

# Jemalong Solar Farm



# **DOCUMENT CONTROL SHEET**

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# **TABLE OF CONTENTS**

1. Intr	roduction	4
1.1.	Overview and Location	4
1.2.	Project Background	4
1.3.	Purpose and Scope	4
1.4.	Habitat Values	9
1.5.	Native Vegetation	9
1.6.	Threatened Flora	11
1.7.	Threatened Fauna	11
1.8.	Weeds	12
1.9.	Pest Fauna	12
2. PR	OJECT IMPACTS	13
3. MA	NAGEMENT ACTIONS	14
3.1.	Management Zones	14
3.2.	Management Measures	16
4. IMF	PLEMENTATION	24
5. Mo	nitoring	30
5.1.	Monitoring Methods	30
5.2.	Monitoring Locations	32
5.3.	Monitoring frequency	32
5.4.	Reporting	32
6. RO	LES, RESPONSIBILITIES and Review	33
6.1.	Responsibilities	33
6.2.	BMP review	33
6.3.	Project inductions	34
7 RFI	FERENCES	35



# 1. INTRODUCTION

## 1.1. Overview and Location

The approved Jemalong Solar Farm ('Project') is subject to conditions of consent including, but not restricted to, the preparation and implementation of a Biodiversity Management Plan ('BMP'). The purpose of this document is to address the conditions of consent by providing management and monitoring prescriptions for the Project within an operational framework.

The land to which this BMP applies is the Project Site as shown in Figure 1.

# 1.2. Project Background

The Project was approved by the Department of Planning, Industry and Environment (DPIE) on 18 May 2018 subject to the conditions set out in Schedules 2 to 4 of the Conditions of Consent ('CoC'), as State Significant Development 8803 (SSD 8803). The Project underwent three separate Modifications to the development consent, with Modification-3 ('Mod-3') approved 15 November 2019. The Mod-3 CoC allows power generation of 50MW<sub>AC</sub> for 30 years.

The Project will involve the installation of an array of photovoltaic (solar) panels and associated infrastructure on cleared agricultural land, including a transmission line to West Jemalong Substation. In association with the solar panel installation, the agistment of sheep may occur periodically during operation, to maintain low levels of pasture biomass underneath the solar panels. This BMP assumes that grazing would occur solely within the Project's security fence, which excludes native vegetation, allowing the native vegetation to be protected from livestock grazing impacts.

# 1.3. Purpose and Scope

This BMP has been developed specifically to comply with Schedule 3, Condition 14 of the CoC. This condition states that prior to the commencement of construction, a BMP must be prepared for the development in consultation with OEH (now the Biodiversity Conservation Division or 'BCD'), and to the satisfaction of the Secretary. Following the Secretary's approval, the Applicant must implement the BMP.

This document also addresses Condition 12 and 13 of Schedule 3 of the CoC. Requirements of Condition 12, 13 and 14 are listed in Table 1, along with the report section and page number where they are addressed.

Table 1: Conditions of Consent and Corresponding Location within this BMP

Condition Number (Schedule 3)	Condition of Consent	Report Section
12	LAND MANAGEMENT Following any construction or upgrading on site, the Applicant must:  a. restore the ground cover of the site as soon as practicable, but within 12 months of completing any construction or upgrades, using suitable species;	3.2.4
	b. maintain a perennial ground cover; and	3.2.4
	c. manage weeds within this ground cover	4.2.7
13	BIODIVERSITY OFFSETS	3.2.9



Condition Number (Schedule 3)	Condition of Consent					
	Within one year of commencing development under this consent, unless otherwise agreed by the Secretary, the Applicant must retire biodiversity credits of a number and class specified in Table 1 below to the satisfaction of BCD.					
		etirement of these credits must be carried out in Biodiversity Offsets Policy for Major Projects ar				
	a.	acquiring or retiring 'biodiversity credits' within t Biodiversity Conservation Act 2016;	he mean	ing of the		
	b.	making payments into an offset fund that has be NSW Government; or	een deve	loped by the		
	C.	providing supplementary measures.				
	Table	e 1. Ecosystem Credit Requirements		<del>,</del>		
	Veg	etation Community	PCT ID	Credits Required		
	loar	Poplar Box grassy woodland on alluvial clay- loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt)				
	Augu: under	Following repeal of the Threatened Species Conserved to 2017, credits created under that Act are taken to be the Biodiversity Conservation Act 2016 by virtue of cervation (Savings and Transitional) Regulation 2017.	biodiver:	sity credits"		
14	BIOD	IVERSITY MANAGEMENT PLAN			This	
	a.	Include a description of the measures that would	d be imp	lemented for:	document	
	_	Managing the remnant vegetation and fauna ha	bitat on s	site	3.2.1, 3.2.2	
	_	Minimising clearing and avoiding unnecessary of vegetation that is associated with the construction development			3.2.1	
	_	Minimising the impacts to fauna on site (including perimeter fencing) and implementing fauna management.	•		3.2.1, 3.2.2	
	<ul> <li>Avoiding the removal of hollow-bearing trees during spring to early summer to avoid the main breeding period for hollow-dependent fauna</li> </ul>					
	_	Rehabilitating and revegetating temporary distu	ırbance a	ireas	3.2.4	
	_	Protecting vegetation and fauna habitat outside disturbance areas	the appr	roved	3.2.1	
	_	Maximising the salvage of vegetative and soil reapproved disturbance area for beneficial reuse the rehabilitation of the site			3.2.6	
	_	Controlling weeds and feral pests			3.2.7, 3.2.8	
	b. Include details of who would be responsible for monitoring, reviewing and implementing the plan, and timeframes for completion of actions.					



Mitigation measures of relevance to biodiversity management from the EIS (refer Appendix A of the Response to Submissions Report dated Feb 2018) are reproduced below in Table 2, with report section where they are addressed in this BMP.

Table 2: Mitigation Measures and Corresponding Location within this BMP

Mitigation Measures from EIS  Phase of works Report					
Willigation Measures from £13	Filase of Works	Section			
<ul> <li>Hollow bearing tree impacts would be minimised by:</li> <li>Staged habitat removal for the removal of hollow bearing trees would be undertaken where non-habitat vegetation would be cleared initially following a preclearing inspection by a qualified ecologist. Habitat trees would be disturbed by 'knocking' at this time and cleared at least 24 hours after.</li> <li>Clearing of hollow-bearing trees would not take place between September and February, where possible. If clearing during this period cannot be avoided, an ecologist would be present on site to check all hollows for animals. If a hollow is being used by a threatened species (e.g. Superb Parrot), an exclusion barrier of appropriate distance (e.g. 30m from the base of the tree) would be installed to prevent disturbance. If a hollow is being used by a species not listed under the TSC Act or EPBC Act, any animals present will be caught and either released into appropriate alternative habitat or taken to a wildlife carer.</li> </ul>	Construction	3.2.2			
Residual impacts would be offset:  - An Offset Management Plan would be developed and implemented to offset the loss of native vegetation, including hollow-bearing trees. This may include direct offsets or other strategies to improve biodiversity outcomes commensurate with the impacts of the project on native vegetation. Minimising the impacts to fauna on site (including fauna interaction with perimeter fencing) and implementing fauna management protocols.	Construction	3.2.9			
To minimise impacts to native vegetation outside the impact zone, stockpile and compound sites would be located using the following criteria:  - Within the Proposal Site.  - At least 40 m away from the nearest waterway.  - In areas of low ecological conservation significance (i.e. previously disturbed land).  - On relatively level ground.  - Outside the 1 in 10 year Average Recurrence Interval (ARI) floodplain.	Construction	3.2.5			
<ul> <li>A Weed Management Plan would be developed for the sites to prevent/minimise the spread of weeds in and between sites. This would include:         <ul> <li>Declared noxious weeds would be managed according to the requirements stipulated by the Noxious Weeds Act 1993 during and post construction</li> <li>Develop protocol for weed hygiene in relation to plant, machinery and importation and management of fill</li> <li>All pesticides would be used in accordance with the requirements on the label. Any person undertaking pesticide (including herbicide) application would be trained to do so and have the proper certificate</li> </ul> </li> </ul>	Construction and operation	3.2.7			



