NORTH CENTRAL
Catchment Management Authority

WORKS SITE CONDITION ASSESSEMENT

Parts 1-6 are required

1. Site Identity

Date:

Site Officer's Name:

Site Name/CAMS No:

2 Species diversity

Record the species you can identify at 2.1. For those you can't identify, fill in which life forms exist at 3.3.

2.1 What INDIGENOUS species are present that you can identify?

Species name	None	Very Few	Some	Lots	% Cover	Regen? *Any signs of recruitment?*	Notes
	Quantity present *Tick in 1 of the 4 boxes **OR** enter a %*						
	☐	☐	☐	☐		☐	
	☐	☐	☐	☐		☐	
	☐	☐	☐	☐		☐	
	☐	☐	☐	☐		☐	
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	☐	☐	☐	☐		☐	
	☐	☐	☐	☐		☐	

3.2.1 Estimated **Number of** native perennial **species** present on site

6.2 What 'problem' WEED species are present?

Thes listed examples are species considered to be problematic in remnant vegetation OR to pose problems in revegetation. Include non-indigenous natives if of concern.

Species *Tick in 1 of the 4 boxes or enter a %*	None	Very Few	Some	Lots	% Cover	Notes
Blackberry	☐	☐	☐	☐		
Boxthorn	☐	☐	☐	☐		
Bridal creeper	☐	☐	☐	☐		
Broom	☐	☐	☐	☐		
Couch Grass	☐	☐	☐	☐		
Evening primrose	☐	☐	☐	☐		
Gorse	☐	☐	☐	☐		
Hog/wire weed	☐	☐	☐	☐		
Horehound	☐	☐	☐	☐		
Lucerne	☐	☐	☐	☐		
Onion weed (White Asphodel)	☐	☐	☐	☐		
Ox-Tongue	☐	☐	☐	☐		
Ragwort	☐	☐	☐	☐		
Skeleton weed	☐	☐	☐	☐		
Sorrell	☐	☐	☐	☐		
St Johns wort	☐	☐	☐	☐		
Other *(Please specify)*						
	☐	☐	☐	☐		
	☐	☐	☐	☐		
	☐	☐	☐	☐		
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	☐	☐	☐	☐		
	☐	☐	☐	☐		

3 Lifeform diversity

3.1Trees

3.1.1 How many Large Trees?

Large trees are those with trunk diameter (or circumference) at breast height greater than the following (in centimetres):

90	(*280)*	Rainforest, Wet or Damp Forest
80	(*250)*	Plains, Riverine or Riparian Forest or Woodland
70	(*220)*	Lowland or Dry Forest
60	(*190)*	all other Forests or Woodlands
20	(*63)*	Mallee

Estimated number of large trees per ha (100m x 100m)

3.1.2 Canopy Cover

This is the tallest layer of native vegetation greater than 3m.

% canopy cover

3.2 Understorey

3.2.1 Understorey Lifeforms

Tick if present as indigenous species (not weeds)	**Lifeform**	***Quantity present*** *Tick in 1 of the 4 boxes OR enter a %*					**Regen?**	**Notes**
		None	**Very Few**	**Some**	**Lots**	**% Cover**	*Any signs of recruitment?*	
☐	Immature Canopy Tree	☐	☐	☐	☐		☐	
☐	Understorey Tree or Large Shrub	☐	☐	☐	☐		☐	
☐	Medium Shrub	☐	☐	☐	☐		☐	
☐	Small Shrub	☐	☐	☐	☐		☐	
☐	Large Herb	☐	☐	☐	☐		☐	
☐	Medium Herb	☐	☐	☐	☐		☐	
☐	Small or Prostrate Herb	☐	☐	☐	☐		☐	
☐	Large Tufted Graminoid (Grasslike plant)	☐	☐	☐	☐		☐	
☐	Large Non-tufted Graminoid	☐	☐	☐	☐		☐	
☐	Medium to Small Tufted Graminoid	☐	☐	☐	☐		☐	
☐	Medium to Tiny Non-tufted Graminoid	☐	☐	☐	☐		☐	
☐	Scrambler or Climber	☐	☐	☐	☐		☐	
☐	Bryophytes/Lichens	☐	☐	☐	☐		☐	

