

Ecological Thinning Information and Workbook

Trust for Nature property at 894 Lewis Road, Muckleford

September 2012



1 BACKGROUND

The ecological thinning information and workbook within this document is based on a draft Ecological Thinning pilot study document produced by the State Department of Sustainability and Environment (DSE, undated). A final version of this document is currently not available (Pettina Blackwell, DSE, *pers.comm.*) therefore the draft guidelines have been used to direct the information provided within this workbook.

This document is to be used in conjunction with the following documents:

- Application for Planning Permit
- Native Vegetation Permit Applicant's Form
- Title Plan documents
- Trust for Nature Deed of Covenant

2 INTRODUCTION – ECOLOGICAL THINNING

2.1 Purpose of the Ecological Thinning draft guidelines document

- This document is intended to assist in a pilot study of ecological thinning to better understand appropriate processes for department and local government staff to process permits for ecological thinning.
- This document is intended solely to assist DSE statutory planning staff in providing advice to the pilot group of landholders or management agencies (eg Trust for Nature) who apply for a permit to thin native vegetation for environmental enhancement.
- It is not intended for distribution to the public until final guidelines are produced.
- This document is only intended to be used as a guide until research brings more information to light. It is a 'draft' and 'live' document that will be updated as more information becomes available.
- These thinning guidelines do not apply to Mallee vegetation.
- Ultimately, a final document is to be released for a wider audience.

2.2 What is ecological thinning?

Ecological thinning is the reduction in the number of trees from a patch of vegetation in order to improve the ecological quality of a remnant. Ecological quality is improved due to

faster growth of trees to maturity and hollow-bearing, increased ground cover and understorey layer due to reduced competition for light and nutrients, and less leaf litter, from a dense stand of trees.

2.3 Why Ecological Thinning may be necessary

Many private forests and woodlands have been managed for forestry or are the result of a regeneration event. The resultant structure of the vegetation is greatly modified from that which is considered ‘natural’. Typically, tree densities are much higher than would occur under natural conditions and there are fewer very large trees. Modified woodlands and forests consist of even-age stands of trees that are uniformly spaced and often are multi-stemmed coppice regrowth. It is generally believed that coppice regrowth does not have the life expectancy of a seedling tree, due to the combined effects of fire, rotting at the base and stress on the root-stock (pers. comm. Jim Allen). In addition the absence of mature trees in a remnant reduces the amount of woody debris and fallen logs on the ground. Mature trees are more likely to drop limbs and branches (pers. comm. Jim Allen).

Modifications to natural stands reduce the ecological quality of woodlands and forests as habitat for the many species of wildlife that did or should inhabit woodlands. Many habitat features critical to the survival of woodland species (e.g. woody debris, mature trees, open spaces, canopy gaps) are no longer present in managed woodlands. Thus, ecological enhancement thinning (EET) has been suggested as a means of restoring “over-stocked” woodlands/forests to either their probable former condition or to an improved ecological condition. The aim of EET therefore, is to enhance the biodiversity/ecological value of woodlands.

Other Benefits

- Better informed communities about environmental issues
- A possible source of limited amounts of firewood that will fill any shortfalls caused by ECC recommendations.
- Communities take greater responsibility for environmental management

2.4 Research

There is a lack of research directly linking environmental thinning with species recovery or that will help quantify optimal thinning procedures or levels.

However, there is research in some areas that point to the need for thinning:

- Thinning allows remaining trees to grow bigger, faster than in an unthinned, over-stocked forest structure.
- Larger trees support higher densities of some fauna species (more hollows, greater range of hollow sizes, more regular and heavy nectar production, more habitat characteristics in the bark surface).
- The loss of large trees is a threatening process contributing to the decline of some species including threatened species eg tuan, grey-crowned babbler.

2.5 Principles

1. Until more quantitative information is gained from research, all thinning guidelines will err heavily on the side of caution (precautionary principle).
2. There must be a definite vision of the desired condition of the remnant tree density, tree species composition, shrub community eg relevant evc benchmark.
3. Ecological thinning is only one step in an enhancement program. Other management techniques (eg weed control) also need to be identified.
4. Thinning should not be undertaken where benchmarks have not been described.
5. The appropriateness of thinning should be determined on a case by case basis and be based on benchmark characteristics.
6. When deciding if thinning is necessary, the whole remnant is to be considered not just small (eg < 0.5 ha) dense regeneration within a remnant.

The objective of a thinning operation is to:

1. Enhance environmental quality of the remnant - EET should only be contemplated where it is obvious that it would improve ecological conditions,
2. Create a vegetation structure in the treated remnant that is patchy ie thinning is not to be homogenous or evenly spaced across the entire treated area,
3. Promote a more rapid growth of the remaining trees (i.e. to expedite occurrence of large, hollow-bearing trees),
4. Ensure that most thinned trees/stems are killed (the aim is to reduce stem density to facilitate growth of large trees),

5. Promote the growth of an understorey, and if this does not occur consider supplementary plantings,
6. Promote mixed-age stands,
7. Replace components of the habitat lost during management,
8. Increase the amount of fallen woody habitat, where there is less than benchmark on site.

3 WORKBOOK FOR ECOLOGICAL THINNING TREATMENT

Application No. DSE referral Officer.....

Date Received..... Shire Officer.....