Mitigation Measures from EIS	Phase of works	Report Section
of completion/competency or statement of attainment issued by a registered training organisation.		
<ul> <li>Any occurrences of pathogens such as Myrtle Rust and Phytophthora would be monitored, treated and reported.</li> </ul>		
Disturbance to habitat features would be minimised by:	Construction	4.2.3
<ul> <li>Any fallen timber, dead wood and bush rock (if present) encountered on site would be left in situ or relocated to a suitable place nearby. Rock would be removed with suitable machinery so as not to damage the underlying rock or result in excessive soil disturbance.</li> </ul>		4.2.4
To minimise injuries to microbats and birds:  — Use of barbed wire would be avoided.	Construction	3.2.2
Implement feral animal management program, including species such as rabbits, rodents and starlings to reduce risk of attracting raptors.	Construction and operation	3.2.8



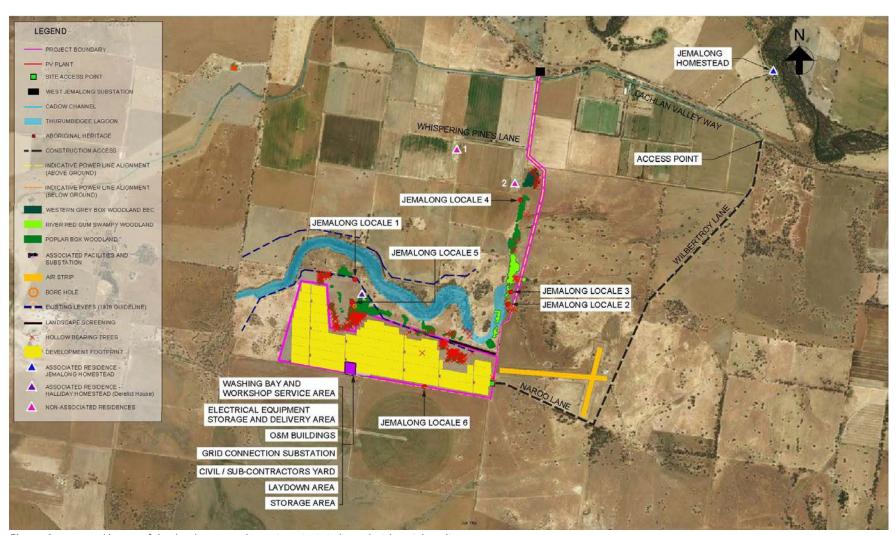


Figure 1: Approved layout of the development. The Project Site is indicated with a pink outline



## 1.4. Habitat Values

The Project Site is comprised of predominantly treeless agricultural land with patches of remnant native vegetation modified by past disturbances associated with land clearing, livestock grazing and weed invasion. Groundcover vegetation is highly modified with a low percentage of native species, and residual impacts from the Project are now limited to the removal of one hollow bearing tree.

Habitat within the Project Site is broadly described in the three habitat types below:

#### Woodland

The woodland community contains a number of trees, some bearing hollows, and a diversity of perennial and annual grasses and herbs that constitute the ground-cover strata. The woodland trees provide suitable habitat for a variety of arboreal and terrestrial birds and mammals. Understorey structure is sufficient in structural diversity and ground debris to provide shelter and foraging opportunities for a range of fauna species including small marsupial mammals, woodland birds and reptiles.

#### Wetland

Ephemeral wetlands occur in patches along the transmission line which contain trees and grasses offering shelter and foraging resources in addition to sedges, rushes and amphibious plants. This habitat also contains resources for aquatic fauna such as insects, fish, frogs and birds.

#### Cleared/disturbed areas

Cleared areas offer limited resources for fauna and flora. Microbats may forage for insects over cleared lands nocturnally and macropods may take advantage of the expansive areas of exotic grasses in cleared areas.

# 1.5. Native Vegetation

#### 1.5.1.Plant Community Types

Two PCTs were recorded within the Project Site, as reported by NGH Environmental (2017a) and RPS (2018), as listed in Table 3 and illustrated in Figure 2.

Table 3: PCTs within the Project Site

PCT number and description	Area (ha)
244 – Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt)	3.11
249 - River Red Gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW	0.63

No threatened ecological communities listed under the NSW *Biodiversity Conservation Act* 2016 (BC Act) are present within the Project Site. However, PCT 244 was recently listed as an endangered ecological community under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act), named as 'Poplar Box Grassy Woodland on Alluvial Plains'.

Outside of the Project Site to the west of the electricity easement is a patch of Western Grey Box – Poplar Box – White Cypress Pine Open Woodland, which is listed as a threatened ecological community under the BC Act and EPBC Act; however, this community would not be impacted by the Project.



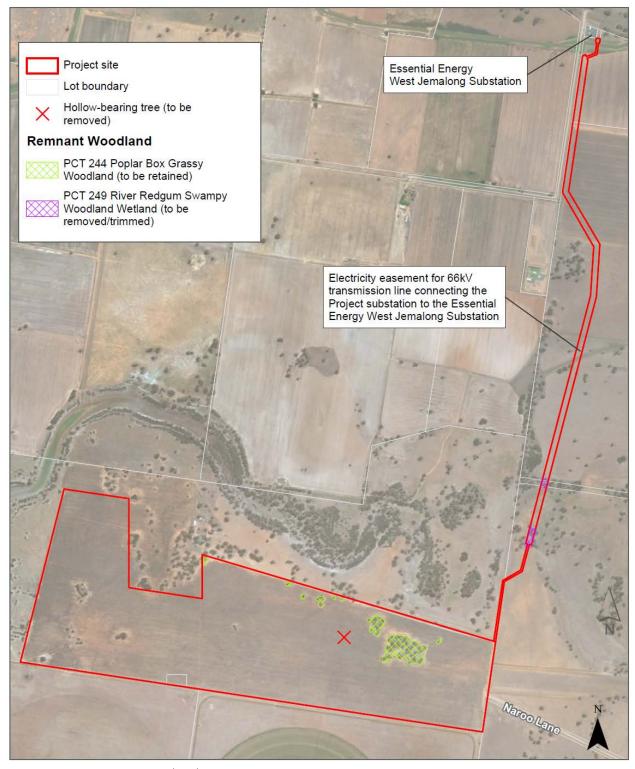


Figure 2: Native Vegetation within the Project Site



#### 1.5.2.PCT BioMetric Benchmarks

The 'natural state' for PCTs observed within the Project site has been quantified and is referred to as BioMetric benchmarks (OEH 2017). The benchmark state for PCTs 244 and 249 are provided in Table 4.

