PRACTICAL ECOLOGY
ecological restoration & consulting

Swift Parrot Offset Monitoring
Year 1: Oct 18 – Oct 19

Old Glenorchy Road, Deep Lead

May 2020

Swift Parrot Offset
Monitoring Year 1
Old Glenorchy Road, Deep Lead

Report by Emma Wilkin and Lincoln Kern

Cover image: Deep Lead Offset Site, 2017

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Version	Date	Version notes	Internal review	External Review
0.1	23/1/20	Draft for review	Lincoln Kern	Matt Gibson
1.0	1/5/20	Final	Lincoln Kern	

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1. Introduction

Practical Ecology Pty Ltd was commissioned by Deep Lead Pty Ltd to implement the Offset Management Plan (OMP) produced by Biosis Pty Ltd in 2017, to undertake monitoring and associated annual reporting for Swift Parrot Habitat Offsets located at Old Glenorchy Road, Deep Lead.

The offset was created as part of infrastructure works undertaken by VicRoads requiring removal of vegetation that was identified as foraging habitat of critically endangered Swift Parrot. As part of the OMP prepared by Biosis, a report summarising annual monitoring and works is required to be submitted to VicRoads, now recognised as Regional Roads Victoria.

This report presents information of the initial set-up, monitoring and works of the site for Year 1 of a 10-year management plan (Biosis, 2017). This report also delivers some clarity in monitoring methodology, specifying clear guidelines for monitoring of percentage cover of vegetation to meet the approved OMP. These recommended guidelines are detailed towards the end of this report and designed to provide a concise decision-making framework in order to achieve the directions stated in the approved OMP for this site.

1.1 Project Scope

The scope of works Practical Ecology was employed to fulfil include annual monitoring and reporting, and ongoing works in relation to:

- fence condition
- weeds- woody and herbaceous
- pest animals
- tree and shrub recruitment and canopy condition

This monitoring is to support and inform adaptive management over time on the property and to ensure the required management actions and land use commitments as outlined in the OMP which are mandatory to satisfy the requirements of the *EPBC Act 1999* approval conditions, and the commitment to providing ongoing foraging habitat for Swift Parrot within the site. Management actions aim to protect existing large trees, and ensure that adequate cohorts of replacement trees are regenerating and growing effectively over time, sustaining Swift Parrot foraging resources.

1.2 Subject Site

This site is located within the Wimmera Bioregion, with vegetation types having strong associations with the Goldfields Bioregion. The Swift Parrot Offset site of interest lies within a larger Deep Lead Offset Property owned by Bush Blocks Pty Ltd. (Bush Broker Credit Site BB-3018). The property contains a mosaic of EVC 882_61 *Higher rainfall Shallow Sands Woodland* and EVC 283 *Plains sedgy Woodland*, dominated by Yellow Gum *Eucalyptus leucoxylon* and Grey Box *Eucalyptus macrocarpa* and Yellow Box *Eucalyptus melliodora*. The understory of the woodland has sparse shrub cover and a mosaic of indigenous ground storey, with natural litter dominated surface. Small areas of herbaceous weeds occur on site, mostly on the western boundary bordering Old Glenorchy Road.

2. Methods

The following methods for monitoring and works have been implemented in response directions stated in the Offset Management Plan (Biosis, 2017) for the site at Deep Lead. Monitoring and works are required to be completed annually.

2.1 Fencing

Fences are to be maintained and in working order and must remain so for the term of the plan- and in perpetuity – if required for the purposes of exclusion of stock, prevention of unauthorised access- particularly for firewood collection, minimising soil disturbance and compaction, and to reduce the spread of weeds and pathogens. The OMP states that any fencing in place must be in good condition according to the standards detailed in *BushBroker Information Sheet 12- Standards for Management – Fencing* (DSE 2012c).

Surveys of the property boundary and existing fence are and were conducted at each site visit and observations recorded in the property logbook (refer table 3).

2.2 Weed monitoring

The *Catchment and Land Protection Act 1994* lists noxious weeds and requires that all landowners take reasonable steps to prevent the spread of, eradicate or control noxious weeds on their land. The OMP requests that monitoring for all new and emerging weeds should be conducted in Spring each year for the term of the management plan, and that any new or emerging weeds identified and controlled. All weed control works must comply with *BushBroker Information Sheet 8-Standards of management – Weeds* (DSE 2012b).

2.2.1 Woody weeds

Directions in the OMP for woody weed monitoring and control are as follows:

- Walking transects at 20m spacing; 8 transects lines extending for approximately 300m.
- All patches of infestations or individual plants are to be mapped with a GPS followed up with appropriate treatment by an experienced contractor.
- Weeds should be treated before flowering and indigenous plants must not be impacted during treatment. Monitoring of woody weed species will involve inspection of the entire offset area annually in Spring with subsequent monitoring to revisit previously mapped infestations to evaluate success of weed control

This monitoring did not occur in the Year 1 monitoring period. Initial assessment for the establishing of offsets at this site identified no woody weeds in the Swift Parrot Offset area. Other general site visits have confirmed that no woody weeds have since established. Additional points of clarity have been added to this woody weed monitoring methodology (See Section 5- Recommendations) as to achieve useful long-term data for the management of the site.

2.2.2 Herbaceous weeds

The OMP states that during site transect monitoring for woody weeds, notes and location (GPS) of existing and emerging herbaceous infestations should be recorded. Weed control in future years will be undertaken in this manner. It is the case that in Year 1 no formal monitoring of herbaceous weeds occurred on site. Areas requiring weed control were identified during an on-site meeting between landowner Lincoln Kern and Project Platypus Co-ordinator Loki McIntire on the 11th of July 2019. The pair walked the extent of the broader offset site discussing pest plant and animal control and identifying any areas where control works were required. The western edge of the property was identified as a location the treatment with works scheduled for Spring 2019. Details of these completed works are found in Results Section 3.5 and evidence attached as Appendix 1 of this report.

2.3 Pest animal monitoring

The *Catchment and Land Protection Act 1994* lists rabbits and foxes as established pest animals and requires that all landowners take reasonable step to prevent the spread of, and as far as possible eradicate, established pests on their land. Signs of pest animals are to be recorded during weed monitoring surveys, and all other times when visiting the site, with any identified areas to be supplied to a pest animal management contractor for treatment. The OMP states the following directions

- Foxes to be controlled if found on the property. Dens identified to be located (GPS) and destroyed through fumigation and hand collapse

- Rabbits monitored and controlled throughout the year- if rabbit activity is detected, burrows identified are to be recorded (GPS) and an integrated approach in accordance with *Bush Broker information Sheet 7*- Standards of Management – Rabbits (DSE 2012a) is to be implemented: Fumigation, hand collapsing of burrows and baiting; Removal of any carcasses to prevent poisoning of native predators; Monitor and control for any new and emerging pest animals

Numerous site visits including inspections for signs of pest animals were conducted in the first year of monitoring. Details of these site visits can be found in Results Section 3.2-Property Log Book and Section 3.6-Pest Animals.

