Koala Habitat Rehabilitation Monitoring Report
ORU 9th Monitoring Period
Yarrabilba

EPBC Number:	2013/6791
Project Name:	Yarrabilba
Proponent's ACN:	103 578 436
Prepared for:	Lendlease
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Date:	28th November 2022

Proposed Action: To construct the Yarrabilba residential development and associated infrastructure approximately 40 kilometres south east of Brisbane, Queensland (see EPBC Act referral 3013/6791 and request to vary proposal dated 5 August 2013)

Natura Pacific – Document Control Sheet

Project	
Title:	**Koala Habitat Rehabilitation Management Report – Offset Area 9th Monitoring Period**
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DCR#:	**NCO_PRJ_221124_Q00225**

Revision History

Version:	**Purpose:**	**Issued by:**	**Date**	**Reviewer:**	**Date:**
0.1	Internal review	K. Leopold	14/11/2022	M.N. Runkovski	15/11/2022
0.2	Quality assurance	M.N. Runkovski	24/11/2022	D. Coburn	25/11/2022
1.0	Submission	M.N. Runkovski	25/11/2022	G. Knox	28/11/2022

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Contents

1 Executive summary 5
2 Introduction 7
2.1 Background 7
2.2 Objectives 7
3 Rehabilitation areas 9
3.1 Purpose of habitat rehabilitation 9
3.2 Offset rehabilitation units (ORU) 9
3.3 Crossing rehabilitation units (CRU) 9
3.4 Pre-clearing Regional Ecosystems rehabilitation units 14
4 Rehabilitation performance indicators 15
4.1 Performance indicators 15
4.2 Contingency measures and corrective actions 16
4.2.1 Meeting benchmarks 16
4.2.2 As constructed data 16
5 Monitoring methodology 21
5.1 Sites 21
5.2 Photo point monitoring 21
5.3 Transect and quadrat monitoring 23
6 Results 24
6.1 Photo-point monitoring 24
6.2 Transect and quadrat monitoring 35
6.2.1 Native species richness 35
6.2.2 Weed species richness 35
6.2.3 Tree height and canopy cover (T1) 36
6.2.4 Small tree height and canopy cover (T2-T3) 37
6.2.5 Shrub height and cover (S1) 38
6.2.6 Native ground cover (G1) 38
6.2.7 Weed incursion 38
6.3 Normalised Difference Vegetation Index (NDVI) monitoring 42
7 Discussion 43
7.1 Benchmark overview – trends within variables 43
7.2 Benchmark overview – site comparison 44
7.3 Priority Precincts for weed management 46
7.4 Conclusions and recommendations 47
8 Bibliography 52

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List of Figures

Figure 1 Overall Yarrabilba layout showing Open Space networks including Fauna Corridor, Greenspace and Conservation Estate 8
Figure 2 Rehabilitation Units within Offset Requirement areas (OR1-OR23) and road crossings (CRU3, CRU11 and CRU15) 10
Figure 3 Koala Offset Monitoring locations 22

List of Tables

Table 1 Offset rehabilitation units (ORU) within the corridor network 11
Table 2 Road and infrastructure crossing rehabilitation units (CRU) traversing offset rehabilitation units (ORU) 13
Table 3 Summary of pre-clearing Regional Ecosystems (RE) within offset rehabilitation units and crossing rehabilitation units 14
Table 4 Reference, interim and final benchmark vegetation structure for each pre-clearing RE detailed for rehabilitation units (ORU and HRU) and crossing rehabilitation units (CRU) . 17
Table 5 Example reference height ranges used for classifying RE vegetation to respective strata layers, based on dominant pre-clearing RE type. 23
Table 6 Data collected at monitoring sites 23
Table 7 Photo monitoring site images 25
Table 8 9th Monitoring round sites with T1 canopy absent along the transect for current and four previous monitoring rounds 36
Table 9 Sites containing *Pinus elliotti* in the small tree layer this monitoring round and previous two monitoring rounds 37
Table 10 9th Koala Offset monitoring period species richness, average canopy height within the canopy (T1), sub-canopy (T2-T3) and shrub layer (S1) and Foliage Projected Cover (FPC %) within the canopy (T1), sub-canopy (T2-T3), shrub layer (S1) and ground layer (G1) 40
Table 11 9th Koala Offset monitoring period top priority ORU (highest to lowest) and recommended management actions 47
Table 12 9th Koala Offset monitoring period species richness, canopy height within the canopy (T1), sub-canopy (T2-T3) and shrub layer (S1) and cover within the canopy (T1), sub-canopy (T2-T3), shrub layer (S1) and ground layer (G1) measured against benchmarks for each respective RE 49

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1 Executive summary

Natura Pacific has developed this *Habitat Rehabilitation Monitoring Report* as the 9th monitoring report after initial baseline, 6 month, 2nd, 3rd, 4th, 5th, 6th 7th and 8th monitoring period reports for rehabilitation within the Yarrabilba offset requirement areas as prescribed in the *Habitat Rehabilitation and Management Plan* (Natura Consulting, March 2015) and the Approval Conditions set out under the *Environmental Protection and Biodiversity Conservation Act 1999* dated 13 November 2014.

The intent of this report is to provide monitoring information to direct the rehabilitation works associated with koala habitat within the Fauna Corridor, Greenspace Corridor and Environmental Protection Zones of the Yarrabilba Priority Development Area (PDA). Pine tree removal and assisted natural regeneration commenced six months prior to the 2nd monitoring period and has been ongoing in response to recommendations in successive monitoring reports. The areas to be rehabilitated are offset requirement areas, ensuring that koala habitat is specifically maintained and enhanced within the 195 hectare offset area. This report provides the 9th monitoring period data for the rehabilitation of the offset areas, with 59 sites assessed, consistent with the 8th monitoring period, all monitored within an area of 198.2 ha in the Yarrabilba footprint. Each monitoring site is located within an offset area rehabilitation unit (ORU1 to ORU23) including road crossing rehabilitation units (CRU8, CRU11 and CU15), with the pre-clearing Regional Ecosystem (RE), management type and corridor type tabulated.

Each rehabilitation unit is to be rehabilitated to a vegetation structure and species composition that is in line with that of the pre-existing (pre-clearing) Regional Ecosystems (REs). This is derived from the vegetation structure and species composition of the appropriate pre-clearing RE. The final benchmark for rehabilitation is derived from the definition of remnant vegetation under the *Vegetation Management Act 1999* (Neldner *et al*. 2022). Interim benchmarks are also provided whereby an assessment at regular intervals will be made on the progress of the rehabilitation / revegetation efforts towards achieving this plan's outcomes. For interim benchmark years 1 to 10, vegetation structure has been quantified from a cumulative growth curve (CGC). The reference benchmark, interim benchmarks and final benchmarks have been tabulated for each RE, with the relevant rehabilitation unit also identified.

Contingency measures and corrective actions have also been provided to account for instances of when interim benchmarks are not being met. 'As constructed' data and surveyed boundaries will also be provided for each rehabilitation unit to test and demonstrate compliance within the offset area (195 ha) requirement.

The monitoring methodology that is applied has been detailed, where a minimum of two monitoring sites per rehabilitation unit has been surveyed to document and assess rehabilitation through time. The final locations of the 59 monitoring sites have been mapped. Monitoring includes photo point monitoring, transect and quadrat monitoring to monitor changes in species richness, percentage foliage cover for the ground layer, shrub and canopy, woody strata average height and weed cover.

An assessment of site species richness and structure was undertaken to determine the 9th monitoring period condition against previous monitoring and benchmark values. With eight monitoring periods now undertaken since the project's commencement, it will be possible to observe trends in the data, however, the analyses made within this report are relatively basic, to identify high priority areas and guide management recommendations for different ORU and CRU based on several variables and RE benchmark indicators. Regardless of results in this report, ongoing passive, and active management, weed control and maintenance of fencing is required to ensure restoration practices are effective within the offset areas.

Overall, compared to the 8th monitoring period, improvements in general ecological health remained varied across offset sites, with a trend for improvement indicating continued recovery in response to

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increased rainfall following on from dry seasonal conditions experienced in the 8th monitoring period. There was a continued significant increase in the number of sites that improved for species richness, supporting the findings of overall improvement. This was also reflected by a 6.7% increase in the number of sites meeting the final benchmark for species richness. There was also an overall trend for improvement in native ground cover (29 sites improved). The one variable with most notable declines were shrub cover (27 sites declined), shrub height (15 sites declined) and % weed cover (8 sites declined). The remaining variables had remained relatively stable since the 8th monitoring period. Overall, the changes observed in this monitoring period may be attributed to continued recovery of the ground layer following the return of more favourable climate conditions including increased rainfall, recruitment of lower order structural layers into higher order structural layers (i.e. movement of shrubs into T2-T3 layers) and flourishing of weed species due to favourable conditions.

Of the 59 sites, a total of 37 sites meet a benchmark for T1 canopy tree cover, 34 sites meet a benchmark for T1 canopy tree height, 46 sites meet a benchmark for T2-T3 small tree cover and 57 sites meet a benchmark for T2-T3 small tree height, 46 sites meet a benchmark for shrub cover, 55 sites meet a benchmark for shrub height, 56 sites meet a benchmark for ground cover and 24 sites meet a benchmark for weed cover of the ground layer.

In summary, this assessment reveals that rehabilitation needs to continue, with a focus on **nine (9) top priority Rehabilitation Units within four (4) precincts**, determined from sites that are in poorest condition, have made the least improvements or fail to meet the weed cover benchmark in accordance with IMO-5 benchmark targets for this 5-year, 9th monitoring period (see Tables 11 and 12). Recommendations aim to assist natural regeneration and prevent weed spread and incursion, particularly in sensitive precinct areas adjacent to the Plunkett Conservation Reserve through targeted weed control including the most abundant weed species - *Lantana camara* (woody shrub), *Andropogon virginicus* (graminoid), *Passiflora suberosa* (vine) and *Ageratum houstonianum* (herb) as well as targeted removal of *Pinus elliotti* from upper strata layers where present. In addition, infill planting is to be considered during favourable seasonal conditions to support long term benchmark goals for the T1 canopy layer, with suitable species recommended based on results for each site.

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2 Introduction

2.1 Background

The Yarrabilba development site is located on the eastern side of Waterford - Tamborine Road and to the south of Logan Village (figure provided below). It is bounded by rural residential areas to the north, Plunkett Road to the south and the Plunkett Conservation Park to the east. The site consists of approximately 2,200 ha, of which 1,931 ha is controlled by Lendlease Communities (Yarrabilba) Pty Ltd. The land has been historically used for pine forestry, a military training camp in WWII and for livestock grazing, when first cleared. Yarrabilba is predominately vegetated with areas of regrowth native vegetation, regenerating pines and exotic grasslands. Some limited areas of native remnant and regrowth vegetation exist but they are mostly confined to creeks, drainage channels and wetlands.