Table 4: PCT BioMetric Benchmarks

PCT	Native Plant Species Richness	Native Over storey Cover MIN	Native Over storey CoverMAX	Native Midstorey Cover MIN	Native Midstorey Cover MAX	Native Groundcover Grass MIN	Native Groundcover Grass MAX	Native Groundcover Shrubs MIN	Native Groundcover Shrubs MAX	Native Groundcover Other MIN	Native Groundcover Other MAX	Number Trees With Hollows	Total Length Fallen Logs
244	25	8	35	3	10	13	50	3	5	3	15	1	75
249	25	10	33	4	15	5	20	3	10	5	20	2	56

These parameters have been used to aid in the description of performance criteria.

# 1.6. Threatened Flora

No threatened flora species were recorded within the Project Site.

# 1.7. Threatened Fauna

Four threatened bird species were recorded within the Project Site as detailed in Table 5. Those marked with an asterisk may occupy hollow-bearing trees for breeding purposes.

Table 5: Threatened Birds within Project Site

Scientific Name	Common name	BC Act	EPBC Act
Polytelis swainsonii*	Superb Parrot	V	V
Circus assimilis	Spotted Harrier	V	-
Climacteris picumnus victoriae*	Brown Treecreeper (Eastern Sub-species)	V	-
Neophema pulchella*	Turquoise Parrot	V	-

In addition, four threatened microbat species were identified to a 'possible to probable' level based on Anabat recordings (NGH Environmental 2017a), as detailed in Table 6. These may occupy hollow-bearing trees.

Table 6: Probable Threatened Bats within the Project Site

Scientific Name	Common name	BC Act	EPBC Act
Chalinolobus picatus	Little Pied Bat	V	-
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-
Vespadelus baverstocki	Inland Forest Bat	V	-
Nyctophilus corbeni	Corben's Long-eared Bat	V	V



## 1.8. Weeds

A total of 17 exotic and non-indigenous flora species were identified by NGH Environmental (2017a) as occurring within the Project Site. One of these species, namely *Lycium ferocissimum* (African Boxthorn), is identified as a WoNS and a priority weed in the western region of NSW under the *Biosecurity Act* 2015.

# 1.9. Pest Fauna

A total of three introduced vertebrate pest species were identified by NGH Environmental (2017a) as occurring within the Project Site. These include the Cat (*Felis catus*), European Rabbit (*Oryctolagus cuniculus*) and the European Fox (*Vulpes vulpes*). These species contribute respectively to the following Key Threatening Processes under the BC and/or EPBC Act:

- Predation by the European red fox (BC Act/ EPBC Act);
- Predation by feral cats (BC Act/ EPBC Act); and
- Competition and grazing by the feral European rabbit (BC Act)/ Competition and land degradation by rabbits (EPBC Act).



## 2. PROJECT IMPACTS

Impacts to flora, fauna and ecological communities were evaluated in the Biodiversity Assessment as part of the EIS for the Project (NGH Environmental 2017a). Impacts expected to occur during construction and operation of the Project include:

- Loss of vegetation;
- Weeds:
- Habitat removal;
- Loss of hollow bearing trees;
- Wildlife connectivity and habitat fragmentation;
- Injury and mortality;
- Pests and pathogens;
- Changed hydrology;
- Impact on relevant key threatening processes; and
- Cumulative impacts.

The Project has an allowance to clear 0.84 ha of native vegetation comprising 0.21 ha of PCT 244 – Poplar Box Grassy Woodland and 0.63 ha of PCT 249 – River Redgum Swampy Woodland Wetland (NGH Environmental 2017a). Native vegetation to be impacted does not include any vegetation communities listed as threatened under the BC Act.



#### 3. MANAGEMENT ACTIONS

# 3.1. Management Zones

The management measures in this BMP are discussed with reference to three management zones as shown in Figure 3 and described below.

#### 3.1.1.Zone A

This zone reflects land that contains the solar panel array and associated infrastructure and will be utilised during construction for construction of the infrastructure, and during operation for operation and maintenance (O&M) activities.

This zone will be cleared of native vegetation as approved in SSD 8803. Much of this has been cleared as outlined in Section 1.4 of this BMP with one remaining hollow bearing tree yet to be removed.

The zone includes a 10m wide defendable space buffer around the solar array which permits unobstructed vehicle access. This defendable space and the solar array will be managed as an Asset Protection Zone to minimise fire risks.

#### 3.1.2.Zone B

This zone reflects the electricity easement that connects the Project substation with the Essential Energy West Jemalong Substation near Lachlan Valley Way, and will be utilised during construction for construction of the 66kV transmission line and during operation for O&M activities.

Ongoing removal/trimming of shrub and tree vegetation is to be performed to maintain the safe function of the 66kV transmission line that run along this easement.

#### 3.1.3.Zone C

This zone reflects land north of the solar array which is outside the Project's security fence, but within the Project's leasehold. This zone contains the retained patches of remnant native woodland (PCT 244 - Poplar Box Grassy Woodland) interspersed within treeless cropped land.

The northeast corner of this zone contains a 500m long corridor to be revegetated for the purpose of providing a visual screen to residents to the north. This is to be revegetated in accordance with the approved Landscaping Plan and involves seedlings being planted during the construction period.

With the exception of ongoing weed and pest management, this zone will not be utilised during the operation of the Project as no Project infrastructure is located in this area.

Some areas of this zone will be temporarily used during construction for landscaping activities and construction vehicle access. There is an existing access track which runs along the inside of northern boundary of this zone from the Project site's access point off Naroo Lane as indicated in Figure 3. This track will be utilised by construction vehicles to enable safe and orderly vehicle movement to the central and western portions of the Project Site. The track will be extended to provided construction access through to Zone A.

Since this Zone will be utilised during construction for landscaping activities and construction vehicle access, to avoid inadvertent impacts to the patches of PCT 244 woodland, all patches of PCT 244 woodland will be temporarily fenced off during construction using flagging, bunting, parawebbing or similar and will be marked as a no go zone. Management involving the control of weed and pest species is authorised in these no go zones, as outlined in Section 4.2.



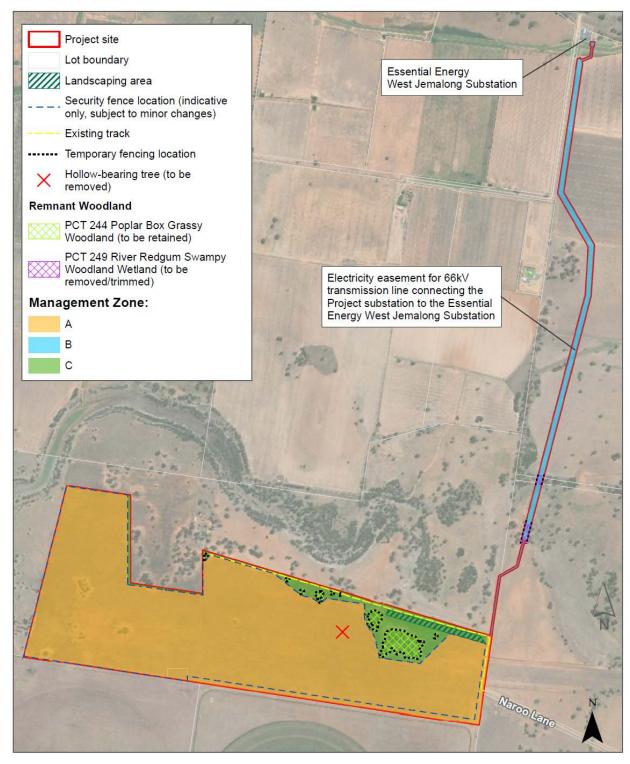


Figure 3 Management Zones



# 3.2. Management Measures

# 3.2.1. Remnant vegetation and habitat

The layout of the Project, as approved, has been designed to minimise clearing and unnecessary disturbance of vegetation.