4 Estimated Ground cover	% Cover	Notes
4.1 Percentage **Cover of** native **ground flora**		
4.2 Percentage **Cover of Organic Litter/Mulch**		
4.3 Percentage **Cover of bare ground**		
4.4 Percentage **Weed cover** overall *(best assessed in Spring)*		
Total		Should equal 100%

5. Logs

Defined by length of stumps, fallen trees or branches greater than 10cm dia. Apply to Forest or Woodland EVCs only

Tick in 1 of the 4 boxes or enter a length	None	Very Few	Some	Lots	Length *(m/0.25ha.)*	Notes
Logs	☐	☐	☐	☐		

6. Photo point monitoring

(see LFW note for guidelines/procedures).

Attach at least one **photo** with **date** taken, details of photo **location** and **direction.**
Preferably use a 'permanent' marker or other easily located place (eg, fence post) for the camera location for photo point monitoring.

Optional section

*The following checklist is intended to remind you of those aspects of a site conditions of that can impact on the success of your vegetation management works. You **don't have to** fill this in or ensure its entry into CAMS.*

7. 'Current' Land Uses	7.1 Site	7.2 Adjoining Land	Notes
Land Use *(prior to works starting)*	*Tick 1 box*	*Tick 1 or more boxes*	
Grazing sown perennial pasture	☐	☐	
Grazing sown annual pasture	☐	☐	
Grazing volunteer pasture/weeds	☐	☐	
Grazing mostly native vegetation	☐	☐	
Crop	☐	☐	
Conservation area	☐	☐	
Quarry	☐	☐	
Surface mining	☐	☐	
Tailings	☐	☐	
Other *(Please specify)*			

8. Slope

		Tick 1 or more
Flat	0-2%	☐
Undulating	2-10%	☐
Sloping	10-20%	☐
Very Steep	>20%	☐

9. Aspect

If sloping, circle one or more N E S W

10. Soil Description

10.1 Bedrock/Parent Material

	Tick 1 box
Granite	☐
Basalt	☐
Sedimentary	☐
Alluvium	☐
Other *(Please specify)*	

10.2 Soil Profile

	Topsoil		Subsoil
	A1 Horizon	A2 Horizon (if present)	
Average depth (mm)			
Colour *(Specify)*			
TEXTURE	*Tick 1 or more*		
Buckshot	☐	☐	☐
Gravel	☐	☐	☐
Sand	☐	☐	☐
Sandy loam	☐	☐	☐
Loam	☐	☐	☐
Clay loam	☐	☐	☐
Clay	☐	☐	☐
Heavy clay	☐	☐	☐
Other *(Specify)*			

10.3 Soil Fertility

Fertility class	*(indicated by OLSEN P test results as below)*	*Tick 1 box*
High	>10 ppm	☐
Moderate	5-10 ppm	☐
Low	2-5 ppm	☐
Very infertile	<2 ppm	☐

10.4 Soil pH

If known

Or circle one Acid Neutral Alkaline

11. Salinity

Tick if these indicators are present ☐

eg. Spiny rush ☐

eg. Sea barley grass ☐

eg. Bare/scalded soil ☐

eg. Salt crusts ☐

Other

(Please specify)

12. Waterlogging

Tick if these indicators are present ☐

eg. Juncus rushes ☐

eg. Black box (north of Bendigo) ☐

Other

(Please specify)

13. Climate

Average annual rainfall (mm)

14. Other potential hazards

	Tick whichever present
Non wetting soil	☐
Cracking soil	☐
Very alkaline soil	☐
Free limestone	☐
Subsurface rock barrier	☐
Surface rock	☐
Frost	☐
Wind exposure	☐
Seed collecting ants	☐
Snails	☐
Slugs	☐
Grasshoppers	☐
Red legged earth mite	☐
Rabbits	☐
Hares	☐
Mice	☐
Kangaroos	☐
Wallabies	☐
Weeds/Competing	☐
Livestock likely to interfere?	Y or N
If so what spp?	

