BioMetric 2.0

A Terrestrial Biodiversity Assessment Tool for the NSW Native Vegetation Assessment Tool
(formerly Property Vegetation Plan Developer)

Operational Manual

Gibbons, P., Ayers, D., Seddon, J., Doyle, S. and Briggs, S.

NSW Department of Environment and Climate Change
c/- CSIRO Sustainable Ecosystems
GPO Box 284
Canberra ACT 2601

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This manual has been updated by Glenn Harpley and Danielle Ayers for the NVAT version of BioMetric.
BioMetric

Summary

This Manual is a guide for using BioMetric. BioMetric is a tool used to assess the impacts (positive and negative) on terrestrial biodiversity of applications for clearing and applications for incentives in native vegetation under the NSW Native Vegetation Act (2003).

BioMetric assesses the value of native vegetation for terrestrial biodiversity at the national, regional, landscape and site scales.

BioMetric is a module in the Native Vegetation Assessment Tool (NVAT) package. BioMetric is used in conjunction with: a GIS tool that maps features of proposals; tools that assess threatened species, land and soil capability, salinity, water quality and invasive native scrub. This information is collated into a Property Vegetation Plan and stored in an administrative database called PADACS (PVPs, Agreements, Data and Customer Service).

Proposals to clear native vegetation

Clearing of native vegetation is permitted under the NV Act if it improves or maintains environmental outcomes.

In BioMetric no further clearing of native vegetation is permitted in vegetation types or landscapes that are already overcleared or listed as threatened at the national, regional or landscape scales, unless the vegetation is in low condition.

Other native vegetation can only be cleared if losses from proposed clearing can be offset by commensurate long-term gains from management. Offsets can only improve or maintain environmental outcomes if:

a) offsets are in vegetation types of equal or greater Regional Value (the conservation status of the vegetation type) to the vegetation proposed for clearing; AND

b) improvement in Landscape Value (the configuration of vegetation) from the offset are commensurate with losses in Landscape Value brought about by proposed clearing; AND

c) improvement in Site Value (the quality and quantity of vegetation) from the offset are commensurate with losses in Site Value from proposed clearing.

Proposals to obtain incentive funding for native vegetation management

Applications for incentive funding under the NV Act are assessed using the same criteria as applications for clearing (i.e. Regional Value, Landscape Value and Site Value) with the addition of measures for the duration of management commitment and a threatened species index which is taken from a separate Threatened Species Tool.

Unlike clearing proposals, incentive proposals are summarised into a single metric, or score, for terrestrial biodiversity value that combines the above elements. This single metric facilitates the option of using market-like instruments to disseminate incentive funding. However, the way in which this metric is used to allocate incentives is not a subject covered in BioMetric.
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1 Introduction

This Manual is a guide for using BioMetric. BioMetric is a tool that provides a quantitative assessment of the impacts (positive and negative) to terrestrial biodiversity of management activities. This tool, in conjunction with other tools that map native vegetation, assess threatened species, invasive native scrub, soils, water quality and salinity, is used to underpin the preparation of Property Vegetation Plans (PVPs) under the NSW Native Vegetation Act (2003).

BioMetric assesses losses of biodiversity from proposed clearing (including thinning), gains in biodiversity from proposed offsets, and gains in biodiversity from management actions proposed for incentives. BioMetric is a tool for assessing terrestrial biodiversity at the scale of the patch, paddock or property - it is not a planning tool.

Neither the BioMetric nor this Manual deals with assessments of threatened species, invasive native scrub, water quality, soils or salinity. BioMetric does not deal with private native forestry, clearing for routine agricultural management activities, continuation of existing farming activities, or clearing of regrowth.

1.1 The NSW Native Vegetation Act (2003)

Property Vegetation Plans are developed under the NV Act (2003). The objects of the NV Act (2003) are:

a) to provide for, encourage and promote the management of native vegetation on a regional basis in the social, economic and environmental interests of the State, and

b) to prevent broadscale clearing unless it improves or maintains environmental outcomes, and

c) to protect native vegetation of high conservation value having regard to its contribution to such matters as water quality, biodiversity, or the prevention of salinity or land degradation, and

d) to improve the condition of existing native vegetation, particularly where it has high conservation value, and

e) to encourage the revegetation of land, and the rehabilitation of land, with appropriate native vegetation, in accordance with the principles of ecologically sustainable development.

Under the NV Act (2003) PVPs may be submitted by landholders for native vegetation management. Among other things, PVPs may provide for:

a) proposals for clearing native vegetation on the land, and

b) proposals to enable landholders to obtain financial incentives for managing natural resources, including funding native vegetation management activities by Catchment Management Authorities (CMAs).

1.2 Proposals for clearing native vegetation

Proposals for clearing (including thinning) native vegetation generally fall into one of the following categories:
• ‘green’ category - actions that improve or maintain environmental outcomes in their own right and can be undertaken without offsets or mitigating actions (thinning native vegetation to benchmark stem densities for that vegetation type falls within this category)
• ‘amber’ category - actions that usually require offsets or mitigating actions to improve or maintain environmental outcomes (offsets that provide gains equal to, or exceeding, losses from clearing subsequently fall into the ‘green’ category)
• ‘red’ category - actions that cannot be undertaken as they do not improve or maintain environmental outcomes (clearing native vegetation with high conservation value, i.e. vegetation not in low condition and of a type, or within a landscape, that is highly cleared, falls into this category as do offsets that do not provide gains equal to, or exceeding, losses from clearing).

A flow chart outlining the framework for assessing proposals to clear native vegetation is in Figure 1.

1.3 Proposals for incentive funding

A score, or metric, is allocated to incentive proposals based on the existing biodiversity value of the site and the predicted biodiversity value of the site with proposed management inputs. This score is calculated using similar data to that used to assess proposals to clear native vegetation. The mechanism for allocating funds is external to the assessment process in BioMetric.

2 The assessment process

This section outlines the process for assessing proposals to clear, thin or obtain financial incentives for native vegetation using BioMetric.

2.1 Resources required to complete an assessment

The following resources are required to complete an assessment using BioMetric:
- hard copy of the BioMetric Operational Manual
- computer loaded with the latest NVAT software
- orthorectified digital imagery for the property extending a distance of at least 1.75km from the property boundary
- a digital layer of any vegetation mapping in the study area is desirable
- hard copy printout of imagery for the proposal that can be annotated.
Figure 1. Flow chart of the assessment process for clearing in a PVP. Unshaded steps in the flowchart are in *BioMetric*. Steps shaded grey are not assessed using *BioMetric*. Note that threatened species, water quality, soils, salinity and invasive native scrub are assessed using other tools.
BioMetric Tool

Outline of assessment process

- hard copy data entry sheets (templates available at http://www.environment.nsw.gov.au/projects/BiometricTool.htm) (these can be customised as required)
- printed copy of relevant vegetation types and definitions for the CMA from BioMetric (i.e. there are descriptions of each vegetation type in the CMA in BioMetric that can be formatted as required). These are also available on the website listed above
- definitions of potential Threatened Ecological Communities (TECs) that may occur on the site listed under the Threatened Species Conservation Act (http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/home_species.aspx) and Environmental Protection and Biodiversity Conservation Act (http://www.deh.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl)
- Global Positioning System (GPS) receiver
- 2 x 50m measuring tapes and tent/surveyors pegs to secure tape ends
- small measuring tape/diameter tape
- clipboard and pencils
- digital camera (not essential)
- plant identification books if required (native and weeds)
- portable printer to leave preliminary copies of PVP with landholder, if feasible.

2.2 Prior to the site inspection

Background work done prior to the site inspection will reduce the amount of time spent at the site. An initial visit to the site prior to the inspection proper may be desirable. BioMetric can be used to do a desk-top simulation of proposals to obtain indicative results, however, all assessments must be ultimately validated with field data. The suggested actions prior to the site inspection are as follows:

1. Refer to the BioMetric website for the most recent versions of supporting documentation and data (http://www.environment.nsw.gov.au/projects/BiometricTool.htm).
2. At first contact with the landholder obtain as much information about the proposal as possible (i.e. boundaries and areas of proposal including offsets if relevant, vegetation types and general condition of vegetation in proposal areas, and proposed nature and impact of clearing on all zones that form the proposal). Inform the landholder about offsets (i.e. that offsets must provide a gain in biodiversity that is equivalent to the expected loss in biodiversity from development and must be located in a similar vegetation type to the development site). This step could require an initial visit to the site.
3. Use the NVAT Mapper to place the approximate location of the proposal area in the Mitchell Landscape layer and any available vegetation maps to determine whether the proposal is likely to be in an over-cleared landscape or over-cleared vegetation type and therefore could be a “Red light”. Vegetation maps are usually too coarse for reliably showing vegetation types at the scale of the patch or paddock, so the actual vegetation types must be confirmed during a site visit. However, vegetation maps may indicate vegetation types likely to be at the site.
4. Undertake as much of the assessment as possible in the office using the NVAT Mapper and BioMetric and available data prior to the site inspection.
5. If sufficient information has been provided to indicate that the proposal will be unsuccessful as it stands, then consider discussing with the landholder prior to the site inspection.

6. Print a hard copy of the orthorectified image with property boundary, riparian areas, proposal area (if known) and Mitchell Landscape boundaries marked on it. Annotate each Mitchell Landscape with its per cent cleared estimate (obtained from Step 1 in BioMetric). Consider printing the 0.2, 0.55 and 1.75km radii circles on a transparency at the same scale as the image/photo for overlaying in the field.

7. Print hard copies of all data sheets from the BioMetric website for completion in the field.

8. Print a copy of the relevant vegetation type definitions from BioMetric.

9. If data have been entered into BioMetric, save a copy of the preliminary assessment on a laptop in the NVAT and take it to the site inspection.

2.3 The site inspection

A suggested order of assessment using BioMetric for each type of PVP (Clearing, Clearing (thinning only), and Incentives) is provided in this section (the actual order of assessment will be at the discretion of the site assessor, and will depend on information gleaned prior to the site inspection, availability of facilities to use a laptop computer and the complexity of the assessment). The process detailed below is based on the assumption that data are initially entered in field sheets printed from BioMetric and a computer is not used until the end of the assessment (i.e. either at the homestead or back at the assessor’s office). However, data can be entered into the tool at any stage through the assessment if conditions allow.

2.3.1 Proposals to clear native vegetation

The steps for assessing proposals to clear native vegetation in the field are:

1. Outline the process with the landholder or proponent.
2. Map the proposal area(s) on the hard copy aerial photo or satellite image with the landholder.
3. Walk and/or drive around the proposal area, identify and map the discrete vegetation zones on the hard copy aerial photo or satellite image (see below, for definitions of zone).
4. Collect required field information for each zone and record in the relevant field data sheet.
5. If the application is a “Red light” (see below for criteria) then discuss options with the landholder (e.g. modifying the proposal, considering incentives). The assessment for biodiversity for the current clearing proposal is complete if an application is determined to be a “Red light” at this point.
6. If the proposal is not a “Red light” then record the necessary plot data for each zone in the relevant field data sheet.
7. If facilities for using a laptop computer are available then transpose data from the data sheets into BioMetric at the property and discuss the offset requirements.
8. If facilities for using a laptop computer are not available then discuss the likely offset requirements with the landholder and undertake the Offset assessment in BioMetric on the offset site(s) using the relevant data sheets. This process is similar to steps for the clearing assessment. If it is determined in the field that the offset is inadequate during then this should be discussed with the landholder. If no feasible options are available then the assessment for biodiversity is complete.
for the proposal being assessed. Necessary data for the PVP should then be entered in the laptop to verify the results.