The following measures will be implemented for the protection and management of the remnant native vegetation and habitat within the Project Site that is to be retained:

- Construction of a solar farm security fence which excludes the remnant vegetation to be retained, enabling long term protection of the retained remnant vegetation within the Project Site and unnecessary disturbance to soil, regenerating vegetation and fauna habitat during operation.
- Restriction of entry to Zone C during operation (i.e. only for the purposes of environmental monitoring and weed and pest management);
- Establishment of temporary fencing prior to the commencement of construction, around the patches
  of PCT 244 woodland in Zone C, using flagging, bunting, parawebbing or similar, and marking the
  fenced areas as a no go zone (note: environmental monitoring and weed/pest management is
  authorised).
- Within Zone B, restrict construction activities to the electricity easement only, during construction
  of the 66kV transmission line. Sections of temporary bunting or similar is to delineate the extents
  of the easement near adjacent woodland at the indicative locations indicated in Figure 3, to avoid
  inadvertent access and impacts to adjacent woodland outside the approved disturbance area.
- The no go zones and sensitive environmental areas will be included in the site induction.
- Exclusion of livestock grazing from remnant vegetation (i.e. Management Zone C).
- Weed inspections will be conducted in this zone during construction and operation to identify any
  priority and/or invasive weeds and conduct weed control as appropriate. Control of weeds is
  outlined further in Section 3.2.7.
- Feral pest inspections will be conducted in this zone during operation to identify any feral pest outbreaks and conduct pest control as appropriate. Control of feral pests is outlined further in Section 3.2.8.

#### 3.2.2. Livestock Grazing

Periodic livestock (sheep) grazing is expected within Management Zone A. Sustainable livestock grazing within this precinct would require ongoing protection of soils from erosion (i.e. landform stability). In the absence of trees and shrubs, landform stability will be controlled by the integrity of the groundcover layer (i.e. vegetation < 1 m high). To protect against rain splash damage in a livestock grazed environment, it is proposed to maintain a grassy herbaceous groundcover stratum of no less than 30% cover at any time with mean vegetation cover being at least 50 % cover. This performance measure falls within the natural range of groundcover vegetation cover and considers the absence of leaf litter and shrubs, which are important factors in minimising the effects of rain splash damage and associated incidence of sheet erosion.

#### 3.2.3. Fauna management protocols

Impacts to fauna will be minimised chiefly by avoidance of habitat clearing (refer section above), followed by exclusion. The security fence is primarily for security but will also prevent most fauna from accessing operational areas and, conversely, prevent livestock from entering remnant vegetation (Zone C). The



fence will be constructed to allow unrestricted native fauna movement within the retained vegetation in Zone C. Non barbed wire fencing will be used to reduce potential injury to fauna.

Fauna management protocols will apply before and during clearing activities. Pre-clearance surveys will be undertaken before the removal of the hollow-bearing tree in Zone A, and the woodland approved for removal in Zone B. Pre-clearance surveys and clearing supervision will be undertaken by a qualified ecologist, who will:

- Check for presence and evidence of fauna species;
- Flag key habitat features, including (but not limited to) nests, hollows or large logs. If inactive nests are present, these will be removed to prevent them becoming active prior to disturbance; and
- Identify nearby habitat suitable for the release of any fauna that may be encountered during clearing works.

Following pre-clearance surveys, vegetation clearing works are to follow the process outlined below:

- Trees will be shaken/tapped twice, with a pause in between, using the machinery to be used during clearing activities, to encourage any animals present to move to an alternate location;
- Nests and on-ground logs will be carefully inspected by an ecologist. Logs should be carefully rolled (where possible) and inspection undertaken beneath. Logs will either remain insitu or be relocated using suitable machinery to a suitable nearby area;
- Habitat trees containing nests or hollows will be carefully lowered to the ground with minimal impact
  and nests and hollows inspected by the ecologist. Hollow bearing trees positioned on the ground
  so the entrance to the hollow faces upwards for easy exit of any fauna; and
- Any fauna species are to be relocated to habitat identified during the pre-clearance process, or if injured, transported to a wildlife carer or veterinarian.

Any fallen timber, dead wood and bush rock (if present) encountered on site would be left in situ or relocated to a suitable place nearby. Rock would be removed with suitable machinery so as not to damage the underlying rock or result in excessive soil disturbance.

Clearing of habitat (e.g. fallen timber, rock and trees) will be synchronised with relevant species lifecycles. Hollow-bearing tree removal is to occur between March and August to avoid the main breeding period of hollow-dependent fauna, especially Superb Parrots (*Polytelis swainsonii*), which breed between September and January (noting February is to be excluded too as required by the mitigation measures stated in the EIS (NGH Environmental 2017).

Two nest boxes should be installed in the remnant vegetation in Zone C to compensate for the loss of the hollow bearing tree within the Zone A (this is an offset ratio of 2:1). The size of the nest boxes should reflect the size of the hollow being removed, to adequately support the fauna species occupying the hollow, if any. A qualified ecologist should install the nest boxes to ensure suitable trees are selected for installation and the direction of the nest box is optimal for candidate species. The nest boxes will be monitored annually during the operations period by the O&M contractor to ensure they remain fixed and functional.

# 3.2.4. Rehabilitation and revegetation of temporary disturbance areas

Rehabilitation and revegetation of temporary disturbance areas will ensure they are safe, stable and non-polluting, and will reduce the area of exposed soil. The objectives of rehabilitation are to establish a low maintenance but effective perennial groundcover to protect the soil and minimise the potential for erosion; and minimise the conditions that could facilitate weed establishment and infestation. Once the groundcover is restored, it is to be maintained throughout operation.



Construction works may involve stripping of topsoil in limited areas for the purposes of access track construction and to flatten some areas of the site prior to installation of the solar array and associated infrastructure. Following construction activities, groundcover will be re-established in stripped and/ or chronically disturbed construction areas. Soil preparation and groundcover re-establishment for these areas are outlined further below.

Temporary disturbance areas that may require rehabilitation include:

- temporary construction laydown areas;
- temporary construction compounds;
- drainage areas;
- trenches for underground infrastructure;
- temporary access tracks and verges;
- batters cuts and fills:
- disturbed areas underneath the solar arrays.

Where disturbance is minimal and topsoil is not disturbed, which will be the case for most areas underneath the solar arrays, reseeding using native grasses may be sufficient without topsoil preparation.