The site is currently in the early-mid stages of development with the growth of Yarrabilba projected to span approximately 30 years. The long-term master-planned development incorporates an extensive network of dedicated open space (in excess of 25% of the site). A significant component of the open space is dedicated to the conservation of habitat for koalas (*Phascolarctos cinereus*).

Habitat rehabilitation is intended to improve koala habitat quality within the site's retained natural vegetation to attempt to increase the carrying capacity of these areas in the medium to long term. In addition, the configuration of key elements of the open space system provides a network covering approximately 510 ha (271 ha of greenspace, 140 ha of fauna corridor and 99 ha of conservation estate) and provides a connection between patches of remnant vegetation in the western and central parts of the site. Together they will enhance the site's contribution to Kkoala movement opportunities within the context of larger areas of koala habitat to the east and west of the site (Austecology 2012). Under the development of Yarrabilba, most existing fragments of remnant vegetation which have value for koalas will be earmarked to be retained (approximately 5.4% of the total site area) (Austecology 2012). The rehabilitation of the Fauna Corridor, Greenspace Corridor and Environmental Protection Zone (conservation estate) will significantly expand on these values by providing additional koala habitat (Natura Consulting 2011).

This report provides the 9th monitoring data for the rehabilitation of offset areas in the development site, based on the 59 sites monitored.

2.2 Objectives

The intent of this report is to provide data with which to assess the rehabilitation of koala habitat within the Offset Requirement area, which includes Fauna Corridor, Greenspace Corridor and Environmental Protection Zone.

This report is consistent with the *Habitat Rehabilitation and Management Plan* (Natura Consulting 2015), *Offset Management Plan* (Austecology 2015), *Koala Management Plan* (Austecology 2012) and *Fauna Corridor Infrastructure Master Plan* (Natura Consulting 2011). In particular the objectives of this report are to:

- describe the rehabilitation areas and provide clear and concise rehabilitation outcomes and performance indicators against which achievement of the rehabilitation will be measured
- identify contingency measures and appropriate corrective actions that will be undertaken if the performance indicators or outcomes are not being met
- outline the monitoring methodology including monitoring site locations
- assess whether rehabilitation is on-track to meet the next interim performance indicator

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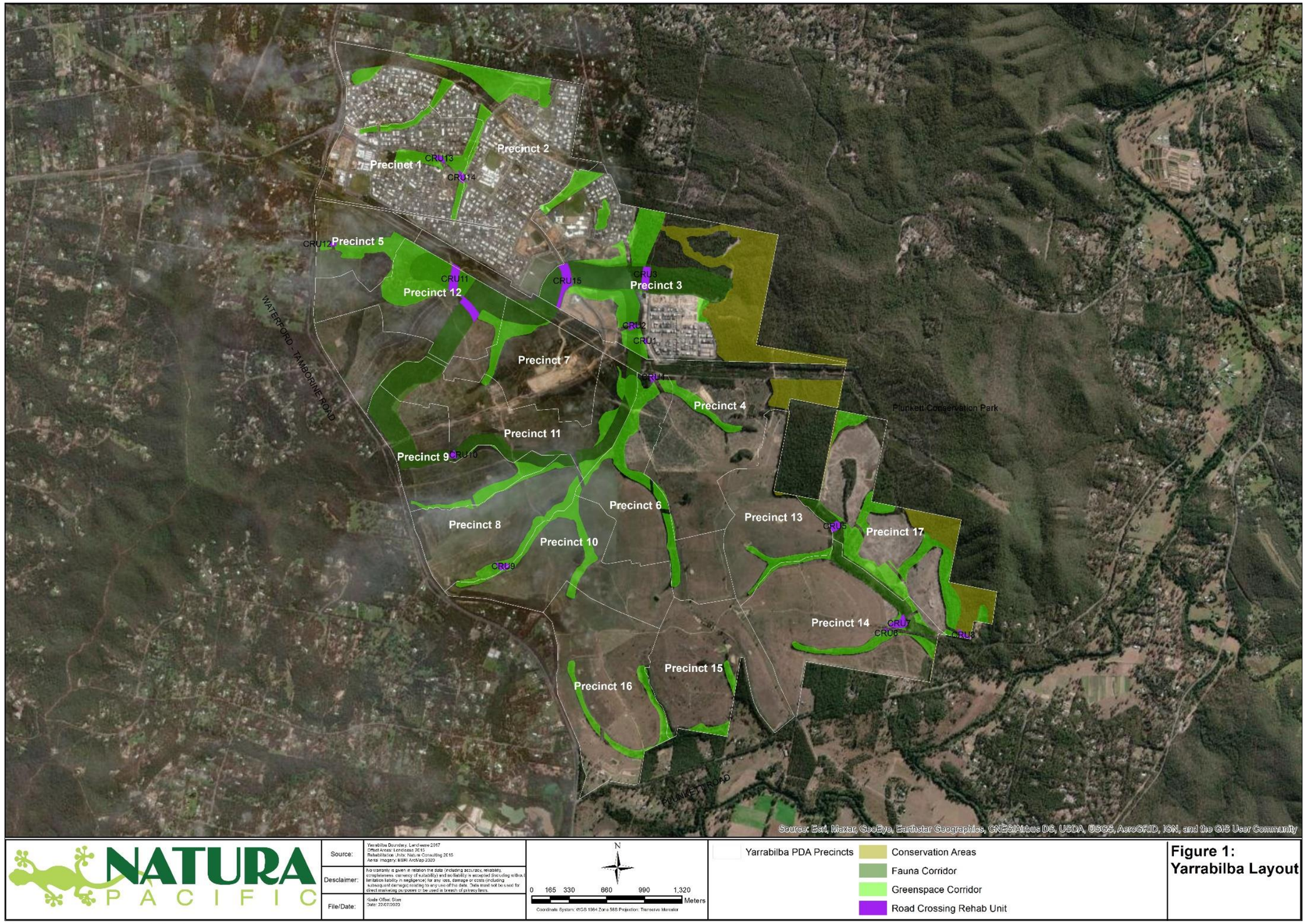

Figure 1 Overall Yarrabilba layout showing Open Space networks including Fauna Corridor, Greenspace and Conservation Estate

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3 Rehabilitation areas

3.1 Purpose of habitat rehabilitation

Koala habitat rehabilitation is to be undertaken within "Existing Assessable Koala Habitat to be protected and managed" and "Offset Areas" within Fauna Corridors, Greenspace Corridors and Environmental Protection Zones. This totals an area of 1,981,771 m^2 (198.2 ha) in the offset areas and an additional 754,657 m^2 (75.5 ha) within existing assessable koala habitat areas outside of offset areas, comprising a combined area of 2,736,428 m^2 (273.6 ha) to be rehabilitated.

The koala habitat rehabilitation area has been divided into offset rehabilitation and habitat rehabilitation units and crossing rehabilitation units. This report is relevant to the offset and crossing rehabilitation units only.

3.2 Offset rehabilitation units (ORU)

Koala habitat rehabilitation is to occur within offset rehabilitation units as indicated in the following figure. Each rehabilitation unit (ORU1 to ORU23) is a mapped polygon, where the polygon boundaries are the mapped Pre-Clearing Regional Ecosystems. The Regional Ecosystem (RE) code applicable to each unit was determined by overlapping Pre-Clearing Regional Ecosystem mapping (Queensland Government 2015b) with Offset Requirement area mapping within the Fauna Corridors, Greenspace Corridors and Environmental Protection Zones.

The Table 1 presents a summary of rehabilitation unit attributes, including:

- the area of the rehabilitation unit in square metres
- the corridor within which the rehabilitation unit is located
- the RE code for pre-clearing vegetation within the rehabilitation unit and the landzone / geology of the rehabilitation unit

It is noted that the minimum rehabilitation unit size is ~2,500 m^2 to reflect the mapping limitation of the Pre-Clearing Regional Ecosystems mapping dataset (Queensland Government 2015a).

3.3 Crossing rehabilitation units (CRU)

Rehabilitation and monitoring will also be undertaken where road and infrastructure is proposed to traverse an Offset Requirement area. Crossing rehabilitation units have been identified by overlaying the proposed internal road network (currently under review) with the Pre-Clearing Regional Ecosystem mapping (Queensland Government 2015a) and Offset Requirement area mapping. Each crossing rehabilitation unit (CRU1 to CRU15) is a mapped polygon overlayed over offset rehabilitation units. It is noted that these locations are indicative and may change with the final alignment of roads. Table 2 presents a summary of the crossing rehabilitation units, which are subject to rehabilitation actions outlined in this report.

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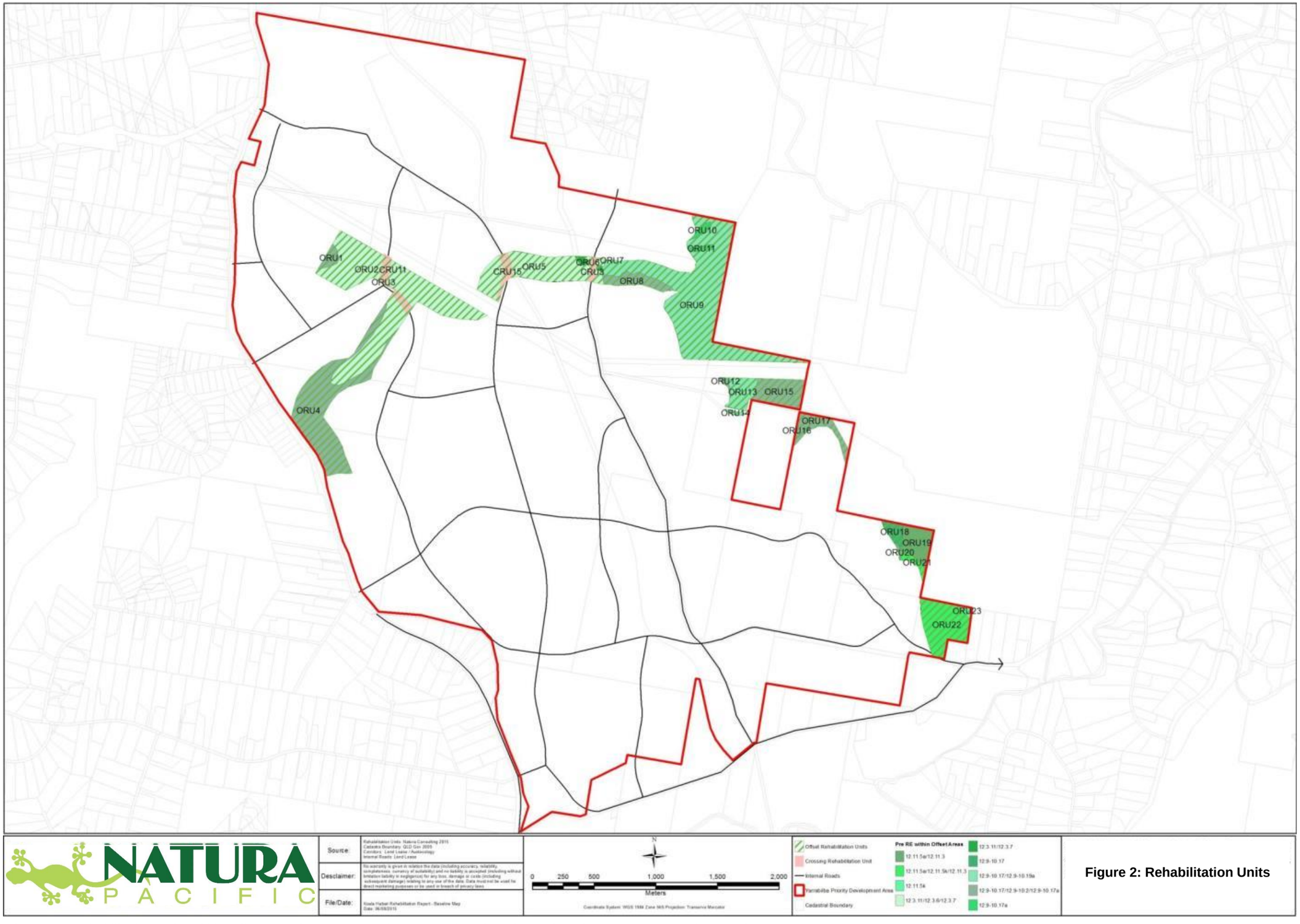