9. If all information has been collected on the site, and there are indoor facilities available, then complete the management actions for BioMetric, and print a draft PVP on site. The advantage of running BioMetric at the site is that any modifications to the proposal can be discussed and tested on site without a further site visit.

10. If the assessment cannot be completed on site then complete the above step in the CMA office. Discuss the results with the landholder via telephone or arrange another meeting. If the proposal is unsuccessful discuss options.

11. Obtain the appropriate clearance for the assessment before finalising the PVP.

2.3.2 Proposals to thin native vegetation
The steps for assessing proposals to thin native vegetation in the field are:

1. Outline the process with the landholder or proponent.
2. Map the proposal area(s) on the hard copy aerial photo or satellite image with the landholder.
3. Walk and/or drive around the proposal area, identify and map the discrete vegetation zones on the hard copy aerial photo or satellite image (see below, for definitions of zone) and record relevant data in field data sheets.
4. If there are indoor facilities available, then enter relevant data on benchmark stem densities for each vegetation type using information provided at the BioMetric website (http://www.environment.nsw.gov.au/projects/BiometricTool.htm), or collected by the assessor on good condition reference sites. If the landholder wishes to thin below the benchmark then the assessment must continue as a clearing proposal as outlined in Section 3.2.
5. Complete the management actions for BioMetric, and print a draft PVP on site if feasible to do so. The advantage of running BioMetric at the site is that any modifications to the proposal can be discussed and tested on site without a further site visit.

6. If the assessment cannot be completed on site then complete the above two steps in the CMA office. Discuss the results with the landholder via telephone or arrange another meeting.

7. Obtain the appropriate clearance for the assessment before finalising the PVP.

2.3.3 Incentive PVPs
1. Outline the process with the landholder or proponent.
2. Map the proposal area(s) on the hard copy aerial photo or satellite image with the landholder.
3. Walk and/or drive around the proposal area, identify and map the discrete vegetation zones on the hard copy aerial photo or satellite image (see below, for definitions of zone).
4. Collect required field information for each zone and record in the relevant field data sheets.
5. If facilities for using a laptop computer are available then transpose data from the data sheets into BioMetric at the property.
6. If all information has been collected on site, and there are indoor facilities available, then complete the management actions for BioMetric, and print a draft PVP on site. The advantage of running BioMetric at the site is that any modifications to the proposal can be discussed and entered on site without a further site visit.
7. If the assessment cannot be completed on site then complete the above step in the office and provide a copy to the landholder.
8. Obtain the appropriate clearance for the assessment and submit to the relevant incentive process for the CMA.
9. Formally notify the landholder as soon as results are available regarding funding.

3  A step-by-step guide to running BioMetric

The following sections describe how to work through the tabs in the BioMetric tool for the following proposals

1. Proposals to clear native vegetation with offsets
2. Proposals to thin native vegetation
3. Incentive PVPs

This manual also looks at the general navigation of BioMetric in NVAT.

The manual assumes that the proposal has been mapped in NVAT Mapper and the appropriate activities have been set for the proposal. For information on these processes please consult the relevant user guide.

3.1  General Navigation of BioMetric in NVAT

3.1.1  General tab
The PVP General tab is common across all assessments used in BioMetric and is the first screen the user sees when the tool is first opened.
As no data has been entered, some of the summary scores will contain ‘NaN’. This stands for ‘Not a Number’. If you see this in the summary pane at any stage during the assessment, you have not entered sufficient data to complete the assessment calculations.

3.1.1.1 Request number
The request number is automatically populated. The request number is generated in the PADACS system when the request was first created.

3.1.1.2 CMA
The CMA in which the proposal occurs is automatically populated. All subsequent data for the assessment in *BioMetric* will be linked to this CMA.

3.1.1.3 Activity
The activity is automatically populated based on the activity set in the *NVAT Mapper*. Only the following activities will initiate the *BioMetric* tool:
- Clearing/Offsets
- Thinning
- Incentives

The subsequent steps in *BioMetric* differ with the type of activity that is set. *BioMetric* must be run separately for different activity types.

3.1.1.4 Number of proposal zones
The number of proposal zones displays the number of clearing, thinning or incentive vegetation zones that will be assessed in the assessment. It is very important to check before proceeding that the number of proposal zones is correct.

If the number of proposal zones is incorrect, please consult the *NVAT Mapper* user guide to ensure that the appropriate number of proposal zones has been selected.

3.1.1.5 Number of offset zones
The number of offset zones displays the number of offset vegetation zones that will be assessed in the assessment. This is only displayed for assessment to clear native vegetation. It is very important to check before proceeding that the number of offset zones is correct.

If the number of offset zones is incorrect, please consult section the *NVAT Mapper* user guide to ensure that the appropriate number of offset zones has been selected.

3.1.1.6 Status
The status of the assessment will provide an immediate summary as to progress of the assessment. There are three status types:

- Indicates that the assessment is yet to be finalised.
- Indicates that the assessment has failed.
- Indicates that the assessment has passed.
3.1.1.7 ‘Previous’ button
The ‘Previous’ button allows the users to move to the previous tab. Tabs that are not required for the assessment cannot be selected.

3.1.1.8 ‘Next’ button
The ‘Next’ button allows the users to move to the next tab in the assessment. Tabs that are not required for the assessment cannot be selected.

3.1.1.9 ‘Delete’ button
The ‘Delete’ button will delete the current assessment. The user will have to relaunch the tool from the NVAT Mapper if an assessment has been deleted.

3.1.1.10 ‘Apply’ button
The ‘Apply’ button saves the current assessment data.

3.1.1.11 ‘Close’ button
The ‘Close’ button closes BioMetric.

3.2 Proposals to clear native vegetation

3.2.1 Vegetation tab
The first step in assessing proposal to clear native vegetation involves entering data on the ‘Vegetation’ tab.

![BioMetric Assessment](image)

This step identifies clearing proposals that can, and cannot, proceed from the outset. Native vegetation cannot be cleared if it:
(a) occurs in an over-cleared landscape (>70% of native vegetation in Mitchell landscape cleared), OR
(b) is an over-cleared vegetation type (>70% of vegetation type in the CMA is cleared), OR
(c) is a threatened ecological community (as listed on the TSC Act or EPBC Act) AND
(d) is NOT in low condition.

Vegetation that is in low condition can be assessed further for clearing.

3.2.1.1 Zone, Activity, CMA and Area
This information is automatically populated from the NVAT Mapper. Before proceeding you need to check that the zones that you are assessing are the correct
zones. The tool accepts an unlimited number of vegetation zones. Refer to Appendix 1 for guidelines on how to map vegetation zones.

3.2.1.2 Low condition?
If the vegetation on the proposal site meets the definition of “low condition” then the assessment progresses to the next step regardless of whether the landscape and/or vegetation type are highly (>70%) cleared.

If the vegetation type is not in low condition, then the tick box is left blank as follows:

If the vegetation type is in low condition, then the tick box is checked as follows:

Vegetation in low condition has a high likelihood of not being viable in the long-term under current management, so an offset that improves long-term viability of other vegetation is appropriate. Definitions of vegetation in “low condition” are provided in Box 1.

Box 1. Definitions for native vegetation in low condition.

A. Native woody vegetation is in low condition if:

The over-storey per cent foliage cover is <25% of the lower value of the over-storey per cent foliage cover benchmark for that vegetation type

AND

<50% of vegetation in the ground layer is indigenous species or >90% is ploughed or fallow.

B. Native grassland or herbfield is in low condition if:

<50% of vegetation in the ground layer is indigenous species or >90% is ploughed or fallow.

Notes:
Only patches of vegetation >0.25ha are assessed separately (as distinct zones) from surrounding vegetation (e.g. a patch of vegetation with benchmark over-storey cover that is <0.25ha is not assessed separately from surrounding vegetation with sparser over-storey cover).

The ground layer must be assessed using a method consistent with the Regulation or the method detailed in Appendix 4.

The over-storey is assessed using one of the methods in Appendix 4.
3.2.1.3 **Mitchell Landscape**

Native remnant vegetation cannot be cleared if it: occurs in a Mitchell Landscape that is >70% cleared and is NOT in low condition (see definitions of low condition in Box 1). The analysis of % cleared by Mitchell Landscape type was undertaken by overlaying the NSW Landscapes coverage (Mitchell 2002) with a presence/absence layer of native vegetation in NSW – an updated version of the layer developed by Pressey *et al.* (2000). These data were further revised during 2007 using a more recent presence/absence vegetation mask for NSW (see *BioMetric* website [http://www.environment.nsw.gov.au/projects/BiometricTool.htm](http://www.environment.nsw.gov.au/projects/BiometricTool.htm)).

Identify the Mitchell Landscape in which the site occurs using the Mitchell Landscapes layer (NSW Landscapes coverage - Mitchell 2002) loaded in the *NVAT Mapper*. Mitchell Landscapes were mapped at a broad scale (1: 250,000) so the Landscape in which a proposal occurs may not always be the landscape mapped (e.g. where the proposal occurs near the boundary of landscapes). Assessors can choose a different Mitchell Landscape in the drop-down list in *BioMetric* from the Landscape indicated by the map in the *NVAT Mapper* if the description of an adjacent Landscape more accurately reflects the environment in which the proposal occurs. Field descriptions of Mitchell Landscapes are loaded into *BioMetric* to enable this and are accessed by selecting the “Reference Data Help Files” button.

When a Mitchell Landscape is selected, *BioMetric* will look up the per cent of native vegetation cleared in this Landscape. This figure can be annotated on the hard copy image printed for the site assessment.

3.2.1.4 **Vegetation formation**

Next the assessor selects the vegetation formation (Keith 2002) present in each zone to identify the list of possible vegetation types that will occur on the site. Select the vegetation formation that best matches the vegetation in the zone from the drop-down list (the “Reference Data Help Files” button links to a key to the vegetation formations). If the vegetation is in low condition an expert judgment as to the vegetation formation that originally occupied the site must be made in the field based on the pattern of surrounding vegetation types at similar positions in the landscape. Do not use predicted pre-clearing vegetation maps to make this decision without field inspection.

3.2.1.5 **Vegetation type**

Remnant native vegetation cannot be cleared if it is a vegetation type that is >70% cleared and NOT in low condition (see definitions in Box 1). The National Objectives and Targets for Biodiversity 2001-2005 Agreement (Commonwealth of Australia 2001) signed by NSW, and the Natural Heritage Trust Bilateral Agreement (2003) signed between NSW and the Commonwealth for the provision of NHT funding.
require NSW to prevent clearing of ecological communities that are already >70% cleared.

The vegetation type closest to the vegetation at the site or likely to have originally occurred at the site (i.e. pre-clearing, or pre-1750) must be selected from the drop-down list. That is, the vegetation type should be the original vegetation type at the site, not the derived vegetation type. Derived vegetation types can be selected from the list only where the original vegetation type cannot be determined.