15. Fencing

Condition of existing fence

Is more fencing required? Y or N

If so, what type?

Notes on the assessment information

1. Site Identity
It is essential to record the identity of the site in a unique, unambiguous way that is linked to an accurate (<100m uncertainty) geographic position. The CAMS number issued for the site is the preferred way to do this.

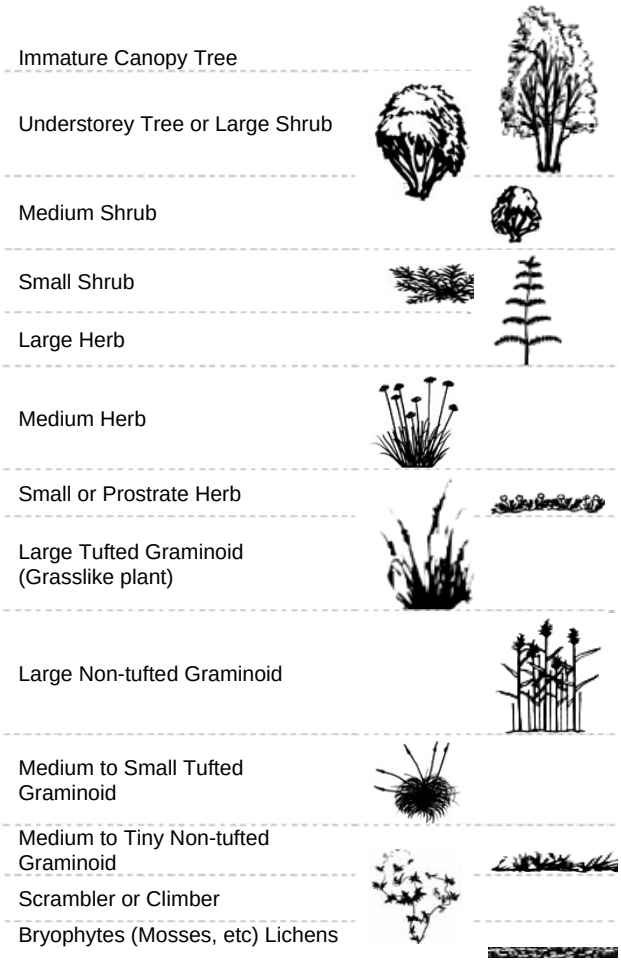
2 Species diversity
The presence of indigenous species on site is a good indicator that 'natural' or assisted regeneration may be possible. It may be prudent to remove or reduce pressures on the native vegetation (eg, grazing) for a few years and observe what happens rather than rushing into revegetation.
Even sites with just a few native grass species apparent under grazing can regenerate spectacularly if given the opportunity.
Often ground cover species (eg, native herbs such as grasses, lilies, etc) remain on land used for grazing. Can you recognise them? Have a look at the BMP website to check out photos of native grasses, chocoate/vanilla lilies, etc, that occur in your bioregion.
These are the most difficult and expensive species to restore, so we must ensure our work doesn't diminish or eliminate them.
Activities such as herbicide application, soil disturbance or cultivation (grading, ploughing, ripping, mounding, rotary hoeing, etc) can quickly destroy remnant ground flora if inappropriately used.
Consider also the future plantscape you are planning. Will dense growth of trees and shrubs out compete remnant ground flora?
Will cessation of grazing allow weeds to proliferate and smother small native herbs?

3.1.1 How many Large Trees
Large, old trees are vital habitat resources in very short supply. Make sure your activities do not threaten their survival or health. They also compete strongly with newly establishing seedlings.

3.1.2 Canopy Cover
To help you better estimate percentage foliage cover, see The Australian Soil and Land Survey Field Handbook (Vol. 1 2nd Edition) for reference photos of different canopy covers.

3.2.1 Understorey Lifeforms

Lifeform



4 Estimated Ground cover
Bare ground is a good indicator that regeneration may be possible. Conversely, if there is 100% vigorous ground cover, even if it is mostly of indigenous species, regeneration is extremely unlikely—some kind of disturbance will be required for recruitment of new seedlings.
Disturbance will of course also create the opportunity for weed recruitment, so must be monitored and followed up with weed control when necessary.