3.1 Details of plan development

Landowner/manager: Paul Hampton

Other professionals involved:

Native Vegetation Consultant

Name: Bianca Aquilina

Address/Organisation: Atlas Ecology - PO Box 718 Woodend 3442

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Other authors/consultations

Name: Kirsten Hutchison

Address/Organisation: Trust for Nature – 233 Barker Street Castlemaine 3450

Telephone: 03 5470 6529

Email: kirstenh@tfn.org.au

3.2 Address details

Property address: 894 Lewis Road Muckleford VIC 3451

Correspondence address: PO Box 69 Castlemaine VIC 3450

Property Title (from Council Rates Notice): n/a

Lot on Plan: TP362266A, TP270895D *Parish:* Walmer

Zone(s) of Property: Farming Zone

Overlays relevant to property: Erosion Management Overlay (EMO), Wildfire Management Overlay (WMO)

Telephone no: 03 5474 2189

Email address: paul-hampton1@bigpond.com

3.3 Property Information (prior to works)

Broad description of the property. Provide maps that include:

MAP:

- *Current Management Units – eg forest/woodland, grazing, fencelines, tracks, topography, soils.* See Figure 1 on page 16.
- *Ecological Vegetation Class(es).* See Figure 2 on page 18.
- *Benchmarks for each Ecological Vegetation Class.* See pages 21-22.
- *Name of any creeks/ rivers that pass through the property and/or name and distance to nearest creek/river.* See Figure 1.
- *Threatened species records.* No coordinate locations for threatened species available

Provide written information:

- *Nature of surrounding land (forest, pasture, cropping, plantation etc.):* Fragmented and modified forest, cleared agricultural land.
- *Average annual rainfall:* 600 mm

3.4 Vision and objectives of the ecological thinning

Provide a short statement that summarises the overall vision and objective that you, the landowner, wish to achieve in the longer term. It should cover both timber utilisation and conservation aspects of land management.

VISION:

- Improve the overall vegetation structure and condition of the thinning site
- Increase the rate of development of large trees and subsequently tree hollows
- Increase understorey cover and diversity
- Increase the cover of logs and woody debris in the ground layer
- Provide improved habitat quality for local fauna species
- Provide a sustainable source of firewood for on-site personal use.

Please tick boxes to show that you understand and agree to the general objectives of the Ecological Thinning Program.

The objective of the thinning operation is to:

- enhance the environmental quality of the remnant - EET should only be contemplated where it is obvious that it would improve ecological conditions,
- create a vegetation structure in the treated remnant that is patchy ie. thinning is not to be homogenous or evenly spaced across the entire treated area,
- promote a more rapid growth of the remaining stems (i.e. to expedite occurrence of large, hollow-bearing trees),
- ensure that most thinned trees/stems are killed - aim is to reduce stem density to facilitate growth of large trees,
- promote the growth of an understorey,
- promote mixed-age stands,
- replace components of the habitat lost during management,
- increase the ecological values of the property,
- protect all sites of ecological significance,
- protect water quality in all rivers and streams,

- to comply with all relevant aspects of the Code of Forest Practices for Timber Production (where appropriate),
- to comply with all planning permit conditions and Timber Harvesting (Coupe) Plan requirements (where appropriate),
- to monitor and record the on-going success and impacts of thinning and regeneration.

3.5 Duration and review of the ecological thinning management plan

Indicate the period of time for which you require a permit for ecological thinning (up to 10 years with a review every 2 years). 10 years

Any changes to the original plan should be notified to DSE, Native Vegetation Officer so that the planning permit may be amended accordingly.

3.6 Description of management units

Proposed Management Map:

Create a management map that outlines the current property area(s) to be thinned into management units. Use clear overlays onto the air photograph of existing management units to determine which areas are to be thinned and the order of the thinning operations.

See Figure 1 attached.

In addition to the map, for each management unit provide:

- *Dominant overstorey species* – Red Stringybark and Red Box (see Table 1 below).
- *Dominant understorey species* – Daphne Heath *Brachyloma daphnoides*, Gold-dust Wattle *Acacia acinacea*, Golden Wattle *Acacia pycnantha*, Spreading Wattle *Acacia genistifolia*, Wattle-headed Mat-rush *Lomandra filiformis* subsp. *filiformis*, Silvertop Wallaby-grass *Rytidosperma pallidum*, Black-anther Flax-lily *Dianella admixta* and wallaby grasses *Rytidosperma* spp. See Appendix 1 for a full list of flora species recorded.
- *Significant plant or animal species* – Brush-tailed Phascogale has been recorded within the property (Kirsten Hutchison, Trust for Nature, *pers.comm.*) however no records have been submitted to either DSE (2012) or FIS (2012). Other threatened species recorded within the local area include Brown Treecreeper, Speckled Warbler, Australasian Shoveler, Powerful Owl and Barking Owl (DSE 2012).

- *Vegetation Quality Assessment Sheet* – See pages 23-24

Slope, aspect, soils, erosion risk and any rivers, creeks and drainage lines:

The proposed thinning area sits on undulating terrain and is primarily on a west to north facing aspect on a slope of <20%. The thinning area slopes down to a minor ephemeral drainage line which runs north-south within the far western portion of the thinning area. The eastern boundary of the thinning area is the highest point of the site. Soils are shallow and rocky, derived from Ordovician sediments and erosion risk is moderate. The drainage line eventually flows into Chinaman Creek which is located immediately east of the property (see Figure 1).

Access for thinning operations:

Access is via the north-south dirt track which borders the eastern boundary of the thinning area (see Figure 1).

3.7 Thinning process information

There are several considerations in determining the thinning regime. Please provide answers to the following as part of the management plan:

1. What is the approximate current density of stems (compared to benchmark eg 10X).

The approximate density of tree stems/ha is 1,917 stems/ha based on the calculations presented below of an average of 231 stems per 0.12ha (300 x 4m transect, see Table 1 below). This figure is averaged to 9,585 stems for the entire thinning area of 5 hectares.

The EVC benchmark for Heathy Dry Forest (EVC 20) for the Goldfields Bioregion indicates the benchmark diameter at breast height (DBH) for Large Old Trees to be 60cm with a benchmark density of 20 per hectare. The benchmark number of Large Old Trees within the thinning area is therefore 100 (20 x 5 ha). No Large Old Trees were recorded within the transect study area. The largest stem diameter recorded within the transect was 20-30cm DBH, however two Large Old Trees were recorded within the wider thinning area. Consequently only 2% of the expected benchmark number of large trees within the thinning area are present.