2.4 Vegetation Condition Survey

2.4.1 Quadrats

To monitor site regeneration, vegetation assessment is required in permanent plots/quadrats within the Swift Parrot offset area. Six 30x30 meter plots were established across the 4.5 ha offset site with one (1) quadrat in Habitat Zone 1F and five (5) quadrats established in Habitat Zone 1G. Plots were marked by permanent posts, placed in the South-West corner and tagged with a plot number identifier. Figure 1 below shows the placement of permanent quadrats within the Swift Parrot offset site.

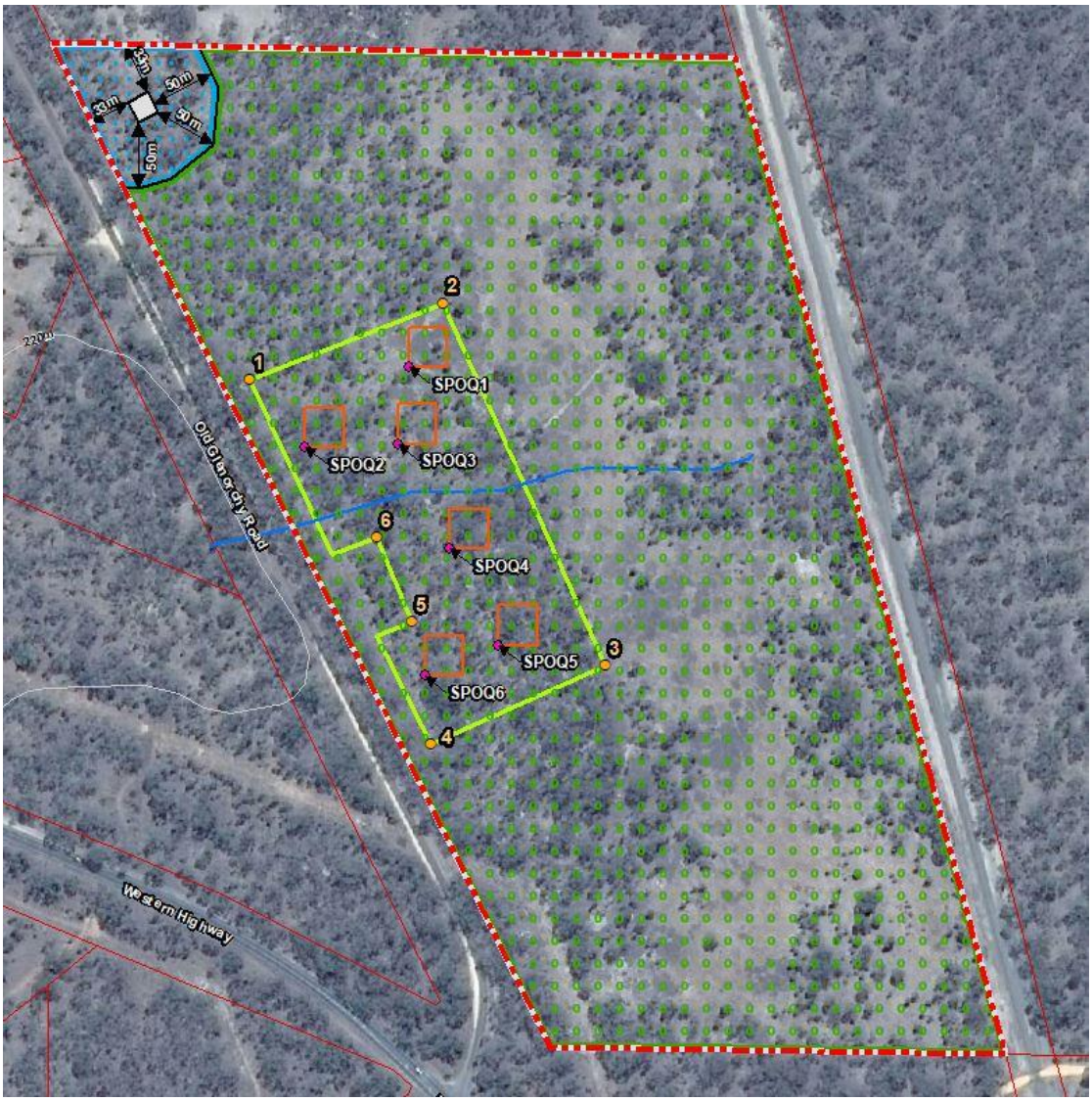

Figure 1. Map of property boundary (red), Swift Parrot offset boundary (green), Quadrats (Orange) and Photopoints (Pink)

2.4.2 Estimation of cover

To monitor site regeneration, the cover of immature canopy trees and understory trees or large shrubs in the Swift Parrot offset area was measured in each quadrat. This vegetation assessment involved the identification of all shrub and tree species within each quadrat, and estimation of the cover of each species. The following statement from the OMP provides some guidance on the topic of acceptable percentage cover of vegetation within the site.

> *If the cover of immature canopy trees, understory trees or large shrubs is greater than 20% higher than the EVC benchmark then the relevant species will be thinned to achieve a cover of approximately 5%. If the cover of either group is significantly less than 5% then action to encourage regeneration of Yellow Gum and other large shrubs will be implemented by either addressing threats to regeneration or planting nursery stock to achieve a cover closer to 5%*

Plot assessments of vegetation were conducted on the 7th January 2020. The "Braun-Blanquet scale of abundance" was applied in the field to assist in the accurate estimation of percentage cover. Results of assessment are summarised in Tables 4 and 5 and demonstrate the comparison of results of each plot against the corresponding EVC benchmark for lifeform.

2.4.3 Plant identification

Species that could not be identified in the field were recorded to the nearest possible family or genera. These were then collected as per the protocols associated with Practical Ecology's *Flora and Fauna Guarantee (FFG) Act 1988 permit (No. 10004805)* for the collection of plant material. In order to assist in the identification of some flora, major features of the specimens were collected where possible, including leaves, parts of branches, fruit and/or flowers.

2.4.4 Photo points

Photo points for each quadrat are directed to be taken annually in Spring. In year 1 of monitoring these photopoints occurred in Summer (January 2020). Quadrats were established on site, and photographs taken from a position at the South-West corner marker (Figure 2) looking in a North-Easterly direction and including the corner marker post in the centre of the photograph. The photopoints are shown is this report in Results Section 3.8-Photopoints. Photopoint locations are also shown in Figure 1.

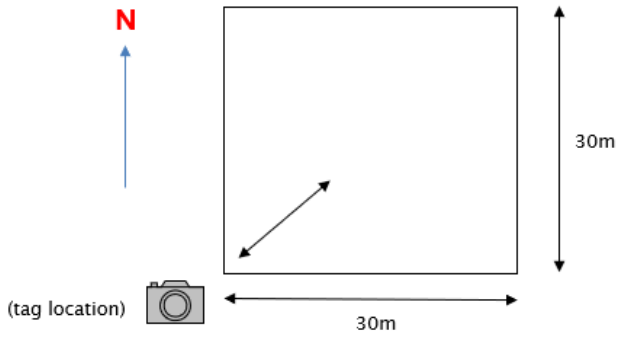

Figure 2. Diagram of quadrat and photo point setup.

2.4.5 Habitat Hectare Assessment

Habitat Hectare Assessments (VQA) were conducted on 7th January 2020 by DELWP accredited assessor and co-owner of the property Lincoln Kern. Assessments were conducted within each of the 6 quadrats using standard DELWP Habitat Hectare methods (DSE 2004). Results of assessment are shown in Section 3.7.2- Table 6.

