natural resources commission

Review of proposed amendments to the Environmental Outcomes Assessment Methodology

Chapter 8

February 2011

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Enquiries

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List of acronyms

EOAM	Environmental Outcomes Assessment Methodology
CMA	Catchment Management Authority
DECCW	Department of Environment, Climate Change and Water
NRC	Natural Resources Commission
NRM	Natural Resource Management
NSW	New South Wales
NVAT	Native Vegetation Assessment Tool
PADACS	PVPs Agreement Data and Customer Service
PVP	Property Vegetation Plan

Document No. D11/0048

ISBN: 978 1 921050 65 7

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1 Introduction and overview

In December 2010, the Minister for Climate Change and the Environment sought advice from the Natural Resources Commission (NRC) on proposed amendments to the Environmental Outcomes Assessment Methodology (EOAM) under the *Native Vegetation Regulation 2005*.

The EOAM is used to assess whether proposals to clear native vegetation will improve or maintain environmental outcomes. The *Native Vegetation Act 2003* prevents broadscale clearing of native vegetation unless it improves or maintains environmental outcomes.

The amendments propose a new Chapter 8 to the EOAM that aims to streamline the current assessment process for five categories of native vegetation, and reduce processing time for clearing applications.

1.1 Recommendations

The proposed amendments in Chapter 8 are a response to the practical experience of Catchment Management Authorities' (CMAs) in using the decision support tool over the last six years. The proposed amendments focus on how the EOAM could be improved to streamline assessments and provide more flexibility to more efficiently negotiate good environmental outcomes with private landholders. CMAs need a range of relatively sophisticated methods and tools to help them seek the best possible sustainable outcomes for their communities, from paddock to catchment and landscape scale.

At the time of giving this advice, the proposed amendments are still being refined and the scientific and practical information basis supporting them is not assembled. Based on the available information the NRC has identified some issues that should be addressed, and these are summarised in Table 1 and 2 in Chapter 3. The most significant of these is the apparent inconsistent application of the 'improve and maintain' test between Chapters 5 and 8 and the lack of comprehensive scenario testing with the proposed offsets, given the potential multiple options.

It might be argued that some parts of the proposals could be adopted now as they are of lower risk, and adopt other parts as they are further refined. However, the gains in efficiency (and effectiveness) sought by the proposed amendments are likely to rely heavily on changes to the supporting computer software and other systems. This is likely to require significant investment. A one-off investment, after all issues have been resolved and the final form of the amendments are bedded down, may be more cost effective than a piece-meal approach.

In view of this, the NRC recommends that the Minister:

- ask DECCW and CMAs to complete their current process to refine the amendments based on feedback, and more thoroughly document the scientific basis for the proposals
- ask DECCW to build and CMAs to test a prototype tool to implement and test the proposed amendments on a significant sample of clearing requests across all regions, with the results being documented and publicly reported
- ask the NRC to provide formal advice on the revised package of tested amendments
- establish a system for periodic, independent auditing of PVPs and public reporting to identify areas for improvement and increase public confidence in the operation of the EOAM.

1.2 Process to develop this advice

In developing this advice, the NRC:

- posted the Minister's request and draft Chapter 8 on its website and invited submissions from the public
- sought an independent scientific peer review (see Attachment 2) and canvassed the view of other experts in landscape ecology and vegetation management
- attended CMA and agency workshops that tested Chapter 8 and received community comment
- internally reviewed Chapter 8 and other background material.

The NRC received 6 submissions from CMAs, environmental groups, a NSW government agency and a member of the community (see Attachment 1).

2 Context for the EOAM and the proposed amendments

The EOAM is a science-based methodology the Government uses to achieve consistency for a regulatory function it has devolved to regional CMAs. The specific regulatory function is the Minister's power to approve (or not) with or without offsets a landholder's application to clear native vegetation.

Since 2005, the methodology has been crucial to balancing the desires of individual landholders and the needs of the broader natural landscape and community. CMAs' application of the methodology (along with their other activities) has successfully implemented the government's policy of ending broadscale clearing unless it maintains or improves environmental outcomes.[1]

There are synergies and tensions between this regulatory role and CMAs' broader role of promoting community stewardship of natural resources across their regions. After six years of operation, there are inevitably some opportunities to improve the operation of the methodology, and how it fits with CMAs' broader role. There appears to be significant opportunity to improve the administrative arrangements in place between DECCW, and the CMAs to identify and implement ongoing improvements to the methodology.

There also appears to be significant opportunity to generate more systematic and publicly available information on the operation of the methodology to drive continuous improvement and increase stakeholder confidence in the EOAM.

2.1 Catchment Management Authorities' roles

With the Government's policy in place to 'end broadscale clearing unless it maintains or improves environmental outcomes', the EOAM is intended to provide CMAs with a consistent, scientifically robust means of responding in practical timeframes to landholders' proposals to clear native vegetation. In effect this is a regulatory role performed on behalf of the Minister.

CMAs also have the role of encouraging private landholders and other stakeholders across their regions to manage natural resources in an integrated way for the benefit of everyone. They do this through developing Catchment Action Plans and running incentive schemes and education activities. This is a non-regulatory role funded by Federal and State Governments.

There are clear synergies between these two roles as management of native vegetation is one of the most powerful ways to improve how natural landscapes function. Better management of native vegetation across a region greatly increases the region's capacity to support the values which communities wish those landscapes to provide. These values span environmental, economic and social issues, and benefit local, regional and national communities.

However, there are also tensions between these roles. For example, the restriction on clearing vegetation can place costs on individual landholders at the property scale. Yet these restrictions are often crucial (in more cleared landscapes) in order to sustain essential landscape processes like water balance, carbon storage, habitat value, crop pollination, recreation and the like. The benefits of well managed native vegetation accrue on that property, but also well beyond to the surrounding region and the nation.

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1 Natural Resources Commission, *Progress towards healthy resilient landscapes: implementing the standard, targets and catchment action plans*, December 2010, Chapter 4.

2.2 The Environmental Outcomes Assessment Methodology

The EOAM prescribes the methodology that the Minister or CMAs must use to assess whether a proposal for broadscale clearing will improve or maintain environmental outcomes as required under the *Native Vegetation Act 2003*. The methodology separately assesses the impacts on four environmental outcomes (water quality, salinity, biodiversity, and land degradation), and is supported by a decision support tool known as the *Native Vegetation Assessment Tool* (NVAT - formerly the PVP Developer) and associated databases.

The system was originally intended to allow a CMA officer to use a laptop computer to run the assessment tool in the field to give landholders a consistent answer on clearing proposals. An assessment can provide three possible outcomes for a clearing proposal:

- 'red-light', where a clearing proposal will not improve and maintain environmental outcomes
- 'orange-light", where a clearing proposal will improve and maintain environmental outcomes if the impacts of the clearing can be offset with prescribed management actions
- 'green-light', where a clearing proposal will improve and maintain environmental outcomes.

An orange (if offsets can be secured) or green light proposal can be approved and a Property Vegetation Plan (PVP) developed for the property. A PVP is legal contract between the landholder and the Minister (signed by CMAs) and sets out a range of management actions (including the clearing) that must be undertaken over a prescribed timeframe.

2.3 Where does the new Chapter 8 fit in this context?

Figure 1 illustrates some key steps in an EOAM process and where the proposed Chapter 8 would sit as an alternate assessment path.

Some key issues the NRC believes need to be addressed are indicated by the blue circles with question marks. For example, in practice there are often only weak connections between the site-specific assessments done using the EOAM, and the regional or catchment scale incentive schemes operated under the catchment action plan. Creating better links would be a significant improvement to the current system. A window of opportunity exists in the coming two years as CMAs upgrade their CAPs, where they are likely to draw more heavily on spatial data and analysis to help better understand the function of landscapes by indentifying and mapping landscape variables, thresholds and priorities for action.

Similarly, the site-specific assessment tool gives CMAs little discretion in how they use the tool or whether they make a decision in line with its calculations.[2] The NRC has previously argued this makes it harder for CMAs to respond meaningfully and in a timely manner to local issues, to be flexible enough to reach sustainable outcomes, and to maintain the community confidence and engagement essential to the success of the overall NRM model in NSW.[3]

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2 Other alternatives include a 'clause 28' policy under the regulations where the Minister allows minor clearing that will lead to long-term environmental outcomes and where CMAs make minor changes to technical parameters within NVAT based on advice from and accredited expert.

3 NRC (2007) A *landscape approach to vegetation management – final report*. Natural Resources Commission, Sydney.

The currently proposed Chapter 8 would not address all issues of concern. Specific issues relating to the proposed Chapter 8 are discussed in the next chapter.