Figure 2: Rehabilitation Units

Figure 2 Rehabilitation Units within Offset Requirement areas (OR1-OR23) and road crossings (CRU3, CRU11 and CRU15)

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Table 1 Offset rehabilitation units (ORU) within the corridor network

Rehab. Unit	Area (m^2)	Corridor Type	RE Code(s)	Landzone / Geology
ORU1	16,933	Greenspace Corridor	12.9-10.17 / 12.9-10.2	Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks
ORU2	439,297	Fauna Corridor / Greenspace Corridor	12.3.11 / 12.3.6 / 12.3.7	Recent quaternary alluvial systems – alluvial river and creek flats
ORU3	1,451	Fauna Corridor	12.9-10.17 / 12.9-10.2	Fine grained sedimentary rocks - undulating country on fine grained sedimentary rocks
ORU4	269,317	Fauna Corridor	12.3.11 / 12.3.6 / 12.3.7 12.9-10.17 / 12.9-10.2	Recent quaternary alluvial systems – alluvial river and creek flats and Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks
ORU5	201,530	Fauna Corridor	12.3.11 / 12.3.6 / 12.3.7	Recent quaternary alluvial systems – alluvial river and creek flats
ORU6	10,205	Fauna Corridor	12.3.11 / 12.3.7	Recent quaternary alluvial systems – alluvial river and creek flats
ORU7	7,264	Fauna Corridor	12.3.11 / 12.3.6 / 12.3.7	Recent quaternary alluvial systems – alluvial river and creek flats
ORU8	46,711	Fauna Corridor	12.9-10.17 / 12.9-10.2	Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks
ORU9	513,080	Environmental Protection / Fauna Corridor	12.9-10.17 / 12.9-10.19	Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks
ORU10	8, 777	Environmental Protection	12.9-10.17	Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks
ORU11	8,324	Environmental Protection	12.9-10.17	Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks
ORU12	46,711	Environmental Protection	12.9-10.17 / 12.9-10.2	Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks
ORU13	49,644	Environmental Protection	12.9-10.17 / 12.9-10.19 / 12.9-10.2	Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks
ORU14	4,286	Environmental Protection	12.9-10.17 / 12.9-10.19 / 12.9-10.2	Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks
ORU15	80,800	Environmental Protection	12.9-10.17 / 12.9-10.2	Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks

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Rehab. Unit	Area (m^2)	Corridor Type	RE Code(s)	Landzone / Geology
ORU16	4,708	Environmental Protection	12.9-10.17 / 12.9-10.19	Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks
ORU17	47,475	Environmental Protection	12.9-10.17 / 12.9-10.2	Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks
ORU18	24,352	Environmental Protection	12.9-10.17	Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks
ORU19	59,917	Environmental Protection	12.11.5 / 12.11.3	Recent quaternary alluvial systems – alluvial river and creek flats
ORU20	3,154	Environmental Protection	12.9-10.17 / 12.9-10.2	Fine grained sedimentary rocks - undulating country on fine grained sedimentary rocks
ORU21	13,374	Environmental Protection	12.11.5 / 12.11.3	Recent quaternary alluvial systems – alluvial river and creek flats
ORU22	118,260	Environmental Protection	12.11.5 / 12.11.3	Recent quaternary alluvial systems – alluvial river and creek flats
ORU23	6,201	Environmental Protection	12.11.5	Recent quaternary alluvial systems – alluvial river and creek flats
Area	**1,981,771**			

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Table 2 Road and infrastructure crossing rehabilitation units (CRU) traversing offset rehabilitation units (ORU)

Crossing Rehab. Unit	Area (m^2)	Traversing ORU	Corridor Type	RE Code(s)	Landzone / Geology
CRU3	12,578	ORU5, ORU6, ORU7, ORU9	Fauna Corridor	12.3.11 / 12.3.6 / 12.3.7	Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks
CRU11	31,324	ORU2	Fauna Corridor	12.3.11 / 12.3.7	Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks
CRU15	22,138	ORU5	Greenspace Corridor / Fauna Corridor	12.3.11 / 12.3.6 / 12.3.7	Fine grained sedimentary rocks – undulating country on fine grained sedimentary rocks
Area	**66,040**				

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3.4 Pre-clearing Regional Ecosystems rehabilitation units

A short description of the pre-clearing Regional Ecosystems (RE) identified in the offset rehabilitation units and crossing rehabilitation units is provided in Table 3.

Table 3 Summary of pre-clearing Regional Ecosystems (RE) within offset rehabilitation units and crossing rehabilitation units

RE Code	RE short description (extract from Qld Herbarium RE Description Database)	*Vegetation Management Act* Class	Biodiversity Status
12.3.6	*Eucalyptus tereticornis, Casuarina cunninghamiana* subsp. *cunninghamiana* +/- *Melaleuca* spp. fringing woodland on coastal alluvial plains	Least concern	No concern at present
12.3.7	*Melaleuca quinquenervia* +/- *Eucalyptus tereticornis, Lophostemon suaveolens* open forest on coastal alluvial plains	Least concern	No concern at present
12.3.11	*Eucalyptus tereticornis* +/- *Eucalyptus siderophloia, Corymbia intermedia* open forest on alluvial plains	Of concern	Of concern
12.9-10.2	*Corymbia citriodora* subsp. *variegata* +/- *Eucalyptus crebra* open forest on sedimentary rocks	Least concern	No concern at present
12.9-10.4	*Eucalyptus racemosa* subsp. *racemosa* woodland on sedimentary rocks	Least concern	No concern at present
12.9-10.12	*Eucalyptus seeana, Corymbia intermedia, Angophora leiocarpa* woodland on sedimentary rocks	Endangered	Endangered
12.9-10.17	*Eucalyptus acmenoides, E. major, E. siderophloia* +/- *Corymbia citriodora* subsp. *variegata* woodland on sedimentary rocks	Least concern	No concern at present
12.9-10.19	*Eucalyptus fibrosa* subsp. *fibrosa* woodland on sedimentary rocks	Least concern	No concern at present
12.11.3	*Eucalyptus siderophloia, E. propinqua* +/- *E. microcorys, Lophostemon confertus, Corymbia intermedia, E. acmenoides* open forest on metamorphics +/- interbedded volcanics	Least concern	No concern at present
12.11.5	*Corymbia citriodora* subsp. *variegata*, *Eucalyptus siderophloia, E. major* open forest on metamorphics +/- interbedded volcanics	Least concern	No concern at present

(Source: QLD Government 2015a)

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4 Rehabilitation performance indicators

In accordance with the *EPBC Act 1999* decision notice, the Koala Habitat Rehabilitation Management Plan (Natura Consulting 2015) has been formulated reflecting the onsite rehabilitation requirements of Fauna and Greenspace Corridors, Regional Ecosystems, drainage lines and post development fauna movement pathways within Offset Areas on the site. This plan identifies koala habitat rehabilitation benchmarks and determines restoration actions to meet these benchmarks.

Each rehabilitation unit is to be rehabilitated to a vegetation structure and species composition that is in line with that of the appropriate pre-clearing RE (Table 4). The reference benchmark for rehabilitation of each rehabilitation unit is derived from the vegetation structure and species composition of the appropriate pre-clearing Regional Ecosystem (RE) (Table 4). These benchmarks quantify average canopy cover, shrub cover, ground cover, species richness and average height of the canopy and have been sourced from the Queensland Herbarium (Queensland Government 2015a). These technical descriptions are a compilation of data from multiple sites for canopy cover, shrub cover, and average stem density for each strata, groundcover and average species richness (Queensland Government 2015a). Through establishing these benchmarks, a reasonable comparison can be made between the floristic composition and vegetation structure of a given rehabilitation unit and the appropriate pre-clearing RE. In this instance, it is the dominant pre-clearing RE that has been used for comparison where there is more than one RE type attributed to a particular rehabilitation unit.

4.1 Performance indicators

The final benchmark for rehabilitation is derived from the definition of remnant vegetation under the *Vegetation Management Act 1999.* Vegetation can be mapped as remnant vegetation and associated essential habitat for Koalas if the canopy is 70% of the height, 50% of the cover and similar species composition of the appropriate pre-clearing RE (Queensland Government 2015a, Neldner *et al.* 2022). Therefore, the final benchmark for rehabilitation is 50% of the reference benchmark cover (for canopy, shrub and ground-layer) and 70% of the reference benchmark height (for canopy and shrub layer) of the appropriate RE.

Six rehabilitation performance indicators were selected:

1) average canopy cover
2) average height of canopy
3) dominant canopy species
4) average shrub cover
5) average groundcover
6) species richness
7) weed cover

Weed cover also needs to be considered for rehabilitation benchmarks for this site, particularly in the canopy where mature exotic pine trees remain. Throughout the life of the development a weed cover of ≤5% is to be reached, and then maintained.

The reference and final benchmark vegetation structure and species composition for each of the pre-clearing RE's identified within the mapped rehabilitation units is identified in Table 4. Note that exotic species identified in Table 4 are to assist with identification purposes only and are to be controlled and managed, not planted or assisted.