Vegetation types are an expression of environmental continua (Austin 1999) and therefore change continuously across a landscape. However, dividing vegetation into discrete communities is required for management. Some vegetation types observed in the field will not fit neatly into any of the vegetation types listed for a CMA in BioMetric (e.g. where the vegetation lies in an ecotone between two types). In these cases professional judgement is required regarding the closest matching vegetation type in BioMetric. Vegetation type is used in BioMetric as a surrogate for regional conservation value. Thus, the vegetation type chosen from the list in BioMetric should reflect this. For example, a site containing a mix of plant species typical of vegetation in flat, productive and highly cleared environments and plant species typical of steeper, less productive and less cleared environments should be classified as the vegetation type that is more typical of the environment supporting the vegetation.

The lists of vegetation types were assembled for each CMA based on best available data for each region (see the field definitions provided in BioMetric for a list of sources). Only sources that provided % cleared estimates could be used. A major review of vegetation types in NSW is underway by John Benson of the Royal Botanic Gardens. A link to definitions for each vegetation type within the chosen CMA is provided via the “Reference Data Help Files” button (Figure 3). This list can be filtered or formatted as required. A list of vegetation types should be printed for use in the field (or a subset comprising those vegetation types likely to be present at the proposal). Estimates of % remaining for the vegetation type selected (rounded to the nearest 5%) can be seen to the right of the screen on the Vegetation tab. These estimates are also provided with the field definitions.
Figure 3. An example of field definitions provided for vegetation types within a CMA.

3.2.1.5.1 Derived vegetation types

Some of the vegetation types listed in BioMetric are derived or secondary vegetation communities (i.e. they have been modified substantially since European settlement).

In the BioMetric assessment process, derived vegetation is assessed against the corresponding original vegetation type/s, not against the derived type/s. Consequently, benchmarks for the original type/s that were present should be used for assessing derived communities.

When assessing derived communities, the selection of vegetation type for the original community should be based on the informed judgement of the assessor, taking into consideration the remaining species composition, patterns of surrounding vegetation, landscapes position, soil type, and historical land management practices.

The vegetation types field definitions in BioMetric include, where possible, an indication of the original vegetation type/s for each derived vegetation type. Note that some vegetation types that are known to be derived in some circumstances may also occur within the same CMA as an original community. Where available, such information is also included in the field definitions for each CMA.

Note, these rules for assessing derived vegetation communities apply to BioMetric. Rules for assessing derived communities may be different in other tools in NVAT.

If a derived vegetation type is selected in BioMetric, the following message will be displayed.
3.2.1.6 Threatened ecological community?
Vegetation that is a threatened ecological community AND is NOT in low condition (see definitions in Box 1) cannot be cleared.

Vegetation types that equate to EECs were identified when the vegetation types data were last revised (2206 or 2007, depending on the CMA). To check for more recent listings, refer to definitions in the TSC Act (http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/home_species.aspx) and the EPBC Act (http://www.deh.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl). A full list of threatened ecological communities and their definitions should be assembled for the CMA prior to commencing assessments. This list should be updated periodically from the above websites.

- Do not check the tick box if the vegetation type is not a TEC or EEC.
- Check the tick box if the vegetation type is a TEC or EEC.

3.2.1.7 Status?
A development proposal can only proceed to the next step if a “Green flag” exists for all zones.

If a “Red Flag” exists for any zones, then the proposal must be revised for the assessment to continue*. 

* By clicking ‘ok’ you will be asked to select another vegetation type. If a vegetation type is selected that may be derived, the following message will be displayed.

By clicking ‘ok’ you can continue or select another vegetation type.

A link to definitions for each derived vegetation type within the chosen CMA is provided via the “Reference Data Help Files” button.
* Note – Even though a red flag may exist at this stage, you can proceed with the assessment. However, the assessment can not be finalised as it is considered to be in a failed state. If you attempt to generate management actions when the assessment is in a failed state, you will receive the error message below.

3.2.1.8 What are the impacts of clearing?

The impacts of clearing are assessed in terms of Regional Value (the vegetation type), Landscape Value (the configuration of vegetation) and Site Value (the quality and quantity of vegetation). These impacts are summarised in the fixed summary pane at the top of the screen (note that if there is no impact of clearing at the scale of the site it follows that there cannot be an impact at the scale of the landscape or region). Negative impacts are represented by negative numbers.

3.2.1.9 Regional Value

Regional Value is based on the relationship between the % cleared of the vegetation types on the site relative to their pre-European (or pre-1750) extent within each CMA. A score is allocated based on the relationship between % cleared and a generic species area curve (Rosenzweig 1995).

Regional Value is calculated automatically as soon as the vegetation types have been selected in the previous tab.

3.2.2 Clearing Landscape tab

3.2.2.1 Landscape Value

Landscape Value is an assessment of the spatial configuration of vegetation, viz. total cover up to 1000ha around the proposal, connectivity and adjacency of native vegetation. For each measure (except Total adjacent remnant area) there is one assessment of the Current state of the landscape around the entire proposal and one assessment of the state of the landscape were the proposal to proceed (With clearing).
The measures of Landscape Value are:

1. **% native vegetation cover in the landscape.** Current native vegetation cover and native vegetation cover after clearing must be assessed within radii of 1.75km (1000ha), 0.55km (100ha) and 0.2km (10ha) around the proposal site. Cover is estimated in categories of 0-10%, 11-30%, 31-70%, or >70% cover using the imagery in the NVAT Mapper or on the hard copy printouts. These percentages represent thresholds at which fragmentation effects generally escalate for different biota (Andren 1994, McIntyre et al. 2000). The different radii recognise that different biota range over, and are affected by, activities at different scales. Broader scales are assessed by other measures.

Tools in the NVAT Mapper draw circles with these three radii. Each circle should be centred so it captures the maximum area of the proposal (see Figure 4). Non-contiguous proposals should be split into separate proposals if they cannot be completely contained within the largest circle (see Figure 4).

**Appendix 3** contains diagrams to assist with visual estimates of native vegetation cover in landscapes. Digitising tools in the NVAT Mapper can be used to estimate the area of cover within any given circle if it lies close to a threshold that cannot be confidently assessed by eye. Cover estimates in woody vegetation are based on the % cover of the over-storey relative to the approximate benchmark for that vegetation type. For example, a completely vegetated circle with benchmark over-storey cover around the proposal would be assessed as >70% cover whether it is open woodland or closed forest. However, if the cover still occurred across the whole circle, but was around 30-70% of the benchmark over-storey cover for that vegetation (e.g. because of thinning) then the estimate of cover would be 30-70%. In non-woody vegetation (e.g. grassland) the assessment is based on the amount of vegetation in the landscape that is unlikely to meet the definition of low condition. These estimates can be made from the imagery and knowledge of the area. Any vegetation native to Australia can contribute to this measure (i.e. planted native species not indigenous to the area can contribute to this measure).

2. **Connectivity value.** This measure aims to assess the impact of the proposal on connectivity between surrounding vegetation. Assess the current connectivity value of the proposal area and the connectivity value with the proposal using the imagery of the site in the NVAT Mapper as one of four levels: high, moderate, low, and nil, using the criteria in Table 1. Examples are provided in Figure 5 to assist with the assessment. The change in connectivity value that would occur
were the proposal to proceed is used in *BioMetric* to calculate the impact of the proposal in this respect.

Figure 4. Examples illustrating how to assess % native vegetation cover in the landscape for different proposals (outlined in bold). Each circle in which cover is assessed must be centred so it captures the maximum area of the proposal. Non-contiguous proposals should be split into separate proposals if they are not completely contained within the largest circle.
Table 1. Criteria for assessing connectivity value. Where the proposal includes multiple types of vegetation, choose the highest connectivity value that pertains to vegetation within the proposal. Vegetation is linked to surrounding native vegetation if it is ≤100m from native vegetation that is, in turn, linked to native vegetation not in low condition and ≥1ha. Any gap >100m within a proposal means that the vegetation is not linked. Low condition is as defined in Box 1 (Section 3.2.3).

<table>
<thead>
<tr>
<th>Connectivity value</th>
<th>Current</th>
<th>With proposal</th>
</tr>
</thead>
</table>
| High               | The proposal includes vegetation that:  
  • is **not** in low condition  
  • has an average width >100m, and  
  • links to surrounding native vegetation on more than one compass quarter of the proposal. | At least one high connectivity value vegetation link is maintained (following clearing) or created (by the offset or incentive proposal) between surrounding native vegetation on more than one compass quarter. |
| Moderate           | The proposal includes vegetation that:  
  • is **not** in low condition,  
  • has an average width of >30m-100m, and  
  • links to surrounding native vegetation on more than one compass quarter of the proposal. | At least one moderate connectivity value vegetation link is maintained (following clearing) or created (by the offset or incentive proposal) between surrounding native vegetation on more than one compass quarter. |
| Low                | The proposal includes vegetation that:  
  • is in low condition,  
  • has an average width >100m, and  
  • links to surrounding native vegetation on more than one compass quarter of the proposal;  
  OR  
  The proposal includes vegetation that:  
  • is **not** in low condition  
  • has an average width ≥5m-30m, and  
  • links to surrounding native vegetation on more than one compass quarter of the proposal.  
  OR  
  The proposal includes vegetation that:  
  • links to surrounding native vegetation via exotic vegetation with similar structure to the proposal on more than one compass quarter. | At least one low connectivity value vegetation link is maintained (following clearing) or created (by the offset or incentive proposal) between surrounding native vegetation on more than one compass quarter. |
<p>| Nil                | The proposal includes vegetation that meets none of the above definitions. | No links between vegetation surrounding proposal that meet any of the above criteria will be maintained (following clearing) or created (by the offset or incentive proposal). |</p>
<table>
<thead>
<tr>
<th>Example clearing proposal</th>
<th>Current</th>
<th>With clearing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate, because the vegetation in the proposal area: • is not in low condition, • has an average width of &gt;30-100m, and • is linked to surrounding native vegetation on two compass quarters.</td>
<td>Nil, because no link (of any connectivity value) will be maintained between the surrounding areas of native vegetation following clearing of the proposal area.</td>
<td></td>
</tr>
<tr>
<td>Low, because the vegetation in the proposal area: • is in low condition, • has an average width &gt;100m, and • is linked to surrounding native vegetation on 4 compass quarters.</td>
<td>Low, because a low connectivity value vegetation link will be maintained between surrounding remnants following clearing of the proposal area.</td>
<td></td>
</tr>
<tr>
<td>Low, because the vegetation in the proposal area: • links to other native vegetation via exotic vegetation with similar structure to the proposal (i.e. exotic pine plantation) on 3 compass quarters.</td>
<td>Low, because a low connectivity value link will be maintained between surrounding native vegetation remnants (≥1ha) via exotic vegetation with similar structure (i.e. exotic pine plantation) following clearing of the proposal area.</td>
<td></td>
</tr>
<tr>
<td>High, because the vegetation in the proposal area: • is not in low condition • has an average width &gt;100m, and • is linked to surrounding native vegetation on 3 compass quarters.</td>
<td>Moderate, because one vegetation link of moderate connectivity value (i.e. not in low condition and &gt;30m-100m wide) will be maintained between the areas of surrounding native vegetation following clearing of the proposal area.</td>
<td></td>
</tr>
<tr>
<td>High, because the vegetation in the proposal area: • is not in low condition • has an average width &gt;100m, and • is surrounded by native vegetation (ie. is linked on 4 compass quarters).</td>
<td>High, because high connectivity value vegetation links will be maintained between all areas of surrounding native vegetation following clearing of the proposal area.</td>
<td></td>
</tr>
</tbody>
</table>

Figure 5: Clearing examples illustrating the four levels of connectivity value. Note, very dark vegetation patches (examples 3 and 4) are areas of exotic pine plantation.
3. **Total adjacent remnant area.** The aim of this measure is to encourage offsets to be established adjacent to, or as part of, remnants that are of equivalent size or larger than the remnant in which clearing is proposed to occur. This reflects findings that vegetation that is adjoining, and therefore part of, large remnants is generally of more value to biota than vegetation that is adjoining, and therefore part of, smaller remnants (e.g. Platt 2002). Record the total remnant area of which the proposal is a part as one of four levels: very large, large, medium, or small. Very large, large, medium, and small remnants are defined differently according to the extent to which the Mitchell Landscape in which most of the proposal occurs has been cleared (Table 2). This figure can be obtained from the Vegetation tab in *BioMetric*. Digitising tools in the *NVAT Mapper* can be used to help estimate the area of the adjacent remnant if necessary.