5. Logs
As well as their habitat value, logs, branches and other coarse debris such as rocks create places where grazing animals can't reach and provide opportunities for regeneration.
If plentiful, fallen branches or even cut material from

woody weeds can be rearranged to provide protected niches if grazing or browsing on site cannot be excluded. Such niches can be hand direct sown, or planted without need for immediate guarding.

7. 'Current' Land Uses

Land with a history of cropping is unlikely to have much potential to regenerate naturally. Not only have most species been eliminated as plants and seed reserves, the raised fertility encourages vigorous weed regrowth that can easily overwhelm native seedlings.

Recently sown pastures are usually in the same situation as cropland.

8. Slope

Flat or gently sloping land may be more prone to waterlogging. See the waterlogging section below.

Steep slopes are less likely to store moisture in the soil and may prevent vehicle access to the site in winter when many revegetation activities take place. Even 4WD vehicles towing direct seeding machines may slip sideways on moderately steep slopes when sowing along the contour.

The influence of aspect is more pronounced as the slope increases.

9. Aspect

Southerly facing slopes are usually cooler and moister than other aspects, as northerly slopes are warmer and drier. This influences the native vegetation that would naturally grow there, even the species compostion within a site ca n vary from one side of a hill to the other. Consider the proposed species make up of your works from this perspective. For instance, perhaps the less drought tolerant species should only go on the south facing slopes.

When moisture from rainfall is limited, aspect can have a significant effect on recruitment from seed even on moderate slopes.

10.1 Bedrock/Parent Material

Granite areas sometimes have a hardpan layer that restricts drainage and deep root growth. They may become severely waterlogged after rain and are extremely vulnerable to erosion which can easily be initiated by soil disturbance. Moisture retention in elevated areas is very poor so earlier planting and sowing may be required.

Most **Basalt volcanic** areas have been converted to intensive agriculture and usually have heavy weed burdens. Flatter areas may have very heavy clay soils and are most unlikely to succeed with direct seeding. Even establishment from container grown seedlings can be difficult.

The **sedimentary** soils of North Central Victoria are inherently infertile and poorly structured. Depending on the site's history, weed growth can be less vigorous and natural regeneration more likely. Waterlogging is very likely on lower slopes as are sodic subsoil conditions. Erosion can easily be initiated by soil disturbance.

Alluvial soils are generally used for agriculture so may be very weedy, reducing likelihood of regeneration. Sites may require extra attention to weed control. Flooding can bury plants near watercourses in debris or drown young seedlings through prolonged waterlogging.

10.2 Soil Profile

Soil depth

Shallow topsoils over impermeable clays or otherwise inhospitable subsoils can be a problem with conventional (scalping) direct seeding. Consider scalping as shallow as possible. Eroded areas may not retain any topsoil.

Soil colour

Pale colours in soil may indicate poor aeration and seasonal waterlogging.

Soil texture

Buckshot layers can indicate a soil prone to waterlogging because of an impervious subsoil.

Heavy clay soils are difficult for direct sowing; consider alternatives, especially if the soil cracks when dry. Dark cracking clay soils are naturally inhospitable for tree growth and are likely to have supported treeless native vegetation such as grasslands.

10.3 Soil Fertility

Most previously farmed land has a higher than natural (pre-1750) fertility level due to widespread use of fertilisers. This is a major impediment to the re-establishment of native vegetation across the region due to the encouragement of weed growth and in some cases, the supression of, or even toxicity to native plant species. The Proteaceae (Grevilleas, Hakeas & Banksias) and Epacridaceae (Heath) and Fabaceae (Peas) families are known to be sensitivity to higher levels of phospates in the soil.

Substantial weed problems almost inevitably arise following any physical disturbance (ripping, ploughing, etc) of more fertile soils. Chemical weed control of existing pasture or weeds may also stimulate vigorous weed growth, but is not usually as strong a stimulus as physical disturbance.

Even without physical disturbance, pasture / weed growth in fertile areas can quickly out-compete newly establishing native species. Follow up weed control will be needed!