Rehabilitation units are to be managed and restored until they reach the final benchmark condition as identified in Table 4 and objectives of the Habitat Rehabilitation and Management Plan. The objectives

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of this plan are long term and are likely to require more than 15 years to be achieved, within each rehabilitation unit, after commencement of implementation.

Interim benchmarks are also provided whereby an assessment at regular intervals can be made on the progress of the rehabilitation / revegetation efforts towards achieving this plan's outcomes. Given this, adaptive management approaches can also be employed to redirect restoration approaches, if interim benchmarks are not being met. Table 4 provides a summary of the timeframe to achieve the interim and final benchmarks.

For Interim Benchmark years 1 to 10, vegetation structure has been quantified from a cumulative growth curve (CGC), which for biological organisms including trees and shrubs, is sigmoidal. As the reference benchmarks applied for this report are at the Regional Ecosystem level and site data and long-term tree and shrub growth curves are not available for Yarrabilba, we have derived general growth curves for each Regional Ecosystem. This is based on a sigmoidal growth curve, the average reference benchmark height of the stratum, the minimum height at which regrowth vegetation is of equivalent height as the RE (50% of reference benchmark height), and the average height of tubestock (20 cm) that is predominately used for revegetation in southeast Queensland.

The final benchmark at year 15 is 70% of the reference benchmark cover (for canopy, shrub and ground-layer) and 50% of the reference benchmark height (for canopy and shrub layer) of the appropriate pre-clearing RE.

4.2 Contingency measures and corrective actions

4.2.1 Meeting benchmarks

During monitoring, if interim benchmarks are not being met, the timeframes to achieve the final benchmarks will be reviewed and extended, whereby Lendlease will continue to undertake rehabilitation works with continued monitoring until the final benchmarks are met. The review of the success of meeting interim benchmarks will be undertaken at each monitoring event and reported on. Where the extension of rehabilitation works is required for rehabilitation units, discussions will be undertaken with the Department of Environment, to ensure that any additional requirements are also highlighted and addressed.

4.2.2 As constructed data

Constructed data and surveyed boundaries will be provided for each rehabilitation unit, within three months of completion of earthworks. This will be undertaken to test and demonstrate compliance within the offset area (195 ha) requirement.

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Table 4 Reference, interim and final benchmark vegetation structure for each pre-clearing RE detailed for rehabilitation units (ORU and HRU) and crossing rehabilitation units (CRU)

Benchmark Condition (where rehabilitation units are treated individually, at least 70% of height and 50% of cover values to be attained within first 15 years of commencement of rehabilitation works)											
RE Code	**Name**	**Status (VMA)**	**Biodiversity Status**	**Offset Rehabilitation Unit**				**Crossing Rehabilitation Unit**			
12.3.6	***Melaleuca quinquenervia* +/- *Eucalyptus tereticornis, Lophostemon suaveolens* open forest on coastal alluvial plains**	Least concern	No concern at present	ORU2, ORU4, ORU5, ORU7				CRU3, CRU15			
				Average Canopy Cover (%)	**Average Canopy Height (m)**	**Average T2-T3 Canopy Cover (%)**	**Average T2-T3 Canopy Height (m)**	**Average Shrub Cover (%)**	**Average Shrub Height (m)**	**Average Ground cover (%)**	**Species Richness (av. +/- SD)**
Interim Benchmark by 1 year				10.0	1.5			1.5	0.5	6.0	
Interim Benchmark by 2 years				14.0	3.0			2.0	0.8	10.0	
Interim Benchmark by 3 years				16.0	4.0			2.5	1.2	15.0	
Interim Benchmark by 5 years				22.0	6.0			3.0	1.4	20.0	
Interim Benchmark by 10 years				28.0	9.2			4.0	1.5	25.0	
Final Benchmark by 15 years				**30.5**	**10.7**			**4.5**	**1.6**	**29.2**	**-**
Reference Benchmark (Pre-Clearing RE)				**60.9**	**15.3**			**8.9**	**2.3**	**58.4**	**33.3 +/- 10.5**
12.3.7	***Eucalyptus tereticornis*, *Casuarina cunninghamiana* subsp. *cunninghamiana* +/- *Melaleuca* spp. fringing woodland**	Least concern	No concern at present	ORU2, ORU4, ORU5, ORU6, ORU7				CRU3, CRU11, CRU15			
				Average Canopy Cover (%)	**Average Canopy Height (m)**	**Average T2-T3 Canopy Cover (%)**	**Average T2-T3 Canopy Height (m)**	**Average Shrub Cover (%)**	**Average Shrub Height (m)**	**Average Ground cover (%)**	**Species Richness (av. +/- SD)**
Interim Benchmark by 1 year				5.5	1.6	2.0	0.8	2.5	0.5	6.0	
Interim Benchmark by 2 years				6.0	2.9	3.0	2.7	3.0	0.8	7.0	
Interim Benchmark by 3 years				7.0	4.1	4.0	3.7	3.5	1.2	8.0	
Interim Benchmark by 5 years				9.0	6.2	5.9	5.2	4.0	1.4	10.0	
Interim Benchmark by 10 years				12.0	10.1	9.3	7.3	6.0	1.5	12.0	
Final Benchmark by 15 years				**13.3**	**13.6**	**11.5**	**8.2**	**6.6**	**1.6**	**14.4**	**-**
Reference Benchmark (Pre-Clearing RE)				**26.6**	**19.4**	**15.3**	**9.0**	**13.2**	**2.3**	**28.7**	**52.8 +/- 7.5**
12.3.11		Of concern	Of concern	ORU2, ORU4, ORU5, ORU6, ORU7				CRU3, CRU11, CRU15			

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Benchmark Condition (where rehabilitation units are treated individually, at least 70% of height and 50% of cover values to be attained within first 15 years of commencement of rehabilitation works)											
RE Code	**Name**	**Status (VMA)**	**Biodiversity Status**	**Offset Rehabilitation Unit**				**Crossing Rehabilitation Unit**			
	***Eucalyptus tereticornis* +/- *Eucalyptus siderophloia*, *Corymbia intermedia* open-forest on alluvial plains**			**Average Canopy Cover (%)**	**Average Canopy Height (m)**	**Average T2-T3 Canopy Cover (%)**	**Average T2-T3 Canopy Height (m)**	**Average Shrub Cover (%)**	**Average Shrub Height (m)**	**Average Ground cover (%)**	**Species Richness (av. +/- SD)**
Interim Benchmark by 1 year				7.0	1.6	2.0	0.8	2.0	0.4	1.5	
Interim Benchmark by 2 years				10.0	3.0	3.0	2.8	4.0	0.7	2.0	
Interim Benchmark by 3 years				12.0	4.2	4.2	3.8	5.0	1.1	3.0	
Interim Benchmark by 5 years				18.0	6.4	6.4	5.5	7.0	1.3	4.5	
Interim Benchmark by 10 years				22.0	10.7	10.7	8.2	9.0	1.5	7.0	
Final Benchmark by 15 years				**25.6**	**16.7**	**13.9**	**9.6**	**10.9**	**1.9**	**8.5**	**-**
Reference Benchmark (Pre-Clearing RE)				**51.1**	**23.8**	**23.9**	**11.3**	**21.7**	**2.7**	**17**	**40.6 +/- 8.5**
12.9-10.2	***Corymbia citriodora* subsp. *variegata* +/- *Eucalyptus crebra* open forest on sedimentary rocks**	Least concern	No concern at present	ORU1, ORU3, ORU4, ORU8, ORU12, ORU13, ORU14, ORU15, ORU17, ORU20							
				Average Canopy Cover (%)	**Average Canopy Height (m)**	**Average T2-T3 Canopy Cover (%)**	**Average T2-T3 Canopy Height (m)**	**Average Shrub Cover (%)**	**Average Shrub Height (m)**	**Average Ground cover (%)**	**Species Richness (av. +/- SD)**
Interim Benchmark by 1 year				6.0	1.6	2.0	0.8	6.0	0.4	6.0	3.0
Interim Benchmark by 2 years				10.0	2.9	2.9	2.8	6.5	0.7	7.0	4.0
Interim Benchmark by 3 years				12.0	4.2	4.0	3.8	7.0	1.1	12.0	5.0
Interim Benchmark by 5 years				18.0	6.3	6.0	5.3	8.5	1.3	18.0	7.0
Interim Benchmark by 10 years				22.0	10.5	9.6	7.7	11.4	1.5	22.0	9.0
Final Benchmark by 15 years				**26.8**	**15.5**	**11.9**	**8.9**	**15.1**	**1.8**	**23.6**	**10.8**
Reference Benchmark (Pre-Clearing RE)				**53.5**	**22.2**	**16.5**	**10.1**	**21.6**	**2.5**	**47.2**	**21.6**

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Benchmark Condition (where rehabilitation units are treated individually, at least 70% of height and 50% of cover values to be attained within first 15 years of commencement of rehabilitation works)												
RE Code	**Name**	**Status (VMA)**	**Biodiversity Status**	**Offset Rehabilitation Unit**				**Crossing Rehabilitation Unit**				
12.9-10.17	***Eucalyptus acmenoides, Eucalyptus major, Eucalyptus siderophloia +/- Corymbia citriodora subsp. variegata* woodland on sedimentary rocks**	Least concern	No concern at present	ORU1, ORU3, ORU4, ORU8, ORU9, ORU10, ORU11, ORU12, ORU13, ORU14, ORU15, ORU16, ORU17, ORU18, ORU20								
				Average Canopy Cover (%)	**Average Canopy Height (m)**	**Average T2-T3 Canopy Cover (%)**	**Average T2-T3 Canopy Height (m)**	**Average Shrub Cover (%)**	**Average Shrub Height (m)**	**Average Ground cover (%)**	**Species Richness (av. +/- SD)**	
Interim Benchmark by 1 year				6.0	1.6	2.0	0.8	6.0	0.6	10.0		
Interim Benchmark by 2 years				10.0	3.0	3.0	2.8	7.0	1.0	20.0		
Interim Benchmark by 3 years				12.0	4.2	4.3	3.9	10.0	1.5	25.0		
Interim Benchmark by 5 years				18.0	6.4	6.5	5.7	14.0	1.8	30.0		
Interim Benchmark by 10 years				22.0	10.9	11.3	8.9	16.0	2.2	35.0		
Final Benchmark by 15 years				**27.2**	**18.2**	**15.0**	**10.4**	**20.0**	**2.8**	**43.9**	-	
Reference Benchmark (Pre-Clearing RE)				**54.3**	**26.0**	**30.5**	**12.9**	**40.0**	**4.0**	**87.8**	**36.5 +/- 15.1**	
12.9-10.19	***Eucalyptus fibrosa subsp. fibrosa* woodland on sedimentary rocks**	Least concern	No concern at present	ORU9, ORU14, ORU16								
				Average Canopy Cover (%)	**Average Canopy Height (m)**	**Average T2-T3 Canopy Cover (%)**	**Average T2-T3 Canopy Height (m)**	**Average Shrub Cover (%)**	**Average Shrub Height (m)**	**Average Ground cover (%)**	**Species Richness (av. +/- SD)**	
Interim Benchmark by 1 year				6.0	1.6	2.0	0.8	2.5	0.4	2.5		
Interim Benchmark by 2 years				7.0	3.0	2.9	2.7	4.0	0.7	3.0		
Interim Benchmark by 3 years				9.0	4.2	4.0	3.7	5.0	1.1	4.0		
Interim Benchmark by 5 years				12.0	6.3	6.0	5.2	7.0	1.3	6.0		
Interim Benchmark by 10 years				15.0	10.5	9.6	7.3	9.0	1.5	8.0		
Final Benchmark by 15 years				**20.9**	**15.8**	**11.9**	**8.2**	**9.6**	**1.7**	**8.2**	-	
Reference Benchmark (Pre-Clearing RE)				**41.8**	**22.5**	**16.4**	**9.0**	**19.1**	**2.4**	**16.4**	**30.1 +/- 4.6**	