The benchmark tree canopy cover within Heathy Dry Forest is 30%. A minimal number of trees within the thinning area met the criteria of a canopy tree (i.e. 80% of tree benchmark

height) therefore tree canopy cover is at less than half the expected canopy cover (i.e. <15% cover). The majority of the canopy trees present occur within the minor drainage line in the far western portion of the thinning area.

Conversely, the cover of immature canopy trees is over-represented within the thinning area. The benchmark immature canopy tree cover for Heathy Dry Forest is 5%. Immature canopy trees cover a majority of the thinning area with projected foliage cover estimated to be at >50%.

Table 1. Tree stem species and diameters recorded within 1 transect (300 x 4m)

		Stem diameter at breast height (cm)									
Tree Species		<10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	>80	Total
	Red Stringybark	6	92	22	0	0	0	0	0	0	120
	Red Box	17	48	35	0	0	0	0	0	0	100
	Dead trunks	-	11	-	-	-	-	-	-	-	11
	Total	23	151	57	0	0	0	0	0	0	231

2. How are you to ensure that the regenerating forest contains a species mix similar to the pre-harvest forest?

The main eucalypt species present are Red Stringybark and Red Box, which are characteristic of a Heathy Dry Forest EVC. Both of these species are equally coppicing and regenerating within the thinning area and both species will be subjected to a similar level of thinning.

3. What are the species you will be removing? Red Stringybark and Red Box

4. How will you ensure that fallen timber retained is to benchmark?

The majority of the fallen timber from thinning works will be retained within the thinning site. The exact amount of fallen timber retained cannot be determined at this stage therefore it is unclear whether retained timber will meet the benchmark of 1000m of logs for the thinning site. Currently the log length within the thinning site is much less than 50% of benchmark length however retained timber will substantially increase this cover. There are no large logs within the thinning sites and none will be felled as part of thinning works. Meeting the large log benchmark of 250m for the thinning site will take many years to achieve. The amount of fallen timber can be assessed more accurately at a later stage during site monitoring.

5. How do you intend to utilise ‘excess’ timber cut from each thinning management unit? (A timber harvest plan will be required if you intend to have commercial gain from the timber – see attached).

All fallen timber will be retained within the thinning site for conservation purposes. This will substantially increase the cover of logs and woody debris in the ground layer. A small proportion of fallen timber will be utilised for personal on-site firewood use.

6. What method do you propose to use to thin each management unit? (eg cut and paste, poison)

Individual tree stems will be cut and painted with herbicide. Stems that are part of a coppiced tree will be cut and left and not painted with herbicide. Re-growth from these stems will be periodically managed by hitting the epicormic growth with the back of a woodsplitter to ensure re-shooting does not occur. This will be undertaken by the landholders or the thinning contractor (i.e. at least once a year re-growth will be monitored).

7. What are the proposed timelines for thinning in each management unit?

All thinning is planned to be undertaken in spring of 2012 and 2013.

8. How will you select which trees are to be thinned (eg coppiced should be thinned before seedling trees, small trees before larger trees, etc.)

Both coppiced stems and seedling stems will equally be targeted for thinning. Smaller tree seedlings and coppiced stems will be prioritised for removal with all stems greater than 20cm diameter retained.

9. How many trees/ha do you intend to retain (this should be greater than 3X benchmark levels but less than 6X benchmark levels).

The thinning treatment will follow the ‘Patchy 2’ treatment as set out in *Establishment of the Box-Ironbark Ecological Thinning Trial in North Central Victoria* (Pigott *et al.* 2010). The Patchy 2 treatment involves the thinning of trees equivalent to a basal area 50% pre-thinning status and represents a moderate reduction in tree density (Pigott *et al.* 2010). Currently the estimated basal area is at 1,917 stems/ha (see Question 1). Using the Patchy 2 treatment, 50% of this basal area will therefore be retained. This equates to the retention of 958 stems/ha or a total of 4,790 stems across the entire thinning site. Basal stem area is not provided within the Heathy Dry Forest benchmark, however it is estimated that the stems

retained will still represent a high cover of immature canopy trees in comparison to the EVC benchmark of 5% cover. The precautionary principle has been employed in this instance, with the 50% reduction in basal area the more conservative method of the thinning treatments listed in Pigott *et al.* (2010).

At least 25% of the thinning area will remain unthinned and will be retained in patches as per the Patchy 2 treatment method.

It is anticipated that a 50% reduction in basal stem area will result in an increased development of large trees, hollows and canopy-height trees in the long-term. This can only be determined through the establishment of long-term monitoring processes that indicate whether progression is being made towards benchmark densities and cover and improved vegetation and habitat quality.

10. What size class are most of the trees to be retained? Note: No trees over 30 cm DBH are to be removed unless assessed by DSE Native Vegetation Officer as appropriate.

Trees retained will be 20cm in diameter or greater. Most of the trees retained will be between 20-30cm DBH, however isolated trees greater than 30cm DBH are present and will also be retained.

11. Do you intend to leave dead standing trees (existing plus at least 4 retained from thinning operations through poisoning of selected live trees).

No dead standing trees were observed within the thinning area however any that are identified during the thinning treatment will be retained. Dead coppiced stems are common within the thinning area and these generally fall within the <20cm DBH category and will be thinned where appropriate. At least four seedling trees within the thinning area will be poisoned and retained as per the guideline.

12. How are safety issues being addressed (see timber harvest plan and code of forest practice).

- A Job Safety Analysis (JSA) specific to foot-based thinning operations will be developed. A JSA identifies potential hazards and provides the solution for controlling the hazard, with the objective of minimising risk and avoiding incidents. Controls include (but are not restricted to) safe practice/techniques, quality issues, restrictions, specific awareness, protective measures, and desired training and accreditations.