<table>
<thead>
<tr>
<th>Level for total adjacent remnant area</th>
<th>% native vegetation cleared in the Mitchell Landscape in which most of proposal occurs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;30%</td>
</tr>
<tr>
<td>Very large</td>
<td>&gt;500</td>
</tr>
<tr>
<td>Large</td>
<td>201-500</td>
</tr>
<tr>
<td>Medium</td>
<td>101-200</td>
</tr>
<tr>
<td>Small</td>
<td>&lt;100</td>
</tr>
</tbody>
</table>

### Table 2. Criteria used for assessing total adjacent remnant area. Adjacent remnant area refers to the area (ha) of native vegetation that is not in low condition and is linked to (≤100m from) the proposal area. The % of native vegetation cleared in the Mitchell Landscape in which most of the proposal occurs is calculated in Step 2.

#### 3.2.3 Clearing Site tab

##### 3.2.3.1 Site Value

To commence assessment of a vegetation zone, you need to highlight the selected zone on the Clearing Site tab by clicking on that zone.

Site Value is assessed for each zone by measuring the ten condition variables in plots and comparing the measured values with benchmarks. Benchmarks represent the range of variability for the condition variables in relatively unmodified examples of the same vegetation type. Each condition variable is allocated a score in *BioMetric* from 0-3 (0=low, 1=moderate, 2=high, 3=very high) based on the difference between its measured value and its benchmark. This scoring system is explained in Table 3.
Table 3. Explanation of the way each variable in Site Value is scored. The term ‘within benchmark range’ means a measurement that is within (and including) the range of measurement identified as the benchmark for that variable for that vegetation type. The percentages <100% refer to the minimum measurement in the benchmark range for that variable for that vegetation type. The percentages >100% refer to the maximum measurement in the benchmark range for that variable for that vegetation type.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Score in BioMetric</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Native plant species richness</td>
<td>0</td>
</tr>
<tr>
<td>Native over-storey cover</td>
<td>0-10% or &gt;200% of benchmark</td>
</tr>
<tr>
<td>Native mid-storey cover</td>
<td>0-10% or &gt;200% of benchmark</td>
</tr>
<tr>
<td>Native ground cover (grasses)</td>
<td>0-10% or &gt;200% of benchmark</td>
</tr>
<tr>
<td>Native ground cover (shrubs)</td>
<td>0-10% or &gt;200% of benchmark</td>
</tr>
<tr>
<td>Native ground cover (other)</td>
<td>0-10% or &gt;200% of benchmark</td>
</tr>
<tr>
<td>Exotic plant cover (calculated in BioMetric as % of total ground and mid-storey cover)</td>
<td>&gt;66%</td>
</tr>
<tr>
<td>Number of trees with hollows</td>
<td>0 (unless benchmark includes 0)</td>
</tr>
<tr>
<td>Proportion of over-storey species occurring as regeneration</td>
<td>0%</td>
</tr>
<tr>
<td>Total length of fallen logs</td>
<td>0-10% of benchmark</td>
</tr>
</tbody>
</table>

Site Value is assessed as follows:
1. Plots are established in each zone. Zones are relatively homogeneous units within the proposal. However, given there is always variation in native vegetation, plots should be established in each zone in approximate proportion to any different habitat types that occur in that zone to achieve a representative sample. It is difficult to provide hard and fast rules regarding the number of plots that must be established.

Recommended steps for establishing plots within a zone are as follows: (a) divide the zone roughly into homogeneous units (e.g. denser and sparser vegetation) using the imagery (these units do not need to be digitised or recorded); (b) roughly estimate the proportion of the zone taken up by each unit; (c) allocate a
minimum of one plot to the smallest unit and then allocate plots to the remaining units in proportion to their area (e.g. if there are two units and the smallest is approximately one third of the total area of the zone then allocate one plot to the smallest unit and two plots to the larger unit). A maximum of ten plots should be measured within a single zone. Plots should be established randomly within a zone (or within the different habitat types within a zone). This can be done by: marking points randomly on the imagery within the zone and establishing plots at all, or some, of these points or pacing a random distance into the zone, establishing a plot that this point and then repeating the process.

2. The ten Site Value variables are measured in plots or across the zone, recorded on a data entry sheet in the field (sample field data sheets are available at the BioMetric website http://www.environment.nsw.gov.au/projects/BiometricTool.htm) and transcribed into the BioMetric Plot tab. Methods for measuring Site Value variables in the field are described in Appendix 4.

3. Benchmark data are available for most vegetation classes (sensu Keith 2004) in each CMA at http://www.environment.nsw.gov.au/projects/BiometricTool.htm. Benchmark data for the vegetation type (class) is automatically populated in BioMetric. If benchmark data is not available for a vegetation type on the site, or if more suitable local benchmarks are needed, they must be obtained from reference sites of the same vegetation type in relatively unmodified condition. Methods for obtaining benchmarks from reference sites are described in Appendix 2. Use the “Data entry – Benchmarks” worksheet from the “Reference Data Help Files” button to enter benchmark data obtained from plots at reference sites. This worksheet automatically calculates benchmark values, which then need to be manually transcribed by the assessor to the Plot tab.

NOTE: assessment officers are encouraged to continue collecting their own reference site benchmark data.

4. A score from 0-3 for each variable in each zone is generated in BioMetric based on the differences between observed data and benchmark data for each variable (note that a higher score is given for low exotic plant cover and a low score for high exotic cover). These scores are recorded on the Zone tab. The assessor then predicts the impact of the development proposal on each condition variable in each zone using the information in Appendix 5.
5. Site Value for each zone is calculated in BioMetric as the difference in the value of the proposal area before and after clearing multiplied by the area of the zone. The total Site Value is this figure summed across all zones.

6. The summary panel at the top of the window pane will indicate when an offset is required i.e. if the proposed clearing will not improve or maintain environmental outcomes.

   An offset is required when ‘Offsets required’ = True
   An offset is not required when ‘Offsets required’ = False

If an offset is required then the next step is described in Section 3.3.

If an offset is not required then you can select the ‘Management Action’ tab to finalise the assessment. This is described in Section 3.6.

3.3 Can the impacts of clearing be offset?

Losses of biodiversity from clearing must be offset by commensurate gains to biodiversity on other sites for the proposal to improve or maintain environmental outcomes. Offsets are based on the principle of like-for-like to ensure that any gain is comparable with any loss. Offsets can therefore only improve or maintain if:

a. the offset is in a vegetation type of equal or greater Regional Value than the vegetation cleared;

b. improvements in Landscape Value brought about by the offset are commensurate with losses in Landscape Value brought about by clearing; AND

c. improvements in Site Value on the offset site are commensurate with losses in Site Value from clearing.

The impacts of the clearing and offset assessments appear in the summary panel at the top of the screen in this sheet. As you fill out the relevant sections in this step the
balance will be updated. Offsets can only improve or maintain environmental outcomes if the value for each component of the assessment is not negative. That is, there is no point in continuing from the Regional Value assessment to the Landscape Value assessment or from the Landscape Value Assessment to the Site Value assessment unless the balance for each of the completed assessments is greater than or equal to zero.

The negotiation of offsets could require several iterations, requiring modification of the initial development and offset proposals. This will require the assessor to go backwards and forwards in BioMetric. The BioMetric tool can be used to explore what-if scenarios based on estimated data, but the final assessment must be underpinned by adequate real field data.

3.3.1 Offset tab

3.3.1.1 Zone, Activity, CMA and Area
Zone, Activity, CMA and Area is automatically populated from NVAT Mapper. Before proceeding you need to check that the zones that you are assessing are the correct zones. The tool accepts an unlimited number of vegetation zones. Refer to Appendix 1 for guidelines on how to map vegetation zones.

3.3.1.2 Regional Value
This is measured in the same way as described in Section 3.2.1.9.

Regional Value is calculated automatically as soon as the vegetation types have been selected in the ‘Offset’ tab. The proposal cannot proceed if the offset returns a negative balance and the following message will be returned.

If this occurs the assessor must modify or terminate the assessment.
### 3.3.2 Offset Landscape tab

#### 3.3.2.1 Landscape Value

<table>
<thead>
<tr>
<th>Incentive Site</th>
<th>Offset Landscape</th>
<th>Offset Site</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current</strong></td>
<td><strong>With Clearing and Offset</strong></td>
<td></td>
</tr>
<tr>
<td>% cover within 1.75km radius (100ha)</td>
<td>0-10%</td>
<td>31-70%</td>
</tr>
<tr>
<td>% cover within 0.55km radius (100ha)</td>
<td>0-10%</td>
<td>11-50%</td>
</tr>
<tr>
<td>% cover within 0.2km radius (10ha)</td>
<td>0-10%</td>
<td>31-70%</td>
</tr>
<tr>
<td>Connectivity Value</td>
<td>Nil</td>
<td>Moderate</td>
</tr>
<tr>
<td>Total adjacent remnant area</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>% within riparian buffer</td>
<td>26-50%</td>
<td></td>
</tr>
</tbody>
</table>

Landscape Value is measured in the same way as described in Section 3.2.2.1, with an additional measure called “% within riparian area”. Offsets with >25% of their area within riparian areas (i.e. riparian zone plus buffer as defined in Appendix 6) receive an additional score (i.e. this recognises the high value of riparian areas for biodiversity (e.g. MacNally et al. 2000). The ‘With clearing and Offset’ part of the assessment is made on the assumption that the proposed clearing has occurred.

The assessment cannot proceed if the offset for Landscape Value returns a negative balance in the summary panel at the top, in which case discuss options with the landholder or terminate the assessment. If this is the case, the following message will be received when the user attempts to save the assessment.

![Management action deletion?](image)

This assessment is currently in a failed state, if you save now all management actions will be deleted.

#### 3.3.3 Offset Site Tab

#### 3.3.3.1 Site Value

This part of the assessment can only proceed if the offset has passed the Regional Value and Landscape Value components of the assessment (recorded as the Balance in the summary panel at the top of the window).