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Benchmark Condition (where rehabilitation units are treated individually, at least 70% of height and 50% of cover values to be attained within first 15 years of commencement of rehabilitation works)												
RE Code	**Name**	**Status (VMA)**	**Biodiversity Status**	**Offset Rehabilitation Unit**				**Crossing Rehabilitation Unit**				
12.11.3	***Eucalyptus siderophloia, E. propinqua* +/- *E. microcorys, Lophostemon confertus, Corymbia intermedia, E. acmenoides* open forest on metamorphics +/- interbedded volcanics**	Least concern	No concern at present	ORU19, ORU21, ORU22								
				Average T1 Canopy Cover (%)	**Average T1 Canopy Height (m)**	**Average T2-T3 Canopy Cover (%)**	**Average T2-T3 Canopy Height (m)**	**Average Shrub Cover (%)**	**Average Shrub Height (m)**	**Average Ground cover (%)**	**Species Richness (av. +/- SD)**	
Interim Benchmark by 1 year				6.0	1.6	1.6	1.0	1.5	0.4	3.0		
Interim Benchmark by 2 years				10.0	3.0	3.0	2.7	2.0	0.7	5.0		
Interim Benchmark by 3 years				14.0	4.2	4.2	3.6	2.5	1.1	7.0		
Interim Benchmark by 5 years				20.0	6.4	6.5	4.9	4.0	1.3	10.0		
Interim Benchmark by 10 years				25.0	10.8	11.2	6.8	4.5	1.5	12.0		
Final Benchmark by 15 years				**31.1**	**17.6**	**14.9**	**7.5**	**5.3**	**1.7**	**15.4**	-	
Reference Benchmark (Pre-Clearing RE)				**62.1**	**25.2**	**30.0**	**8.0**	**10.5**	**2.4**	**30.8**	**55.1 +/ 15.4**	
12.11.5	***Corymbia citriodora* subsp. *variegata*, *Eucalyptus siderophloia*, *E. major* open forest on metamorphics +/- interbedded volcanics**	Least concern	No concern at present	ORU19, ORU21, ORU22, ORU23								
				Average T1 Canopy Cover (%)	**Average T1 Canopy Height (m)**	**Average T2-T3 Canopy Cover (%)**	**Average T2-T3 Canopy Height (m)**	**Average Shrub Cover (%)**	**Average Shrub Height (m)**	**Average Ground cover (%)**	**Species Richness (av. +/- SD)**	
Interim Benchmark by 1 year				6.0	1.6	1.6	1.0	0.5	0.4	8.0		
Interim Benchmark by 2 years				9.0	3.0	2.8	2.7	1	0.7	10.0		
Interim Benchmark by 3 years				12.0	4.2	3.8	3.7	1.5	1.1	14.0		
Interim Benchmark by 5 years				15.0	6.4	5.4	5.3	2	1.3	18.0		
Interim Benchmark by 10 years				18.0	10.8	7.9	7.7	2.5	1.5	20.0		
Final Benchmark by 15 years				**21.8**	**15.8**	**9.2**	**8.7**	**2.9**	**1.6**	**23.0**	-	
Reference Benchmark (Pre-Clearing RE)				**43.5**	**22.5**	**10.6**	**9.9**	**5.8**	**2.3**	**46.0**	**48.0 +/ 12.3**	

Adapted from Queensland Government (2015a) * No pre-defined benchmarks for this RE are provided within the RE technical descriptions (Queensland Government 2015) and therefore, these numbers have been based on data collected in the field from previous assessments and reference sites within this RE type.

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5 Monitoring methodology

The following monitoring program was implemented to capture baseline data prior to rehabilitation treatments being applied. Adaptive management strategies will be used where a rehabilitation treatment does not produce the desired result. When this occurs, the treatment will be identified and/or modified.

For this monitoring program, a minimum of two monitoring sites per rehabilitation unit is sufficient to identify any major changes and to provide a 'snap-shot' of ecological conditions. Monitoring in this way will allow the ongoing collection of information to demonstrate the effectiveness of habitat rehabilitation efforts, and the frequency of monitoring activities will enable management prescriptions to be adjusted to bring about any necessary changes and corrective actions (adaptive management).

5.1 Sites

Vegetation monitoring for the 9th monitoring period occurred in a network of 59 monitoring sites (refer to Tables 1 and 2). The final location of each monitoring site within its representative rehabilitation unit was identified by GPS coordinates and direction (compass bearing). Monitoring site locations are identified in Figure 3.

Site locations have been permanently marked by two steel pickets with yellow safety caps placed 50 m apart, measured using a 50 m stringline and marked at 10 m intervals with wooden stakes to ensure consistent replication. Each picket is clearly labelled identifying the site number.

Note: Due to the vegetation clearing for road construction being undertaken in the Precinct 3 road corridor, two sites (site 55 and 58) were lost and needed to be relocated in the 8th monitoring period. Another two sites were able to be retained, with start points moved outside of the clearing footprint and new end points established respectively. This may not have an impact over the long-term goals of restoring sites to original RE, however the new sites selected appear to be highly degraded, potentially resulting in lower benchmark values.

The following methodology is applied for monitoring of each site.

5.2 Photo point monitoring

For each site, a permanently marked photo point has been established at the first marker picket. In previous monitoring rounds, a second marker picket at 10 m along the relevant compass bearing was used to assist with photo direction. This methodology has changed slightly with no difference in outcome observed – 10 m marker pickets were removed and all photos were taken such that the 0 m picket was located in the bottom left hand corner of the photo with the site number visible.

The photos were saved with the following information recorded for each file:

- site number
- survey (i.e. 9th mon.)
- date

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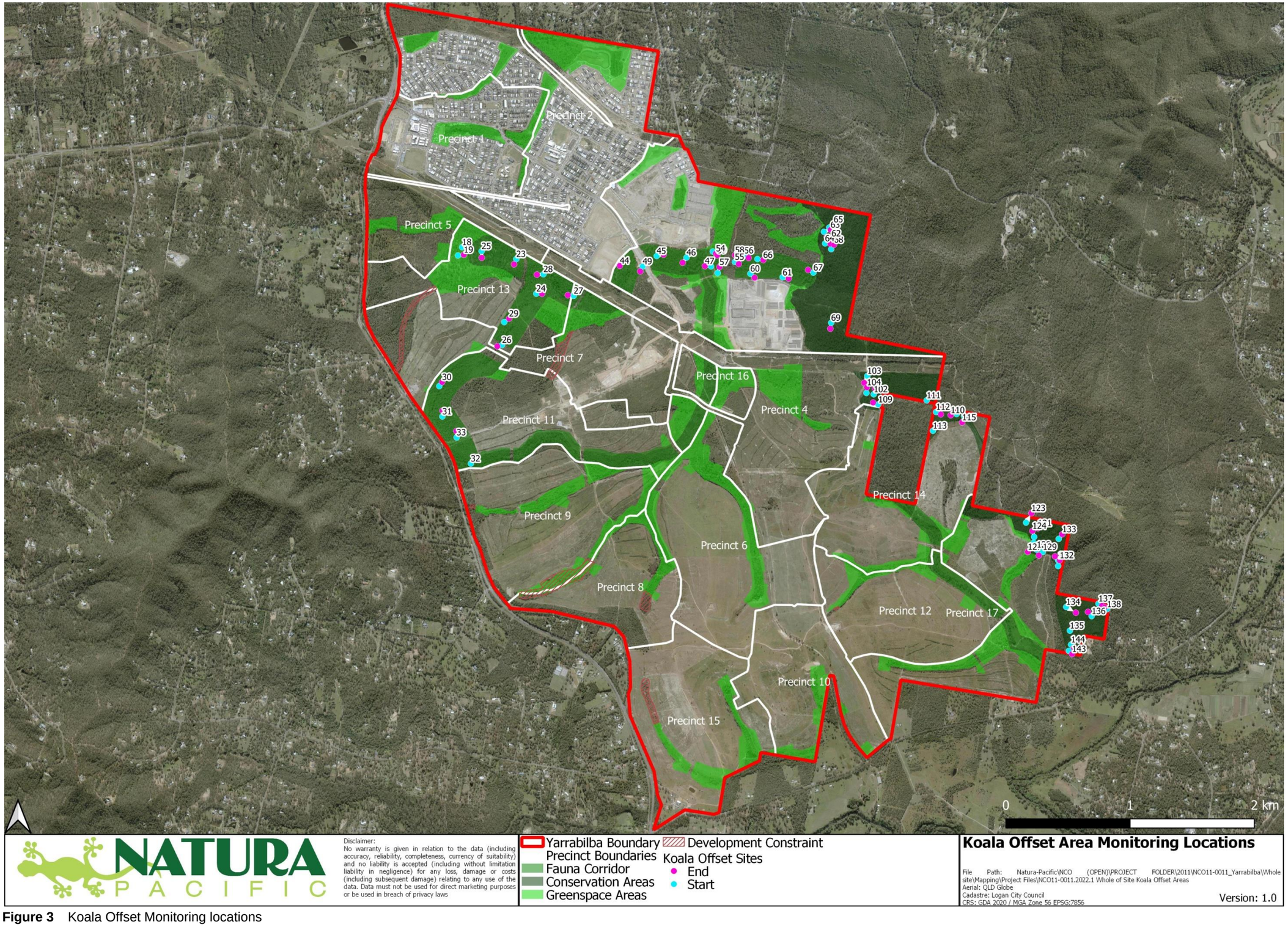

Figure 3 Koala Offset Monitoring locations

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5.3 Transect and quadrat monitoring

Quantitative site data, including the attributes of species richness, percentage foliage cover for the ground layer, shrub and canopy layers, canopy height, and weed cover are to be collected from field transects and quadrats established at each of the monitoring sites:

- A 50 m transect was placed between the 0 m and 50 m metal pickets. Ten metre intervals were marked permanently with wooden stakes that had flagging tape attached for high visibility.