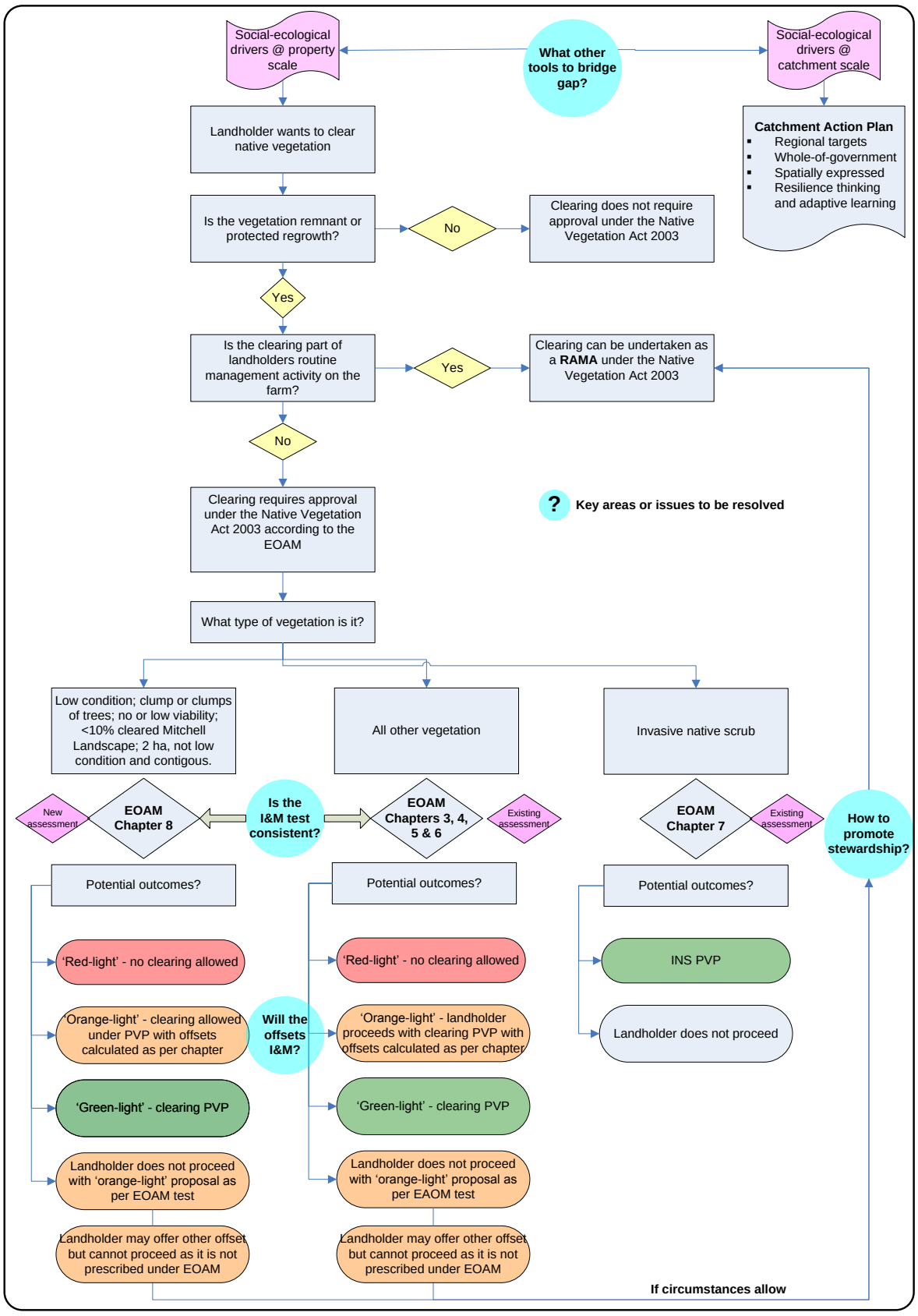

Figure **1:** **Key components of the EAOM, including new Chapter 8 and decision paths**

3 The proposed amendments: Chapter 8

Chapter 8 is intended to provide a streamlined assessment process compared to a full assessment using the other chapters of the EAOM. The assessment process is designed to:

> *"(i)provide efficient assessment of whether proposed broadscale clearing improves or maintains environmental outcomes through a shortened assessment process; and,(ii) where proposed broadscale clearing does improve or maintain environmental outcomes, to provide offsets that are appropriate for the local environmental conditions."*[4]

Ultimately, any clearing proposals assessed under Chapter 8 must still meet the 'improve or maintain' test before a CMA can approve a PVP on behalf of the Minister. This section describes some key risks around the proposed Chapter 8 that should be addressed before they are adopted.

3.1 CMAs' motivation for the proposed amendments

A number of CMAs have argued for the amendments on various grounds, and others have concerns about some aspects of the changes. This illustrates the complexity of administering a site-specific assessment tool which is uniform across the state, and reinforces the need to carefully assess the region-specific impacts of any proposed changes.

The proposed Chapter 8 appears to be a genuine attempt by CMAs to apply their practical experience to create more flexibility in how CMAs manage site-specific assessments so they can better reinforce community stewardship across the region. The changes also appear designed to reduce a reported backlog of applications for clearing PVPs in some regions.

It is reasonable to expect that proposals such as those outlined in Chapter 8 would emerge over time, based on the application of the NVAT in the field by trained and experienced users such as CMA officers. In this instance, CMAs have identified a range of vegetation categories that in many instances are likely to be low risk, their current return-for-effort on them is low and may be causing them to miss opportunities for better natural resource management (including environmental) outcomes.

For example, the NRC heard how a landholder proposed to clear around 0.12 ha of native vegetation to install pivot irrigation and increase water efficiency on the farm (thereby likely to reduce impacts on local river and groundwater systems, potentially increasing the landholder's economic viability and that of the surrounding community). The vegetation was an over-cleared Mitchell landscape causing the proposal to be rejected according to the tests in the EOAM. Using a minor variation (under the native vegetation regulations) would mean the landholder would have to secure over 100 ha of additional vegetation as an offset.

This was rejected by the landholder, who instead offered to exclude stock and actively manage 20 ha of riparian vegetation along a local watercourse, which the CMA considered reasonable. As this was not allowed under the EOAM rules, the landholder did not proceed any further with the Property Vegetation Plan. Instead, the landholder legally cleared the vegetation using a firewood Routine Agricultural Management Activity (RAMA), without having to provide any

[4] DECCW (2011) *Chapter 8 - Streamlined assessment of certain vegetation categories.* Available at http://www.nrc.nsw.gov.au/Workwedo/EnvironmentalOutcomesAssessmentMethodology.aspx

offsets. The potential benefits of securing improved management of the 20 hectares of riparian vegetation were foregone.

The NRC learned of many other similar CMA case studies. They demonstrate why CMAs need other methods, tools and analysis above and beyond the NVAT to help understand the way vegetation and groundcover generally should be reconfigured, retained and restored to support diverse uses and values in landscapes across a range of scales in their catchments. For example, a functional connectivity layer could be developed for each CMA region, mapping all vegetation patches and the viability of the connectivity that adjoins every pair of adjacent patches using readily available LandSat of SPOT satellite data.

3.2 Outline of the proposed streamlined decision path

Figure 2 illustrates the main elements of the decision path in the proposed chapter 8. There are three main elements:

- five 'low risk' vegetation categories which would be eligible to be considered
- four assessment filters placed on these categories, which exclude all but certain circumstances, and
- a range of off-set rules which indicate the offsets required in particular circumstances

These five categories of eligible vegetation are significantly different to what is permitted to be cleared/off-set under the full assessment methodology and hence are important to review.

In practice, the filters relating to water quality, salinity and soil are identical to those in the full methodology. Nearly all of the proposed tests under the biodiversity filter are new and need to be reviewed.

The offset arrangements are significantly different to those in the full assessment methodology and so need to be reviewed.

Attachment 2 contains a peer review by Eco Logical Australia which reviews these elements in some detail.

Tables 1 and 2 in the following sections draw out the key concerns raised in this peer review.

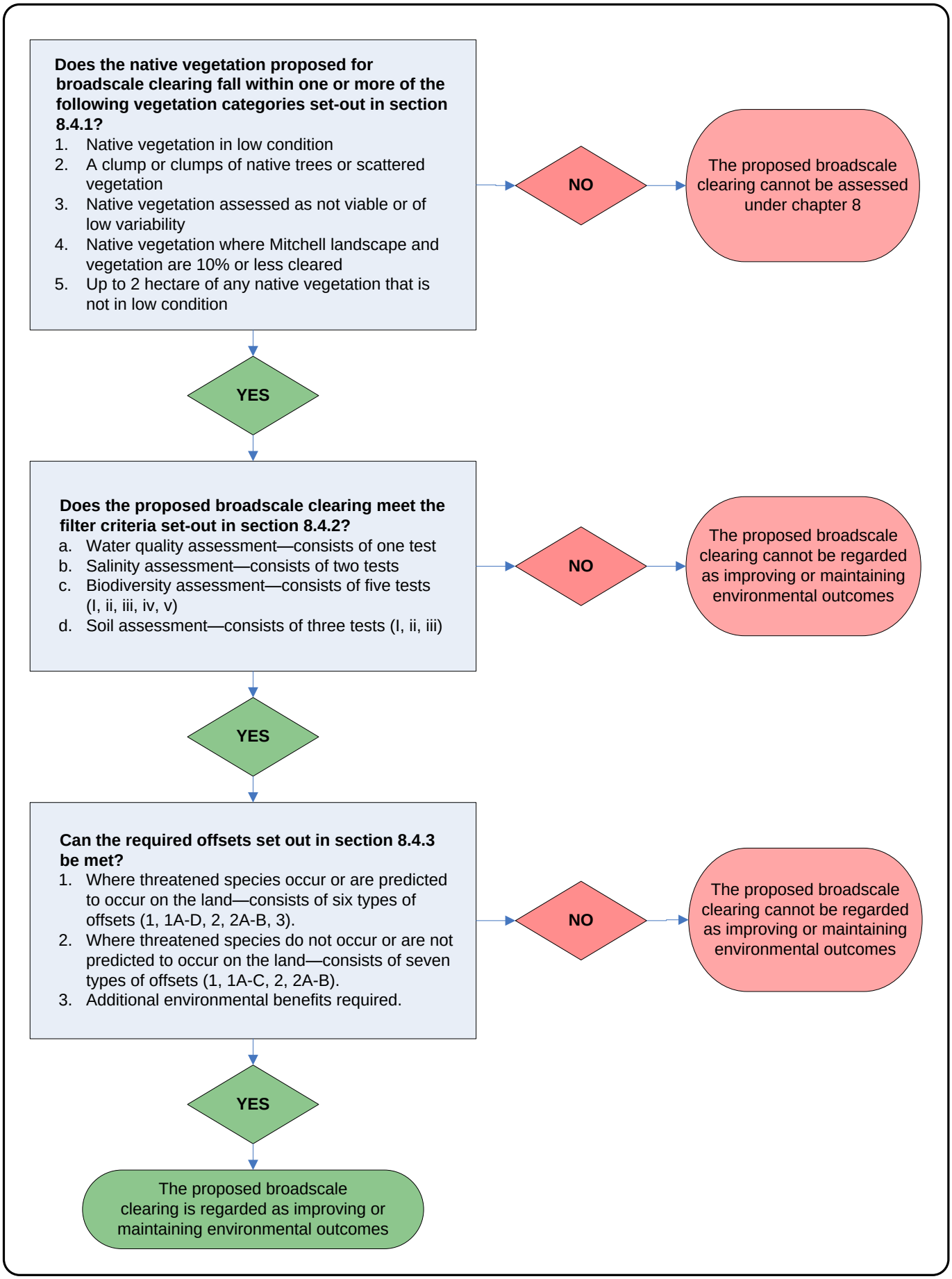

Figure 2: Key elements of the Chapter 8 and the main decision path

3.3 Proposed vegetation categories for the streamlined assessments

As shown in Figure 2, the five categories of vegetation eligible to be considered are:

1. native vegetation in low condition
2. a clump or clumps of native trees or scattered native trees
3. native vegetation assessed as not viable or of low viability
4. native vegetation where the Mitchell landscape and vegetation are 10% or less cleared
5. up to 2 hectares of native vegetation that is not in low condition.