- All personnel (both TFN and contracted, or any person visiting site) will be made aware of these hazards and the hazard control mechanism and will sign the JSA.
- Hazard control includes the use of all recommended personal protective equipment (PPE), such as hard hats, high visibility vests and safety boots – especially when using saws and axes.
- All chainsaw users will have appropriate permits.
- Safety pants and eye protection are also a required PPE accessory when using saws. These will all be listed on the JSA and included as a requirement in thinning contracts.
- At least one member of the thinning team will have a valid first aid certificate and a first aid kit on-site.
- The thinning team will be briefed on potential hazards priority to entering the site;
- Site hazard assessments will be conducted prior to commencing work.

13. How do you intend to monitor the success of the thinning operation? As a minimum you will need to:

- *Provide photos from your marked photo points at approximately the same time each year as the original, pre-thinning photos AND spring photos.*
 - *Carry out a Vegetation Quality Assessment immediately pre- and post thinning and then every year thereafter.*
1. Five 10 x 10m quadrats will be established within the thinning area. Each quadrat corner will be recorded with a GPS and mapped for ease of locating them at a later time. Each quadrat will be positioned in areas representing differing site characteristics, i.e. top of the rise, near or along the minor drainage line, mid-slope, within a densely treed area, sparse area etc. Each corner of the quadrat will be discreetly marked with an in-ground pin and flagging tape. Species cover and diversity is to be assessed within each quadrat using the Braun-Blanquet scale (or similar). The same five quadrats will be assessed annually (in spring) to determine any changes, issues or improvements to the quadrat areas both pre and post thinning. The following needs to be assessed and recorded for each quadrat:
 - All introduced species to be recorded with their % cover;
 - All native species to be recorded;
 - Plant lifeforms to be recorded with their % cover;
 - Bare earth % cover;

- Bryophyte/lichen % cover;
 - Soil crust % cover;
 - List of native species successfully recruiting or regenerating;
 - Organic litter % cover;
 - Height of tallest plant in quadrat;
 - Estimated tree canopy cover;
 - The DBH of selected larger trees within the quadrat to be recorded. These trees to be marked with a GPS or marked discreetly on-site. The number and size of any hollows to be recorded.
2. One photopoint will be established within each quadrat. One corner of each quadrat is to form a photopoint to visually document changes that occur. The photopoint should aim to capture the landscape and ideally incorporate trees, shrubs and weeds. The photopoint GPS coordinate and direction of photo will be documented. The first photopoints will be taken pre-thinning.
 3. A Vegetation Quality Assessment for the entire thinning area will be conducted each year in spring to monitor overall changes and improvements to the site. This will be undertaken immediately pre- thinning and each spring thereafter. Spring assessment to be undertaken at the same time as quadrat and photopoint monitoring.
 4. Flora and fauna species to be recorded as baseline data during site monitoring and submitted to the Victorian Biodiversity Atlas (VBA). Any new records of species thereafter to be noted and supplied to the VBA.
 5. Bird monitoring and survey at appropriate intervals will be further investigated and, if feasible, will be incorporated into the overall monitoring program for the property.

14. What other management actions are you taking within the proposed thinning management units?

Weed cover is currently low within the thinning area (i.e. <5% cover) and needs to be maintained at this level. Any emergent weed species will be recorded during the monitoring process and targeted for control. To limit the introduction of introduced species into the thinning area, contractors will ensure their vehicles, footwear and equipment are cleaned of dirt and other debris before entering the site.

No other actions other than thinning and monitoring will be undertaken within the thinning area. A grazing exclusion zone is currently being erected within close proximity to the thinning area to determine the effects of native herbivores on understorey species diversity and cover.

15. How do you propose to minimise disturbance to existing native vegetation to be retained? (eg fencing, minimum disturbance by vehicles, etc.).

The thinning area is bordered by a vehicle track to the east. This will be the only vehicle access point into the thinning area. Access into the interior of the thinning area will either be by foot or quad bike with a maximum of two people at any one time. Human traffic and disturbance within the thinning area will be kept to a minimum.

The quad bike and trailer will be fitted with wide flotation low-pressure tyres that will have minimal impact on the groundlayer. Branches and bark will be retained on tracks where possible to minimise soil compaction and disturbance. This is in accordance with recommended guidelines as set out by DSE's Native Forest Silviculture Guideline 15 (DSE 2009). The quad bike and trailer will be used on-site for the following reasons:

- Containment of fuel and herbicide where required in remote locations.
- Ready access to first aid kit and for emergency evacuations (if needed).

Note: Quad bike and trailer will not be used in wet conditions.