Very infertile soil can potentially slow revegetation growth if it has no natural diversity of micro-life such as mycorrhizal fungi. Such situations often occur on mining spoil or post gravel extraction sites.

Slow growth may mean that trees and shrubs are exposed to grazing pressure for longer or that re-introduction of livestock to farming sites is unacceptably delayed. In extreme cases (eg, mining sites) the revegetation species may fail to establish or die after a short time. Adding nutrients via 'planting tablets' or other means is possible.

10.4 Soil pH

The acidity or alkalinity of soil can have a marked effect on plant growth, however, indigenous vegetation is well adapted to the natural pH ranges. Problems may occur where human activities have markedly changed the natural pH. Soil becomes more alkaline where ash is deposited after repeated burning of materials or where lime has been dumped. Agricultural practices tend to acidify soil but it is not known if this has yet caused problems with revegetation. Most hill country in Nth Central CMA is naturally acid and the native vegetation is well adapted.

11 Salinity

Saline soils can occur naturally in the north of the region where they support salt adapted native vegetation. Genera like Chenopodium, Atriplex, Maireana are examples.
Elsewhere, saline soils are usually the result of artificially high watertables and can be indicated by bare ground, salt crystals in the worst cases to obvious salt tolerant plants to subtle changes in pasture composition. Some of the indicator plants are: sea barley grass, etc, (link to DPI http://www.dpi.vic.gov.au/DPI/Vro/vrosite.nsf/pages/water_spotting_soil_salting

12 High / saline watertables / waterlogging

(Waterlogging can also occur from surface flows and poor drainage.)
Un-naturally high watertables can waterlog soil, making indigenous plant growth difficult or impossible for some species. Where the watertable is also saline, plant growth is even more reduced. Evaporation through the soil means that concentrations of salt can become quite toxic. Some species of Indigenous vegetation may fail in this situation, although there are often some naturally salt/waterlogging tolerant species amongst the indigenous species of the area. Examples include Red Gum, Phragmites

Soil EC range	Effect on plant growth	Tolerant species

Direct seeding into waterlogged / saline soil WILL FAIL for all but the most tolerant species.

Direct seeding in waterlogged areas will often fail apart from waterlogging tolerant species such as River Red Gum or Paperbarks. Conventional direct seeding operations can exacerbate waterlogging by forming a trench. If waterlogging is likely, consider other approaches, eg, using seedlings, mounding before sowing, sowing onto undisturbed ground.
Mounding the soil may also allow accumulated salt to be leached away by rainfall.

13 Climate

Knowing the climate of your site is valuable for native vegetation management. When does evaporation normally start to exceed rainfall?

Rainfall

If average annual rainfall is below ~400 mm, winter spring rainfall may be so variable that revegetation may fail in difficult sites in all but high rainfall years.

14. Other potential hazards

Non wetting soil	Occurs in sandy mallee areas, preventing rainfall percolation. Revegetation may fail due to lack of soil moisture. Can be ameliorated by the addition of clay.
Cracking soil	Inhospitable to woody plant growth. Direct seeding may still be possible using coarse granite/quartz sand in sowing line.
Very alkaline soil	Naturally alkaline areas have their own high pH adapted indigenous flora. Un-natural alkaline sites such as ash dumps pose problems. 'Fire-weed' species may be available in the indigenous flora. Examples include Solanum laciniatum, S. simile.
Subsurface rock or hard pan barrier	Prevents root penetration to deeper soil where moisture can be accessed. Occurs naturally in some granite areas, causing winter waterlogging. Woody revegetation may establish but later mysteriously fail when moisture reserves are exhausted. Avoidance of areas like this is probably the best advice but if that not possible, it may be possible to carry out very deep ripping with bulldozer to break the hard pan.
Surface rock	May prevent vehicle access and use of machinery, but often provides niches where grazing pressure is reduced or eliminated.