2.4.6 Supplementary Planting

Supplementary planting works are required within Habitat Zone 1F in SPOQ1, as stated in the OMP. Yellow Gum and Grey Box seed was collected onsite by the landowners in April and October 2019 for the purposes of germinating seedlings for replanting within the site. The landowners have adopted a social procurement strategy in placing the seed with local Nursery GreenFingers, a local nursery enterprise, based in Stawell, employing staff with disability. Seed germination only occurred with varying success. All Yellow Gum seed collected in April 2019 was mostly unsuccessful, with limited germination and a total of 4 Yellow gum seedlings. Grey Box seed produced 74 tube stock plants that are currently healthy. Seeds collected in October are in the process of being propagated.

On top of propagation of seed from the on-site population of Eucalypts, all local nurseries have been approached for the procurement of a total of 400 Yellow Gum and 400 Grey boxes to be planted. The large number of Eucalypts have been sought in order to guarantee success in the revegetation with ample redundancy for deaths among planted trees. No planting has occurred on site to date, with planting set to commence in HZ1F- SPOQ1 in early Autumn or Winter 2020.

Monitoring and recording of the success of these plantings will occur in the following years after planting.

3. Results

3.1 Summary of management actions – Year 1

Table 1. OMP Management Actions and progress after Year 1– October 2018– October 2019

Objective	Standard to be achieved	
1– Exclusion of stock	Exclusion of domestic stock from offset area	
	Exclusion of vehicles from offset area	
	Exclusion of unauthorised access or unauthorised firewood collection	
	Maintain perimeter fencing to BushBroker Information Sheet 12 (DSE 2012c)	
2– remove all woody weed infestations	No woody weeds present within offset area (<1% cover)	
	woody weeds not to interfere with shrub or canopy recruitment	
	minimise off target damage to all native plants during weed control works	
3– monitor and control herbaceous weeds	Herbaceous weeds cover not exceed current levels	
	herbaceous weeds not to interfere with shrub or canopy recruitment	
	minimise off target damage to all native plants	
4– monitor and control new and emerging weeds	New outbreaks of woody weeds to be removed as soon as detected	
	no woody weeds present within offset area	
	minimise off target damage to all native plants	
5– monitor and control Rabbits Hares and Foxes	no fresh ground disturbances by pest animals observed in the offset area	
	no active rabbit warrens within offset area	
	minimal surface harbour for rabbits and hares present	
6– monitor and control all new and emerging pest animals	control numbers of any new and emerging pests	
7– Monitor tree and shrub regeneration and overstory condition	tree layer continues to regenerate and provide habitat for swift parrot	
	Maintain cover of immature canopy trees and understory trees or large shrubs to a level < 20% higher than the EVC benchmark. If cover levels exceed 20% then they will be thinned to achieve a cover of ~5%. if the cover is significantly <5% than action to encourage generation of yellow gum and other shrubs will be implemented by addressing threats or planting tube stock to achieve cover closer to 5%	

not achieved	
partially achieved	
achieved	

3.2 Property Log Book

Table 2. Summary of log book entries for Deep Lead Offset property for the Year 1 period

Date	Whom	Tasks completed	Observations			
			Pest animals	Weeds	Fence lines	Other
19/11/18	Lincoln Kern	Took photopoints and checked all boundaries –	no signs	Not assessed	no incursions or concerns,	Dry time with minimal wildflowers, Small mob of Kangaroos observed again
12/11/18	Lincoln Kern	Visited the site in early arvo, walked the western and southern boundaries;	no signs	Not assessed	no new disturbances.	Found PP 13 in between the Powerline easement and the road.
4/12/18	Lincoln Kern	surveillance visit– North/West/south boundaries	no signs	Not assessed	No signs of disturbance/vehicle access	
9/3/19	Lincoln Kern	surveillance visit– North/West/south boundaries	no signs	Not assessed	No signs of disturbance/vehicle access	introduction to neighbours adjacent to the North, Lyle and Robert (Lyle's son).
9/4/19	Paul Guest Robyn Penfold	surveillance visit of road boundaries, seed collected (Yellow Gum and Grey Box)	no signs	Not assessed	No signs of disturbance/vehicle access	Dry, minimal wildflowers Small mob of roos, parrots
22/5/19	Lincoln Kern	surveillance visit of road boundaries,	no signs	Not assessed	No signs of disturbance/vehicle access	
11/7/19	Lincoln Kern Loki McIntire– Project Platypus	inspected for weeds	no signs	Annual grasses, ruderal weeds appear less abundant after control in Winter 2018	No signs of disturbance/vehicle access	Chickweed/soursob/ Onion grass control planned
17/8/19	Lincoln Kern	surveillance visit of road boundaries, walk of SE corner of site	no signs	Not assessed	No signs of disturbance/vehicle access	Walked through SE corner
23/10/19	Paul Guest	surveillance visit of road boundaries, Collected seed (Grey Box)	no signs	Not assessed	No signs of disturbance/vehicle access,	no Yellow Gum seeds
4/11/19	Lincoln Kern	walk of entire site, collected photopoints	no signs	Not assessed	No signs of disturbance/vehicle access	Some confusion over numbering of photo points but have now solved discrepancies
6/1/20	Lincoln Kern	Collected quadrat data in Swift Parrot site	No signs	Not assessed	No signs of disturbance/vehicle access	

3.3 Fencing

No evidence of any trespassing by vehicle or people on foot onto the land has ever been observed in any site visits, either in Year 1 of the monitoring plan or any visit to the site prior to offset establishment. Fences are not currently maintained however other factors reduce the physical access of people and vehicles and the likelihood of stray stock entering the property. These factors and put forward and explained in the Discussion section of this report. At this point there is no evidence that the poor condition of the existing fencing is having a detrimental impact to the ecological values of the site.

3.4 Woody Weeds

No woody weeds have been identified within the Swift Parrot Offset Site at any time, including during initial assessments for the entire property conducted by Brett Lane and Associates and assessments conducted by Biosis for the establishment of Swift Parrot Offsets. Sugar Gum *Eucalyptus cladocalyx* have been identified as the only woody weed on the entire property and does not occur within the Swift Parrot Offset area. There is no intention to remove the mature Sugar Gums as they are considered habitat, with removal likely detrimental. Treatment of Sugar Gums seedings has been identified as a priority and will continue to occur each year until mature trees senesce and the species eradicated from the site.

3.5 Herbaceous Weeds

Control of herbaceous weeds was undertaken in areas identified during site visit with Project Platypus Coordinator in July 2019. Species identified for removal were Soursob *Oxalis pes-caprae*, Chickweed *Stellaria media* and Bridal Creeper *Asparagus asparagoides.* All weeds were treated with the aim of ensuring that weed cover does not increase beyond December 2017 levels, as required in the OMP. Table 3 below summarises weed control works conducted by Project Platypus since establishment of the offset property in areas inside the Swift Parrot Offset and across the western third of the property. Site visits and logbooks indicate that treatment appears to have been effective in that the cover of infestations be visibly reduced post treatment. Appendix 1 – 3 of this report provides further information and evidence of weed works conducted in 2019.