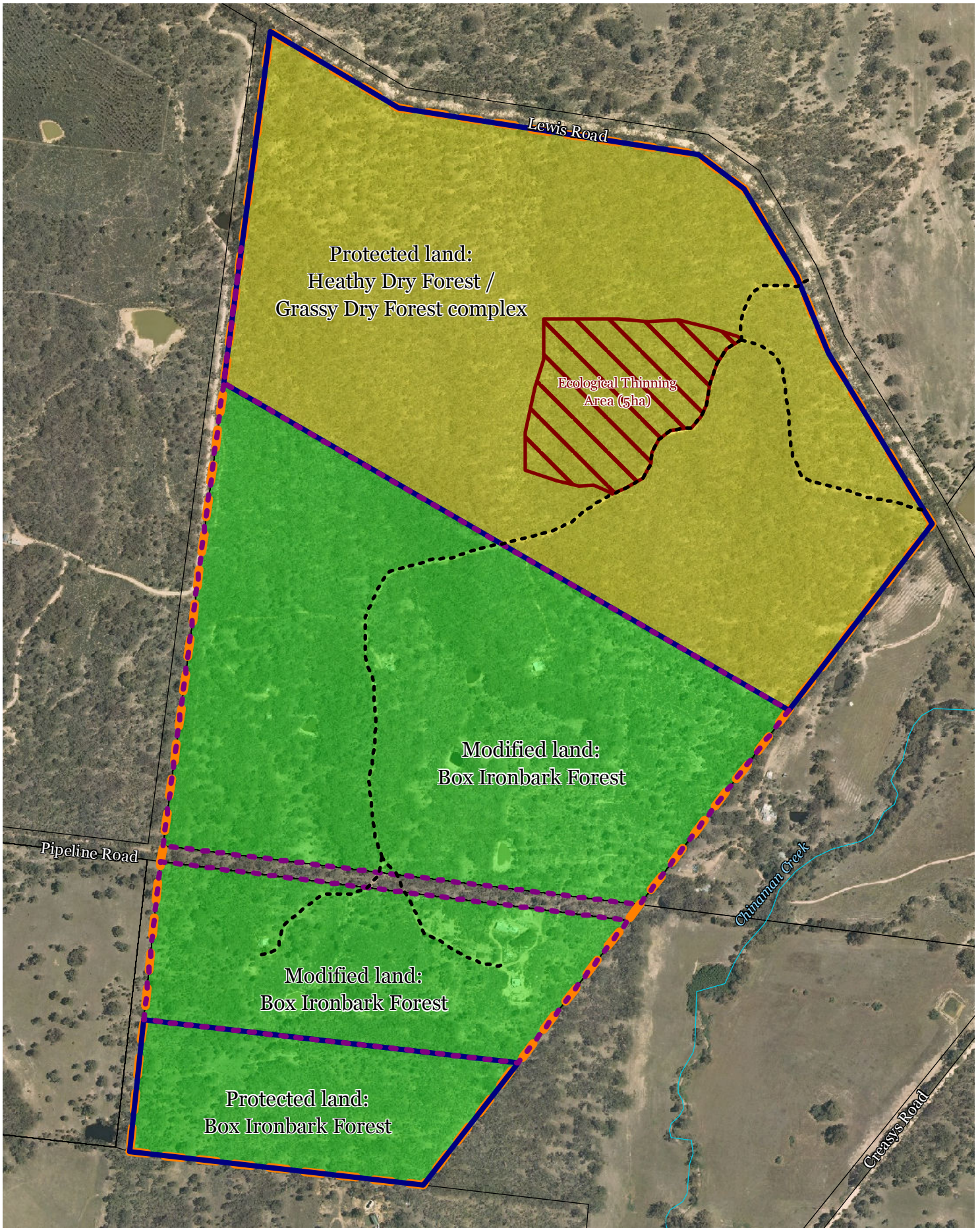
16. Fire Management Regime - A comprehensive fire prevention strategy and plan is not part of this guide, but should be part of your suite of planning and management tools. However, if burning is part of your additional management tools then this should be discussed in the overall plan.

N/A

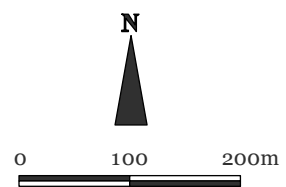
17. If timber is to be harvested for commercial purposes - Operational details