The ‘Current’ score is measured as described in Section 3.2.3.1.

The ‘Score with Offset’ is based on the extent to which the management actions proposed by the landholder will improve the state of each variable. Note that these do not need to be new management actions - they may include, or be confined to, actions that the landholder is already undertaking and for which further gains are expected. For example, it is quite feasible that a landholder proposes, as an offset, an area in which grazing was previously excluded and proposes to continue to exclude grazing.
If the assessed gain from continuing this activity is commensurate with the loss from development assessed in Section 3.2 then this would be an appropriate offset.

For each zone the assessor predicts the future condition of the 10 condition variables based on the proposed management actions. The predicted improvements in condition must be consistent with the duration of the offset. Guidelines for scoring management actions are provided in Appendix 5. We encourage each CMA to develop guidelines specific to local conditions.

Proposed management actions can only advance the score for each variable 1 or 2 levels, depending on the variable (except tree hollows for which no improvement can be scored because of the period required for hollows to form). These limits reflect the slow rate at which restoration occurs and the inherent risk associated with achieving biodiversity outcomes in the long-term. The proposed management actions for each zone are recorded in the tick boxes (multiple actions can be ticked), but note that these tick boxes are not linked to the scoring system, i.e. the effects of management must be scored manually. There is space for recording the specific details of each management action in the next step. An example of an assessment of current and predicted Site Value is in Figure 6.

![Figure 6](image_url)

Figure 6. Assessing Site Value on an offset zone. Site Value with the proposed offset is determined by predicting how each site value variable will change with the agreed management actions. The maximum change for each variable is 1 or 2 levels in the score, except for tree hollows, which cannot be improved with management actions because of the long timeframe required for hollows to form.

Note that the ‘Score’ for each zone is not simply the difference between the ‘Current score’ and the ‘Score with Offset’. The extent to which the zone could be degraded over time within the minimum standards set by the NV Act (2003) is taken into account. This means that landholders will not get a better score by degrading native vegetation (within the standards of the NV Act) on the proposed offset site prior to the assessment, and equally, landholders who have managed native vegetation above the standards of the NV Act are rewarded for that management.

The Balance at the top of this window indicates whether the offset is sufficient for the proposal to pass the three components of the assessment. If none of the three balances in the summary are negative, the “Improve/Maintain” outcome is “True”, and the assessment may proceed to the Management Actions tab. If the proposal outcome is “False”, then the proposal must be modified or the assessment is terminated.
If an offset is sufficient and the assessment passes, then you can select the Management Actions tab to finalise the assessment. This is described in Section 3.6.

3.4 Proposals to thin native vegetation

This component of BioMetric is only available if the activity of the area to be thinned has been set in NVAT Mapper as ‘Thinning’.

Thinning improves or maintains environmental outcomes—and does not require offsets—if, and only if, it results in: stem densities at or above a pre-defined benchmark for the vegetation type; minimal disturbance to remaining vegetation; and does not occur over more than 80% of the proposal area. If proposed thinning does not meet these criteria the assessment fails and if the landholder wishes to proceed, the PVP must be assessed as a regular clearing application.

3.4.1 Vegetation tab

Zone, Activity, CMA and Area is automatically populated from NVAT Mapper. Before proceeding you need to check that the zones that you are assessing are the correct zones. BioMetric accepts an unlimited number of vegetation zones. Refer to Appendix 1 for guidelines on how to map vegetation zones.

Record the vegetation formation and type for each zone in the same way as for a regular clearing proposal Sections 3.2.1.4 and 3.2.1.5.

*Note – Condition, Mitchell Landscape and TEC is not required to be answered for a Thinning assessment.
3.4.2 **Thinning Details tab**

Thinning proposals are assessed as follows:

1. 50x20m assessment plots are established in each zone as per Section 3.2.3.1.
2. The number of stems in each specified stem diameter (or DBH) class are assessed in the plots, recorded on a data entry sheet in the field (sample field data sheets are available at the *BioMetric* website [http://www.environment.nsw.gov.au/projects/BiometricTool.htm](http://www.environment.nsw.gov.au/projects/BiometricTool.htm)) and transcribed into the Plot tab for the corresponding zone. Methods for assessing stem numbers in the field are described in Appendix 4.

3. Benchmark stem counts are also required. Limited benchmark stem density data are available from [http://www.environment.nsw.gov.au/projects/BiometricTool.htm](http://www.environment.nsw.gov.au/projects/BiometricTool.htm), however it is likely that reference sites will be required to obtain benchmark stem counts (see Appendix 2). Enter the benchmark data into the Zone tab.

4. For each DBH class in each proposal zone, *BioMetric* will:
   a. automatically calculate the mean spacing between stems and the corresponding stem spacing under benchmark conditions;
   b. determine whether the number of stems is above benchmark (True or False);
   c. indicate whether thinning can proceed; and
   d. outline the stem retention requirements.

Thinning can proceed only for the zones and DBH classes for which the answer is “True”, and only if the thinning is consistent with the other conditions listed above. Stem retention requirements must also be followed.
Thinning cannot proceed for any diameter class where the answer is “False” for that vegetation zone.

Once this has been completed, then you can select the Management Actions tab to finalise the assessment. This is described in Section 3.6.
3.5 Incentive Proposals

Applications for incentive funding are assessed using the same types of data as applications for clearing (i.e., Regional Value, Landscape Value and Site Value) with the addition of a measure for the duration of management commitment, and a threatened species index for incentives taken from the Threatened Species Tool. The biodiversity value of management actions proposed by the landholder is predicted in a similar way as for offsets in Section 3.3. However, there are three key differences in the way the biodiversity index for incentives is calculated compared with offsets:

1. The scores for duration of management commitment, Threatened Species, Regional Value, Landscape Value and Site Value are combined into a single score per hectare out of 100. The total score for the incentive proposal is the per hectare score multiplied by the area of the proposal. A single metric or score enables a broad suite of policy instruments (e.g. market-based instruments such as tender schemes) to be employed to allocate incentives.

2. The duration of the management commitment is factored in as a multiplier of the incentive index. Agreements in perpetuity have greater value for biodiversity than temporary agreements.

3. The Site Value part of the index is calculated as the product of the current Site Value and the difference between the predicted Site Value with management and the predicted Site Value without management, as guided by the minimum standards for managing native vegetation in the NV Act (2003). Current management actions that enhance condition and which the landholder continues are taken into account when increases in condition with management actions are scored for incentives. This both rewards landholders who manage their land well for biodiversity and allocates priority to sites in reasonable condition that are more likely to recover with management.
3.5.1 Vegetation tab
Zone, Activity, CMA and Area is automatically populated from NVAT Mapper. Before proceeding you need to check that the zones that you are assessing are the correct zones. The tool accepts an unlimited number of vegetation zones. Refer to Appendix 1 for guidelines on how to map vegetation zones.

*Note – Condition, Mitchell Landscape and TEC is not required to be answered for an incentive assessment.

3.5.1.1 Regional Value
Regional Value for Incentives is assessed as for Clearing PVPs (Section 3.2.1.9). The Regional Value is calculated automatically as soon as the vegetation formation and vegetation type are selected.

3.5.2 Incentive Landscape tab

3.5.2.1 Landscape Value
Landscape Value is assessed as for Clearing proposals (Section 3.2.2.1), but only for the ‘With Proposal’ component (i.e. ‘Current’ value is not assessed).

3.5.2.2 Threatened Species
A score for benefits for threatened species that must be transcribed from the Threatened Species Tool.

3.5.2.3 Duration of Commitment
Management actions that last longer receive higher scores. Management actions in perpetuity result in the highest scores. Duration of commitment is calculated as a multiplier on the overall incentive score. In perpetuity agreements receive a
multiplier of one (i.e. the full score contributed by the Threatened Species score, Regional Value, Landscape Value and Site Value), while shorter agreements receive multipliers of less than one (5 years=0.1, 10 years=0.3, 15 years=0.5). Choose the appropriate duration of commitment after discussing with the landholder.

### 3.5.3 Incentive Site tab

#### 3.5.3.1 Site Value

Site Value is assessed as for Clearing proposals (Section 3.2.3.1) although there are differences in the way the score is calculated, as outlined above.

Once this has been completed, then you can select the Management Actions tab to finalise the assessment. This is described in Section 3.6.

### 3.6 Management Actions

The final step in BioMetric is to generate and develop the agreed management actions. Management Actions for each BioMetric assessment are developed differently depending on the activity being assessed.

#### 3.6.1 Generating Management Actions

When you first click on the Management Actions tab, the following screen will be displayed.
You must click ‘Generate’ to generate the management actions that have previously been specified on the Site Value tab. The management actions will be displayed as follows.

3.6.2 Editing Management Actions

To edit a management action, click on the management action that you want to edit and then click the ‘Edit’ button.
3.6.3 **Detailed description of agreed action**
The assessor must provide a description of each action within each zone. The description of each management action should include, where relevant: (a) the objective of the action; (b) a description of the action that will be undertaken; (c) when the action is to be undertaken; and (d) a monitoring and adaptive management strategy. Principles for developing management agreements are provided in separate PVP documentation.

3.6.4 **Duration**
The duration of the action must be entered, with a schedule for ongoing actions if relevant. If applicable, (e.g. all Offset vegetation zone management actions), the duration can be set as ‘In perpetuity’.

3.6.5 **Management Actions for Clearing and Offset Proposals**
For each Clearing vegetation zone, a standard ‘Clearing’ management action will be generated.

The management actions for the ‘Offset’ vegetation zones will have been agreed to by the CMA and the land holder and chosen from the Offset Site tab.
3.6.6 Management Actions for Thinning Proposals
For each ‘Thinning’ vegetation zone, three standard management actions will always be generated for the three different DBH classes.

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Thinning (DBH class &gt; 0 to 10cm)</td>
</tr>
<tr>
<td></td>
<td>No Thinning</td>
</tr>
<tr>
<td>1b</td>
<td>Thinning (DBH class &gt; 10 to 20cm)</td>
</tr>
<tr>
<td></td>
<td>Maximum stem spacing of 77.74m.</td>
</tr>
<tr>
<td>1c</td>
<td>Thinning (DBH class &gt; 20 to 30cm)</td>
</tr>
<tr>
<td></td>
<td>Maximum stem spacing of 77.74m.</td>
</tr>
</tbody>
</table>

3.6.7 Management Actions for Incentive Proposals
The management actions for ‘Incentive’ vegetation zones will have been agreed to by the CMA and the land holder and chosen from the Incentive Site tab.

The incentive date, and the incentive amount can be recorded against this management action for reporting purposes.
4 References


Department of Infrastructure Planning and Natural Resources (2005). Water Quality Tool Operational Manual for PVP Developer.


5 Glossary

**Benchmark.** Benchmarks are quantitative measures of the range of variability in vegetation with relatively little evidence of modification by humans since European settlement. Benchmarks are defined for specified variables by vegetation community at the scale of the stand or patch. Vegetation with relatively little evidence of modification generally has minimal timber harvesting (few stumps, coppicing, cut logs), minimal firewood collection, minimal exotic weed cover, minimal grazing and trampling by introduced or over abundant native herbivores, minimal soil disturbance, minimal canopy dieback, no evidence of recent fire or flood, not subject to high frequency burning, and evidence of recruitment of native species. Benchmarks are currently available by vegetation class (*sensu* Keith 2004) at [http://www.environment.nsw.gov.au/projects/BiometricTool.htm](http://www.environment.nsw.gov.au/projects/BiometricTool.htm).