They intend to represent clearing proposals that are likely to be of low risk (or impact on the environment). A range of definitions are provided with the categories to help the assessor determine whether vegetation proposed for clearing can be assessed under the chapter.

Under the current EAOM, Chapter 5 (Biodiversity Assessment) sets out certain types of broadscale clearing proposals that cannot proceed because they will not meet the 'improve or maintain' test. These include proposals for overcleared vegetation and endangered ecological communities (EECs) [5] unless they are in low condition.[6]

The new vegetation categories under Chapter 8 can include overcleared vegetation, including EECs, which would otherwise not have been previously allowed under Chapter 5.

Table 1 lists the five vegetation categories under Chapter 8 and describes whether they would likely meet the 'improve or maintain' test in Chapter 5. It also lists key issues to resolve with each of the vegetation categories.

The first two categories of vegetation in low condition and paddock trees are the least controversial, and require only better documentation of the supporting science and field testing to ensure the provisions play out as intended.

There are more significant unresolved questions about the remaining three categories as indicated in Table 1.

5 Overcleared vegetation is (i) a >70% cleared Mitchell Landscape (ii) a >70% vegetation type and (iii) an EEC listed under the *Threatened Species Conservation Act 1995* (NSW) and the *Environment Protection and Biodiversity Conservation Act 1999* (Cwth).

6 Low condition is defined in the EOAM by a range of ecological condition benchmarks.

Table 1: Issues and risks with the proposed vegetation categories in Chapter 8

Chapter 8 vegetation category	Meets chpt 5 M&I test?	Key issues to resolve	Risk	Process to resolve
1 Native vegetation in low condition	▪ Yes	▪ May create incentives to erode condition where close to thresholds ▪ Emerging scientific literature on the ecological functions of paddock trees	▪ Low	▪ Further scenario and field testing ▪ Document rationale & information base
2 A clump of clumps of native trees or scattered native trees	▪ Yes	▪ Significant areas could be cleared if several clump's' are in close proximity ▪ 10 ha threshold may be too high ▪ Language too open (e.g. 'usually')	▪ Low to Medium	▪ Expert panel review ▪ Document rationale & information base
3 Native vegetation assessed as not viable or of low viability	▪ No in some cases ▪ Can include overcleared vegetation, including EECs	▪ Inconsistent with Chapter 5 ▪ Requires considerable judgement ▪ Language too open (e.g. 'relatively') ▪ Very small patches may be viable with management	▪ High	▪ Further scenario and field testing ▪ Expert panel to review ▪ Document rationale & information base
4 Native vegetation where the Mitchell landsdcape and vegetation type are 10% or less cleared	▪ Probably	▪ No maximum size threshold ▪ Potential cumulative impacts over time ▪ Query impact on coast	▪ Medium	▪ Expert panel to review ▪ Document rationale & information base
5 Up to 2 ha of native vegetation that is not in low condition that is contiguous with or included within any larger area of native vegetation	▪ No in some cases ▪ Can include overcleared vegetation, & EECs	▪ Inconsistent with Chapter 5 ▪ Area threshold is significant in some landscapes ▪ Language open to interpretation ▪ Potential cumulative impacts	▪ High	▪ Further scenario and field testing ▪ Expert panel to review ▪ Document rationale & information base

3.4 Filter criteria for the streamlined assessments

Any proposed clearing within the five vegetation categories must then meet a range of filter criteria before it can proceed for further assessment. Table 2 describes these and notes some issues that should be reviewed.

The filter criteria for water quality, salinity and soil assessments are consistent with requirements under a full EOAM assessment.

The filter criteria for biodiversity assessment are nearly all new compared with those tests found under the full EOAM assessment. As with the vegetation categories, there remain some concerns around the scientific validity, the application of the biodiversity filter criteria in practice and potential inconsistencies with the 'improve and maintain' test as set out in Chapter 5.

The NRC considers that the information base (both scientific and local knowledge) supporting the amendments should be well documented and further peer reviewed before they proceed.

Table 2: Issues and risks with the proposed biodiversity filter criteria in Chapter 8

Filter criteria	Consistency with other EOAM Chpts	Key issues	Risk	Process to resolve
Broadscale clearing not to be carried out on land where loss of landscape value is >10%.	▪ New test	▪ A loss in *landscape value* less than 10% can still impact vegetation connectivity and population viability ▪ Emerging scientific literature on the ecological functions of paddock trees	▪ Medium	▪ Expert panel review ▪ Document rationale & information base
Broadscale clearing not to be carried out on land were 1 or more threatened species that cannot withstand loss are known or predicated to occur.	▪ Test exists in Chapter 5 ▪ Threatened spp. (NSW TSC Act and C'mth EPBC)	▪ None	▪ Low	-
Broadscale clearing not to be carried out where trees supporting large stick nests > 30cm are proposed to be cleared.	▪ New test	▪ Small stick nests (i.e. less than the current 30 cm threshold) also indicates threatened or declining species	▪ Medium	▪ Expert panel review ▪ Document rationale & information base
Broadscale clearing not to be carried out where tree hollows >15cm diameter are proposed to be cleared.	▪ New test	▪ A range of available tree hollow sizes (i.e. less than the current 15 cm threshold) are important	▪ Medium	▪ Expert panel review ▪ Document rationale & information base
Broadscale clearing not to be carried out where the current extent in the CMA area of the vegetation type proposed to be cleared is <1000ha.	▪ New test	▪ 1000 ha area threshold may be significant in some landscape contexts (8.4.2) (and may prevent any vegetation community in the IUCN critically endangered being considered) ▪ Spatial data to determine 1000 ha area threshold may not be available in most CMAs or is of insufficient quality	▪ Medium to high	▪ Expert panel review ▪ Document rationale & information base ▪ Further scenario and field testing ▪ Resource mapping

3.5 Offset requirements for the streamlined assessments

Once a clearing proposal has met all the requirements set out under the filter criteria, it then must secure certain offsets to be regarded as improving or maintaining environmental outcomes.

Central West CMA and DECCW hosted a workshop on 27 and 28 January to run a number of scenarios based on previous PVPs where clearing was allowed with offsets. There has not been sufficient time for the results of the workshop to be written up and reviewed the NRC. Early indications are that the offsets that emerged from the more streamlined assessments were sometimes significantly higher and sometimes significantly lower than the offsets originally calculated under the prior formal EOAM assessments.

While it is encouraging to see the proposed amendments being 'desktop' trialled, it is important that systematic field trials in multiple regions be completed, documented, and peer reviewed. Without such documented results of scenario testing, the NRC cannot be confident that the proposed offsets are likely to be regarded as improving or maintaining environmental outcomes.

The NRC is encouraged however by the addition of revegetation as a potential offset in *some* circumstances, as it potentially allows the CMA to take a strategic approach to vegetation management, say for example, connecting remnant vegetation patches with large-scale corridor plantings (and promoting CAP targets). However, this option needs to be weighed against the potential risk in the continued loss of faunal species which is only gradually offset by adequate habitat (e.g. hollow bearing trees) as revegetation matures over time.

3.6 Efficiency gains

A central assertion in favour of the proposed changes is that they will shorten the assessment process for clearing applications, helping to overcome a backlog of applications and long processing times in some regions.

The NRC has heard assessment and processing times for broadscale clearing proposals for the vegetation categories proposed in Chapter 8 can range anywhere between a few days to over 2 years in extreme cases. Even after extensive processing and assessment has occurred, a landholder may decide not to proceed with a property vegetation plan.

The NRC is supportive in principle of any approach that can reduce costs and processing times while still maintaining and improving environmental outcomes. However, there is still some uncertainty around how much time efficiencies can be achieved using Chapter 8.[7] For example, through its consultation the NRC heard efficiency gains of anywhere between 5 and 75% in assessment and processing times (depending on the vegetation category and type and other factors).

Additionally, efficiency gains are likely to also be reliant on software amendments to tools and systems such as NVAT and PVPS Agreement Data and Customer Service (PADACS) and training CMA staff if Chapter 8 is adopted.

[7] The NRC understands that a cost benefit analysis of the proposed amendments is being prepared, but at this stage the NRC has not reviewed the outcomes of this analysis.

4 The challenges of consulting on practical amendments

Ultimately there is insufficient scientific and practical trial information for the NRC to conclusively determine whether the proposed amendments are likely to improve operation and functionality of the decision support tool or not.

Similarly, some stakeholders have been unable to meaningfully review the proposed amendments given the available information. This illustrates the challenge of meaningfully consulting stakeholders about amendments to such a complex methodology applying in different regions across NSW.