N/A

Figure 1 - 894 Lewis Road, Muckleford

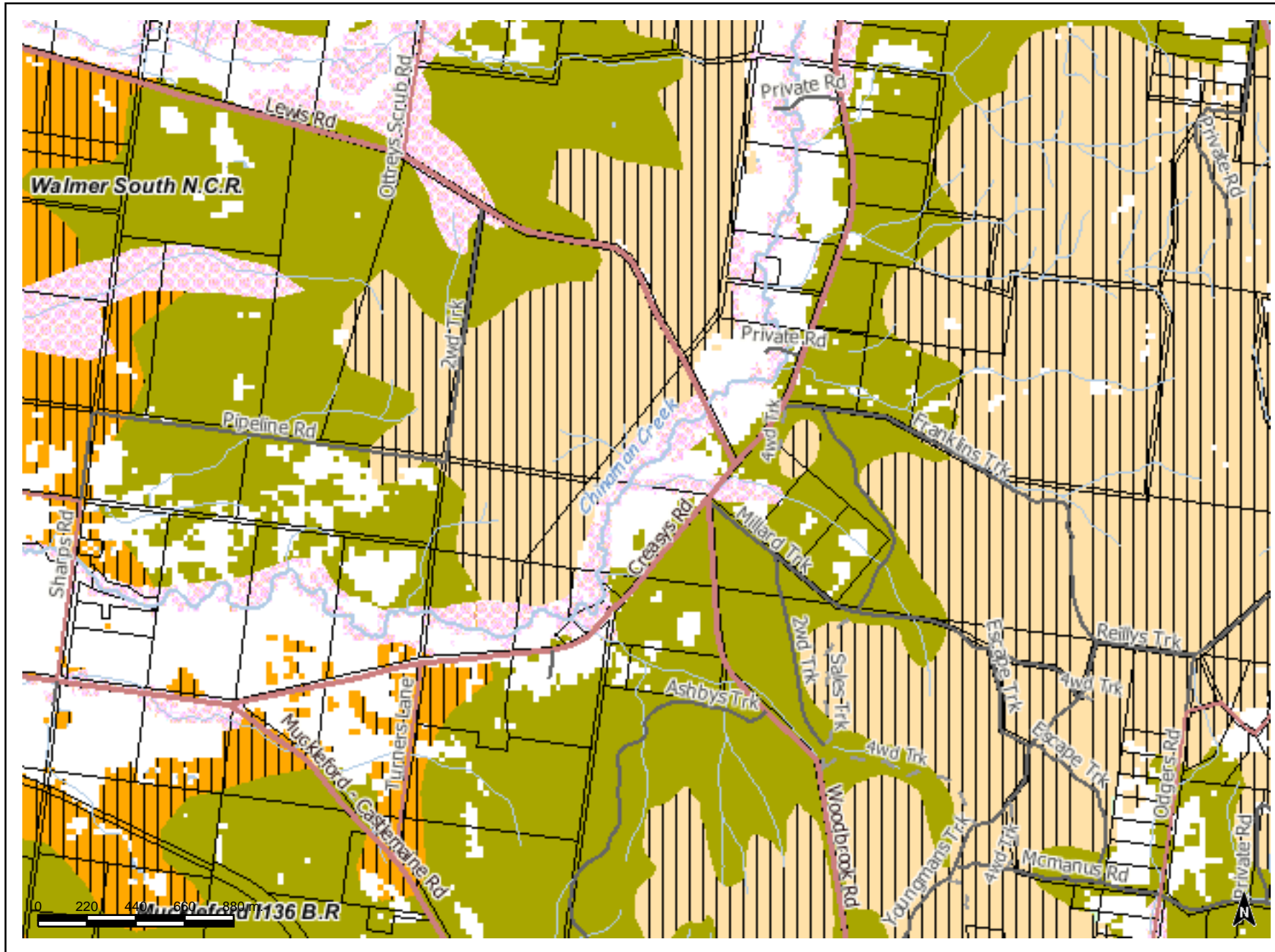


- Heathy Dry Forest/Grassy Dry Forest complex
- Box Ironbark Forest
- Ecological Thinning Area
- Modified land
- Protected land
- Study site
- Track



Note: Map features are approximate and are to be used as a guide only.

**Figure 2 – Extant location of Ecological Vegetation
Classes (EVCs) based on DSE (2012)**



* Refer to page 2 for legend details

Disclaimer: This map is a snapshot generated from Victorian Government data. This material may be of assistance to you but the State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons accessing this information should make appropriate enquiries to assess the currency of the data.

APPENDIX 1 – FLORA SURVEY RESULTS

Flora species recorded within the thinning area (19 July 2012)

FIS 2012-1:100,000 Land Use

Species Name	Family Name	Freq
<i>Acacia acinacea s.s.</i> - Gold-dust Wattle	Mimosaceae	183.3%[1]
<i>Acacia aculeatissima</i> - Thin-leaf Wattle	Mimosaceae	183.3%[1]
<i>Acacia genistifolia</i> - Spreading Wattle	Mimosaceae	183.3%[1]
<i>Acacia paradoxa</i> - Hedge Wattle	Mimosaceae	183.3%[1]
<i>Acacia pycnantha</i> - Golden Wattle	Mimosaceae	183.3%[1]
<i>Astroloma humifusum</i> - Cranberry Heath	Ericaceae	183.3%[1]
<i>Austrostipa mollis</i> - Supple Spear-grass	Poaceae	183.3%[1]
<i>Brachyloma daphnoides</i> - Daphne Heath	Ericaceae	183.3%[1]
<i>Cassinia arcuata</i> - Drooping Cassinia	Asteraceae	183.3%[1]
<i>Daviesia ulicifolia</i> - Gorse Bitter-pea	Fabaceae	183.3%[1]
<i>Dianella admixta</i> - Black-anther Flax-lily	Hemerocallidaceae	183.3%[1]
<i>Drosera aberrans</i> - Scented Sundew	Droseraceae	183.3%[1]
<i>Eucalyptus goniocalyx s.s.</i> - Bundy	Myrtaceae	183.3%[1]
# <i>Eucalyptus leucoxydon</i> - Yellow Gum	Myrtaceae	183.3%[1]
<i>Eucalyptus macrorhyncha</i> - Red Stringybark	Myrtaceae	183.3%[1]
<i>Eucalyptus polyanthemus</i> - Red Box	Myrtaceae	183.3%[1]
<i>Glossodia major</i> - Wax-lip Orchid	Orchidaceae	183.3%[1]
<i>Gonocarpus tetragynus</i> - Common Raspwort	Haloragaceae	183.3%[1]
<i>Hydrocotyle laxiflora</i> - Stinking Pennywort	Araliaceae	183.3%[1]
* <i>Hypochaeris radicata</i> - Flatweed	Asteraceae	183.3%[1]
<i>Lepidosperma laterale</i> - Variable Sword-sedge	Cyperaceae	183.3%[1]
<i>Leucopogon virgatus</i> - Common Beard-heath	Ericaceae	183.3%[1]
<i>Lomandra filiformis subsp. filiformis</i> - Wattle Mat-rush	Xanthorrhoeaceae	183.3%[1]
<i>Ozothamnus obcordatus</i> - Grey Everlasting	Asteraceae	183.3%[1]
<i>Poa sieberiana</i> - Grey Tussock-grass	Poaceae	183.3%[1]
<i>Pterostylis melagramma</i> - Tall Greenhood	Orchidaceae	183.3%[1]
<i>Pterostylis nutans</i> - Nodding Greenhood	Orchidaceae	183.3%[1]
<i>Pultenaea mollis</i> - Soft Bush-pea	Fabaceae	183.3%[1]
<i>Rytidosperma pallidum</i> - Silvertop Wallaby-grass	Poaceae	183.3%[1]
<i>Rytidosperma spp.</i> - Wallaby Grass	Poaceae	183.3%[1]
<i>Senecio tenuiflorus spp. agg.</i> - Slender Fireweed	Asteraceae	183.3%[1]
<i>Thelymitra spp.</i> - Sun Orchid	Orchidaceae	183.3%[1]
<i>Thysanotus patersonii</i> - Twining Fringe-lily	Anthericaceae	183.3%[1]
<i>Veronica plebeia</i> - Trailing Speedwell	Veronicaceae	183.3%[1]
<i>Wahlenbergia stricta subsp. stricta</i> - Tall Bluebell	Campanulaceae	183.3%[1]

EVC/Bioregion Benchmark for Vegetation Quality Assessment

Goldfields bioregion

EVC 20: Heathy Dry Forest

Description:

Grows on shallow, rocky skeletal soils on a variety of geologies and on a range of landforms from gently undulating hills to exposed aspects on ridge tops and steep slopes at a range of elevations. The overstorey is a low, open eucalypt forest, poor in form to 20 m tall with an open crown cover. The understorey is dominated by a low, sparse to dense layer of ericoid-leaved shrubs including heaths and peas. Graminoids and grasses are frequently present in the ground layer, but do not provide much cover.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	60 cm	20 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
30%	<i>Eucalyptus macrorhyncha</i>	Red Stringybark
	<i>Eucalyptus polyanthemus</i>	Red Box
	<i>Eucalyptus tricarpa</i>	Red Ironbark
	<i>Eucalyptus goniocalyx s.s.</i>	Bundy

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	1	5%	T
Medium Shrub	8	25%	MS
Small Shrub	6	15%	SS
Prostrate Shrub	2	5%	PS
Large Herb	3	5%	LH
Medium Herb	10	20%	MH
Small or Prostrate Herb	2	5%	SH
Large Tufted Graminoid	2	5%	LTG
Medium to Small Tufted Graminoid	10	25%	MTG
Medium to Tiny Non-tufted Graminoid	2	1%	MNG
Bryophytes/Lichens	na	10%	BL
Soil Crust	na	10%	S/C

EVC 20: Heathy Dry Forest - Goldfields bioregion

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Brachyloma daphnoides</i>	Daphne Heath
MS	<i>Acacia pycnantha</i>	Golden Wattle
MS	<i>Grevillea alpina</i>	Cat's Claw Grevillea
MS	<i>Cassinia arcuata</i>	Drooping Cassinia
SS	<i>Tetradthea ciliata</i>	Pink-bells
SS	<i>Hovea heterophylla</i>	Common Hovea
SS	<i>Leucopogon virgatus</i>	Common Beard-heath
SS	<i>Cheiranthra cyanea var. cyanea</i>	Blue Finger-flower
PS	<i>Acrotriche serrulata</i>	Honey-pots
PS	<i>Astroloma humifusum</i>	Cranberry Heath
LH	<i>Senecio tenuiflorus</i>	Slender Fireweed
LH	<i>Wahlenbergia stricta</i>	Tall Bluebell
LH	<i>Xerochrysum viscosum</i>	Shiny Everlasting
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
MH	<i>Drosera peltata ssp. auriculata</i>	Tall Sundew
SH	<i>Opercularia varia</i>	Variable Stinkweed
SH	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
LTG	<i>Austrostipa mollis</i>	Supple Spear-grass
MTG	<i>Joycea pallida</i>	Silvertop Wallaby-grass
MTG	<i>Lomandra filiformis</i>	Wattle Mat-rush
MTG	<i>Poa sieberiana</i>	Grey Tussock-grass
MTG	<i>Dianella revoluta s.l.</i>	Black-anther Flax-lily
MNG	<i>Microlaena stipoides var. stipoides</i>	Weeping Grass
SC	<i>Thysanotus patersonii</i>	Twining Fringe-lily

Recruitment:

Episodic/Fire. Desirable period between disturbances is 20 years.

Organic Litter:

20 % cover

Logs:

20 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Hypochoeris glabra</i>	Smooth Cat's-ear	high	low
MTG	<i>Briza maxima</i>	Large Quaking-grass	high	low
MTG	<i>Briza minor</i>	Lesser Quaking-grass	high	low
MNG	<i>Aira elegantissima</i>	Delicate Hair-grass	high	low
MTG	<i>Vulpia</i> spp.	Fescue	high	low

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Vegetation Quality Field Assessment Sheet

Version 1.3 - October 2004

Department of Sustainability and Environment
 PO Box 2439
 Sunbury, Victoria, 3429
 Tel: 03 940 9355
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Site Name/No. Lewis rd. Muckleford

Location Thinning area (5 ha)

Date 19/7/12

Assessor(s) Bianca Aquilina

Map Name/No.

AMG / MGA

Tenure Private

EVC Healthy Dry Forest (EVC 20)

Bioregion



'Site Condition Score'

2

Large Trees

Score

Category & Description	% Canopy Health*		
	> 70%	30-70%	< 30%
None present	0	0	0
> 0 to 20% of the benchmark number of large trees/ha	3	②	1
> 20% to 40% of the benchmark number of large trees/ha	4	3	2
> 40% to 70% of the benchmark number of large trees/ha	6	5	4
> 70% to 100% of the benchmark number of large trees/ha	8	7	6
≥ the benchmark number of large trees/ha	10	9	8

Large trees are defined by diameter at breast height (dbh) - see EVC benchmark.

* Estimate proportion of an expected healthy canopy cover that is present (i.e. not missing due to tree death or decline, or mistletoe infestation).

Understorey Life forms

LF Code from EVC benchmark	# spp observed / Benchmark spp.	% cover observed / Benchmark % cover	Present (✓)	Modified (✓)
IT	4 / 4	> 5 / 5	✓	
T	1 / 1	1 / 5	X	
MS	7 / 8	> 15 / 25	✓	
SS	10 / 6	> 15 / 15	✓	
PS	2 / 2	1 / 5	✓	
LH	1 / 3	1 / 5	X	
MH	4 / 10	< 10 / 20	✓	✓
SH	6 / 2	1 / 5	✓	
LTG	1 / 2	1 / 5	✓	
MTG	7 / 10	X 15 / 25	✓	✓
MNG	1 / 2	1 / 1	X	
BL	1 / -	> 5 / 10	✓	
S/C	1 / -	> 5 / 10	✓	✓
	1	1		
	1	1		
	1	1	10/13	3/10

For life forms with benchmark cover of < 10%, considered 'present' if

Present

- any specimens are observed.
- For life forms with benchmark cover of ≥ 10%, considered 'present' if
 - the life form occupies at least 10% of benchmark cover.