Table 3. Summary of herbaceous weed control works completed

Date	Weeds treated	Chem	Method
25/9/18	Annual grasses	Haloxyfop/Glyphosate	Spot spray
10/9/19	Annual grasses	Haloxyfop	Spot spray
17/9/19	Annual grasses	Haloxyfop	Spot spray
19/9/19	Soursob, chickweed, Bridal creeper	Metsulfuron	Spot spray

3.6 Pest Animals

Observations of pest animals were recorded in the property log book, for any indication of pest animals present on site. During year 1 of site visits, there were no observations of pest animal species occurring on site, of either foxes or rabbits. There is evidence of older rabbit warrens, but none are currently active. The site visit by Project Platypus included an inspection for signs of pest animals and a discussion with the landowner of proposed works should either fox or rabbit populations be observed at the site.

3.7 Vegetation Condition Survey

3.7.1 Quadrat estimation of tree and shrub cover

An estimation of percentage cover is required in each of the quadrats, the Braun–Blanquet scale of cover abundance was utilised for its standard application in such an assessment. Results of the assessment are summarised in Table 5 below. Note that while a Braun–Blanquet scale (Table 4) is a standard approach, analysis of results of monitoring show this method was not compatible in being able provide an accurate comparison of on–site conditions as compared to the EVC benchmarks. There is little guidance within the OMP on how accurate estimate may be achieved, however recommendations have been made within this report to resolve this.

Table 4. The 'Braun–Blanquet cover abundance scale'

Cover Value	Cover Abundance	Cover Class
_	No individuals present	nil
+	Few individuals with small cover	Insignificant cover
1	Numerous individuals	<5%
2	Any number of plants	5–25%
3	Any number of plants	25–50%
4	Any number of plants	50–75%
5	Any number of plants	75–100%

Table 5. Assessment of shrub and tree species and estimation of cover (%)

Plot number			SPOQ1	SPOQ2	SPOQ3	SPOQ4	SPOQ5	SPOQ6
EVC Name EVC 283: Plains Sedgy Woodland (PSW) EVC 882_61: *Higher rainfall* Shallow sand woodland (SSW)			PSW	SSW	SSW	SSW	SSW	SSW
Scientific name		Common name	Braun – Blanquet scale for % cover					
Canopy Tree species	*Eucalyptus leucoxylon*	Yellow Gum	2	3	2	2	3	2
	Eucalyptus microcarpa	Grey Box	(+)	–	2	(+)	–	–
	On–site % cover total (Canopy tree+ IT)		5–25%	50–75%	10–50%	5–25%	25–50%	5–25%
	EVC Benchmark % cover (Canopy tree+ IT)		15%	20%	20%	20%	20%	20%
Understory species	*Acacia pycnantha*	Golden Wattle	–	(+)	(+)	(+)	2	2
	Acacia acinacea	Gold dust wattle	–	–	–	–	–	2
	On–site % cover total – (MS+SS)		0%	1–5%	1–5%	1–5%	5–25%	10–50%
	EVC benchmark % cover (MS+SS)		6%	25%	25%	25%	25%	25%

Canopy Tree: Specified tree species of specified height, as stated in the relevant EVC
IT: Immature Canopy Tree, less than 80% of the mature canopy height*
T: Tree(sub–canopy) or Large Shrub, woody plant, single stem, greater than 5m high*
MS: Medium Shrub, woody plant between 1m and 5m high*
SS: Small Shrub, more or less erect woody plants between 20cm and 1m high*
**as defined in the Vegetation Quality Assessment Manual, DSE, 2004*

3.7.2 Habitat Hectare Assessment

The Habitat scoring method was applied as directed by the OMP, and as outlined in the *Vegetation Quality Assessment Manual – Guidelines for applying the habitat hectares scoring method* (DSE 2004). Assessment was conducted 7th January 2020, results outlined below in Table 6. While the site presents as having relatively good quality vegetation in general, it must be noted that the property and broader region has a history of extensive goldmining, with evidence of this found as mullock heaps, open mines other indications of significant soil disturbance in the past. Drought and historic soil disturbance are likely factors in the generally low scores relating to understory species. Large trees are well represented within the plots, and in general across the site– and are an important indication of the availability of foraging resources for Swift Parrot.

Table 6. Summary of Habitat Hectare Assessment results

Habitat Zone/Quadrat			SPOQ1	SPOQ2	SPOQ3	SPOQ4	SPOQ5	SPOQ6
Bioregion			WIM	WIM	WIM	WIM	WIM	WIM
EVC Name (initials)			PSW	SSW	SSW	SSW	SSW	SSW
EVC Number			283	882_61	882_61	882_61	882_61	882_61
EVC Conservation Status			DE	EN	EN	EN	EN	EN
Size of Zone/Quadrat (ha)			0.009	0.009	0.009	0.009	0.009	0.009
		Max Score	Score	Score	Score	Score	Score	Score
Site Condition	Large Old Trees	10	0	10	9	10	10	9
	Canopy Cover	5	5	2	4	3	3	5
	Understorey	25	15	10	10	10	15	15
	Lack of Weeds	15	7	13	9	13	13	9
	Recruitment	10	0	3	10	5	3	10
	Organic Litter	5	5	3	5	5	5	5
	Logs	5	0	3	3	5	5	2
	EVC Standardiser	n/a	1	1	1	1	1	1
	Standardised Score	75	33	45	51	52	55	56
Landscape value	Patch Size	10	19	19	19	19	19	19
	Neighbourhood	10						
	Distance to Core	5						
Habitat points		100	52	64	70	71	74	75
Habitat Score		1	**0.52**	**0.64**	**0.70**	**0.71**	**0.74**	**0.75**

3.8 Photopoints

Figure 3. Photo Point SPOQ1 (Quadrat 1)

Figure 4. Photo Point SPOQ2 (Quadrat 2)

Figure 5. Photo Point SPOQ3 (Quadrat 3)

Figure 6. Photo Point SPOQ4 (Quadrat 4)

Figure 7. Photo Point SPOQ5 (Quadrat 5)

Figure 8. Photo Point SPOQ6 (Quadrat 6)

4. Discussion

Monitoring and management actions prescribed in the OMP for Year 1 of monitoring at Old Glenorchy Road, Deep Lead have been completed with relative success in terms of the collation of some baseline data for future monitoring at the site. A summary of the achievement of management actions is listed in Table 1 and Appendix 4 of this report. Year One- October 2018 to October 2019 has been successful in the setup of monitoring points that will provide a framework for all future monitoring and works conducted on site.

There are two areas of where non-compliance of the OMP has occurred. Site visits listed in Property Log Book (Table 2) have confirmed that the outer fences of the property are present but not in good working order. Works have not begun currently to improve the existing fence, however, due to existing features of the boundary there are significant and effective secondary deterrents for vehicle entry to the property. Fencing may not be strictly required to protect the property and offset site because the adjacent land uses and topography of the property are currently preventing access that may be a degrading influence. The property borders linear infrastructure on three sides, Old Glenorchy Road to the west, the rail reserve to the east and undeveloped road reserve with native vegetation to the south. There is private land to the north but this adjacent land owner does not graze any stock and has no fencing on his other boundaries to contain stock on their property. The Old Glenorchy Road boundary has a large table drain along most of that margin preventing access to the property by vehicles. The rail reserve to the east has been barricaded off with concrete barriers for protection of the rare Spiny Rice Flower *Pimelea spinescens ssp spinescens* that occur there, preventing vehicle access the rail reserve or property. The road reserve and adjacent land to the south has fencing that protects the property to some degree but there is also no grazing of stock occurring. Two possible limited vehicle access points exist at the south-east and north-west corners but remaining fencing, trees and rough ground make such access unlikely.