- Quadrats were placed along the transect:
  - 50 x 10 m plot positioned at the transect starting at 0 m on the right-hand side of the transect
  - 1 x 1 m subplots positioned at staked intervals 0 m, 10 m, 20 m, 30 m and 40 m. Adjustments were made for each subplot if its positioning was placed over a trunk, fallen tree or roots. Installation of permanent stakes ensures consistent sampling and adequate replication for data collection in future monitoring periods.

- When recording data, reference height ranges were used for allocating vegetation to different strata layers according to dominant pre-clearing RE allocated for the different rehabilitation units (ORU and HRU) and crossing rehabilitation units (CRU) (see table below).

Table 5 Example reference height ranges used for classifying RE vegetation to respective strata layers, based on dominant pre-clearing RE type.

RE Type	Pre clearing height ranges (m)			
	Canopy (T1)	Small trees (T2-T3)	Shrub layer (S1)	Ground Layer (G1)
12.3.11	>19.1	5.1-19	1.26-5	<1.25
12.9-10.17	>13.1	6.1-13	0.76-6	<0.75
12.11.5	>17.5	4.6-17.5	1.2-4.5	<1.1

Given the above, each monitoring site had the information collected as detailed in the table below. This benchmark monitoring process has also been undertaken at Baseline, 6 months, 1 year, 1.5 years, 2 years, 2.5 years, 3 years, 3.5 years, and 4 years and the current monitoring period (5 years) post commencement; having commenced a yearly-interval roster from the 4 years report. Reporting from each of the monitoring events shall be provided to the Department of Environment within 4 weeks of completion of monitoring.

Table 6 Data collected at monitoring sites

Method of collection	Data collected
50 m x 10 m quadrat (plot)	Species richness, height of each canopy species
50 m transect	Canopy species cover (% Foliage Projected Cover (FPC)) and height, shrub cover (% FPC) and height
Five 1 x 1 m quadrats (subplot)	Percentage cover in ground layer (including regenerating native canopy cohorts)

Percent Foliage Projected Cover calculation:

$$\%\ FPC = \frac{total\ cover\ (m)}{transect\ length\ (m)} \times 100$$

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6 Results

6.1 Photo-point monitoring

Photo monitoring results for all surveyed sites are reported in the following table, indicating the variety of vegetation types and condition. In most cases, the site photo was indicative of the condition of the entire transect, which was supported in the results section that follows, with the vegetation type and structure remaining consistent throughout individual sites. Many of the sites are typically at an advanced state of natural regeneration with common canopy tree sized eucalypts and mixed Acacia species. In congruence with previous monitoring periods, the ground cover vegetation varies from mixed native grasses such as blady grass (*Imperata cylindrica)* and bracken fern (*Pteridium esculentum),* mixed with exotic grass pasture in the understorey with sparse regenerating shrubs and trees to established sclerophyll woodland to open forest with intact structure and diverse species composition.

Several sites indicated photographic evidence of increases in *Lantana camara* infestations, potentially attributable to favourable seasonal conditions including higher rainfall following dry periods and fire observed in the 6th monitoring period. Felled and fallen trees can be seen within many of the photo monitoring points. A number of these are exotic pine (*Pinus elliottii*) which have been hand felled as part of the ongoing weed management process. There are several sites also containing immature *Pinus elliottii* in the understorey and shrub layers. Several sites continue to be moderately vegetated with regrowth of mixed Acacia species, predominantly *Acacia leiocalyx* and *A. disparrima*.

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Table 7 Photo monitoring site images

Site 18 – taken 15/09/2022

Site 19 – taken 19/09/2022

Site 23 – 31/08/2022

Site 24 – 31/08/2022

Site 25 – 19/09/2022

Site 26 – 14/09/2022

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Site 27 – 31/08/2022

Site 28 – 31/08/2022

Site 29 – 07/09/2022

Site 30 – 10/08/2022

Site 31 – 27/07/2022

Site 32 – 10/08/2022

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Site 33 – 27/07/2022

Site 44 – 14/06/2022

Site 45 – 26/07/2022

Site 46 – 04/05/2022

Site 47 – 28/04/2022

Site 49 – 14/06/2022 (not collected)

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Site 54 – 03/05/2022

Site 55 – 21/04/2022

Site 56 – 21/04/2022

Site 57 – 27/04/2022

Site 58 – 27/04/2022

Site 59 – 03/04/2022

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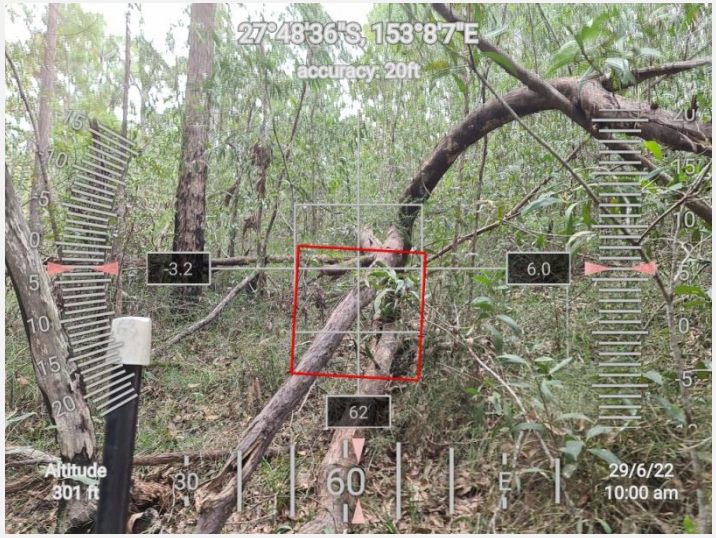
Site 60 – 20/04/2022

Site 61 – 13/04/2022

Site 62 – 07/07/2022

Site 63 – 29/06/2022



Site 64 – 07/07/2022

Site 65 – 15/06/2022

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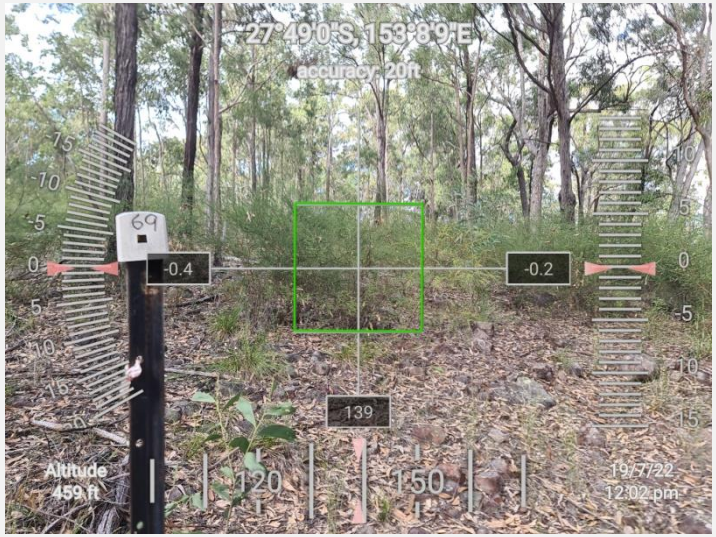
Site 66 – 21/04/2022

Site 67 – 13/04/2022

Site 68 – 07/07/2022

Site 69 –19/07/2022



Site 102 – 06/09/2022

Site 103 – 06/09/2022

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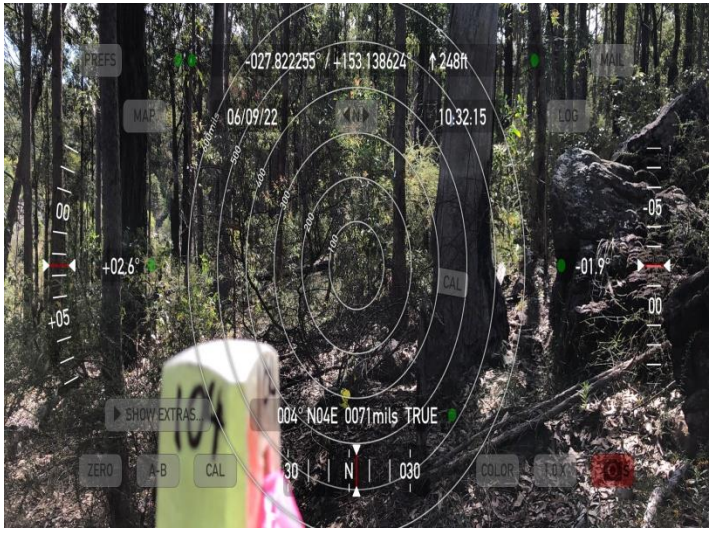
Site 104 – 06/09/2022



Site 109 – 07/09/2022

Site 110 – 04/08/2022

Site 111 – 04/08/2022

Site 112 – 23/08/2022

Site 113 – 04/08/2022

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Site 115 – 04/08/2022

Site 123 – 10/08/2022

Site 124 – 10/08/2022

Site 127 – 12/07/2022

Site 128 – 12/07/2022

Site 129 – 26/04/2022

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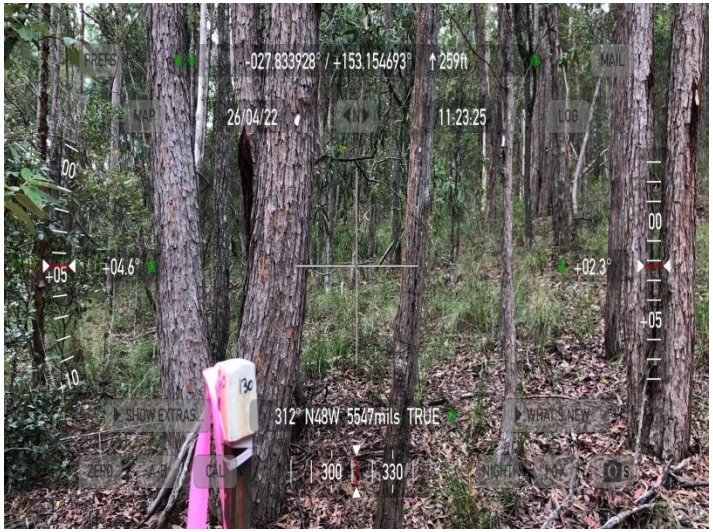
Site 130 – 26/04/2022



Site 131 – 27/09/2022

Site 132 – 26/04/2022

Site 133 – 27/09/2022

Site 134 – 28/09/2022

Site 135 – 28/09/2022

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Site 136 – 21/09/2022

Site 137 – 21/09/2022

Site 138 – 21/09/2022

Site 143 – 13/09/2022

Site 144 – 20/09/2022

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6.2 Transect and quadrat monitoring

6.2.1 Native species richness

During the 9th monitoring period undertaken between April to September 2022, a total of **377 species** were recorded within different strata at the 59 monitoring sites in the Offset Area. This is an increase of 63 species from the 8th monitoring period. Species richness within sites ranged from 20 to 73 native species (minus weeds), with 37 native species per site observed on average, resulting in **a continued improvement in native species richness, with an average of 6.7% increase** since the 8th monitoring period. Site 66 replaced site 127 as the site with highest overall native species richness this monitoring period.