Following disturbance, groundcover is to be restored as soon as practicable, but within 12 months of completing any construction or upgrades.

# **Topsoil Preparation**

Where practical, shallow ripping should be undertaken from 50 to 100 mm in depth. Multiple passes may be required depending on the equipment being used. The final surface should be presented in a roughened state to reduce runoff and provide furrows for seeds to wash into, and then be covered by soil for germination. Topsoil removed for permanent construction activities (as discussed in Section 3.2.4 above) should be appropriately stockpiled on site and used in areas subject to rehabilitation such as this. Sediment fencing is to be installed where required to minimise erosion and should be left in situ until vegetation has re-established.

#### **Seed Broadcasting**

Where required, seeds can be broadcast or applied with hydromulch. Recommended seeds include a mix of native grasses found within the Project Site, comprising Wire-grass (*Aristida ramosa*), Speargrass (*Austrostipa scabra* and *Austrostipa verticillata*), Windmill Grass (*Chloris truncata*), Common Wheat Grass (*Elymus scaber*), Weeping Grass (*Microlaena stipoides*), and Wallaby Grasses (*Rytidosperma* spp.).

The groundcover will be kept free of weeds by implementing the measures described in Section 3.2.7. In areas where no groundcover has been removed no groundcover restoration is required, provided that ongoing maintenance allows for natural regeneration. During periods of extended drought, topsoil preparation and seed broadcasting will not commence until conditions are more seasonally favourable.

#### 3.2.5. Stockpiling

Stockpiled material is to be restricted to Zone A. This will ensure stockpiled materials will;

- not be placed within 40m of a waterway (Thurumbidgee Lagoon);
- only be placed within an area of low ecological significance;
- be on relatively level ground; and



only be placed outside the 1 in 10 year Average Recurrence Interval (ARI) floodplain.

## 3.2.6. Reuse of Vegetative and Soil Resources

Where appropriate and practicable, stripped topsoil and mulched non-hollow bearing vegetation will be salvaged stored for short periods of time and utilised during groundcover restoration efforts to stabilise bare ground and prevent erosion. Felled timber with hollows is to be collected and placed into the remnant woodland in Zone C.

#### 3.2.7. Weed management plan

Weed management during construction and operation shall target any species likely to significantly invade bushland, prevent natural regeneration, or impede native seedling growth.

During an initial primary weed control phase during construction, priority shall be given to areas where Weeds of National Significance (WoNS) and/or priority weeds occur. Weed removal techniques should be appropriate to the weed type, growth form, and ecology. Wherever possible, weed removal should be carried out prior to annual seed set.

It is generally not possible to remove a weed from a site on a single occasion, as many weeds have a persistent seed bank that can remain viable for long periods of time. Seeds may germinate rapidly after the parent plant has been removed due to increases in light and habitat availability. Therefore, a secondary consolidation phase of weed control will be undertaken, which will involve control of minor infestations and revisiting the primary control phase sites for follow-up weeding. This is likely to consist of spraying with herbicide (in areas not in the vicinity of a water body) or removal by hand, as any weeds present will generally be small and easily eradicated. Minimal weed cover should be evident at the completion of this stage. Preventative measures and an ongoing maintenance phase control program will be undertaken to ensure this remains the case.

## **WoNS and Priority Weeds**

Table 7 details the duties required for weed species referred to under the *Biosecurity Act* 2015 that occur within the Project Site.

Table 7: Weed Biosecurity Duties

Weed	Area	Biosecurity Duty
Lippia Phyla canescens	All of NSW	General Biosecurity Duty:  - All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.
African Box Thorn Lycium ferocissimum	All of NSW	General Biosecurity Duty:  - All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.  Prohibition on dealings:  - Must not be imported in the State or sold
	Western	Regional recommended measure:



<ul> <li>Land managers mitigate t</li> </ul>	ne risk of the plant spreading
from their land. Land man	agers reduce impact of plant
on priority assets (riparian	areas and floodplains).

#### **Weed Control Methods**

Weed control requires an integrated approach and a single method of treatment should not be relied upon. Bush regeneration principles (Bradley 2006) designed for use in bushland settings, in combination with designated plantings, should be employed. The systematic removal of weeds will allow native plants to establish themselves naturally (Buchanan 1989) in designated regeneration areas.

The Bradley Method of bush regeneration employs four basic principles:

- 1. Work outwards from good bush areas towards areas of weed;
- 2. Make minimal disturbance to the environment;
- 3. Weed control will involve primary, consolidation and long-term maintenance; and
- 4. Do not over-clear; where possible let native plant regeneration dictate the rate of weed removal.

Manual removal of herbaceous weeds, regrowth and seedlings is preferred where practicable, with minimal disturbance to soil stability and existing native species. Ecologically sensitive areas where weeds are removed manually should be stabilised or planted within 24hrs or prior to forecast rainfall events. Removal work will be undertaken outside the seeding period of weeds, especially those weeds that produce large quantities of seed. If any work is undertaken within these periods, seed will be collected, bagged and disposed of off-site, ensuring that no seed remains.

#### **Lippia Management**

Cultivation and herbicides can be used to provide short-term lippia suppression while establishing a pasture. Cultivation will often be more practical due to the variable age and moisture stress levels of the plants present. Cultivate a number of times until tareas of lippia are visibly declining.

Landholder experience has shown that cultivation of dry soil in hot weather prevents lippia fragments from transplanting and gives the best lippia kill. Blade ploughs and chisel ploughs with sweeps can give a better initial lippia kill.

With good soil moisture and actively growing lippia, applying herbicide will give reliable control. Spot spraying is suitable for treating small infestations. Lippia can re-invade very quickly so regular monitoring and follow-up control is needed, especially after floods.

#### **Herbicide Use**

Chemical removal is only considered appropriate for larger weeds and areas of large infestation or in areas containing few natives. In regard to larger woody weed species and infestations, felling and digging up the roots can be dangerous, expensive, time consuming and could potentially increase erosion. Where practical the application of herbicides should only be carried out by qualified personnel and the use of chemicals should be kept to a minimum. Care should also be taken when implementing chemical spraying techniques near waterways, environmentally sensitive areas and non-target plant species.

The use of more environmentally friendly herbicides such as "Roundup Biactive ®" should be adopted when working within or adjacent to riparian areas. Herbicides should not be applied immediately prior to rain occurring. This reduces the effectiveness of the herbicide and poses the risk that the herbicide could be transported by runoff into local creeklines and waterways.



Herbicide use has the advantage of reduced management effort (i.e. cost) compared to physical removal, particularly for large areas or large infestations of weeds. In this respect, it is considered that the use of herbicides is warranted in the following circumstances:

- There are small areas of dense weeds with few or no native plants to protect;
- There are large areas of weeds;
- The weeds are growing too rapidly for physical removal; and
- The receiving environment is tolerant of herbicide applications with respect to indirect impacts on non-target species such as threatened plant species.

It is important to plan herbicide control of target species according to a weeding calendar that recognises the weed's life form and seasonality (i.e. flowering, fruiting and seed set).

Herbicide application associated with the implementation of this BMP shall be limited to the following techniques. Always remember to read the product label and any relevant permit before using any herbicide.