By contrast, when a working group of (then) Department of Environment and Climate Change, CMAs and scientists developed a new Invasive Native Scrub module for the EOAM in 2006, the group conducted field trials before proposing the changes and included these with a detailed review of the science underpinning the changes.[8]

4.1 Stakeholder feedback on the proposed amendments

Some parties expressed concern that the desire for administrative efficiencies may undermine the intent of the Native Vegetation Act 2003. The Environmental Defender's Office of NSW (EDO) argued:

> *"While there may be areas of the assessment process that could be made more efficient (and user friendly for both CMA officers and landholders), the EDO is concerned that the fast tracking of assessments for the 5 categories is designed to meet an application assessment timeframe goal rather than an ecological goal as required by the Act."*[9]

Other parties have found it very difficult to anticipate the impact of the changes without the benefit of field trials and because of the limited documentation underpinning them. For example, Industry and Investment NSW argues:

> *"…supports the intention of the proposed changes* [however]*…In reviewing Chapter 8 as it is currently written it is difficult to ascertain whether the revised assessment process, in the case of the five native vegetation categories, will actually result in a streamlined approval process."* [10]

In practice, only those CMA vegetation assessment officers directly involved in developing the tool have sufficient direct experience to feel confident with its ultimate operation. This is not surprising given the complexity of managing native vegetation at such a detailed scale. Those not directly involved can readily engage with the bigger policy issues in this area, but need to see the practical demonstration of any amendments to the EOAM to judge their merits.

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8 NRC, *Advice to the Minister: Amendments to the EOAM, Chapter 7 Invasive Native Scrub*, September 2006.

9 EDO, Submission on the *Environmental Outcomes Assessment Methodology under the Native Vegetation Act 2003*, 21 January 2011.

10 NSW Industry & Investment, submission to the NRC, 25 January 2011.

4.2 CMA feedback on the proposed amendments

The proposed amendments are in response to issues raised by CMAs to improve the operation and functionality of the assessment tools.

In general, those CMAs who have been actively involved in developing the amendments support them, while some of those not involved remain uncomfortable.

The NRC attended workshops with DECCW and CMA native vegetation staff to consider how specific field examples might be affected by the proposed amendments.

The proposed amendments made sense on paper. However, the NRC and CMA staff found it difficult to anticipate the impact of the proposed amendments without trialling of a 'beta version' of how the amendments might be coded into the software.

4.3 Could field trials of proposed amendments be done?

In May 2009, the NRC provided advice to the Minister on a set of proposed amendments to the EOAM. In that advice, the NRC noted the commonly held view that field testing of proposed amendments was impractical. Instead the NRC recommended a periodic review of the operation of the EOAM as a whole and more transparent public reporting.

The NRC now believes that even though field testing may well require a prototype version of the NVAT to be built outside the main computer system, this would seem a worthwhile investment in allowing testing of amendments which are intended to save time and deliver better outcomes in negotiations with landholders in the field.

In all likelihood the way in which CMAs implement the amendments may have as significant an impact in the field as the 'on paper' amendments themselves. DECCW trains CMAs in using the tool and retrains when amendments are made. Field trials would allow the testing to verify how the proposed amendments would in fact be implemented by CMAs.

Broader stakeholders should also have access to information and specialised knowledge on how the tool is operating in line with Governments stated policy positions, so they can satisfy themselves that CMAs are using the tool appropriately and it is delivering good outcomes.

4.4 Options for publicly demonstrating the tool is effective

Environmental stakeholders have previously sought more independent and systematic assessment of the operation of the EOAM in the field. They remain interested in being consulted about ongoing changes to the current methodology, but are also asking whether the overall EOAM is working as intended or not.

For example, in response to a previous set of proposed amendments, the EDO argued:

> *"It is unclear to what extent this review evaluated whether the EOAM properly values biodiversity at a site. It is also unclear to what extent the EOAM has been tested and monitored over the four or so years of its operation to provide the data needed to undertake such an evaluation.*
>
> *On-going independent and systematic testing and monitoring of the EOAM across different sites and landscapes is vital to the ecological integrity of the EOAM and the results of such testing and monitoring should be considered in reviews such as this one.*
>
> *Without such testing, sites that are actually of highest value to biodiversity may be being lost over sites of lower value."* [11]

Similarly, the Total Environment Centre was looking for "independent audit" of the success of the current EOAM before Government made any changes to it.[12]

The NRC believes the Minister should establish periodic audits and public reports on the operation of the EOAM and its compliance with the Government's policy settings in the EOAM. NSW is well past the point in implementing the current EOAM, where an independent review should be completed of how CMAs are in fact using the tool in the field.

The most effective form of such reporting is likely to be an annual report based on auditing a representative sample of PVPs across NSW, to 'ground truth' the available PVP performance data and illustrate operation of the EOAM with appropriately anonymous case studies.

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11 EDO, *Submission to the review of EOAM*, 29 April 2009, page 2. See NRC (2009) *Review of proposed amendments to the Environmental Outcomes Assessment Methodology – Chapters 2 and 5 (Biodiversity.* Natural Resources Commission, Sydney. This argument was further reinforced in their submission to this review.

12 Total Environment Centre, *Email on the review of EOAM*, 27 May 2009. See NRC (2009) *Review of proposed amendments to the Environmental Outcomes Assessment Methodology – Chapters 2 and 5 (Biodiversity),* Natural Resources Commission, Sydney.

Attachment 1 List of submissions

The NRC received written submissions from the following:

1. Combined submission from environmental groups—led by Natural Conservation Council
2. Environmental Defender's Office of NSW
3. Industry and Investment NSW
4. Lower Murray Darling Catchment Management Authority
5. Namoi Catchment Management Authority
6. Mr Ron Sokolowski

Attachment 2 Peer review – Ecological Australia

Proposed Changes to EOAM

An Independent Review

Prepared for
Natural Resources Commission

02 February 2011

DOCUMENT TRACKING

ITEM	DETAIL
Project Name	Proposed Changed to EOAM – An independent Review
Project Number	11COFNRM-0001
File location	H:
Prepared by	Julian Wall
Reviewed by	Andrew Morison
Status	Final
Version Number	1
Last saved on	02 Feb 2011

This report should be cited as 'Eco Logical Australia 2011. *Proposed Changed to EOAM – An Independent Review*. Project 11COFNRM-0001 prepared for NSW Natural Resources Commission. February 2011.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Todd Maher and Pia Zadnic of the Natural Resources Commission.

Executive Summary

Changes to the Environmental Outcomes Assessment Methodology (EOAM) are proposed that would streamline assessment of applications to undertake broadscale clearing in NSW. Proposed changes are encompassed within a new draft Chapter 8 of the EOAM, and include five vegetation categories and related filter criteria and offsets.

This report advises whether the proposed new EOAM Chapter 8 is likely to maintain or improve environmental outcomes as required under the *Native Vegetation Act 2003*, and whether it is based on the best available knowledge on native vegetation management.

The report finds that Chapter 8 is not based on the best available knowledge on native vegetation management and in some circumstances could result in perverse environmental outcomes, particularly for applications that propose to remove paddock trees and clumps of trees that exhibit important landscape values. It finds that Chapter 8 may not streamline the assessment process as the gross number of applications to clear vegetation may increase, and it is possible that landholders may insist on trialling both options. It also finds that testing has been inadequate as it has not included PVP applications that 'red-lighted' using the standard assessment process (to ensure they don't 'green-light' under Chapter 8).

It is recommended that the proposed Chapter 8 be rejected in its current form.

Instead, it is advised that consideration be given to exploring ways in which the *current* methodology could be streamlined. Improving the benchmark database, reviewing fieldwork requirements and constructing a statewide functional connectivity layer would assist in streamlining assessments.

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1 Introduction

Management of native vegetation on rural lands in NSW is administered under the *Native Vegetation Act 2003* (NV Act). The main objective of this Act is to end broadscale clearing except where it will 'improve or maintain' environmental outcomes. The Environmental Outcomes Assessment Methodology (EOAM; DECCW 2010) is a technical document supporting the NV Act that sets out circumstances in which broadscale clearing is to be regarded as improving or maintaining environmental outcomes.

Under the current EOAM framework, any proposal to clear native vegetation (other than invasive native scrub) is assessed against four environmental values – water quality, salinity, biodiversity and soils – each of which must be maintained or improved for the proposed clearing to be permitted. This outcome may or may not involve the use of offsets.

Amendments to the EOAM are currently being considered that seek to streamline the assessment and reduce administrative processing times while continuing to improve or maintain environmental outcomes. Amendments include minor changes to Chapter 2 and insertion of a new Chapter 8 entitled "Streamlined Assessment of Certain Vegetation Categories".

The proposed amendments relate to native vegetation that falls into one of five categories (section 8.4.1):

- low condition native vegetation including paddock trees;
- scattered paddock trees and clumps of trees not in low condition;
- not viable or low viability vegetation that is not in low condition and is overcleared vegetation;
- the Mitchell landscape and vegetation type are 0% - 10% cleared; and
- small areas that are part of larger areas of native vegetation.

The proposed amendments also require that broadscale clearing meet a number of filter criteria within each of the four environmental values (section 8.4.2), and require certain offsets to maintain or improve environmental outcomes (section 8.4.3).

The intent of the amended version of the EOAM is that it will reduce the time taken for CMA personnel to complete Property Vegetation Plans while maintaining current environmental outcomes.

2 Scope

Eco Logical Australia was contracted by the Natural Resources Commission in January 2011 to provide expert advice on proposed changes to the EOAM.

The key tasks to be completed include:

1. advise whether the proposed new EOAM Chapter 8 is likely to maintain and improve environmental outcomes as required under the Native Vegetation Act 2003, with particular attention to:

    - whether the vegetation categories for streamlined assessment and related definitions (section 8.4.1 of the new chapter) are scientifically credible, robust and defendable and generally sound for the landscape types these vegetation categories are likely to be found in;

    - whether the filter criteria (section 8.4.2 of the new chapter), collectively and individually are scientifically credible and robust assessments so as to ensure environmental outcomes are maintained and improved (as defined by the EOAM and regulations) where broad scale clearing is proposed; and

    - whether the offset requirements (section 8.4.3) of the new chapter can be regarded as scientifically credible and robust so as to ensure environmental outcomes are maintained and improved (as defined by the EOAM and regulations) where broad scale clearing is proposed.