During site visits there have been no indications that unauthorised vehicle assess has occurred and no signs of removal or timber or any other activity. Similarly, there have been no signs of stock grazing during any site visits. Surrounding landowners manage their own stock out of the road reserves and neighbouring Conservation and Bushland Reserves. Current conditions of all adjacent landholders' land use is not causing an impact and is unlikely to for an indefinite period. However, if these conditions were to change and, in the first event that detrimental effects were seen to occur, the offset site landowners have stated the intention to upgrade to more secure fencing around the broader property.

The second area of non-compliance relates to monitoring for weeds. The OMP states the requirement for annual monitoring for woody weeds across the entirety of the Swift Parrot Offset area using transects and GPS location upon identification. While it is the case that this monitoring has not occurred within Year 1 of monitoring, it is noted that since the establishment of the offset property and during each subsequent site visits and assessments, no woody weeds have been identified within the Swift Parrot offset area. Mature Sugar Gum *Eucalyptus cladocalyx* are present on the property and monitored for new growth to be targeted.

There have been small patches of annual grasses and small ruderal weeds present across the western third of the property where Yellow Gum dominated woodland occurs. These areas were treated in Winter of 2018 and 2019. These weeds were not present or observable during most site visits post treatment due to the high temperatures and dry conditions in the local region and on the property. No assessment for herbaceous weeds was conducted in Spring, as is required in the OMP. Transect monitoring remains an important tool for the identification of emerging threats from herbaceous weeds and it is a requirement that it be completed annually for the remainder of the management plan period.

Non-compliance within first year of monitoring has likely not had severe detrimental effects to the values of the site. However, in future years it is important the that site remain secure, and that all monitoring, including that for woody weeds be implemented as directed in the OMP or agreed adaptations.

As a condition of the offset agreement, the effectiveness of the management plan and its implementation is to be audited by an independent ecologist after years 1, 4, 8 and at the completion of the 10-year management period. Since execution of the first year of monitoring, Practical Ecology has identified some issues in the direct application of the OMP, specifically relating to methods for monitoring vegetation percentage cover and the validity of results obtained. These matters are outlined as follows:

- Lack of methodology for obtaining correct data specific to percentage cover. The current guidance utilises the EVC Benchmarks as optimal for percentage cover of lifeforms as measured within each plot. The relevant statement within the OMP reads the following:

  Maintain cover of immature canopy trees and understory of large shrubs to a level of not greater than 20% higher than the EVC benchmark. If cover levels of the relevant species exceed 20% then they will be thinned to achieve a cover of approximately 5%. If the cover of either group is significantly less than 5% than action to encourage regeneration of Yellow gum and other large shrubs will be implemented by either addressing threats to regeneration by planting of nursery stock to achieve a cover of closer to 5%.

While EVC's are important as a baseline for comparison, there is no methodology stated within the OMP for guidance on measuring the percentage cover in a way that can distinguish an increase of 20% higher than the benchmark. In discussing the acceptable percentage cover, The OMP statement itself is somewhat unclear it its meaning, and may be interpreted as either an increase of 20% (as 5% to 25%) or an increase of 20% of the benchmark percentage (5% to 6%). Other problematic issues arise in considering how to use the quadrat data as an adaptive management decision point, including:

- No practical application of results from the plots to the entire site. Habitat scoring assessments and cover abundance monitoring are to be conducted in each plot on an annual basis. This can provide long-term data for these areas however there is no instruction on how these results are to apply more broadly across the site, or how to determine if thinning/planting is required outside of these plots. There is similarly no direction on how the results of habitat scoring within the site can be used to make judgements on the recruitment success of Eucalypts and specifically Yellow Gum. Habitat Scoring is not precise enough to measure the number of cohort's present, or to identify areas where particular age groups are missing from the population. This Habitat Scoring assessment is helpful as a long-term measure of the overall quality of the vegetation with the plot, especially in comparing weed scores, or the final scores over time. The method is however limited in its ability to provide useful long-term monitoring data for decisions relating to adaptive management. If *estimation* of percentage cover is to be used as this decision point, it must be noted that this method is notoriously subjective and would not provide clarity on the point at which works (thinning, planting) are to occur.

- No guidance on the implementation of works. If planting or thinning is to occur, no information is given on how this is to be implemented, other than the assumption that non-target vegetation not be impacted.

For this reason, the first year of monitoring utilised the Braun-Blanquet scale of cover abundance in the six (6) required quadrats, in an effort to more accurately estimate percentage cover of *Eucalypts* (Greybox and Yellow Gum) and Wattle *Acacias*. The results if these estimates were not accurate enough to distinguish a point at which either thinning or planting should occur.

While the current OMP does not provide detailed methodology for more detailed data collection or guidance on actions, it *does* provide a clear intention as to how this may be determined. The basic, and overall most important aim for the site is the improvement of condition of Swift Parrot foraging habitat. All management and monitoring works are to be conducted in a way that supports this aim without compromising other significant values, contributing to the overall success of naturally regenerating Yellow Gum cohorts over time as a food resource for Swift Parrot.

It is the case that the area has historically been heavily impacted by goldmining, the ecosystem has regenerated to a point where large trees are now again present and recruitment of most species, including Yellow Gum, is naturally occurring. It is the purpose of the offset to protect the existing values of the site as it continues improve naturally in the absence of threats. It is assumed that in the absence of threats, the site has greater resilience and capacity to naturally respond to environmental effects of drought, fire, and other processes that may not be controlled.

As such any intervention, such as ecological thinning to minimise competition, made prematurely could have a detrimental effect on the site's ability to recover from the environmental effects detailed above. Given this, management of the site should involve minimal intervention, with effort largely focused on proper fencing and control of pest plant and animal species as required. Interventions such as planting or ecological thinning should only occur where sufficient monitoring has identified issues in recruitment of Yellow Gum, and that foraging resource availability is negatively affected.

Changes to the Yellow Gum population and resources may be observed at different stages and for various reasons. These may include; aging or stressing of large trees where large amounts of nectar is not available, an observed decline in germination of seedlings over several years that may result in disruption in formation of replacement cohort groups, and increased competition for resources from same or other species. Each of these situations may occur in response to changes in abiotic stresses and may not warrant action after a single year. For this reason, monitoring must be adequate so that it identifies the point at which intervention is required, where foraging resources for Swift Parrot may be compromised through over-abundant shrub and tree competition, slow growth of eucalypt seedlings and/or lack of regeneration for the future.

The following recommendations to the monitoring methodology have been made in consideration of the issues discussed.