- Cut-stump and poison (cut and dab);
- Stem injection;
- Stem-scrape or frilling and poison;
- · Basal bark painting; and
- Selective spot-spraying (suitable for herbaceous weeds, grasses and saplings of woody weeds).

Annual weed monitoring will be undertaken during construction and operation. This will involve of traverses on foot by a suitably qualified person, across retained vegetation zones and groundcover reestablishment zones, as well as opportunistic observations.

All herbicides and pesticides must be used in accordance with the requirements on the label. Any person undertaking pesticide (including herbicide) application must be trained to do so and have the proper certificate of completion/competency or statement of attainment issued by a registered training organisation.

#### Weed hygiene

All tracked vehicles/plant/equipment must be made free of soil, seed and plant material prior to entering the Project site and on leaving the site – this will be managed as follows:

- An initial vehicle inspection will include a check for weeds and seeds on the vehicle.
- Public roads will be inspected weekly for tracked soil and will be swept as required.
- Vehicles and equipment shall remain on existing roads and defined site access tracks where possible.
- Parking will be restricted to designated areas. These areas will be communicated at the induction.

All imported fill must have certification that demonstrates that the material is weed free.

#### Significant weed outbreaks

Uncontrolled weed outbreaks are to be managed by a qualified bush regeneration contractor using appropriate measures specified in the *NSW Weed Control Handbook: A guide to weed control in non-crop, aquatic and bushland situations* (DPI 2018).



## 3.2.8. Feral pest management

Annual feral pests monitoring will be undertaken within the retained vegetation zone during operation. Monitoring will consist of visual inspections for signs of introduced fauna species (scats, diggings etc). If significant introduced fauna species outbreaks are identified, specific controls will be developed and undertaken. Any vertebrate pest control activities undertaken will be done in accordance with the best practise methods available.

Options for pest management during operation, are outlined below:

- European Rabbit: current best practice control is the inspection, ripping and rehabilitation of rabbit warrens as detected. Initial pest management audit that establishes trapping and baiting requirements;
- European Fox and feral cat: 1080 baiting of foxes and Curiosity® baiting for cats in accordance
  with relevant legislation (i.e. usage signs erected around the Project Site, avoid placement near
  waterways), the disposal and recording of carcasses;
  - Notification to neighbours regarding commencement of a 1080 and Curiosity® baiting program onsite; and
  - Trapping with cage traps euthanasia undertaken in accordance with legislation (NSW Agriculture Animal Care and Ethics Committee).
- Black Rat and House Mouse: Non-trapping/ poison methods are to be maintained as the primary method of management. A clean operational area is to be maintained to reduce potential for home range establishment (i.e. limit refugia habitat and food sources). Water availability is to strictly be managed to prevent occurrence. Vegetation management is to include maintenance of low groundcover (i.e. < 10cm high vegetation). Chemical/ trapping control measures to be deployed if primary method is ineffective.

# 3.2.9.Offset Management Plan

Condition 13, Schedule 3 of the Development Consent specifies:

Within one year of commencing development under this consent, unless otherwise agreed by the Secretary, the Applicant must retire biodiversity credits of a number and class specified in Table 1 [of the Development Consent] below to the satisfaction of OEH.

The retirement of these credits must be carried out in accordance with the NSW Biodiversity Offsets Policy for Major Projects and can be achieved by:

- a) acquiring or retiring 'biodiversity credits' within the meaning of the Biodiversity Conservation Act 2016;
- b) making payments into an offset fund that has been developed by the NSW Government; or
- c) providing supplementary measures.

# Table 1: Ecosystem Credit Requirements

Vegetation Community	PCT ID	Credits Required
Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt)	244	8

Note: Following repeal of the Threatened Species Conservation Act 1995 on 25 August 2017, credits created under that Act are taken to be "biodiversity credits" under the Biodiversity Conservation Act 2016 by virtue of clause 22 of the Biodiversity Conservation (Savings and Transitional) Regulation 2017.

In order to satisfy this condition, the Project has chosen to make a payment into the NSW Biodiversity Conservation Fund, in accordance with Condition 13(b) specified above. By doing this, the



responsibility of finding an offset is transferred to the Biodiversity Conservation Trust (BCT). The amount payable will be automatically generated by the Offsets Payment Calculator.

The payment will be made within one year of commencing the development and the receipt issued by the BCT will be provided to DPIE to demonstrate that the Project's offset obligations have been satisfied.



# 4. IMPLEMENTATION

Table 8 summarises the management objectives, performance criteria and corrective actions, responsible party and a timeframe for their implementation.

Records will be kept in order to document the dates, methods and outcomes of the management and monitoring measures to be implemented relevant to the BMP to demonstrate compliance.

Table 8: Management Measures and Implementation

Management objective	Actio ID	ons Description	Applicable Zone	Responsibility	Performance measure/ Completion criteria	Trigger for correction	Corrective actions	Monitoring frequency
Protect remnant native vegetation and habitat outside the approved disturbance	B1	Install temporary fencing prior to construction to demarcate PCT 244 using flagging, bunting, parawebbing or similar, as a no go zone.  Maintain for the duration of construction.	Zone C	EPC Contactor	Temporary fencing in good working order and prevents unauthorised impacts on Zone C	Fencing fails to exclude unauthorised activity.	Restore fencing failures. Investigate damage and rectify. Conduct refresher staff inductions.	Weekly during construction
areas	B2	Install Permanent security fence to exclude livestock and unauthorised access to remnant vegetation in Zone C for the duration of operation.	Boundary between Zone A and C	EPC Contactor (during construction) O&M Contractor (during operation)	Permanent fencing in good working order and prevents livestock intrusion/ unauthorised impacts on Zone C	Livestock or unauthorised activity detected within Zone C	Restore fencing failures. Remove livestock. Investigate damage and rectify. Conduct refresher staff inductions.	Monthly during operation
	В3	Install temporary fencing to delineate the extents of the easement near adjacent woodland at the indicative locations indicated in Figure 3.	Zone B	EPC Contactor	Fencing in good working order and prevents unauthorised impacts	Fencing fails to exclude unauthorised activity.	Restore fencing failures. Investigate damage and rectify. Conduct refresher staff inductions.	Weekly during construction of the 66kV line



Management objective	Actio	Description	Applicable Zone	Responsibility	Performance measure/ Completion criteria	Trigger for correction	Corrective actions	Monitoring frequency
	B4	Incorporate no go zones and sensitive environmental areas in the site induction	N/A	EPC Contractor	Unauthorised impacts avoided	Staff repeatedly perform unauthorised activities in protected areas	Amend site induction material and perform refresher inductions	Each time the site induction material is updated
	B5	Stockpiled material is to be restricted to Zone A. Use sediment and erosion measures to contain impacts.	Zone A	EPC Contractor	No adverse impacts on adjoining lands by stock piling	Stockpiled material escapes Zone A	Relocate or stabilise stockpile and/ or Reinstate sediment and control measures	Weekly during construction
Manage remnant vegetation and fauna habitat within the Project Site	B6	Control weed outbreaks in accordance with the Weed Management Plan (Section 3.2.7 of this BMP) Listed Biosecurity weeds are managed in accordance with Biosecurity duties (see Table 7)	Zone C	EPC Contactor (during construction) O&M Contractor (during operation)	Biosecurity weeds not listed in Table 7 are found within Zone C Known Biosecurity weeds listed in Table 7 are managed and maintained to < 5% cover	New Biosecurity listed weeds identified within Zone C Listed Biosecurity weeds exceed 5% cover within Zone C	Conduct weed control in accordance with the Weed Management Plan (Section 3.2.7 of this BMP). Where required, consult with Local Land Services to initiate broader control measures.	Twice yearly during construction and operation (spring and autumn)