For life forms with benchmark cover of < 10%, then considered substantially 'modified' if the life form has either:

Modified

(apply only where life form is 'present')

- < 50% of the benchmark species diversity; or
- no reproductively-mature specimens are observed.
- For life forms with benchmark cover of ≥ 10%, then considered substantially 'modified' if the life form has either:
 - < 50% of benchmark cover; or
 - < 50% of benchmark species diversity; or
 - ≥ 50% of benchmark cover due largely to immature canopy specimens but the cover of reproductively-mature specimens is < 10% of the benchmark cover.

Tree Canopy Cover

Score

3

Category & Description	% Canopy Health *		
	> 70%	30-70%	< 30%
< 10% of benchmark cover	0	0	0
< 50% or > 150% of benchmark cover	③	2	1
≥ 50% or ≤ 150% of benchmark cover	5	4	3

Tree canopy is defined as those canopy tree species reaching ≥ 80% of mature height - see EVC benchmark description.

* Estimate proportion of an expected healthy canopy cover that is present (i.e. not missing due to tree death or decline, or mistletoe infestation).

Lack of Weeds

Score

15

Category & Description	'high threat' weeds*		
	None	≤ 50%	> 50%
> 50% cover of weeds	4	2	0
25 - 50% cover of weeds	7	6	4
5 - 25% cover of weeds	11	9	7
< 5% cover of weeds**	⑮	13	11

* proportion of weed cover due to 'high threat' weeds - see EVC benchmark for guide.

'High threat' weed species are defined as those introduced species (including non-indigenous 'natives') with the ability to out-compete and substantially reduce one or more indigenous life forms in the longer term assuming on-going current site characteristics and disturbance regime.

The EVC benchmark lists typical weed species for the EVC in the bioregion and provides an estimate of their 'invasiveness' and 'impact'. In general, those weed species considered to have a high impact are considered high threat regardless of their invasiveness.

** if total weed cover is negligible (<1%) and high threat weed species are present then score '13'.

Understorey

Score

15

Category & Description	Score
All strata and Life forms effectively absent	0
Up to 50% of life forms present	5
≥ 50% to 90% of Life forms present	10
<ul style="list-style-type: none"> of those present, ≥ 50% substantially modified of those present, < 50% substantially modified 	⑮
≥ 90% of Life forms present	15
<ul style="list-style-type: none"> of those present, ≥ 50% substantially modified of those present, < 50% substantially modified of those present, none substantially modified 	25

Vegetation Quality Field Assessment Sheet

Version 1.3 October 2004

6

Recruitment

Score

Category & Description			High diversity**	Low diversity**
No evidence of a recruitment 'cohort'+	within EVC not driven by episodic events		0	0
	within EVC driven by episodic events^	clear evidence of appropriate episodic event	0	0
		no clear evidence of appropriate episodic event	5	5
Evidence of at least one recruitment 'cohort' in at least one life-form	proportion of native woody species present that have adequate recruitment°	< 30%	3	1
		30 - 70%	6	3
		≥ 70%	10	5

+ 'cohort' refers to a group of woody plants established in a single episode (can include suppressed canopy species individuals).
 ^ refer to EVC benchmark for clarification.
 ° treat multiple eucalypt canopy species as one species.
 * high diversity defined as ≥ 50% of benchmark woody species diversity.

Species Recruitment

Woody species recorded in habitat zone	Adequate Recruitment
Eucalypt canopy (combined species)	(✓)
<i>Cassinia arcuata</i>	✓
<i>Brachylaena daphnoides</i>	✓
<i>Danesia uliifolia</i>	X
<i>Acacia sinuata</i>	✓
<i>Acacia yuccanella</i>	X
<i>Acacia gemistifolia</i>	X
<i>Acacia paradoxa</i>	X
<i>Leucopogon virgatus</i>	X
<i>Ozothamnus orbiculatus</i>	X
<i>Pultenaea mollis</i>	X
number of woody spp. in EVC benchmark (SS and taller)	

16

Organic Litter

Score

3

Category & Description	Dominated by native organic litter	Dominated by non-native organic litter
< 10% of benchmark cover	0	0
< 50% or > 150% of benchmark cover	3	2
≥ 50% or ≤ 150% of benchmark cover	5	4

Logs

Score

2

Category & Description	Large logs present*	Large logs absent#
< 10% of benchmark length	0	0
< 50% of benchmark length	3	2
≥ 50% of benchmark length	5	4

Large logs defined as those with diameter ≥ 0.5 of benchmark large tree dbh.
 * present if large log length is ≥ 25% of EVC benchmark log length.
 # absent if large log length is < 25% of EVC benchmark log length.

'Landscape Context Score'

Patch Size

Score

8

Category & Description	Score
< 2 ha	1
Between 2 and 5 ha	2
Between 5 and 10 ha	4
Between 10 and 20 ha	6
≥ 20 ha, but 'significantly disturbed'*	8
≥ 20 ha, but not 'significantly disturbed'*	10

* 'significantly disturbed' defined as per RFA 'Old Growth' analyses eg. roading, coupes, grazing etc. - effectively most patches within fragmented landscapes.

Distance to Core Area

Score

4

Distance	Core Area not significantly disturbed*	Core Area significantly disturbed*
> 5 km	0	0
1 to 5 km	2	1
< 1 km	4	3
contiguous	5	4

* defined as per RFA 'Old Growth' analyses.

Neighbourhood

Score

5

Radius from site	% Native vegetation*	Weighting	Score
100 m	100	0.03	3
1 km	60	0.04	2.4
5 km	40	0.03	1.2
subtract 2 if the neighbourhood is 'significantly disturbed'			-2
Add Values and 'round-off'			4.6

* to nearest 20%.

Multiply % native vegetation x Weighting for each radius from the zone (eg. 40% x 0.03 = 1.2); then add values to obtain final Neighbourhood Value.

Final Habitat Score

Component	'Site Condition Score'							'Landscape Context Score'		Total
	Large Trees	Tree Canopy Cover	Lack of Weeds	Understorey	Recruitment	Organic Litter	Logs	Patch Size	Neighbourhood	
Score	2	3	3	3	3	2	8	5	4	63

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