5. Recommendations

5.1.1 Guidelines of proposed methodology

Practical Ecology recommends additional clearly stated methodology to the existing OMP to more accurately assess vegetation across the entire site for its suitability for Swift Parrot, and to clarify the point at which works must be implemented

It is recommended that additional data be collected during the vegetation assessment to assist in identifying areas with;

- sufficient regeneration and number of cohorts of Yellow Gum present, that Swift Parrot habitat is naturally regenerating and sustainable;
- insufficient recruitment of Yellow Gum, where lack of regeneration requires additional planting of tube stock;
- high competition between Eucalypt seedlings, where ecological thinning will benefit natural regeneration; and
- competition from shrubs, Wattles *Acacia* spp. observed to this point, is limiting regeneration of Eucalypt, and requires control.

It is recommended that assessment of percentage cover of trees and shrubs be monitored in a comprehensive manner across the extent of the Swift Parrot Offset site. All methodologies as stated in the OMP relating to weed and pest control are to remain unchanged, with this added methodology allowing accurate data to be collected for decisions relating to ecological thinning or planting at the site. Vegetation assessment is to include:

- Habitat Hectare Assessment within the quadrats
- Measuring of Percentage cover using cohort methodology described below in Section 5.1.1
- Percentage cover, HabHectare Assessment, and GPS of woody and herbaceous weeds across the site (Weed monitoring) to occur on the same day, or consecutive days in Spring of the monitoring period, as stated in the approved OMP.
- Transect lines of weed monitoring described in the OMP to form the monitoring framework for measurement of percentage cover, through the success of Eucalyptus cohorts.

Collection of this data would provide a more accurate set of information than the method currently assumed in the OMP. Analysis of this data over time would provide a clearer understanding of longitudinal recruitment activity than could not be achieved using estimates of cover alone, and allow the identification of specific areas within the offset site where either ecological thinning or planting may be required.

5.1.2 Proposed methodology– assessment of cohorts

This additional data collection above the current OMP monitoring requirements, which would continue, is proposed to address the issues discussed above. It is particularly important to consider data collection that will provide specific information to make detailed decisions about the need for ecological thinning in the Swift Parrot Offset site.

- Data is to be collected across the entirety of the site at points of set distance – approximately every 20 meters (refer to figure 9), permanently tagged points along a transect line. Survey points are to be GPS and/or visually located. These transect lines are the same as those for the woody/herbaceous weed survey, therefore both the weed survey and vegetation cover assessment can occur at the same time.

- Definitions of size classes are listed in Tables 7 and 8, and Example Data Sheet Appendix 5

- At each survey point, assessor is to survey the area within a 10–meter radius of the point. Data may be collected using Example Data Sheet (Appendix 5) or using a Tablet (ArcCollecter etc). The following information of the 10m–radius area is to be recorded

    - Presence and identification of Eucalypt species
    - If Yellow Gum is present, collect information on the number of different cohort's present
    - If Yellow Gum seedlings are present, estimation of number of seedlings
    - Presence and identification of Wattle species or other shrubs
    - If shrubs present, collect information on their number and proximity to Yellow Gum seedlings
    - Weed species also GPS recorded at each point

Table 7. Classification and definition of cohorts/size classes

Eucalypt Species Yellow Gum and Grey Box				Acceptable Window (number trees/quadrat
Size Classes	Large Old Tree (LOT)	>70cm DBH	15m tall	any
	Canopy Tree	<70cm DBH	12m– 15m tall	>5
	Immature Canopy Tree	>5cm DBH	2m–12m tall	>5
	Seedlings/Saplings	<5cm DBH	<2m tall	30–90
Acacia /Shrubs				
Size Class	Mature	>5cm	>1.5m tall	<40
	Seedlings/Saplings	<5cm DBH	<1.5m tall	<1.5 x more than yellow Gum Seedlings

5.1.3 Application of data collected

Data collected during transect monitoring will be populated using GIS software, with the aim of producing a map where locations of interest can be visually interpreted. Each spatial point will have information on the type and health of vegetation present, and may be selected to convey information such as;

- Presence/absence of key species
- Presence/absence of cohort groups
- Locations where thinning may be required
- Locations where planting may be required

Longitudinal data collected in this way can, after several years of monitoring, be used to plan works and also to observe any gradual changes that may naturally occur on site, or identify responses to impacts including drought, flooding or fire, or disease and loss from other influences such as *Phytophthora.* Importantly, it can be used as a measurement of the success of the OMP across the entire Swift Parrot Offset Area and be used form the basis for adaptive management of the site when required.

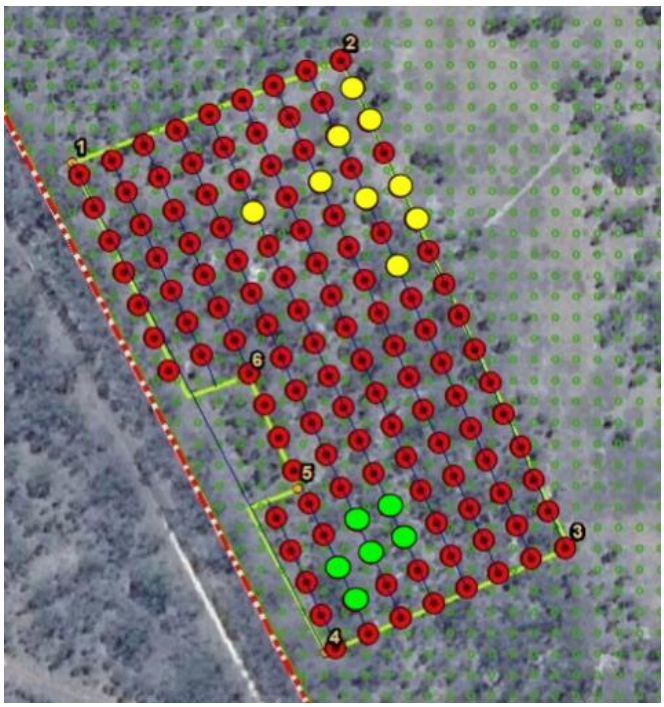

Figure 9. Example of how data may be used to visually identify areas of interest; yellow and green plots could indicate where planting or thinning are needed.

5.1.4 On-ground response to monitoring results

The following parameters are set for all works in response to monitoring:

- Efforts are to be focused on control of threats, so that interventions of planting or thinning are conservative;
- Works to occur after a period of up to three (3) years of monitoring- where Yellow Gum has been measured as having insufficient recruitment at the same location on three consecutive years (with the exception being Habitat Zone 1F (SPOQ1) where planting will occur in winter 2020); and
- No ecological thinning to occur on any woody plants with DBH greater than 5cm or at a height above 2 metres

Methodology summarised in Table 7 provides the definitions of size classes for vegetation to be used for the proposed methodology and summarises the decision-making framework of Table 8. The information provided in Table 8 demonstrates the logical thinking and reasoning behind this proposed methodology, showing how calculations were made to determine the required numbers of individuals within a cohort, based on percentage covers given in the relevant EVC. The intention of this exercise is to identify at which point works are required- the point that foraging resources are not being adequately maintained and that supplementary planting, or control works are required to ensure ongoing availability of main foraging resources for Swift Parrot. Key points are as follows:

- Projected cover was estimated at 9m3 for mature canopy trees, and at 4m2 for immature canopy trees. Estimations are intentionally conservative.
- These values were then used to calculate an acceptable range, or window of where on-ground works (planting/thinning) are not required- based on EVC benchmark cover of lifeforms
- No action is to be taken on Eucalypt species to remove immature canopy trees or larger, as this will likely have unnecessary and detrimental ecological impacts
- Action is only to be taken on Eucalypt species at the seedling/sapling stage (ecological thinning) in locations where long-term monitoring has identified that high-density seedlings have not thinned naturally over time – using passive adaptive management
- No action is to be taken on mature Acacia (DBH >5cm) as this will likely have unnecessary and detrimental ecological impacts
- Action is only to be taken on Acacia species at the seedling/sapling stage (ecological thinning) in locations where the growth of Eucalyptus seedlings is seen to be impacted over a period of up to 3 years.
- Supplementary planting of Eucalyptus species is to only occur in locations where Eucalyptus are not establishing naturally and/or where 2 or more cohort groups are missing from the population or seen to be impacted over a period of up to 3 years.