Canopy tree species (T1 stratum) totalled 24 species (6 species more than 8th monitoring period). One of these was the exotic *Pinus elliotti* recorded at site 24. Those most common across the offset area were represented at a greater number of sites than previous and varied slightly from the 8th monitoring period, potentially due to recruitment of *Corymbia trachyphloia* from the T2 layer and included *Corymbia trachyphloia* (13 sites), *Eucalyptus siderophloia* (12 sites), *E. acmenoides* (10 sites), *E. fibrosa* (8 sites) and *E. resinifera* (8 sites).

Small tree species (T2-T3) totalled 36 species (2 species more than 8th monitoring period). One of these was the exotic *Pinus elliotti,* recorded at site 26. The most common species were consistent with the 8th monitoring period, with the addition of *Alphitonia excelsa* at 25 sites which had migrated from the shrub layer. Others included *Acacia disparrima* (25 sites)*, Lophostemon confertus* (24 sites)*, L. suaveolens* (24 sites) and *Eucalyptus siderophloia* (22 sites).

Shrub species (S1 stratum) totalled 58 species (7 species more than 8th monitoring period). This included 4 exotic species, with *Lantana camara* being the most widespread of these, recorded at 28 sites. The most common native species included *Alphitonia excelsa, Acacia disparrima, A. leiocalyx* and *Lophostemon confertus* (from highest to lower abundance). These were also among species most represented in the 8th monitoring period.

In the ground layer, a total of 260 species were recorded (49 more than 8th monitoring period). Of these, 59 species were exotic, the most widespread of these being *Lantana camara* recorded at 46 sites. The increase indicates a positive response to recent wet conditions in the lead up to and during field visits for the 8th monitoring period. Species most represented in the ground layer were typically consistent with the 8th monitoring period, comprising grasses, forbs and a twining herb. These included *Entolasia stricta, Lobelia purpurascens, Lomandra longifolia, L. multiflora, Imperata cylindrica, Glycine clandestina* and *Cymbopogon refractus* (from highest to lower abundance).

6.2.2 Weed species richness

Of all the species recorded, 65 were exotic weeds (9 more species than 8th monitoring period). Most of these were recorded in the ground layer, with five species recorded in the shrub layer and one species, ***Pinus elliotti*** **recorded in the T1 and T2 layers.** ***P. elliotti also*** **remained in the shrub layer (2 sites) and ground layer (15 sites).**

Weed species in the shrub layer included *Lantana camara, Gomphocarpus physocarpus, Cinnamomum camphora* (recruiting) and *Passiflora subpeltata* (from highest to lowest number of sites).

The ground layer contained 59 weed species (91% of all weed species recorded), including a combination of graminoids, herbs, twining scramblers and woody weeds. The most common weed species in the ground layer continued to increase in the number of sites at which they were recorded

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since the 8th monitoring period. Moreover, the most common weeds were identical to those recorded in the 7th and 8th monitoring periods. These included *Lantana camara* (46 sites, 4 more than 8th monitoring period), *Passiflora suberosa* (37 sites, 10 more than 8th monitoring period), *Andropogon virginicus* (28 sites, 4 more than 8th monitoring period), *Ageratum houstonianum* (25 sites, 1 more than 8th monitoring period) and *Digitaria didactyla* (22 sites) (from highest to lower abundance).

6.2.3 Tree height and canopy cover (T1)

Twenty-one sites did not have any canopy trees present along the transect midline for the measurement of tree height and FPC % (same as 8th monitoring period). The consistency in the number of sites without T1 canopy cover and height measurements indicates a pause in succession through the recruitment of T2 trees into higher layers of strata. Despite this, T1 average height and total FPC cover had increased slightly overall.

Of the sites with canopy trees present along the transect in the T1 stratum, **tree height** ranged from 14.4 m to 23.3 m, with the **average tree height being 18.2 m (an 0.3 m increase since 8th monitoring period)** (Table 10). Canopy species with high average canopy height were consistent with the 8th monitoring period, including *Corymbia trachyphloia. Eucalyptus siderophloia, E. acmenoides, E. fibrosa, E. resinifera* and *C. intermedia* (in order of highest to lower).

Of the sites with canopy trees present along the transect in the T1 stratum, **tree canopy FPC** ranged from 8% to 107% overlapping cover, with **average total canopy cover of 55.1% (6% more than 8th monitoring period)** (Table 10). Canopy species with high canopy cover were *Corymbia trachyphloia, Eucalyptus fibrosa, E. siderophloia, C. intermedia, E. resinifera* and *E. acmenoides* (in order of highest to lower FPC).

There continued to be a small presence of weed crown cover in the T1 layer in the 9th monitoring period, with *Pinus elliotti* recorded at three sites (24, 110 and 132). I**t is recommended that removal of these trees is prioritised to eliminate further contribution of seed to the seed bank, or dispersal to other areas.**

Table 8 9th Monitoring round sites with T1 canopy absent along the transect for current and four previous monitoring rounds

Site and Rehabilitation Unit	5th mon	6th mon	7th mon	8th mon	9th mon
19 (ORU1)	x	x			
23 (CRU11)	x	x	x	x	x
24 (CRU11)	x	x	x	x	x
25 (ORU2)	x	x			
26 (ORU2)	x	x	x	x	x
27 (ORU2)	x	x	x	x	x
28 (ORU2)	x	x	x	x	x
32 (ORU4)	x	x	x	x	x
33 (ORU4)	x	x	x	x	x
44 (ORU5)	x	x	x	x	x
47 (ORU5)	x	x	x	x	x
49 (CRU15)	x	x	x	x	x
54 (ORU6)	x	x	x	x	x
56 (CRU3)	x	x	x	x	x
57 (CRU3)	x	x	x	x	x
58 (ORU7)	x	x	x	x	x

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Site and Rehabilitation Unit	5th mon	6th mon	7th mon	8th mon	9th mon
59 (ORU7)	x	x	x	x	x
60 (ORU8)	x	x	x	x	x
61 (ORU8)	x	x	x	x	x
110 (ORU15)	x	x	x		
111 (ORU15)		x	x		
112 (ORU16)	x	x	x	x	x
113 (ORU16)	x	x	x	x	x
124 (ORU18)	x				
129 (ORU21)		x	x		
130 (ORU21)	x				
132 (ORU19)	x				
134 (ORU22)	x	x	x	x	x
135 (ORU22)	x	x	x		
143 (CRU8)	x				
144 (CRU8)		x	x	x	x
TOTAL	**28**	**27**	**25**	**21**	**21**

6.2.4 Small tree height and canopy cover (T2-T3)

In this monitoring period, only one site (site 69) did not have any small trees (T2-T3 strata) present along the transect midline for the measurement of height and FPC %. Sites 29 and 56, which had previously no small trees recorded, had improved. In review of the T2/T3 layer, weed crown cover was recorded at 6 sites (1 more than 8th monitoring period) for the presence of *Pinus elliottii* including sites **23, 26, 115, 128, 129 and 132**. **Most of these sites contained *P. eliottii* in the T2 layer in the 8th monitoring period (Table 9), therefore prioritisation of pine removal in the T2 layer is also recommended.**

Table 9 Sites containing *Pinus elliotti* in the small tree layer this monitoring round and previous two monitoring rounds

Site and Rehabilitation Unit	× = *Pinus elliotti* present in small tree layer				
	5th mon	6th mon	7th mon	8th mon	9th mon
23 (CRU11)	×		×	×	x
26 (ORU2)					x
57 (CRU3)		×			
110 (ORU15)	×	×	×	×	
115 (ORU17)					x
128 (ORU20)	×	×	×	×	x
129 (ORU21)	×	×	×	×	x
132 (ORU19)	×	×	×	×	x
TOTAL	**5**	**5**	**5**	**5**	**6**

Of the sites with small trees present in the T2-T3 stratum along the transect, the **minimum tree height was not significantly different from the 8th monitoring period,** varying from 6.5 m to 13.3 m, with the average tree height 9.8 m (0.4 m more than 8th monitoring period) (Table 10). Small tree species with highest average canopy height included *Eucalyptus siderophloia, Acacia disparrima, Lophostemon suaveolens, L. confertus, Alphitonia excelsa* and *E. acmenoides,* (in order of highest to lower). *Corymbia trachyphloia* was no longer amongst the highest small trees in this monitoring period.

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Of the sites with trees present along the transect in the small tree layer, **tree canopy FPC** ranged from 6% to 165%, and there was a slight increase in **average total FPC (29%, 4% higher than in the 8th monitoring period)**. Small tree species with high average cover were mostly consistent with the 8th monitoring period yet varied in order. These included *Acacia leiocalyx, A. disparrima, Lophostemon confertus, L. suaveolens, Alphitonia excelsa* and *Eucalyptus siderophloia* (from highest to lower FPC). *E. acmenoides* had decreased in cover despite maintaining a high average height.

6.2.5 Shrub height and cover (S1)

Of the sites with shrubs present along the transect in this monitoring period (56 sites), average shrub height ranged from 1.3 m to 7.2 m. **Average height had a non significant decrease at 2.8 m (0.1 m less than 8th monitoring period)**. Shrub species with high average height were similar to those recorded in the 8th monitoring period, including *Acacia leiocalyx, A. disparrima, Alphitonia excelsa, Lantana camara* (exotic), *L. suaveolens* and *L. confertus* (in order of highest to lower FPC).

Shrub FPC ranged from 4.4% to 79.6%. **Average FPC increased to 26.1% (3.1% more than 8th monitoring period).** Shrub species with highest average FPC were similar to the 8th monitoring period, with highest FPC recorded for the woody weed *Lantana camara*, followed by the native species *Acacia leiocalyx, Pteridium esculentum, A. disparrima, Alphitonia excelsa, Lophostemon confertus,, Daviesia umbellulata* and *Leptospermum polygalifolium* (from highest to lower FPC).