Management objective	Actio ID	ons Description	Applicable Zone	Responsibility	Performance measure/ Completion criteria	Trigger for correction	Corrective actions	Monitoring frequency
	B7	Control feral pests in accordance with Section 3.2.8 of this BMP. As required in response to annual monitoring and identified corrective actions.	Zone C	O&M Contractor	Feral pests are maintained at or below baseline conditions	Feral pests rise above baseline levels.	Control feral pests in accordance with Section 3.2.8 of this BMP. Where required, consult with Local Land Services to initiate broader control measures.	Twice yearly during construction and operation (spring and autumn)
	B8	Livestock grazing	Zone A	O&M Contractor	Livestock restricted to Zone A and groundcover condition remains above 30% vegetated cover	Livestock found within exclusion area (i.e. Zone C) and/ or groundcover vegetation < 30% cover	Remove/ relocate livestock to approved grazing precincts. Investigate and rectify damage to Zone C. Revegetated ground surfaces to 50% or greater vegetation cover.	Monthly during operation
	B9	Maintain grassy groundcover through rotational grazing, regular seeding and grazing exclusion during drought conditions	Zone A	O&M Contractor	Protect soils from erosion by maintaining a mean annual vegetation cover of 50% in the groundcover	Groundcover falls below 30% vegetated groundcover in any given month	Remove livestock, revegetate with seeding to restore vegetation cover to 50% or more and refrain from future livestock grazing.	Monthly during operation



Management objective	Actio	Description	Applicable Zone	Responsibility	Performance measure/ Completion criteria	Trigger for correction	Corrective actions	Monitoring frequency
Minimising impacts to fauna within the Project Site	B10	Determine fence alignment during design. Install security fence during construction. Maintain during operation.	Zone A	EPC Contactor (during construction) O&M Contractor (during operation)	Solar farm security fence to exclude operational activities from remnant vegetation in Zone C and be maintained throughout operation.	Unauthorised construction or operational activities/ livestock grazing detected in Zone C	Remove/ relocate livestock to approved grazing precincts. Investigate and rectify damage to Zone C. Repair damage to fencing.	On completion of construction Monthly during operation
	B11	Security fence must not have barbed wire	Zone A	EPC Contactor	Fence design excludes the use of barbed wire	Barbed wire is detected as a fencing material	Remove and replace barbed wire with appropriate material	Construction
	B12	Implement fauna management protocols as per Section 3.2.2 of the BMP.	Zone A Zone B	EPC Contactor and engaged ecologist	No injury or death to fauna	Fauna death or injury occurs	Seek veterinarian assistance if required. Review fauna management protocol and revise of shortfalls identified.	During vegetation clearing activities.
	B13	Remove hollow-bearing tree between March and August to avoid the main breeding season.	Zone A	EPC Contactor and engaged ecologist	Hollow-bearing tree removal occurs only between March and August	Removal occurs outside specified timeframe	Stop work in the area of the unauthorised tree clearing activities and report incident immediately to DPIE.	During vegetation clearing activities.



Management objective	Actio	Description	Applicable Zone	Responsibility	Performance measure/ Completion criteria	Trigger for correction	Corrective actions	Monitoring frequency
Rehabilitate and revegetate temporary	B14	Retain topsoil where possible	Zone A	EPC Contactor	During construction	Topsoil is not unnecessarily being stripped	Amend construction method to avoid unnecessary topsoil stripping.	Weekly during construction
disturbance areas to protect soil and minimise erosion	B15	Undertake rehabilitation and revegetation in accordance with Section 3.2.4 of this BMP at temporary disturbance areas where groundcover has been removed or chronically disturbed.	Zone A	EPC Contractor and O&M Contractor	Following completion of construction	Successful perennial groundcover re- establishment within 12 months of completion of construction	Consult and ecologist or agronomist to identify appropriate corrective actions	Monthly during operation
Maximise the salvage of vegetative and soil resources within the approved disturbance	B16	Where appropriate and practicable, stripped topsoil and mulched non-hollow bearing vegetation will be salvaged utilised during groundcover restoration.	Zone A, Zone B, Zone C	EPC Contractor	Construction	No unnecessary offsite disposal of spoil or mulch	Amend rehabilitation method to include the reuse of salvaged material.	During construction, and prior to seed application
area	B17	Felled timber with hollows is to be collected and placed into the remnant woodland in Zone C	Zone A, Zone C	EPC Contactor	Construction	No mulching of felled timber with hollows	Consider installing more than 2 nest boxes in Zone C to further compensate loss of hollows.	During vegetation clearing



Management objective	Actio	Description	Applicable Zone	Responsibility	Performance measure/ Completion criteria	Trigger for correction	Corrective actions	Monitoring frequency
Controlling weeds and feral pests	B18	Control weed outbreaks in accordance with the Weed Management Plan (Section 3.2.7 of this BMP).	Zone A Zone B	EPC Contactor (during construction) O&M Contractor (during operation)	No new occurrence of listed biosecurity weeds Listed Biosecurity weeds are managed in accordance with Biosecurity duties	New Biosecurity listed weeds identified Listed Biosecurity weeds exceed 5% cover within Zone C	Conduct weed control in accordance with the Weed Management Plan (Section 3.2.7 of this BMP). Where required, consult with Local Land Services to initiate broader control measures.	Twice yearly during construction and operation
	B19	Control feral pests in accordance with Section 3.2.8 of this BMP	Zone A Zone B	O&M Contractor	Feral pests are maintained at or below baseline conditions	Feral pests rise above baseline levels.	Control feral pests in accordance with Section 3.2.8 of this BMP. Where required, consult with Local Land Services to initiate broader control measures.	Twice yearly during construction and operation



## 5. MONITORING

The framework for monitoring, including methods, baseline data, timing and frequency of monitoring events and analysis are described in the following sections.

Monitoring will be undertaken by an ecologist.

# 5.1. Monitoring Methods

Monitoring will be used to determine whether management actions outlined in the BMP are achieving performance criteria; hence trending towards the performance measures/ completion criteria (refer to Table 8). Three methods are to be used to evaluate performance as listed below:

- Point intercept method;
- · Photo monitoring; and
- Camera trapping for pest fauna species.

# 5.1.1.Point Intercept Method

The BioMetric method (Gibbons et al. 2009) is the basis for calculating the percent cover of native and exotic plants. Monitoring transects used for this purpose are shown in Figure 4 (i.e. 50 m length placed along contour).