5.1.5 Submission of methodology for approval

This methodology is put forward as a comprehensive way of measuring percentage cover in the interest of securing Swift Parrot foraging resources over time, and to directly address the requirement of monitoring as outlined in the approved OMP. No changes or directions have been made to contravene any aspect of the approved management plan as it is simply recommended that new monitoring procedures are added. For this reason, it is deemed unlikely that this methodology is required to be submitted for approval before implementation in Spring 2020. However, if approval is deemed required, submission will be made for review and approval by DOEE.

Table 8. Calculations and reasoning of proposed methodology

Yellow Gum		EVC Benchmark /Ha	EVC Benchmark Calculations	EVC Benchmark # trees/plot	Acceptable window	Reasoning	Action	Point of Action
LOT (DBH >70cm)		15/ha	10,000m2/400m2 = 25 –>/15 trees = 0.6 LOT/Ha	0.6	NA	Any number of Large trees as acceptable	no action to be done in regard to LOT	NA
Mature canopy trees (12–15m)	EVC 882_61	15% cover	Projected cover (T) = 9m2 @ 15% cover/Ha = 1500m2/Ha –>/9m2 = 166.66 trees/Ha –> x 0.04 Ha = 6.6	6.6	>5 trees/plot	Any number of Mature trees is acceptable	no action to be done in regard to mature canopy trees	NA
	EVC 283	10% cover	Projected cover (T) = 9m2 @ 10% cover/Ha = 1000m2/Ha –>/9m2 = 111.11 trees/Ha –> x 0.04 Ha = 4.4	4.4	>3/ plot	Any number of Mature trees is acceptable	no action to be done in regard to mature canopy trees	NA
Immature canopy tree (2m–12m)		5% cover	Projected cover (IT) = 4m2 @ 5% cover/Ha = 500m2/Ha –>/4m2 = 125 trees/Ha –> x 0.04Ha = 5	5	> 5 trees per plot	Immature canopy trees should not be removed as are likely to naturally thin out as they age.	no action to be done regarding immature canopy trees – if immature canopy stands are identified and becoming too thick over time, adapt management plan through thinning of seedlings	NA
Seedlings and Saplings (<5cm DBH)		NA	90 seedlings – 25% loss each year for 8 years =12 trees 30 seedlings – 25% loss each year for 8 years = 4 trees	NA	30–90 seedlings per plot	based on general estimates of Eucalypt recruitment loss or thinning over time	Highly conservative ecological thinning as adaptive management.	**Pending adaptive management** Where monitoring of entire site has identified areas where large numbers of Yellow Gum seedlings (>90) have developed and not naturally thinned over time or where competitiveness of immature canopy trees is seen to be reducing growth rates of new seedlings

Understory Species	EVC Benchmark /Ha	EVC Benchmark Calculations	EVC Benchmark # trees/plot	Acceptable window	Reasoning	Action	Point of Action
Medium Shrubs Small Shrubs (Acacia sp)	25% cover	Projected cover (MS/SS) ≃ 3m² @ 25% cover/Ha = 2500m2/Ha –>/3m2 = 833.3 trees/Ha –> x 0.04Ha = 33	33	<40 plants/plot	25% cover as in line with EVC Benchmark. Estimation of projected cover (3m2) is generous given the general size of Acacia sp. on site– *A. acinacea* small/spindly, *A. pycnantha* up to 3m tall on site. No large older Wattles found on site.	Conservative removal of select individual Wattle plants as required	where >10 Acacia individuals above 1.5m tall occur and where Yellow Gum Seedlings are either absent or recorded to have decreased over a period of up to three years. or Acacia are growing in close proximity to Yellow Gum seedlings, where the dripline of the Acacia is <1m from the Euc seedling
Seedlings (<5cm DBH)	NA	NA	NA	<1.5 x more than yellow Gum Seedlings	Acacia species may have the ability to grow faster than Eucalypts, and in dense number present competition for resources	Conservative removal of select individual Wattle plants as required	where Yellow Gum seedlings are either absent or recorded to have decreased over a period of up to three years. or Where Wattle seedlings are more than 2x more numerous than Yellow Gum Seedlings

Canopy Tree: Specified tree species of specified height, as stated in the relevant EVC
IT: Immature Canopy Tree, less than 80% of the mature canopy height*
T: Tree(sub-canopy) or Large Shrub, woody plant, single stem, greater than 5m high*
MS: Medium Shrub, woody plant between 1m and 5m high*
SS: Small Shrub, more or less erect woody plants between 20cm and 1m high*
**as defined in the Vegetation Quality Assessment Manual, DSE, 2004*

References

Biosis. (2017) Old Glenorchy Road, Deep Lead, Victoria: Offset Management Plan. Report for VicRoads, Biosis Pty Ltd, Ballarat.

Brett Lane & Associates (2017) Offset Management Plan for Credit Site BB-3018-LA01. Prepared for Deep Lead Property Pty Ltd.

Commonwealth of Australia (2012) Environment Protection and Biodiversity Conservation Act 1999 – Environmental Offsets Policy. Australian Government Department of Sustainability, Environment, Water, Population and Communities.

DELWP (2018) Ecological Vegetation Class (EVC) Benchmarks. Department of Environment, Land, Water and Planning, Government of Victoria. Accessed via: https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks

DELWP (1988) Flora and Fauna Guarantee Act 1988. Department of Environment, Land, Water and Planning.

DSE (2004) Vegetation Quality Assessment Manual – Guidelines for applying the habitat hectares scoring method, Version 1.3. Department of Sustainability and Environment, East Melbourne, Victoria.

DSE (2012a) BushBroker information sheet number 7. Standards for management – Rabbits. Department of Sustainability and Environment, Melbourne.

DSE (2012b). BushBroker information sheet number 8. Standards for management – Weeds. Department of Sustainability and Environment, Melbourne.

DSE (2012c). BushBroker information sheet number 12. Standards for management – Fencing. Department of Sustainability and Environment, Melbourne.