2. advise whether the proposed new EOAM Chapter (8) is based on the best available knowledge on native vegetation management.

This review presents a brief overview of landscape ecology literature relevant to population viability and connectivity of remnant clumps of trees and paddock trees, as these are largely the focus of the Chapter 8 amendments. This provides context in addressing the key tasks as stated above.

This review is partly informed by outcomes of a workshop convened in Orange on 17 – 28 January 2011 to discuss and trial the proposed amendments (attended DECCW and Catchment Management Authorities (CMAs) and independent observers).

3 Landscape Ecology - Review

3.1 POPULATION VIABILITY

The theory of metapopulation biology asserts that a number of small physically isolated populations that are linked by some level of connectedness that facilitates dispersal can collectively function as one larger, more resilient population (Brown and Kodric-Brown 1977; Harrison 1991). Dispersal of individuals among populations is a critical ecological process as it can maintain genetic diversity, rescue declining populations, and re-establish extirpated populations (Calabrese and Fagan 2004). Sufficient movement of individuals between isolated, extinction-prone populations can allow an entire network of populations to persist via metapopulation dynamics (Hanski and Gilpin 1991). As areas of natural habitat are reduced in size by human activities, the degree to which the remaining fragments are functionally linked by dispersal (i.e. their connectivity) becomes increasingly important (Calabrese and Fagan 2004). If individual sub-populations are too small to be viable in their own right, and isolation prevents dispersal of individuals, the combination of stochastic and anthopogenic impacts can result in rates of local extinction that exceed the rate of recolonisation (Lambeck 1997). As observed in empirical studies, the extinction probability of a local population is largely determined by its size, which is often approximated by patch area, and the colonization probability of an empty habitat patch is mainly determined by its connectivity to existing local populations (Moilanen and Nieminen 2002).

3.2 CONNECTIVITY

Landscape connectivity is referred to as either 'structural connectivity' which is an index of the connectedness of the native vegetation across landscapes (Bélisle 2005), or 'functional connectivity' which relates to the capacity of individuals to disperse across the landscape (Beier and Noss 2007). Examples of structural connectivity include linear elements such as corridors, clearly separated clumps of trees and individual paddock trees, and partially vegetated drainage lines or fence lines. It may consist of more subtle habitat elements such as scattered shrubs, or even scattered clumps of tussock grass, rocky outcrops, or coarse woody debris, all of which are referred to as 'stepping stones' because of their scattered, non-linear structure (Doerr et al. 2010). Functional connectivity is distinguished from structural connectivity in the context that conservation value accrues to stepping stones only if animals in real landscapes actually use them to bring about connectivity (Beier and Noss 2007). That is, if structural connectivity comprises in a series of small log piles, and those features are able to facilitate movement and/or dispersal of certain reptile species across the landscape, then those structural elements (i.e. the structural connectivity) manifest themselves as functional connectivity. Non-contiguous habitat patches of native vegetation are connected functionally if a species can cross the non-habitat area (matrix) successfully and move between habitat patches (Tischendorf and Fahrig 2000).

Understanding how loss of functional connectivity might impact species is important in the context of this review. For one, conservation biologists generally agree that landscape connectivity enhances population viability for many species and that until recently most species lived in well connected landscapes (citations in Beier and Noss 2007). It is well established that landscape connectivity in Australia is critical to the maintenance of viable populations of many of Australia's fauna species (e.g. Recher 1999; Ford et al. 2001; Vesk and MacNally 2006; Briggs et al. 2007; Drielsma and Ferrier 2009; Doerr et al. 2010) and that vegetation fragmentation reduces populations. For example, the scale and geographic scope of population decline among Australia bird species as a response to fragmentation is

well established (Kitchener et al. 1982; Saunders and Curry 1990; Robinson and Traill 1996; Watson et al. 2003). One bird species (Paradise Parrot) has become extinct on the Australian mainland, and comparison of reporting rates between the first and second volumes of the 'Atlas of Australian Birds' has provided quantitative evidence of decreases in several other species of woodland birds (Barrett et al. 2003).

Although connectivity of landscapes is highly scale dependent and varies for organisms with different dispersal behaviour (e.g. Keitt et al. 1997), recent work establishes some critical metrics for which connectivity will continue to function for many species. Doerr et al. (2010) estimated critical gap crossing and inter-patch crossing distance thresholds from data associated with a set of structural connectivity studies. A mean gap-crossing threshold of 106 m was calculated, indicating that many species can still move if gaps between elements of structural connectivity exceed 100 m. For example, some foliage-foraging bird species such as the medium-sized White-plumed Honeyeater and Black-faced Cuckoo-shrike, and the smaller Striated Pardalote, have been frequently observed to cross large gaps (>100 m) (Fischer and Lindenmayer 2002). Doerr et al. (2010) also calculated a mean inter-patch crossing threshold of 1,100 m, indicating that many species are able to disperse between patches of habitat separated by more than 1 km.

3.3 PADDOCK TREES

Paddock trees have been described as 'keystone structures' in agricultural landscapes because of the disproportionately large ecological values and ecosystem services they provide relative to the area they occupy in these landscapes, and the low density of scattered trees collectively (Manning et al. 2006, 2009). Paddock trees provide a range of ecosystem services that are summarized by Gibbons and Boak (2002), including: provision of habitat for species that feed on pollen, nectar, seed and invertebrates; provision of nesting hollows; interception of water thus mitigation of salinity; natural mitigation of erosion; habitat for native vertebrate and invertebrate fauna which can help control pest invertebrate species; maintenance of neutral pH and improved soil friability in the root zone; and a seed source to undertake restoration activities. Manning et al. (2006) describe the critical role that large scattered trees play as 'biological legacies' - individuals of species which are able to persist after disturbance. These trees provide 'regeneration nuclei' or focal points in the landscape from which ecosystems might be recovered, and provide a source of energy and nutrients for other organisms, and stabilise environmental conditions (Manning et al. 2006).

Arguably the most important service of paddock trees is their contribution to functional connectivity within fragmented landscapes, thus their role in maintaining viable sub-populations of various species of birds, reptiles and other fauna (in which only one movement per generation is sufficient to prevent in-breeding - Mills and Allendorf 1996). Scattered trees can make landscapes effectively 'useable' for many woodland and forest organisms, through provision of stepping stones for movement (i.e. 'permeability') of plants and animals, as well as provision of foraging habitat, nesting sites or shelter from weather or predators. For many organisms, scattered trees provide all their requirements so that they can complete their life cycle by using them, while others use scattered trees some of the time (Manning et al. 2009).

Various studies have considered the role of paddock trees and clumps of trees in landscape connectivity. For example, Fischer and Lindenmayer (2002) assessed the use of paddock trees in a grazing landscape in southern NSW and found that many birds commonly detected in woodland patches (e.g. Striated Pardalote, Scarlet Robin and Grey Shrike-thrust) were also common in paddock trees. They suggested that the value of paddock trees may have been under-estimated in the past because a wide variety of bird species use paddock trees on a regular basis. This viewpoint was

vindicated recently by Fischer et al. (2009) who estimated that of a conservative 100 bird, 25 mammal and 25 reptile species inhabiting eucalypt woodlands of the Upper Lachlan catchment, scattered trees were used as the primary or complementary habitat by well over half these species. Insectivorous bats are known to forage around the canopies of scattered trees (Law et al. 1999, 2000) and a range of ground-dwelling invertebrates have been documented under paddock trees in south-eastern Australia (Oliver et al. 2006). Arnold et al. (1993) radio-tracked the movement of wallaroos in a fragmented landscape and recorded longer movement distances across farmlands that contained patches of trees or fence lines with native vegetation.

Given that fragmentation is among the main processes threatening biodiversity (Saunders et al. 1991), ensuring the continued survival of paddock and scattered trees should be an important aspect of future conservation efforts in Australian grazing landscapes (Fischer and Lindenmayer 2002). Yet paddock trees are declining in rural NSW due to a number of factors including: the 400-500 year lifespan of paddock trees (i.e. trees retained during extensive clearing through the 1800s will progressively die from old age); high rates of mortality due to elevated nutrient loads, salinity and soil compaction; absence of clearing restrictions imposed on single paddock trees within relevant legislation; and absence of natural regeneration in grazed or cultivated paddocks (Gibbons and Boak 2002). This progressive loss is likely further fragment the vegetation of rural landscapes, particularly in the sheep-wheatbelt. For example, in an 800,000 ha section of south-eastern Australia, Fischer et al. (2009) stated that under conventional agricultural management "millions of hectares of land currently supporting tens of millions of trees will be treeless within decades from now". This is supported by Gibbons et al. (2008) who modelled a 50% decline in the abundance of Yellow Box *Eucalyptus melliodora* within the same region within 50 years, and complete loss of the scattered Yellow Box within 180 years.

The impact of such widespread loss of paddock trees and small clumps of trees on landscape connectedness is exemplified in a study by Gibbons and Boak (2002) within a 30,000 ha area of the South-west Slopes of NSW. The authors found that over half the total tree cover occurred within patches < 1 ha, and that mean distance to any tree cover at any point in the region increased almost five-fold, from 80 m to 380 m, if all remnant patches < 1 ha were removed. This magnitude of fragmentation would surpass the threshold of many species to move around the landscape, and would thus contract the effective habitat area of such species.