**Broadscale clearing.** Clearing of remnant native vegetation or protected regrowth (as defined in the NSW Native Vegetation Act 2003).

**Clearing.** Broadscale clearing of native vegetation that is not thinning to benchmark stem densities.

**Cover.** The area occupied by the periphery of vegetation, i.e. when the vegetation outline is treated as a solid object. Expressed as per cent.

**Connectivity value.** A measure of the extent to which native vegetation not in low condition is linked. Assessed as high, moderate, low, nil according to Table 1 in Section 3.2.2.1.

**Derived vegetation type.** A vegetation type modified substantially since European Settlement and with no relatively unmodified analogue.

**Development.** Clearing or thinning of native vegetation in the context of a PVP.

**dbh.** Stem diameter at breast height, i.e., at 1.3 metres above the ground.

**Foliage Cover.** The amount of light intercepted by vegetation (leaves and branches) as if a light source were directly overhead. Expressed as a per cent.

**Low condition vegetation.** Defined in Box 1 in Section 3.2.1.2.

**Landscape Value.** Extent of fragmentation, connectivity and adjacency of native vegetation within 1000 ha of the site being assessed.

**Listed ecological community.** Critically endangered, endangered or vulnerable ecological community listed under the NSW Threatened Species Conservation Act 1995 or the Federal Environment Protection and Biodiversity Conservation Act 1999.

**Management actions.** Actions that lead to increases (or occasionally decreases) in Site Value. Gains in biodiversity to offset loss in biodiversity from clearing are partly derived from increases in condition predicted to occur with management actions. Management actions must fall under eight broad headings - stock grazing exclusion,
strategic stock grazing, planting or direct seeding of native vegetation, weed control, erosion control, feral herbivore control, retention of all dead timber, retention of all regrowth (regrowth as defined in the NSW Native Vegetation Act 2003).

**Mitchell Landscape.** NSW is divided into 580 relatively homogeneous landscapes in terms of geomorphology, soils and broad vegetation types mapped at a scale of 1:250,000 (Mitchell 2002, 2003). These landscapes are used in parts of the assessment in *BioMetric*.

**NVAT.** Native Vegetation Assessment Tool.

**Offset.** Actions on a site that aim to balance any losses on another site proposed for clearing.

**Overcleared landscape.** A Mitchell Landscape in which more than 70% native vegetation cover has been cleared.

**Overcleared vegetation type.** A vegetation type of which more than 70% has been cleared in the Catchment Management Area.

**PADACS.** PVP Agreements Data and Customer Service – Database of PVP information used by CMAs

**Percent foliage cover.** Percent foliage cover is equivalent to the amount of shadow that would be cast on the ground if there were a light source directly overhead.

**Permitted clearing.** Broadscale clearing that is permitted as defined in Section 8 of the NV Act 2003.

**Plot.** Area in which the assessment of individual variables that make up the Site Value score are is undertaken; usually 0.1 hectare or 0.04 hectare depending on the condition variable being measured.

**Proposal.** The proposed site and management actions put forward for assessment by a landholder.

**Reference site.** Relatively unmodified sites used to obtain benchmark information where the benchmarks are not already available for a vegetation type. Refer to Appendix 2.

**Regional Value.** Regional Value is a measure of the conservation significance of the vegetation type at the regional scale and is measured in *BioMetric* as the percentage of the original extent that a vegetation type has been cleared in the CMA. The greater the percentage of the original extent of a vegetation type that has been cleared the higher is its Regional Value.

**Regrowth.** Any native vegetation that has regrown since 1983 in the Western Division or 1990 in the case of other land or since the date specified in a PVP (see Section 9 of NV Act).

**Riparian area.** Area in riparian zone and buffer as defined in Appendix 6.
**Stem density.** Number of tree stems per hectare. Where a single tree has multiple stems then refers to the largest stem.

**Site Value.** Quantitative measure of structural, compositional and functional condition of native vegetation multiplied by the area of the zone.

**Thinning.** Removing individual trees or shrubs only to benchmark densities. Thinning to benchmark levels for stem densities improves or maintains environmental outcomes for biodiversity in its own right (no offset is required). Thinning to below benchmark levels for stem densities generally requires offsets to improve or maintain environmental outcomes for biodiversity and is assessed as clearing.

**Total adjacent remnant area.** The total remnant area of which the proposal is a part. Assessed as very large, large, medium or small using criteria according to Table 2 in Section 3.2.2.1.

**Vegetation Class.** An intermediate level of vegetation classification as defined in Keith (2004). There are 99 vegetation classes across NSW.

**Vegetation Formation.** A broad level of vegetation classification as defined in Keith (2004). There are 16 vegetation formations (including subformations) across NSW.

**Vegetation type.** The finest level of vegetation classification employed in BioMetric. Typologies were obtained from a number of sources across NSW, so vary in the way they were defined, but are generally at the classification level of association as defined in the Native Vegetation Information System (National Land and Water Resources Audit 2000).

**Zone.** Relatively homogenous unit within proposal area that is the same vegetation type and broad condition state. A single zone must not contain a mix of vegetation in low condition and not in low condition.
Appendix 1 - How to map vegetation zones

For any assessment in BioMetric the proposal must be divided into relatively homogenous or discrete zones for assessment. Each zone should represent a distinct vegetation type (according to the vegetation types provided in BioMetric) and broad condition state (vegetation in low condition must always form a separate zone to vegetation not in low condition). Zones within proposals do not need to be continuous (i.e. a single zone could occupy two or more discrete areas). Each zone must be >0.25ha in area (equivalent to 50mx50m). These zones should be digitized and labelled using the NVAT Mapper. The same zone labels will be transferred into BioMetric automatically. An example of a clearing proposal divided into zones is provided in Figure 2.

![Figure 2. An example of how an area proposed for clearing (proposal area) should be broken into relatively homogeneous vegetation zones before commencing the assessment. This proposal has been broken into three zones: Zone 1, bounded by blue, is essentially cleared and was determined to be a single vegetation type; Zone 2, bounded by green, appears to be a distinct vegetation type that is in a broadly uniform condition state; and Zone 3, bounded by red, is the same vegetation type as in Zone 1, but is in a different condition state.](image-url)
Appendix 2 - Obtaining benchmarks from reference sites

The Site Value score in BioMetric is based on a comparison between measurements of several variables on the proposal area and a benchmark for each of these variables. Benchmarks are quantitative measures of the range of variability in vegetation with relatively little evidence of modification by humans since European settlement. Benchmarks are defined for specified variables by vegetation community at the scale of the stand or patch. Benchmarks derived from quantitative data and expert knowledge are available for most vegetation classes across NSW at [http://www.environment.nsw.gov.au/projects/BiometricTool.htm](http://www.environment.nsw.gov.au/projects/BiometricTool.htm). However, where benchmarks do not exist for a vegetation type, or where local benchmarks may be more appropriate, they must be derived from measurements taken in reference sites, that is, sites measured in the same vegetation type in relatively unmodified condition.

Locating reference sites

Reference sites are required to have little modification relative to other vegetation in the region as indicated by: minimal timber harvesting (few stumps, coppicing, cut logs), minimal firewood collection, minimal exotic weed cover, minimal grazing and trampling by introduced or over abundant native herbivores, minimal soil disturbance, dieback not in excess of normal senescence, no evidence of very recent major perturbation such as fire or flood, not subject to high frequency burning, and evidence of recruitment of native species.

It may be difficult to find totally unmodified sites in a landscape, particularly in highly cleared regions. Vegetation in relatively unmodified condition can be found in some travelling stock routes and reserves, national parks and nature reserves, state forests (especially Flora Reserves), cemeteries, roadsides and commons. Appropriate reference sites may exist on the assessment property. Reference sites can occur in small remnants, such as narrow roadsides and cemeteries. Sources of local knowledge regarding the potential location of reference sites include field-based staff from: CMAs, DECC, Department of Primary Industries (including Forests NSW), Rural Lands Protection Boards, Greening Australia, Landcare Coordinators, field naturalist clubs and landholders. Individuals who undertook the surveys underpinning the vegetation types listed in BioMetric (these sources are listed with the definitions of each vegetation type) may be another potential source of information regarding potential reference site locations.

Numbers of reference plots

To obtain a reasonable composite picture that encompasses the variation in condition variables, a minimum of three reference plots for each variable should be measured for each vegetation type with more plots being desirable.

Field methods for measuring the vegetation condition variables on reference sites

**Data entry**
The data from all reference plots for a specific PVP assessment need to be entered into the “Data entry - Benchmarks” worksheet from the “Reference Data Help Files” button to enter benchmark data obtained from plots at reference sites for that proposal. This worksheet automatically calculates benchmark values. These benchmarks then need to be copied by the assessor into the Plot tab for the relevant proposal type (development, offset, thinning or incentive) in *BioMetric* for the Site Value assessment.
Appendix 3 - Per cent cover of native vegetation at the landscape scale

<10% cover

10%–30% cover

30%–70% cover

>70% cover
Appendix 4 - Field methodology for measuring condition variables in Site Value

Suggested plot layout

Plot marker and GPS point where relevant

20m

20x20m plot

50m line transect

20m

Figure 1. Layout of nested 20x50m and 20x20m plots used for the assessment of vegetation condition attributes.
**Field methodology**