Appendix 1. Documentation of weed control works

Photos of treated areas – taken 19/11/2019

Photo 1 looking South 0652314/5903395

Photo 2 looking North 0652363/5903308

Photo 2

Photo 3 looking North 0652411/5903225

Photo 4 looking North 0652456/5903111

Photo 5 Looking North 0652521/5903008

Appendix 2. Documentation of Weed Control Works –

Daily Works Record

30PROJECT DETAILS	DAY: 10/17/19th SEP 2019	DATE:			JOB #		
	CONTRACTOR: CLIENT: PROJECT PLATYPUS	VEHICLE REGO:					
	SITE NAME: OLD GLENORCHY RD	Start	Breaks	Stop	Signature	Hours	
EMPLOYEE DETAILS	PROJECT MANAGER NAME: LACHLAN MCINTYRE	9	.5	1630		7+7 (2 SHIFTS)	10/9
	SUPERVISOR NAME: DENE MARSHALL	8	.5	16.30		8	17/9
	FIELD CREW NAME: JULIE ANDREW	9	.5	1630		7+4 (2 SHIFTS)	19/9
	FIELD CREW NAME					3 PHOTOS + REPORT	25/9
	FIELD CREW NAME						
	FIELD CREW NAME						
	FIELD CREW NAME						
# Chainsaw Rate					Total Hours	36.	
AREA DETAILS	Location	Task/s Undertaken					
	1 OLD GLENORCHY RD.	ANNUAL GRASSE CONTROL					
	2						
	3						
	4						
	5						
					Total Time (must equal TOTAL HOURS above)	36.	

Note: Please remember Practical Ecology's TRAVEL TIME POLICY

HERBICIDE USAGE

Weather	Temperature	Wind Speed & Direction	Additive/s Used	Other notes	Dye Color
CHECK OVER PAGE					Blue

SAFETY EQUIPMENT/PRECAUTIONS USED:

Herbicide 1		Herbicide 2		Herbicide 3	
Name	Chemical Supplier	Name	Chemical Supplier	Name	Chemical Supplier
HALOMEP	APPARENT	BOWSAW	APPARENT		
Qty Mix Sprayed		Qty Mix Sprayed		Qty Mix Sprayed	
1100 Lt.	Batch Number	110 L	Batch Number	L	Batch Number
Ratio Used		Ratio Used		Ratio Used	
300ml per 100Lt	Manufacture date	15g per 100Lt.	Manufacture date		Manufacture date
Herbicide Used		Herbicide Used		Herbicide Used	
ml	Application Method	ml	Application Method	ml	Application Method
	foliar Spray.		foliar Spray		

Weeds Targeted: ANNUAL GRASSES/ CHICKWEED/SOURSOB/BRIDAL CREEPER

I CERTIFY THAT THIS IS A TRUE AND ACCURATE RECORD OF AGRICULTURAL SPRAYING

SIGNED: NAME: LACHLAN MCINTYRE

WATER HYDRANT USE PROJECT PLATYPUS OFFICE.

Amount: 1210 L Location of hydrant: Time:

NOTES : (expenses, delivery notes, wildlife sightings, progress report, etc)

NB: EACH EMPLOYEE IS RESPONSIBLE FOR FILLING IN AND SIGNING THEIR PART OF THIS DAILY WORK RECORD.
THE SUPERVISOR IS RESPONSIBLE FOR RETURNING THIS FORM TO THE OFFICE ASAP.
ALWAYS COUNT PLANTS AND OTHER UNITS INSTALLED EACH DAY.

Practical Ecology Pty Ltd - Daily Work Record

WEATHER.

DAILY PLANTING RECORD SHEET

Plant Species (Botanical names preferred)	Numbers Installed
WIND 10/9 - WSW 5-10 km	
17/9 - NE 0-10 km	
19/9 - NE 0-10 km	
Total	
Work Hours planting	
Effective Daily rate per 8 hrs (Total plants divided by hours)	
Effective Planting rate (Number of plants per hr)	

** Please note that an effective planting rate should be at least 200 plants per person per day, depending on site conditions

Comments: (ie: site conditions, slope, aspect, soil moisture, amount of competing weeds, etc)

Appendix 3. Map of location of photo documentation of weed control

Appendix 4. Summary of required management actions – Year 1

OMP Section	Management Action	Parameters Measured	Survey/monitoring Guidelines	Where	When	Actions/Notes from Year 1
3.9.1	Fence Condition	Condition of boundary fences	Survey the perimeter of the offset site – any damage that allows entry of stock/vehicles must be repaired immediately	Offset site perimeter	Quarterly	Fences not adequate but drains and other features acting as secure perimeter. No evidence of vehicles/stock recorded during any site visit.
3.9.2	Weed monitoring	Cover of woody and herbaceous weed species present	Vegetation survey to be conducted – transect lines 20m apart, complete coverage of site– identify woody and herbaceous weed species to determine cover. Woody species to be mapped using GPS and treated. Herbaceous weed cover (% cover) to be estimated for each habitat zone (suitable patches mapped and treated) All weed species present to be identified to species level	Offset Area (Habitat Zones 1F and 1G)	Annual–Spring	Vegetation assessment – transects line not completed within monitoring period. However, no woody weeds have been identified within monitoring area on any occasion. Treatment of herbaceous weeds in September 2019.
3.9.3	Pest animal monitoring – Rabbits/Hares/Fox/New and emerging	Presence of pest animals or signs; scats, diggings, browsing or grazing	Signs recorded during vegetation surveys Locations of Rabbit warrens to be mapped (GPS) and treated (with addition further monitoring)	Offset Area (Habitat Zones 1F and 1G)	Annual–Spring	Observations recorded during each site visit during 2019. No control measures implemented.
3.7.4	Tree and Shrub recruitment	Vegetation Condition Survey	–Tree and shrubs species and size classes to be –assessed within permanently marked quadrats. –Photo point monitoring –Habitat Scoring Assessment	Offset Area (Habitat Zones 1F and 1G)	Annual–Spring	Completed on 7th January 2020. Estimation of cover achieved using adapted Braun–Blanquet scale.

Type of Report	Approval condition		Timing	Reporting Authority	Trigger (if any)
Annual Management Actions	To be completed	Offset site owner	Completed 31st August	DOEE BushBroker	NA
Annual Monitoring Report	To be completed	Offset site owner	Monitoring completed in spring Report completed Nov 30	DOEE BushBroker	Completion of annual reporting
Review of OMP	To be completed	Offset site owner	As required	DOEE BushBroker	Significant environmental event–widespread damage
Audit Report	To be completed	VicRoads	End of years 1, 4, 8, 10	DOEE	NA

Appendix 5. Survey data sheet for proposed monitoring

		Date															
	Transect ID – *(please circle)* *A B C D E F G H*	Assessor Name															
		Location/Survey Point															
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Presence *(tick)*																	
Euc. Spp	Yellow Gum *Eucalyptus leucoxylon*																
	Grey Box *Eucalyptus microcarpa*																
	Other																
Count (#)																	
Eucalyptus Cohorts	LOT's (DBH 70cm+)																
	Mature trees (12-15m)																
	Immature canopy trees (2-12m)																
	Seedlings/400m2 (<5cm DBH) *(tick)*																
	0																
	1-20 /																
	20-40 /																
	40-60 /																
	60-90+ /																
Presence *(tick)*																	
Understory trees/shrubs	Golden Wattle *Acacia pycnantha*																
	Gold dust Wattle *Acacia acinacea*																
	Other																
	Acacia sp. Seedlings present																
	Acacia seedlings >1.5x number of Yellow gum seedlings																
	>10 acacia plants above 1.5m tall																
	Tall Acacia growing with Yellow gum seedlings in dripline																