3.4 NATIVE GRASSLANDS

The conservation significance of native grasslands in NSW is high. They have been extensively cleared for cultivation and cropping in the past, are poorly represented in the formal reserve system, are exposed to a number of ongoing threats, and play a key role in ecological function across rural landscapes (ELA 2009). Native grasslands support a multitude of specialist flora species, including 47 listed as either endangered or vulnerable under State and/or Federal legislation (e.g. Bluegrass, Coastal Headland Pea, Monaro Golden Daisy and Mountain Swainson-pea) and at least 50 grassland dependent vertebrate fauna species (including 20 threatened species) including Eastern Grass Owl, Grassland Earless Dragon, Long-haired Rat, Plains-wanderer, Stripe-faced Dunnart and Striped Legless Lizard) and unknown diversity of invertebrates (ELA 2009). Many extensive areas of grassland in eastern NSW are derived from the broad-scale clearing of forests and woodlands, often with remnant patches or linear strips of original habitat remaining in the landscape. These anthropogenic or derived native grasslands provide suitable habitat for a diverse range of avian species, including several grassland specialists. While derived grasslands are often simpler in structure and floristics than their former structure, they can continue to support a high diversity of flora and fauna, and provide a more 'permeable' matrix across which animals can move in the landscape.

4 Chapter 8 - Review

4.1 INTRODUCTION

The proposed Chapter 8 of the EOAM, entitled "Streamlined assessment of certain vegetation categories", sets out the circumstances in which broadscale clearing of certain categories of vegetation is to be regarded as improving or maintaining environmental outcomes under the NV Act. The streamlined nature of the assessment process outlined in Chapter 8 is designed to provide a more efficient determination of whether a broadscale clearing proposal for certain vegetation categories improves or maintains environmental outcomes, accounting for filter criteria and offset requirements.

This section provides a review of Section 8.4.1, 8.4.2 and 8.4.3 of the proposed Chapter 8 of the EOAM; with respect to whether maintain and improve environmental outcomes would be achieved.

4.2 CANDIDATE VEGETATION

4.2.1 Definitions

According to Section 8.4.1 of the proposed Chapter 8, broadscale clearing may only be assessed if the vegetation proposed falls under one or more of five categories.

1. Native vegetation in low condition, which is define as either:

    i. Paddock trees exhibiting an overstorey foliage cover less than 25% of the lower percent foliage cover benchmark for the vegetation type, and where less than 50% of the groundcover vegetation constitutes native species, or more than 90% of the area is either ploughed, fallow or non-protected regrowth.

    ii. Native grassland, wetland or herbland where less than 50% of the groundcover vegetation constitutes native species, or more than 90% of the area is ploughed, fallow or non-protected regrowth.

2. A clump or clumps of native trees or scattered native trees, where:

    i. A clump of native trees is a small area of native vegetation (usually ranging in area from 0.25 ha to 10 hectares) that partly or fully comprises trees, and that is not in low condition, is not an overcleared vegetation type, and is either devoid of groundcover, or the groundcover comprises less than 50% indigenous species; and

    ii. Scattered trees is native vegetation dominated by native trees that is not in low condition, is not overcleared vegetation, has an overstorey foliage cover of 25-50% of the lower percent foliage cover benchmark for the vegetation type, and is either devoid of groundcover, or the groundcover comprises less than 50% indigenous species.

3. Native vegetation other than low condition native vegetation that has been assessed as not viable or of low viability, using one or more of the following criteria:

    i. Current or known future land uses surrounding the vegetation to be cleared reduces its viability;

ii. The size and connectedness of the vegetation to be cleared is insufficient to maintain its viability;

iii. The condition of native vegetation to be cleared is substantially degraded resulting in loss of or reduced viability.

Derived grasslands are only included here if they are below 90% of the benchmark richness for their vegetation type, or they are in Hunter Central Rivers or Northern Rivers CMA regions.

4. Native vegetation represented by a vegetation type that is less than 10% cleared, and which occurs in a Mitchell Landscape that is less than 10% cleared.

5. Up to two hectares of any vegetation that is not in low condition that is contiguous with or included within any larger area of vegetation.

4.2.2 Comments

In summary, candidate native vegetation that is subject to streamlined assessment under Chapter 8 includes paddock trees, scattered trees, small clumps of trees, and small parts of major contiguous patches, as well as low condition grassland, wetland or herbland, and specific types of derived grasslands.

The elements above that comprise native trees are commonly the focus of scientific literature that considers viable populations, viable habitat areas, and functional connectivity (section 3). In respect of this emerging literature in which paddock trees, small clumps of trees, and contiguous habitat (patch size) are all known to contribute to the viability of sub-populations of many native species in NSW landscapes, it would appear on face value that the new EOAM Chapter 8 is not based on the best available knowledge on native vegetation management, and that any policy, regulation or legislation that seeks to relax the conditions around broadscale clearing of such features should be very closely scrutinised.

Labelling paddock trees as 'low condition' because they are well below benchmark canopy cover and groundcover nativeness ignores their potential significance to landscape function. Mobile fauna (including many woodland birds) do not generally require the vegetation type represented by paddock trees, scattered trees and clumps of trees to be in good condition. Moreover they require the trees themselves to be present as stop overs so they can move between areas of preferred habitat. Ironically, removal of paddock, scattered and clumps of trees has little implication in the context of vegetation condition, but has major implication for loss of functional connectivity and population viability. These points are pertinent to Section 8.4.2 of the proposed Chapter 8 which addresses Landscape Value (section 4.3).

As NSW has lost about 50% of the former extent of contiguous forests and woodlands, mainly through agricultural development over the past 150 years, it is surprising that Chapter 8 would propose further clearing of intact or contiguous forest and woodland. There are four types of forest and woodland that is considered 'intact or contiguous' under 8.4.1.

1. Clumps of trees to 0.5 ha to 10 ha.

   Many areas of the sheep wheatbelt of central NSW are highly fragmented or relictual, where small remnants and paddock trees make up the majority of the remaining tree cover (e.g.

Gibbons and Boak 20010). Removal of larger remnants to 10 ha would appear to be at odds with the stated aims of landscape conservation, which suggest retention of these patches.

2. Native vegetation that has been assessed as not viable or of low viability.

   Vegetation that is proposed to be cleared is assessed as 'not viable or of low viability' according to one or more of the following criteria:

   i. the current or known future land uses surrounding the vegetation to be cleared reduce its viability or make it unviable.

      Section 8.3 Definitions includes the following notes associated with this criterion:

      Relatively small areas of native vegetation (eg patches of a few hectares or less) surrounded or largely surrounded by intense land uses such as intense cropping can be unviable or have low viability because of disturbances from the cropping including edge effects.

   ii. the size and connectedness (with other native vegetation) of the vegetation to be cleared is insufficient to maintain its viability.

      Section 8.3 Definitions includes the following notes associated with this criterion:

      Relatively small areas of isolated native vegetation (eg patches of a few hectares or less that are more than several hundred metres from the next patch of native vegetation) can be unviable or have low viability.

   iii. the condition of native vegetation to be cleared is substantially degraded resulting in loss of or reduced viability.

      Section 8.3 Definitions includes the following notes associated with this criterion:

      Native vegetation in degraded condition can be unviable or have low viability. Degraded condition means substantially outside benchmark in the majority of vegetation condition variables listed in 5.3.4, but does not necessarily meet the strict definition of 'low condition'. Vegetation that is substantially outside benchmark due to recent disturbance such as a fire or a prolonged drought is not considered degraded

Because there appears is no specific area threshold that relates to this category of vegetation - points (i) and (ii) above state *"relatively small .... e.g. patches of a few hectares or less* - there is a risk here that a larger patch of vegetation might be wrongly interpreted as "relatively small" if it meets either of the first or second viability criteria. There are many cases in NSW in which larger patches of vegetation (e.g. in excess of 10 ha) are entirely surrounded by cropland, and such patches could feasibly be included within the first viability criterion. Likewise, there are many cases in NSW in which larger patches of vegetation (e.g. in excess of 10 ha) are isolated in the landscape and such patches could feasibly be included within the second viability criterion. It is suggested that "relatively small" in points (i) and (ii) of the above definitions of "not viable of low viability" be replaced with a specific maximum area, preferably 2 ha or less.

It is suggested that the first and second criteria be made mandatory, and that an alternative threshold with a rule of thumb imposed for the second criterion that only considers patches up to a maximum of 4 ha, and those surrounded by at least 200 m of land use that make the patch unviable (i.e. land use in which native vegetation has been entirely removed).

3. Native vegetation where the Mitchell landscape and vegetation type are less than 10% cleared.

   McIntyre and Hobbs (1999) developed a framework in which landscapes were described as a continuum of intact, variegated, fragmented and relictual, where intact landscapes contain at least 90% native vegetation cover, exhibit little or no degree of destruction of habitat, high connectivity, and a low degree of modification. We thus oppose this category where it coincides with large, intact patches of forest and woodland in the Central and Eastern Divisions of NSW. It is well established that large remnants support a richer diversity of species than smaller remnants (e.g. Briggs et al. 2007), and are often the strongholds for species forced from their preferred habitat. These types are usually associated with poor soils and poor agricultural productivity, so there is also the risk that broadscale clearing will result in land being used beyond its capability.

4. Up to 2 ha of any native vegetation that is not in low condition that is contiguous with or included within any larger area of vegetation.

   While there will be circumstances in which this will be justified, we oppose this category in general on the grounds that it may result in the incremental loss of native vegetation in NSW. There appears to be no advice as to whether this could occur on a patch by patch basis, how big is a 'larger area of vegetation', and how often it may be permitted.

   Removal of vegetation within a larger patch may reduce the effective habitat area below a threshold that enables successful breeding of certain species. Removal of the periphery of a patch may increase the distance between it and the nearest adjoining patch, decreasing the likelihood of dispersal of certain species. These issues would need to be tested on a case by case basis.

Category 3 includes derived native grasslands that have been assessed as 'not viable or of low viability', are below 90% of the benchmark value of native species richness for the vegetation type, and may include over-cleared vegetation types. It is our view that any derived native grassland that is within 50%-90% of benchmark species richness should be removed from Category 3, as this level of species richness indicates that the grassland may be in reasonably good condition. It is also our view that overcleared vegetation types (e.g. the derived form of Box Gum Grassy Woodland) be removed from Category 3.