Table 1: Field methods for measuring the vegetation condition variables in Site Value. An asterisk indicates that an alternative method is provided for proposals where tree density is very low (e.g. paddock trees).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Plot or transect type</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indigenous plant species richness</td>
<td>20mx20m plot</td>
<td>Indigenous plant species refers to vascular species local to the area and, if planted, come from a local seed source. Systematically walk the plot counting the number of indigenous plant species for all vascular plants (i.e. the species do not have to be identified).</td>
</tr>
<tr>
<td>Native over-storey cover</td>
<td>At 10 points along 50m transects*</td>
<td>Native over-storey is the tallest woody stratum present (including emergents) above 1m and includes all species native to New South Wales (i.e. native species not local to the area can contribute to over-storey structure). In a woodland community the over-storey stratum is the tree layer, and in a shrubland community the over-storey stratum is the tallest shrub layer. Some vegetation types (e.g. grasslands) may not have an over-storey stratum. Over-storey cover is estimated as per cent foliage cover, which is equivalent to the amount of shadow that would be cast on the ground if there were a light source directly overhead and can be estimated using one of two methods: (1) At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover directly overhead using the images provided in Figure 2. Divide the total by the number of points (i.e. 10) measured along the transect (e.g. 50%, 0%, 0%, 0%, 45%, 50%, 55%, 0%, 0% = 240/10 = 24% foliage cover). NOTE: Multiple transects are usually required to sufficiently encompass over-storey heterogeneity; OR (2) In proposals where the over-storey cover is very sparse (e.g. paddock trees), foliage cover can be estimated across the entire zone using the following steps: (a) calculate the average crown diameter of trees using the imagery in the PVP Mapper, (b) determine the average foliage cover of individual trees (estimated by observing several trees in the field using diagrams in Figure 2); (c) count the number of trees in a known area within the zone using the imagery and PVP Mapper; (d) enter these data in the Scattered Tree Calculator in BioMetric (Appendix 8) to arrive at the estimate for the entire zone. This figure must then be recorded as the over-storey cover estimate for each plot within the relevant zone.</td>
</tr>
<tr>
<td>Native mid-storey cover</td>
<td>At 10 points along 50m transects, or 20mx20m plot</td>
<td>The mid-storey contains all vegetation between the over-storey stratum and 1m in height (typically tall shrubs, under-storey trees and tree regeneration) and includes all species native to New South Wales (i.e. native species not local to the area can contribute to mid-storey structure). Foliage cover of the mid-storey is expressed as a % and can be measured using one of two methods: (1) Visually estimate per cent foliage cover in a 20mx20m plot. The precision of the estimate can be improved if the assessment is conducted separately in each of the four 10mx10m quarters that make up the 20mx20m plot. In a 10mx10m sub-plot 1m² of foliage cover is equal to 1% of foliage cover (in a 20mx20m plot 1% of foliage cover is equal to 4 m² of foliage cover). Tally the total m² of foliage cover for each of the four 10mx10m sub-plots and average them for a per cent foliage cover estimate for the entire 20mx20m plot. NOTE: Multiple transects are usually required to sufficiently encompass mid-storey heterogeneity; OR (2) At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover in the mid-storey. Divide the total by the number of points (i.e. 10) measured along the transect (e.g. 50%, 0%, 0%, 0%, 45%, 50%, 55%, 0%, 0% = 240/10 = 24%</td>
</tr>
<tr>
<td>Classification</td>
<td>Methodology</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Native ground cover (grasses)</strong></td>
<td>The ground stratum contains all native vegetation below 1m in height and includes all species native to New South Wales (i.e. is not confined to species indigenous to the area). The ground stratum (grasses) refers to native grasses (i.e. plants belonging to the family Poaceae). Foliage cover of the ground stratum (grasses) is expressed as a % and can be measured using one of two methods: (1) Visually estimate per cent foliage cover in a 20mx20m plot as described for native mid-storey cover above; OR (2) At 50 points along the 50m transect (i.e. every 1m) record whether native grass intersects that point. Divide the total of ‘hits’ by the number of points measured along the transect (i.e. 50). NOTE: Multiple transects may be required to sufficiently encompass ground cover heterogeneity.</td>
<td></td>
</tr>
<tr>
<td><strong>Native ground cover (shrubs)</strong></td>
<td>The ground stratum contains all native vegetation below 1m in height and includes all species native to New South Wales (i.e. is not confined to species indigenous to the area). The ground stratum (shrubs) refers to native woody vegetation &lt;1m. It is measured in the same way as for native ground cover (grasses) (see above).</td>
<td></td>
</tr>
<tr>
<td><strong>Native ground cover (other)</strong></td>
<td>The ground stratum contains all native vegetation below 1m in height and includes all species native to New South Wales (i.e. is not confined to species indigenous to the area). The ground stratum (other) refers to non-woody native vegetation (vascular plants only) &lt;1m that is not grass (e.g. herbs, ferns). It is measured in the same way as for native ground cover (grasses) (see above).</td>
<td></td>
</tr>
<tr>
<td><strong>Exotic plant cover</strong></td>
<td>Exotic plants are vascular plants not native to Australia. Exotic plant cover is measured as total per cent foliage cover of all exotics in all strata. Exotic cover was measured as a % of total ground cover vegetation in previous versions of BioMetric. This calculation is now done within BioMetric. If the exotics are in the over-storey then measure using the same method as native over-storey cover (see above), if exotics are in the mid-storey then measure using the same method as native mid-storey cover (see above) and if exotics are in the ground stratum then measure using the same method as described for native ground cover (grasses) (see above).</td>
<td></td>
</tr>
<tr>
<td><strong>Number of trees with hollows</strong></td>
<td>This is a count of the number of living and dead trees within a 50mx20m plot with at least one hollow (note that the hollows do not have to be within the plot). A hollow is only recorded if: (a) the entrance can be seen; (b) the minimum entrance width is at least 5cm across; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1m above the ground (this omits hollows in cut stumps or at the base of trees); and (e) the centre of the tree is within the plot. Trees should be examined from all angles. In proposals where trees occur in very low densities (e.g. paddock trees), the number of trees with hollows per 0.1ha (equivalent to the area of a 50x20m plot) can be estimated by: (a) identifying a representative area (in hectares) over which all trees will be examined using the imagery in the PVP Mapper; (b) recording the number of trees with hollows within this area; and (c) entering these data in the Scattered Tree Calculator in BioMetric. This figure must then be recorded as number of trees with hollows in each plot within the relevant zone.</td>
<td></td>
</tr>
<tr>
<td><strong>Regeneration</strong></td>
<td>Regeneration is measured as the proportion of over-storey species present at the site that are regenerating (i.e. with dbh ≤ 5cm). For example if there are three tree species present at the site but only one of these species is regenerating, then the value is 0.33. The maximum value for this measure is 1.</td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td>Plot or transect type</td>
<td>Method</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-----------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Total length of fallen logs</td>
<td>50mx20m plot</td>
<td>This is the total length of logs at least 10cm diameter and at least 0.5m long. The diameter is estimated with a measuring tape (or callipers if available) held horizontally immediately above the log and the length is estimated to the nearest metre by measuring with a tape, or pacing, along the part of the log that is at least 10cm diameter. If estimating length by pacing then the actual length of a sample of logs should be measured regularly with a tape so the assessor can calibrate their estimate derived from pacing. Only those parts of logs lying within the plot are measured.</td>
</tr>
<tr>
<td>Number of stems in specified diameter classes</td>
<td>50mx20m plot</td>
<td>This is a count of the number of stems of over-storey tree species in dbh classes relevant for the vegetation type. Record only those trees in which the centre of the stem is within the plot. Record only the largest stem for multi-stemmed trees.</td>
</tr>
</tbody>
</table>
Figure 2. Diagrams to assist with estimates of per cent foliage cover (Walker and Hopkins 1984).
Appendix 5 - Guidelines for assessing the impacts of management actions on Site Value

This appendix provides guidelines to assess change in Site Value with proposed clearing and with proposed management actions.

Site Value is made up of 10 variables: richness, over-storey, mid-storey, ground layer (grasses, shrubs, other), exotic plant cover, trees with hollows, logs and regeneration. For the current value of the proposal site, a score between 0 and 3 is allocated to each variable based on the difference between the observed value in the proposal and the benchmark. Scores are allocated as described in Section 3.2.13.

For the future value of the proposal site with management actions (i.e. clearing, offsets or incentives), the assessor must predict the loss or gain that can be feasibly expected with any proposed management actions. This appendix is a guide to doing this, but the assessor must also bring to bear informed judgement based on the local conditions to this decision. We encourage regional bodies to develop guidelines to assist assessors make transparent and consistent decisions in this regard.

Predicting change in Site Value from clearing proposals
For proposals to clear native vegetation the assessment is based on the difference between the current value of the proposal site and the value of the proposal site were clearing to proceed. The method for assessing the current value of the proposal is explained in Section 3.2.3.1. This process allocates a score between 0 and 3 to each variable. The assessor then assigns a score to each condition variable based on the effect of the proposed clearing. This step cannot be automated within BioMetric because many scenarios are possible and thus requires expert input by the assessor.

The impacts of clearing are often negative, but can vary in their effect. A proposal to clear intact woodland (e.g. to establish a crop) will generally take all condition variables down to zero (i.e. cropping does not generally include the permanent retention of any components of native vegetation). A proposal to partially clear the over-storey for grazing (i.e., where some trees will be retained for shade and other environmental services) will take the over-storey down one or two points commensurate with the level of over-storey removal. An understanding of how the Site Value score works (see Section 3.2.3.1) will help the assessor judge the extent of loss. For example, if the benchmark for over-storey is 20-30% cover and the site currently has 25% over-storey cover then the current score for over-storey is 3. If the proposal is predicted to result in an over-storey cover of around 5% then the score with the proposal would be 1 (i.e. the proposal results in over-storey cover that is within >10~<50% of the lower benchmark), but if the proposal were to result in only few scattered trees, or a predicted over-storey cover of 1% then the score with the proposal would be 0 (i.e., 0-10% of the lower benchmark).

Some impacts of clearing can be positive. For example, the removal of over-storey and/or mid-storey without damage to the ground layer can stimulate increased cover in the ground layer. Certain rules must be observed when scoring an increase in value of a variable:

(1) the increase in the score for each variable can generally only be by one point unless there is strong management intervention (e.g. planting or direct seeding
of native pasture species) in which case the increase can be by two points (for some variables);

(2) planting or direct seeding will only result in an increase in richness if the species is indigenous to the area and the seed is sourced locally; and

(3) where a variable is currently absent from the proposal site and adjacent area then an increase cannot generally be scored unless it is to be specifically introduced;

(4) where an increase is not feasible because of other pressures associated with the proposal (e.g. grazing or exotic invasion) then an increase should not be scored;

(5) an increase in some variables (e.g. ground cover) beyond the benchmark will result in a decrease in the score (e.g. if the current score for grass cover is 3 then an anticipated increase in grass cover beyond the benchmark range will reduce the score to 2).

Predicting change in Site Value with proposed management actions for offsets or incentives

For proposals to manage native vegetation as part of offsets or incentive applications, the calculations of the score in BioMetric are based on the difference between the current Site Value of the proposal (minus any loss that is acceptable under the NV Act) and the future Site Value were the management actions implemented. Changes in the condition score with management actions is predicted for each of the 10 variables that make up Site Value. After assessing the current condition score for each variable in each zone the assessor must define the specific management actions that the landholder agrees to undertake and then estimate the future condition for each variable given these actions. Eight generic management actions listed in BioMetric (Table 1) are acceptable, although any combination of actions a landholder wishes to undertake that fall under these broad categories can be applied, except Grazing exclusion and Strategic grazing, which are mutually exclusive.

Table 1. Definitions for generic management actions listed in BioMetric. Any combination of actions that fall under these broad headings is permitted (except Grazing exclusion and Strategic grazing, which are mutually exclusive).

<table>
<thead>
<tr>
<th>Management action</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grazing exclusion</td>
<td>The complete and permanent removal of grazing by all domestic stock at the site.</td>
</tr>
<tr>
<td>Strategic grazing</td>
<td>The implementation of a variable and adaptive stock grazing regime for enhancing biodiversity, such as for controlling exotic weeds or vegetation biomass and/or enhancing competitiveness of native perennial species. Typically involves short periods of intensive grazing between long periods of little or no grazing. Strategic grazing strategies differ with management goals, seasonal conditions and regions.</td>
</tr>
<tr>
<td>Planting/direct seeding</td>
<td>The direct establishment of tree, shrub or groundlayer species that are likely to have existed at the site, using species and seed sources suitable for the vegetation type and region.</td>
</tr>
<tr>
<td>Weed control</td>
<td>Reducing the number or cover of exotic plants using herbicides, manual or mechanical control. Stock grazing for weed management is covered by the management action ‘Strategic grazing’. Landholders are required by law to ‘continuously suppress and destroy’ some weed species, including most Noxious Weed categories (all W1, W2, W4d and W4e weeds). Management of such species is therefore outside the definition of this management action.</td>
</tr>
<tr>
<td>Erosion control</td>
<td>The mitigation of mass soil movement. It can be achieved using engineering solutions, management of grazing and/or revegetation.</td>
</tr>
</tbody>
</table>
Feral herbivore control

Aims to eliminate or reduce to very low population densities exotic herbivores that contribute to high total grazing pressures and disturbance of areas of native vegetation. Feral herbivore species include rabbits, goats, pigs, horses, escaped domestic stock, and deer.

