi

Eucalyptus bridgesiana

Eucalyptus camphora

Eucalyptus dalrympleana

Eucalyptus dives

Eucalyptus goniocalyx

Eucalyptus macrorhyncha

Eucalyptus mannifera

Eucalyptus melliodora

Eucalyptus nortonii

Eucalyptus ovata

Eucalyptus radiata

Eucalyptus rossii

Eucalyptus sieberi

Appendix C Summary of underlying methods

Monaro and Werriwa CTGW Assessment Spreadsheet Tool

The Monaro and Werriwa CTGW Assessment Spreadsheet Tool is based on quantitative analysis of floristic plot and expert elicited data. It is underpinned by parsimonious generalised linear models that attempt to maximise model fit and minimise model complexity (input variables).

In total, 18 experts contributed to the elicitation, which was undertaken using a structured Delphi process in two separate workshops. The tool uses the breadth of expert opinion to provide a transparent and consistent assessment approach to identifying the CTGW CEEC and estimating the low condition threshold. The models themselves predict the likelihood that the site is CTGW CEEC and whether it is low condition.

The probabilities output by the models are converted to simple text descriptions that reflect broad classes of likelihood (Table 3).

Table 3 Model predicted probabilities and associated text descriptions of likelihood

Predicted probability	Text likelihood
> 0.75	Highly Likely
> 0.5 – 0.75	Likely
≥ 0.45 – 0.5*	Possible
< 0.45	Unlikely

*Lower thresholds of 0.4 for ‘Possible’ were applied in two instances: for predictions of low condition if summed exotic high threat weeds were >33%, and for predictions of CEEC secondary grassland when logs and/or stumps were absent.

Monaro and Werriwa Cool Temperate Grassy Woodland critically endangered ecological communities advisory layer

The advisory layer provides an estimate of the likely modelled extent of both the Monaro and Werriwa CTGW CEECs.

The likely extent of the CEECs was modelled using Random Forests (RF) using ~10,000 vegetation plots and a selection of environmental variables. A core spatial envelope derived by a threshold on the predicted occurrence of the CEECs (where sensitivity equals specificity) was used as a target for systematic aerial photographic interpretation in a 3D environment. This woody attribution was then extended by a 100-metre buffer out across any contiguous candidate native grassland. The layer captures all CEEC presence classified plots with rigorous discrimination within their convex spatial envelope.