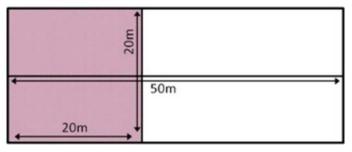


Figure 4: BioMetric Plot

Data to be recorded at each 1 m interval along the 50 m transect includes:

- Native plant cover in the overstorey (i.e. woody plants with > 10 m height) and midstorey (i.e. woody plants with 1-10 m height);
- Native plant species observed (i.e. one or more) in the groundcover stratum (i.e. < 1 m height);
- Counts for native groundcover 'grasses', shrubs' and 'other' to generate a percent cover statistic;
- Presence of exotic flora in any vegetation stratum (including species name); and
- Total native plant species richness is to be recorded within a 400 m<sup>2</sup> area (i.e. 4 m either side of the transect).

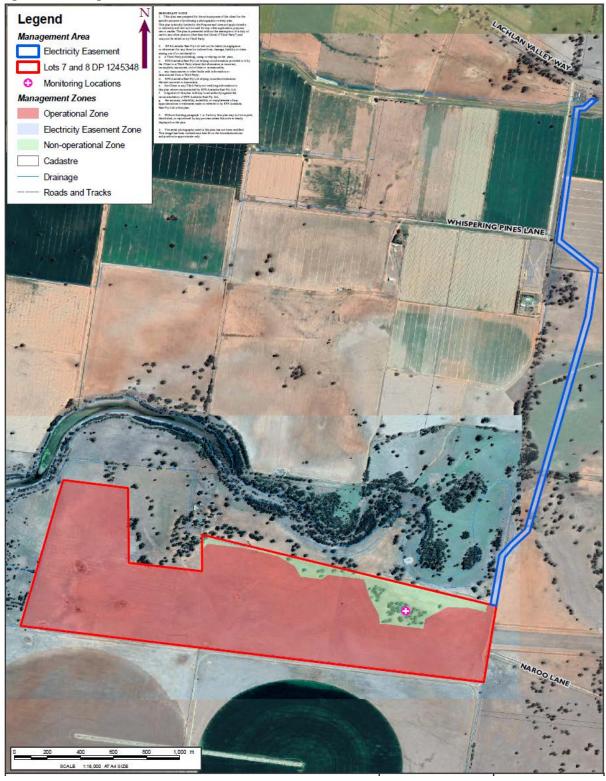
Data generated from post construction monitoring will be compared with benchmarks described in Table 8. Compliance with performance targets and completion criteria is to be determined from this comparison.

Two fixed monitoring points are located within the Zone C. A minimum of five randomly selected biometric transects to measure groundcover conditions (i.e. % grassiness and exotic flora) and record



weed species incidence is to be performed within Zone A. The location of these monitoring sites is to be determined during the first monitoring event (see Section 5.2).

Figure 5: Monitoring Locations





#### 5.1.2. Photo Monitoring

The progressive photo monitoring will provide an indication of the success or failure of any areas of rehabilitation conducted in accordance with this BMP. They will enable contractors to adjust rehabilitation works accordingly to enhance the quality of retained vegetation further and provide required information for ongoing monitoring reports.

Photo monitoring will be performed for review of weed cover during scheduled monitoring works. Photos supplied are to be date stamped together with location (GPS) and bearing for central view in photo. Purpose of photo is to be provided (e.g. removal of African Boxthorn, ground cover monitoring in Zone A).

### 5.1.3. Camera Trapping

Camera trapping will be used to evaluate pest species type and estimated activity within Zone C. Monitoring locations will be determined during the first monitoring event. Camera deployment will be a single annual monitoring event comprising one trap per hectare for a period of no less than three consecutive weeks.

# 5.2. Monitoring Locations

Monitoring locations and pre-construction conditions for the Project Site are to be quantified prior to the start of construction works using the monitoring methods specified in Section 5.1. The monitoring locations and results are to be reported as part of the inaugural monitoring report, which is to be a key reference for future monitoring and performance management. The BMP may also be reviewed, as indicated in Section 6.2, for the purposes of updating the monitoring locations and pre-construction environmental conditions.

## 5.3. Monitoring frequency

The frequency of monitoring events is specified in the last column of Table 8.

# 5.4. Reporting

Records will be kept in order to document the dates, methods and outcomes of the management and monitoring measures to be implemented relevant to the BMP. Records of all environmental activities will be maintained by the proponent to demonstrate compliance with this BMP and the conditions of the Development Consent. The monitoring measures described in Table 8 will be implemented and reported biannually for the first year from the commencement of construction, then annually thereafter.

A report will be submitted to the Department of Planning, Industry and Environment (DPIE) within 12 months of construction and annually for a period of three years thereafter. These reports will assess the efficacy of the management measures implemented against the relevant performance criteria in Table 8. If performance criteria have been achieved after the four-year reporting period, no further reporting will be undertaken. If completion criteria are not met, recommendations may be made to continue implementing management measures and monitoring requirements until completion criteria are met.



# 6. ROLES, RESPONSIBILITIES AND REVIEW

# 6.1. Responsibilities

The owner of the Project (referred to as the Project Owner) has ultimate responsibility and accountability to ensure that the Project is designed, built, operated, upgraded and decommissioned in accordance with the Development Consent including this BMP. However, all actions to achieve compliance with the Development Consent and implement this BMP will be undertaken by the EPC contractor during construction, and O&M contractor during operation, at the timings indicated in Table 8.

Figure 6 outlines the structure of organisations and key roles involved in the construction and operation of the Project. Further details on the responsibilities of each role are provided in the Project's Environmental Management Strategy.

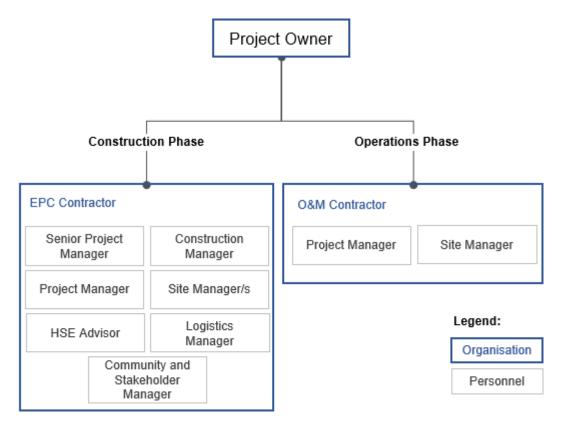


Figure 6 Structure of organisations and key roles

## 6.2. BMP review

A review of the BMP may be initiated as a consequence of the following reasons:

- On completion of the first monitoring event to document monitoring locations and condition of the management area prior to construction; or
- On completion of construction (O&M Contractor); or
- Five yearly following the start of operations; or
- In response to the occurrence of an incident; or



 Modification to the conditions of the Development Consent, in accordance with Condition 2 of Schedule 4 of the Development Consent.

The review of the BMP will be managed by the Project Owner with support from the EPC Contractor if the review is conducted during the construction stage, or the O&M Contractor if during the operations stage. The implementation of the BMP will be the responsibility of the EPC or O&M Contractor. The review will be completed within a 2-month timeframe.

Any revisions to the BMP must be approved by the DPIE.

# 6.3. Project inductions

Key elements of this BMP should be communicated to all on-site personnel during the site induction during construction and operation. In particular, the following key elements should be communicated as relevant to the construction or operation phases.

- vegetation approved to be disturbed
- · vegetation to be retained, no go zones and other sensitive environmental areas to be aware of
- fauna management protocols
- stockpile management.

Records of site inductions will be maintained by the EPC and O&M Contractors.



## 7. REFERENCES

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