Retain dead timber

Means that no dead timber (i.e. logs and litter on the ground and standing dead trees) is removed from a site.

Retain regrowth

The retention of all regrowth on a site is defined as: not clearing communities of native vegetation comprising trees, under-storey and groundcover that have regrown since 1 January 1983 in the Western Division and 1 January 1990 in the case of other land.

Some general rules must be considered when scoring an expected increase in value of a variable with management:

1. the increase in the score for a variable can generally only be by one point unless there is strong management intervention (e.g. planting or direct seeding) in which case the increase can be by two points (for some variables);
2. planting or direct seeding will increase the relevant cover values, but will only result in an increase in richness if the species are indigenous to the area and the seed is sourced locally;
3. where a variable is currently absent from the proposal site and adjacent area then an increase cannot generally be scored unless it is to be specifically introduced;
4. where an increase is not feasible because of other pressures associated with the proposal (e.g. grazing or exotic invasion) then an increase should not be scored;
5. no increase can be scored for trees with hollows because of the long period that hollows take to form (generally >100 years).

Suggested scores for different management actions in BioMetric are outlined in Table 2. However, when estimating the effect of management actions on the proposal site the assessor must balance the potential positive impacts of the proposed management actions with the potential negative impacts of other pressures on the same zone. For example, native ground cover is unlikely to increase with the removal of grazing alone on a site that has very high exotic ground cover. In Table 2 we have also suggested the conditions in which management actions are likely to have a positive effect. The information in Table 2 is intended as a guide only and should be informed by local conditions and professional judgement by the assessor.
Table 2. Suggested responses to Site Value scores with different management actions. The + sign followed by a number refers to the suggested number of increments that the score should be increased with the activity and the codes (e.g. N1) refer to the conditions that should be present before such a response can be expected (see below for explanation of codes). This table is intended as a guide only and should be augmented by local knowledge.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Grazing exclusion</th>
<th>Strategic grazing</th>
<th>Planting/direct seeding</th>
<th>Weed control</th>
<th>Erosion control</th>
<th>Feral herbivore control</th>
<th>Retain dead timber</th>
<th>Retain regrowth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indigenous plant species richness</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td></td>
<td>N1, E2</td>
<td>N1, E2</td>
<td>G1, P2</td>
<td>N2, E2, G1, P1</td>
<td>N1, E2, G1, P1</td>
<td>E1, G1, F1, F2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Native over-storey cover</td>
<td>+1</td>
<td>+1</td>
<td>+2</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>No change</td>
<td>+1</td>
</tr>
<tr>
<td></td>
<td>E1, E2, P1, R1</td>
<td>E1, E2, P1, R1</td>
<td>G1, P2</td>
<td>E2, G1, P1, R1</td>
<td>E2, G1, P1, R1</td>
<td>E1, G1, F1, F2, P1, R1</td>
<td></td>
<td>G1</td>
</tr>
<tr>
<td>Native mid-storey cover</td>
<td>+1</td>
<td>+1</td>
<td>+2</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>No change</td>
<td>+1</td>
</tr>
<tr>
<td></td>
<td>N1, E1, E2, P1</td>
<td>N1, E1, E2, P1</td>
<td>G1, P2</td>
<td>N2, E2, G1, P1</td>
<td>N1, E1, G1, P1, F1, F2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Native ground cover (measured separately for grasses, shrubs &amp; other plant life forms)</td>
<td>+1</td>
<td>+1</td>
<td>+1 (+2 for grasses)</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td></td>
<td>N1, E1, E2</td>
<td>N1, E1, E2</td>
<td>G1, P2</td>
<td>N2, E2, G1</td>
<td>N1, G1, F1, F2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exotic plant cover</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td></td>
<td>E2</td>
<td>E2</td>
<td>E2, P2</td>
<td>E2</td>
<td>E2</td>
<td>E2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of trees with hollows</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Over-storey Regeneration</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td></td>
<td>E1, E2, P1, R1, R2</td>
<td>E1, E2, P1, R1, R2</td>
<td>E1, G1, P1, R2</td>
<td>E2, G1, P1, R1, R2</td>
<td>E2, G1, P1, R1, R2</td>
<td>E1, E2, G1, P1, F1, F2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total length of fallen logs</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
<td>+1 T1</td>
<td>+1 T1</td>
</tr>
</tbody>
</table>

Codes for Table 2 are:

**NATIVE SPECIES**

**N1**: some palatable &/or grazing-sensitive native plant species (within relevant structural class/es) still present on site or in adjacent vegetation of same type.

**N2**: some native plant species (within relevant structural class/es) still present on site or in adjacent vegetation of same type.

**EXOTIC PLANTS**

**E1**: initial exotic ground cover on site is low.

**E2**: exotic plant species monitored and managed if cover increases.

**GRAZING MANAGEMENT**

**G1**: grazing management (exclusion or strategic stock grazing) undertaken if necessary to facilitate natural regeneration of native plant species in relevant structural class/es. Includes control of access to watering points.

**PLANTING OR DIRECT SEEDING**

**P1**: planting/seeding and follow-up management of indigenous local species relevant to vegetation type, landscape position & structural class/es if natural regeneration does not occur within three years. Seeds/seedlings to be of local provenance. Follow-
up management includes watering, grazing management, control of weeds & other competing species.

**P2:**
- appropriate site preparation prior to planting/seeding (including weed control)
- plantings restricted to indigenous local species relevant to vegetation type, landscape position & structural class/es, with seeds/seedlings of local provenance
- follow-up management of plantings for long-term survival (e.g. watering, grazing management, control of weeds & other competing species, replanting)
- planting configuration reflects natural density and patchiness
- grazing excluded until seedlings established.

**FERAL HERBIVORES**

**F1:** monitoring of specified feral herbivore species and management of populations to allow regeneration of native plant species in relevant structural class/es.

**F2:** existing (or recent) grazing pressure from feral herbivores moderate to high.

**NATURAL REGENERATION**

**R1:** nearby seed source of native over-storey species (on site or in adjacent vegetation of same type).

**R2:** site preparation for natural eucalypt regeneration, if necessary.

**FALLEN TIMBER MANAGEMENT**

**T1:** retention of all fallen timber.
Appendix 6 - Riparian zones and buffers - definitions

Widths of riparian zones and buffers (in parentheses). Figures are distances (m) from the top of each bank if defined, otherwise from the centre of the stream. More information is provided in Department of Infrastructure and Natural Resources (2005).

<table>
<thead>
<tr>
<th>Location</th>
<th>Size of stream</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minor watercourses, flood runners and effluents</td>
</tr>
<tr>
<td>Coast &amp; tablelands</td>
<td>10m</td>
</tr>
<tr>
<td>Western slopes and plains</td>
<td>20m</td>
</tr>
<tr>
<td>Estuarine areas</td>
<td>50m from the astronomical high tide mark (where no obvious bank).</td>
</tr>
</tbody>
</table>
Appendix 7 - Guide to average hectares of offset required

These charts provide a guide to the mean hectares of offset required in BioMetric for each hectare cleared—assuming the offset has passed the Regional and Landscape components of the assessment. Each data point is a possible clearing/offset scenario derived from Monte Carlo (random) simulations. Bold lines represent the average of all scenarios. To use these charts: (a) choose the chart that approximates the condition of the vegetation to be cleared; (b) estimate the condition (with management) of the offset site on the horizontal axis; (c) where this value intersects the bold line read the mean hectares of offset required on the vertical axis. The actual area of offset required can only be determined by completing the assessment in BioMetric.

A. Where the vegetation being cleared is in low condition (11 out of 100) (e.g. paddock trees). (Note that areas are those bounded by the outermost paddock trees in the proposal, not the total area of tree crowns).

B. Where the vegetation being clearing is in moderate condition (55 out of 100).

C. Where the vegetation being cleared is in excellent condition (82 out of 100).
Appendix 8 - Explanation of the Scattered Tree Calculator

In sparsely wooded vegetation (e.g. paddock trees) over-storey cover and trees with hollows can be assessed using the rectified imagery in the NVAT Mapper combined with some simple field measurements rather than by measuring these variables in plots. In response to feedback from the trials BioMetric now includes a tool to make these calculations. The calculator for scattered and paddock trees is accessed via the Calculator button.

1. Enter the average crown diameter of paddock trees in the zone by measuring several crowns on the rectified imagery within the zone (using the distance tool in the NVAT Mapper) and averaging them.
2. Enter the average foliage cover by examining the crowns of several trees in the zone, assigning a % foliage cover using the diagrams in Appendix 4 and averaging these (the typical range of % cover for eucalypts in good health is 40-70%).
3. Enter the number of trees within the entire zone or a representative area within the zone.
4. Enter the area (in hectares) in which the trees were counted. This is determined using digitising tools in the NVAT Mapper.
5. The calculator will provide the % foliage cover of the over-storey for the whole zone.
6. Return to the plot data entry sheet and enter this figure for each plot established within the zone.

To assess over-storey cover using the Scattered tree calculator:

1. Enter the average crown diameter of paddock trees in the zone by measuring several crowns on the rectified imagery within the zone (using the distance tool in the NVAT Mapper) and averaging them.
2. Enter the average foliage cover by examining the crowns of several trees in the zone, assigning a % foliage cover using the diagrams in Appendix 4 and averaging these (the typical range of % cover for eucalypts in good health is 40-70%).
3. Enter the number of trees within the entire zone or a representative area within the zone.
4. Enter the area (in hectares) in which the trees were counted. This is determined using digitising tools in the NVAT Mapper.
5. The calculator will provide the % foliage cover of the over-storey for the whole zone.
6. Return to the plot data entry sheet and enter this figure for each plot established within the zone.
To assess whether over-storey cover meets the low condition definition using the Scattered Tree Calculator
Native vegetation must have an over-storey cover <25% of the lower benchmark value (as well as under-storey that is <50% native) to be classed as “low condition”. The Scattered Tree Calculator can be used assess whether the vegetation meets the over-storey criterion for low condition by simply entering the lower over-storey benchmark for the vegetation type. This part of the calculator will only work if the foliage cover was calculated following the above steps.

To assess the number of trees with hollows using the Scattered Tree Calculator
1. Enter the area (in hectares) over which hollows in trees were examined. This may be the entire zone, a representative area sampled within the zone or the same area in which trees were counted for the over-storey cover calculation (above).
2. Enter the number of trees with hollows (living and dead) observed within this area.
3. The Scattered Tree Calculator will provide the average number of hollow-bearing trees (per 0.1 ha or 50x20m plot) for the zone.
4. Return to the plot data tab and enter this figure for each plot established within the zone.