Category 5 was included in response to concerns about telecommunications towers not being permitted on private land (as they are on Crown Land) without a full assessment. However, Chapter 8 permits clearing for purposes other than telecommunications towers and no indication is provided about how often and how many 2 ha blocks may be cleared. These need to be clearly stated in Chapter 8.

4.3 FILTER CRITERIA

4.3.1 Definitions

There are four filter criteria that must be met if a proposed broadscale clearing application is to be considered under Chapter 8. These are: water quality assessment; salinity assessment; biodiversity assessment; and soil assessment.

This review only considers the biodiversity assessment filter, which states that broadscale clearing must not be proposed to be carried out in any of the following circumstances:

i. Where the loss of Landscape Value resulting from the proposed broadscale clearing is greater than 10%, as assessed as in 5.3.3.

ii. Where one or more threatened species that cannot withstand loss (as set out in threatened species profile database) are known or predicted to occur on the land on which the broadscale clearing is proposed.

iii. Where trees supporting large stick nests greater than 30 cm are proposed to be cleared.

iv. Where trees with hollows greater than 15 cm diameter are proposed to be cleared.

v. Where the current extent in the CMA area of the vegetation type proposed to be cleared is less than 1000 ha.

4.3.2 Comments

The intent of these filters is to address loss of connectivity, loss of threatened species habitat, and loss of habitat trees. However, we are not convinced that these measures will meet the objectives for which they are intended (i.e. maintain or improve environmental outcomes), nor are we convinced that the science is credible with relation to habitat tree features identified for tree retention (i.e. hollows and stick nests). Each filter is reviewed below.

Landscape Value

Landscape Value is calculated in Section 5.3.3 of the EOAM document. It encompasses fragmentation, connectivity and adjacency of native vegetation around the clearing and offset sites. For fragmentation it considers percent cover of native vegetation in the landscape within 100 ha and 1000 ha areas surrounding the clearing and offset sites. For connectivity it considers linkage widths and linkage condition. For adjaceny is considers size of the remnant patch to which the clearing site is linked, and percentage of the offset site within riparian vegetation.

An issue with the linkages definition in the EOAM is that linkages are *not* considered if the clearing site is greater than 100 m from an adjacent patch of woody vegetation that is not in low condition and is larger than 1 ha. The linkage value is 0 in these cases. While it is beyond the scope of this report to discuss possible shortcomings of the EOAM, this is of particular relevance as vegetation categories 1, 2 and 3 in Chapter 8 are those for which literature suggests that functional connectivity can be maintained between patches up to 1 km apart as long as paddock trees and clumps of trees are interspersed to provide ‘stepping stones’ between those patches (e.g. Doerr et al. 2010). Thus we suggest that Landscape Value is being under-estimated by disregarding linkage values where trees are further than 100m from the adjacent patch.

With respect the improve of maintain test for biodiversity, Section 5.3.1 of the EOAM states that offsets can only improve or maintain environmental outcomes for biodiversity if "*improvement in Landscape Value from the offset is equal to or greater than losses from clearing*". In contrast, filter criterion c.ii. of Chapter 8 states "*broadscale clearing must not be proposed to be carried out where loss of Landscape Value resulting from the proposed broadscale clearing is greater than 10%"*. Because the streamlined nature of Chapter 8 negates assessment of Landscape Value for the proposed offset, a maintain or improve environmental outcome cannot be demonstrated. For example, if a clearing proposal under Chapter 8 finds that the Landscape Value is reduced by 9% as a result of the proposed clearing, then the activity is permissible according to this criterion irrespective of whether the associated offset counters this 9% reduction.

In summary, a loss in Landscape Value of between 0% to 10% as a result of a proposed broadscale clearing event does not demonstrate an improve or maintain outcome for landscape connectivity. This needs to be demonstrated, as the literature asserts that loss of connectivity has negative consequences for population viability.

Threatened species that cannot withstand loss

We have no objection to this filter. It should be noted that the number of species likely to be predicted on each site is unknown, and this filter may limit the use of Chapter 8.

Trees supporting stick nests greater than 30 cm

It is unknown why this threshold has been chosen. Many smaller stick nests are represented by small to medium sized bird species that are considered threatened or declining. If trees that support stick nests are to be protected, then any observed stick nest should be considered (note. presence of stick nests generally indicates some level of viability).

Trees supporting hollows greater than 15 cm

Tree hollows are semi-enclosed cavities in the main truck or major branches that form in mature or senescent trees (primarily eucalypts) as a result of decay of heartwood by fungi and invertebrates and subsequent abscission of major limbs (Wilkes 1982, Mackowski 1984). Hollow entrances are more common in larger trunks and branches because damage is less likely to be occluded by growth of external sapwood (Marks et al. 1986). Thus hollow bearing trees are usually the oldest and often largest members of the tree community, with some species taking up to 300 years to develop hollows (e.g. Wormington et. al. 2003). Old growth trees can continue to provide nesting and breeding hollows, perching places and forage substrate for birds and arboreal mammals long after tree mortality (Lindenmayer et al. 1993), and natural treefall of dead trees continue to provide habitat for a range of ground-dwelling species (MacNally et al. 2001). DBHOB (diameter at breast height over bark) is a strong predictor of occupancy by vertebrate fauna (Mackowski 1984, Saunders et al. 1982, Smith and Lindenmayer 1988, Gibbons et al. 2002) that utilise hollows for diurnal or nocturnal shelter sites, for rearing young, for feeding, for thermoregulation, and to facilitate ranging behaviour and dispersal (GHD 2009).

Numerous fauna species use hollows for shelter, roosting and nesting, and for many species including arboreal marsupials, bats, owls and parrots this use is obligate (i.e. no resource other than hollows can be used - Gibbons and Lindenmayer 2002). It is noteworthy that hollows and cavities in paddock trees are also used by a variety of birds, mammals, reptiles and amphibians (e.g. Gibbons and Lindenmayer 2002; Manning et al. 2004).

We contend that retention of *all* tree hollows is important in rural landscapes in which hollows are generally scarce, not just those above an arbitrary size threshold such as 15 cm that support a subset of hollow-dependent species (threatened and otherwise). We suggest that a DBHOB threshold be established for paddock trees (suggested 80 cm), above which trees cannot be cleared under Chapter 8 as they are likely to support hollows. Detecting trees hollows is often difficult. For example tree hollows are often obscured by branches, and hollow dimensions are commonly under-estimated where they occur high on the main trunk and branches. Large trees that don't appear to have hollows at present, may well develop hollows in the near future as a result of the natural dieback and abscission of large branches. If a DBHOH threshold is used, we would suggest that the 15 cm rule continue to be applied for trees that have a DBHOH less then 80 cm.

Current extent in CMA is less than 1000 ha

This area (1000 ha) appears to have been drawn from the International Union for the Conservation of Nature (IUCN) Threat Status Criteria for assessing the threat status of communities. The second IUCN criteria states that a community is 'critically endangered' if it is very restricted with a total area of occupancy of < 1000 ha and significant degradation or destruction is continuing (see Benson 2006). Thus inclusion of this category would prevent any community in the IUCN category "critically endangered" being considered.

It is also noted that the spatial data that are needed to determine if a community has < 1000 ha remaining is not available within most CMAs in NSW, or is of insufficient quality to ensure a robust estimate, particularly in the rural areas where Chapter 8 will be used most widely. This lack of data makes application of the filter problematic.

4.4 OFFSET REQUIREMENTS

4.4.1 Definitions

Under Section 8.4.3 of Chapter 8, proposed broadscale clearing of native vegetation is regarded as improving or maintaining environmental outcomes if certain offsets are provided and secured. These offsets are summarised for paddock trees in Table 1 and for other candidate vegetation in Table 2.

4.4.2 Comments

In relation to whether the proposed offsets would result in an improve or maintain environmental outcome, we advise the following:

Paddock trees (Table 1) are often relatively old relics of cleared landscapes, up to 400-500 years old (Gibbons and Boak 2002). Their importance is more than the condition of the former vegetation type that they represent – it is also their specific location in the landscape for the purpose of functional connectivity, and their provision of habitat for various species. If one removes a number of paddock trees within a proposed clearing site, then the offsets proposed may well lead to a maintain or improve outcome with respect to inherent condition of the vegetation, but that may not be the case with connectivity, and that overall the result would be negative for species that rely on such trees for temporary refuge as they move across the landscape, or as habitat in its own right.

It is our view that Offset 1C in Table 1 would not lead to a maintain or improve result. Replacing the habitat features of felled paddock trees with those planted or sown at the offset site would take many decades, as hollow development is invariably slow (e.g. Wormington et. al. 2003). It follows that there would be a net decline in provision of hollow bearing trees (coupled with loss of functional connectivity)

for many decades, and over that timeframe there would be no guarantee that the offset would deliver its stated objective, however well intentioned. Rural native plantings often fail or are neglected over the years.

For candidate vegetation other than paddock trees (Table 2), we are concerned that threatened (and other) native fauna will have access to, and will be using, the clearing site and the offset site at present, but as a result of clearing, will have lost their access to an area of habitat for many decades, and that the final area and connectivity values may never be regained. Again, the offsets probably work in the context of long-term improvement in vegetation condition, but the question is whether an already declining suite of native fauna species are able to persist in the period over which the offset site attains the quality and extent of habitat relinquished at the clearing site. Given many species are known to be declining now (threatened species and other), we doubt these measures will be successful.

For threatened flora, the offset site must gain at least the number of individuals that was lost from the clearing site. This is doubtful. If an offset site contains a population of threatened flora, those numbers are 'at a point in time' and are likely to have fluctuated about that point, and will continue to do so with climatic and seasonal changes at the site. At the clearing site, flora will be removed, so we anticipate a net loss over the long term.