Frost	Can destroy species not adapted to colonising open situations. Many species are more sensitive as young seedlings. Cold air flows 'like honey' and accumulates in low places in the landscape where frosts will be more severe. Overnight temperatures are much warmer under canopy trees. Investigate local experience with indigenous species' frost tolerance.
Wind exposure	Exposed, treeless areas, especially on hills can be very windy. This may cause problems with planted seedlings that have poor root systems. Wind also blows seed out of sowing lines. If a problem, consider using glues/'tackifiers'.
Seed collecting ants	Can remove surface sown seed from sowing lines. More likely to be a problem in drier, warmer areas, and where close to remnant vegetation that supports the seed harvesting ant species. Surface sown seed can be treated to make it unpalatable to ants, or can be 'fixed' to the ground with glues or 'tackifiers'.
Snails	Garden snails not usually a problem in agricultural areas, but white snails may be present in mallee country. Can eat small seedlings as they emerge. Unsure if problem with larger seedlings. Remedy by poison baiting.
Slugs	Very widespread in pastures based on introduced species. Treat as for snails.
Grasshoppers	Wingless grasshoppers can defoliate young seedlings in summer, possibly killing them, certainly reducing their growth. Direct sown seedlings probably more resistant than seedlings. Only known short term remedy is insecticide use. Long-term, keep planting trees, as the adults apparenty lay eggs only in sunny grassy areas!
Red legged earth mite	Still some debate over the significance of RLEM to direct seeding generally, but strong belief in northern plains areas to their destructive power on newly emerging seedlings. More likely to be a problem in exotic, lush pastures dominated by annuals such as Rye Grass, Clovers and Capeweed. Only known short-term remedy is chemical spray.
Rabbits	Very widespread problem for revegetation, regeneration and remnant vegetation. Rabbit netting exclusion great but expensive. If present, consider rabbit campaign (poison baiting, warren destruction, hole fumigation) at least one year ahead of intended works.
Hares	In some areas just as bad as rabbits, but harder to control. Spotlighting campaign may be effective.
Mice	Plague populations of mice can eat seed in direct sowing lines. Large, soft seeds are more likely to be eaten, eg, Kurrajong (*Brachychiton spp*).
Kangaroos	Not usually a problem for re-establishment of woody vegetation as they are primarily selective grazers of herbaceous ground vegetation. May turn to browsing when other food in short supply. They may also cause very minor local damage in their resting and fighting areas through trampling.
Wallabies	Swamp or Black Wallabies (Wallabia bicolor) are very significant browsers of young native woody vegetation. Guarding needs to be sturdy and at least one metre high to be effective. Repellent chemicals often suggested, but even if effective, application is labour intensive and may need to be repeated very frequently. As native fauna, culling is not an easy option, though would be far more cost effective.

Competing vegetation	Weeds are the most frequent cause of revegetation failure. Most important to note is the presence of winter dormant perennial weeds such as sorrel and couch grass. Because of their dormancy, these cannot be killed by herbicide application in winter when we normally carry out weed control. Released from competing weeds by the herbicide application, these species grow quickly and proliferate in spring and summer and will very successfully out compete newly establishing native species, especially if direct sown. There is no selective herbicide for broad leaved weeds such as Sorrel that won't also kill young native woody species. Although selective herbicides exist for grasses, they are very expensive and don't seem terribly effective on Couch Grass. In both cases, it is far better to avoid sites infested with such weeds or to spend a year controlling them before attempting revegetation. Remnant native vegetation also competes with new seedlings and the larger the plant, the better a competitor. Mature Eucalypts are extremely powerful competitors with roots capable of extending 50 metres. Attempting to re-establish new vegetation under or near existing canopy trees is very difficult in much of the region, primarily because of competition for moisture. If you wish to do this, breaking the tree roots by ripping is often recommended as a way of providing temporary relief from the competition. Avoid doing this near iconic large, old or otherwise significant individual trees as pathogens can be introduced into the tree's system, shortening its life.
Livestock likely to interfere? and **15 Fencing**	If in doubt, fence them out. Some landholders still think livestock don't hurt young revegetation. They're wrong. Establish fencing that will stand up to the livestock concerned. If landholder intent dubious, question the worth of working on their property. If already committed, you may be able to design the fence to dissuade livestock introduction, eg, no gate.