Section 8.4.3.3 states that additional environmental benefits for one or more of biodiversity, water quality, salinity and/or soils are required when the vegetation in vegetation category 3 that is proposed to be cleared, is overcleared vegetation. The additional environmental benefits must be provided in addition to the required offsets, and must be appropriate for the area of vegetation that is proposed to be cleared. Additional environmental benefits include improving condition of riparian areas, improving groundcover (including by planting or by tillage or grazing practices), and controlling feral carnivores. Vegetation in vegetation category 3 that is overcleared vegetation can only be proposed for clearing if an accredited expert has certified that the additional environmental benefits are appropriate for the area of vegetation that is proposed to be cleared. We have no objection to this section.

Table 1. Tabular summary of offset requirements for paddock trees outlined in Section 8.4.3.

One or more of the Offsets below (1A, 1B, 1C, 1D) are required	Threatened species (flora and/or fauna) occur or are predicted to occur on the land proposed for clearing	Threatened species (flora and/or fauna) do not occur or are not predicted to occur on the land proposed for clearing
1A. Number of trees which is:		
a. Five times the number of trees proposed to be cleared; and	✓	✓
b. with the same or greater dbhob and with the same or greater number of hollows as the trees proposed to be cleared are managed on the offset site to reach benchmark over-storey cover or benchmark number of hollows, and	✓	✓
c. the trees are habitat tree species as the trees proposed to be cleared (where habitat tree species are specified in the threatened species profile database).	✓	na
1B. A number of trees which is:		
a. ten times the number of trees proposed to be cleared, and	✓	✓
b. with lower dbhob or with lower number of hollows as the trees proposed to be cleared are managed on the offset site to reach benchmark over-storey cover or benchmark number of hollows, and	✓	✓
c. the trees are habitat tree species as the trees proposed to be cleared (where habitat tree species are specified in the threatened species profile database).	✓	na
1C. An area of land:		
a. which is ten times the area of land measured as if the trees proposed to be cleared were at benchmark over-storey cover, and	✓	✓
b. the trees are planted or sown on the land and managed to reach benchmark overstorey cover, and	✓	✓
c. the trees are habitat tree species as the trees proposed to be cleared (where habitat tree species are specified in the threatened species profile database).	✓	na
1D. The offsets for paddock trees which are described in 5.8.	✓	✓

Table 2. Tabular summary of offset requirements for candidate vegetation other than paddock trees, outlined in Section 8.4.3.

One of the Offsets below (2A, 2B) is required	Threatened species (flora and/or fauna) occur or are predicted to occur on the land proposed for clearing	Threatened species (flora and/or fauna) do not occur or are not predicted to occur on the land proposed for clearing
2A. An area of land where: - the gain in the area of habitat of threatened species (fauna) with management actions equals or exceeds the loss of habitat from the proposed broadscale clearing on the clearing site (as calculated in accordance with 5.8).	✓	na
- an area of land where the gain in Site Value with the management actions calculated in accordance with 5.3.4 is equal to or greater than the loss in Site Value on the land proposed to be cleared.	na	✓
2B. Where all management actions for the threatened species (fauna) that occur or are predicted to occur in the native vegetation on the land on which broadscale clearing is proposed are applied on the land proposed as an offset, an area of land where the gain in Site Value with the management actions calculated in accordance with 5.3.4 is twice or more than the loss in Site Value on the land proposed to be cleared.	✓	na
2B. An area of land: a. which is ten times the area of land measured as if the trees proposed to be cleared were at benchmark over-storey cover (or at benchmark groundcover if non-woody vegetation), and where b. native over-storey, mid-storey and groundcover species (as applicable for the vegetation type) is/are planted, sown or regenerated on the land and managed to reach benchmark levels for the condition attributes in Table 5.7.	na	✓
The following offset is required where threatened species (flora) that occur on the site will be cleared by the broadscale clearing: An area of land where the gain in number of individuals of threatened species (flora) with management actions equals or exceeds the loss in individuals from the proposed broadscale clearing (as calculated in accordance with 5.8).	✓	na

5 General Observations

5.1 STREAMLINED ASSESSMENT

A workshop was convened in Orange NSW on 27 – 28 January 2011 to test the streamlined Chapter 8 assessment using data from approved PVP-Developer Projects. The major findings of this workshop were:

- The attendees considered that an average time saving for individual assessments would generally range from be 5% to 25%, depending on CMA and vegetation category assessed.
- Most of the time saving would be associated with not having to calculate offsets (these are stated up-front), and not having to run the Site Value (BioMetric) in many cases.

Despite the above time savings, there are two major risks to the streamlining:

1. It is possible that landholders may request that Chapter 8 and Chapter 3-6 assessments *both* be undertaken to determine which might be the more reasonable outcome in terms of offsets, or if Chapter 8 gives a red light, then try the original approach. This would lead to a time loss.
2. There is a risk that overall time savings may be negated if there is a surge of new proposals in response to Chapter 8 going public and being seen as 'a way out' by landholders seeking to clear 8.4.1 categories. One comment at the workshop was that there may be cases in which landholders choose to reassess red-lighted or orange-lighted PVP proposals using Chapter 8, in an attempt to get a more favourable outcome.

5.2 POTENTIAL LOOP HOLES

We are concerned that some of the wording in Chapter 8 could be used to achieve perverse outcomes. Three examples are provided below:

Note: A clump of native trees usually ranges in area from 0.25 hectares to 10 hectares (page 2)

The word 'usually' in this sentence implies that clumps could also be less than 0.25 ha or greater than 10 ha.

Notes:
(i) Relatively small areas of native vegetation (eg patches of a few hectares or less) surrounded or largely surrounded by intense land uses such as intense cropping can be unviable or have low viability because of disturbances from the cropping including edge effects.

(ii) Relatively small areas of isolated native vegetation (eg patches of a few hectares or less that are more than several hundred metres from the next patch of native vegetation) can be unviable or have low viability (page 3)

The use in the above points of 'relatively', 'e.g.', 'a few', 'largely' and 'can be' could lead to inconsistencies in the way 'not viable or low viability' vegetation is identified, within and between CMAs.

5. *Up to two hectares of any native vegetation that is not in low condition that is contiguous with or included within any larger area of native vegetation* (page 5)

The term "any larger area of vegetation" in Category 5 vegetation could be interpreted as any adjoining patch that is larger than the patch to be cleared.

5.3 TESTING

The testing was carried out by imposing the Chapter 8 pathway on clearing applications (representing Categories 1 to 5) that had already been granted as 'green-light' (with offset requirements) using the current tools. There was usually enough information in the existing paperwork and maps to complete the requirements of Chapter 8, all of which were also found to 'green-light' using Chaper 8, with offset requirements.

While this testing was useful in providing an idea of the likely time savings, it could have been improved by trialling some proposals that had previously red-lighted through employment of Chapters 3-6. Testing whether Chapter 8 is consistent with Chapters 3-6 in terms of approval and environmental outcome was not able to be demonstrated by the testing. However, it was noted that clumps of trees needed to be excised from the original PVP applications for a 'green-light' (with offsets) to be achieved, and that these clunmps of trees were 'green-lighted' (with offsets) by implementing Chapter 8.

It was noted at the workshop that the original tool was thoroughly field tested and trialled before release of the PVP-Developer to ensure that perverse outcomes were not possible. There has been no opportunity to test Chapter 8 in the same way due to the short timeframes.

An ancilliary outcome of this workshop was that at least two of the approved PVP Projects used to test Chapter 8 appeared themselves to have been assessed incorrectly, with offset requirements set too low to have achieved a maintain or improve outcome. Quality control measures should be improved to ensure these outcomes are avoided.

6 Recommendations

6.1 DO NOT ADOPT CHAPTER 8

It is recommended that Chapter 8 not be adopted. Reasons are:

- it may result in perverse environmental outcomes in some cases;
- it may not streamline the overall workload for CMAs (although it will streamline some assessments);
- it has not been adequately tested; and
- there may be other means to streamline assessments within the current assessment framework.

The following are supplementary recommendations regarding future work

6.1.1 Develop alternatives for streamlining current assessments

An expert technical review should be undertaken to identify areas of the current assessment that could be streamlined., particularly Chapter 5. For example, site assessment and calculation of Site Value may be streamlined by considering a sub-set of variables. Collection of crown cover rather than foliage projected cover may speed up the assessment, as GIS tools can be developed to rapidly delineate boundaries and calculate tree cover (this would also improve science underpinning the outcome). Guidelines for landholder liaison may be explored to minimise negotiation time.

6.1.2 Review benchmarks

Benchmark data in NSW are represented by broad ranges for different variables (e.g. tree cover), as they are based on NSW vegetation classes (Keith 2004) which themselves are very broad (fewer than 100 in NSW). As a result, the lower benchmark in the benchmark range is often so low that vegetation that would otherwise be considered to be in low condition (i.e. less than 25% of that lower benchmark range) is not technically so. Developing benchmarks at a finer level (e.g. BioMetric Vegetation Types) is recommended.

6.1.3 Improve spatial information on connectivity

The Landscape Value tool only considers links (connectivity) where a site is within 100 m of an adjacent patch. This is inadequate as scattered trees can act as stepping stones (and thus functional connectivity) across much larger distances (up to 1 km from patch to patch), where trees are not more than 100 m apart (e.g. Doerr et al. 2010).

It is recommended that a functional connectivity layer be built in each CMA region in NSW. This would map all vegetation patches, and the viability of the connectivity that adjoins every pair of adjacent patches. This could be readily built using the DECCW woody/non-woody vegetation cover data captured from LandSat or SPOT satellite data.

6.1.4 Quality Control

Quality control measures within the current assessment process should be improved to ensure that perverse environmental outcomes are avoided. This may simply involve a rapid check of the spatial output (clearing site vs. offset site) to ensure that a gross error in calculating offsets has not occurred.

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