6.2.6 Native ground cover (G1)

Consistent with previous monitoring periods, **a living native ground cover layer was recorded within quadrats at all sites**, ranging from 3.2% to 86%. Average ground cover increased to 45.6% (14.1% increase since 8th monitoring period). This, coupled with improvements in species richness indicates continued overall improvement in the rehabilitation of the native ground layer.

Breaking the trend of **the native grass *Imperata cylindrica* having the highest native ground cover overall**, in this monitoring period, another native grass, *Entolasia stricta* had the highest ground cover of any species. This was followed by *I. cylindrica*, *Lomandra longifolia Lobelia purpurascens, Cymbopogon refractus* and *Eragrostis brownii.* The changes are likely a reflection of seasonal variation and response to wetter climatic conditions, for example dieback of *Pteridium esculentum* was regularly observed in transects, resulting in lower representation in the ground layer.

6.2.7 Weed incursion

Weeds in the ground cover quadrats were present at 50 sites (1 site more than the 8th monitoring period), ranging from 0.4% to 45.6% with an average weed cover of 14.5% (2.2% increase in weed cover since the 8th monitoring period). **Overall, weed cover in the ground layer increased at 35 sites (same as 8th monitoring period)**. Weed cover in the ground layer had decreased at 17 sites (8 more than 8th monitoring period).

There was some variation in sites with highest weed cover, which included **sites 110** (45.6%, 2.4% increase since 8th monitoring period), **site 137** (40.8%, 4.4% decrease), **site 59** (39.2%, 7.6% decrease), **site 24** (38.4%), **site 60** (37.6%) and **site 129** (37.2%, same as 8th monitoring period). These sites are located within the Precinct 12 Fauna corridor adjacent to the road crossing (site 24), Precinct 3 Fauna Corridor area to the north (sites 59 and 60), or within Precinct 17 Greenspace Corridors (sites 110 and 129) and Conservation Areas (site 137) adjoining the Plunkett Conservation Area (Figure 3). **Considering these sites are all within highly sensitive areas, it is recommended that these sites**

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are included among those to prioritise for assisted rehabilitation, to continue progressing the offset area towards improved ecological condition and higher benchmark achievement in this area.

Four weed species are important to mention as they were also amongst overall species with highest ground cover, including *Andropogon virginicus, Lantana camara, Passiflora suberosa* and *L. montevidensis* (in order of highest to lower cover).

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Table 10 9th Koala Offset monitoring period species richness, average canopy height within the canopy (T1), sub-canopy (T2-T3) and shrub layer (S1) and Foliage Projected Cover (FPC %) within the canopy (T1), sub-canopy (T2-T3), shrub layer (S1) and ground layer (G1)

Site	Species Richness (incl. weeds)					Height (m)			Foliage Projected Cover (%)					Av. Ground Cover (%)	
	Canopy (T1)	Sub - Canopy (T2 and T3)	Shrubs (S1)	Ground Layer (G1)	Total (excl. weeds)	Canopy (T1)	Sub - Canopy (T2 and T3)	Shrubs (S1)	Canopy (T1)	Sub - Canopy (T2 and T3)	Shrubs (S1)	Total Weed Crown FPC	Total Native Crown FPC	Total Ground Layer	Total Weed Ground Layer
18	2	4	5	30	29	17.8	7.9	3.9	58.0	58.4	79.6	0.0	196.0	41.2	8.4
19	1	4	4	30	31	20.3	9.9	2.8	46.0	97.8	26.4	0.0	170.2	33.6	11.2
23	0	8	6	38	40	0.0	8.9	3.0	0.0	70.0	16.4	14.0	72.4	54.8	7.6
24	1	4	1	34	29	0.0	8.9	3.0	0.0	51.0	16.0	0.0	67.0	71.6	38.4
25	1	3	7	42	38	20.0	10.5	2.6	30.0	90.0	28.8	0.0	148.8	46.4	7.2
26	0	7	5	44	40	0.0	8.2	2.7	0.0	68.4	24.4	0.0	92.8	61.2	8.8
27	0	6	5	30	33	0.0	9.5	7.2	0.0	73.0	12.2	0.0	85.2	18.8	8.8
28	0	6	6	39	37	0.0	8.5	2.6	0.0	26.0	19.0	0.0	45.0	68.0	19.6
29	3	4	5	43	42	15.0	9.6	3.8	30.0	75.0	17.0	0.0	122.0	71.2	20.0
30	3	3	2	45	32	17.9	10.8	0.0	88.0	17.0	0.0	0.0	105.0	64.0	2.8
31	1	6	2	23	21	15.3	10.8	3.0	16.0	67.0	22.0	0.0	105.0	6.0	2.0
32	1	7	5	23	26	0.0	8.1	2.4	0.0	56.4	15.6	0.0	72.0	3.2	0.8
33	0	5	4	22	20	0.0	8.4	4.8	0.0	77.0	22.0	0.0	99.0	14.0	10.8
44	0	4	4	29	25	0.0	7.3	2.9	0.0	41.0	62.0	0.0	103.0	26.8	1.6
45	1	5	6	32	34	22.3	12.7	2.5	66.0	87.0	18.8	0.0	171.8	60.4	15.6
46	2	4	5	34	33	20.8	12.1	2.6	39.0	60.0	24.0	0.0	123.0	57.2	15.2
47	0	4	4	19	21	0.0	8.6	3.0	0.0	51.0	63.2	0.0	114.2	42.8	0.8
49	0	8	6	33	34	0.0	8.7	0.0	0.0	30.0	0.0	0.0	30.0	41.2	10.8
54	0	7	7	26	33	0.0	8.7	1.9	0.0	28.4	54.6	0.0	83.0	32.4	11.6
55	1	8	9	27	41	22.0	13.3	6.0	34.0	134.6	34.3	0.0	202.9	54.8	4.0
56	0	4	2	30	32	0.0	12.6	3.8	0.0	120.0	11.0	0.0	131.0	52.0	7.2
57	0	3	2	44	37	0.0	10.5	2.1	0.0	16.0	21.0	0.0	37.0	52.2	17.6
58	0	6	5	34	37	0.0	10.2	2.3	0.0	72.0	18.0	0.0	90.0	12.0	1.6
59	1	3	7	24	28	0.0	6.8	2.0	0.0	49.6	17.8	0.0	67.4	85.2	39.2
60	0	5	5	42	40	0.0	7.1	1.9	0.0	23.0	5.0	0.0	28.0	60.0	37.6
61	0	2	1	36	31	0.0	8.4	2.6	0.0	50.0	40.0	0.0	90.0	45.6	8.8
62	3	3	5	32	43	16.8	9.9	1.9	64.0	26.0	11.0	0.0	101.0	48.4	0.0
63	3	3	7	24	36	22.1	8.5	2.2	51.0	33.0	39.8	0.0	123.8	48.4	0.0
64	4	4	7	27	41	15.6	12.1	2.6	69.0	37.0	20.0	0.0	126.0	42.8	0.0
65	4	5	12	25	46	17.8	10.8	2.0	75.0	33.0	33.6	0.0	141.6	49.6	0.0
66	4	5	9	67	73	15.3	9.1	2.0	33.0	58.6	59.0	0.0	150.6	84.4	13.6
67	2	3	6	31	40	17.1	7.9	2.4	97.0	31.4	23.6	0.0	152.0	35.2	0.8
68	3	3	9	18	33	14.4	12.1	2.4	82.0	28.0	11.2	0.0	121.2	21.6	0.0
69	2	1	7	18	28	16.1	0.0	1.8	48.0	0.0	44.0	0.0	92.0	17.6	0.0
102	3	4	3	13	23	17.9	9.7	2.6	81.0	34.0	6.0	0.0	121.0	9.6	0.0
103	4	1	8	27	37	17.8	6.5	1.7	68.0	8.0	17.0	0.0	93.0	20.0	3.2
104	1	4	5	20	27	17.4	12.8	2.6	50.0	26.0	18.0	0.0	94.0	29.2	0.0
109	2	5	8	32	43	18.6	8.2	2.7	46.0	19.0	13.0	0.0	78.0	19.2	1.6
110	1	5	4	31	22	16.0	7.8	2.4	12.0	6.0	54.6	12.0	60.6	74.0	45.6

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Site	Species Richness (incl. weeds)					Height (m)			Foliage Projected Cover (%)					Av. Ground Cover (%)	
	Canopy (T1)	Sub - Canopy (T2 and T3)	Shrubs (S1)	Ground Layer (G1)	Total (excl. weeds)	Canopy (T1)	Sub - Canopy (T2 and T3)	Shrubs (S1)	Canopy (T1)	Sub - Canopy (T2 and T3)	Shrubs (S1)	Total Weed Crown FPC	Total Native Crown FPC	Total Ground Layer	Total Weed Ground Layer
111	4	4	4	34	38	14.7	9.8	3.3	63.0	50.0	65.0	0.0	178.0	40.8	11.6
112	0	5	3	33	27	0.0	8.9	4.5	0.0	85.8	5.4	0.0	91.2	66.8	34.0
113	0	7	8	32	39	0.0	8.0	3.1	0.0	55.0	20.0	0.0	75.0	60.4	26.0
115	2	2	8	44	39	16.0	6.5	2.8	8.0	20.0	19.0	0.0	47.0	51.2	25.2
123	2	3	5	33	43	16.2	10.2	2.6	107.0	27.0	17.6	0.0	151.6	22.4	0.0
124	4	6	6	25	39	17.5	8.5	3.9	100.0	34.0	19.0	0.0	153.0	29.6	1.2
127	5	7	15	43	70	16.2	10.0	1.6	67.0	36.0	12.0	0.0	115.0	21.6	0.4
128	6	8	7	36	49	18.6	10.8	2.8	90.0	37.0	9.2	9.0	127.2	46.8	14.0
129	1	5	7	41	43	18.0	8.7	2.3	20.0	38.0	59.0	19.0	98.0	46.4	37.2
130	3	7	7	41	54	18.9	12.6	3.3	45.0	127.0	9.2	0.0	181.2	45.2	20.8
131	4	7	5	37	49	23.3	12.0	2.6	31.0	100.0	5.0	0.0	136.0	46.4	2.4
132	1	7	13	47	55	17.7	13.2	0.0	46.0	88.0	0.0	34.0	100.0	47.2	8.0
133	3	9	5	36	42	23.3	9.1	2.9	64.0	33.0	19.0	0.0	116.0	68.4	23.6
134	0	5	6	34	41	0.0	10.5	2.1	0.0	165.0	14.0	0.0	179.0	28.4	1.2
135	11	9	4	35	50	18.5	11.1	2.9	28.0	137.0	28.0	0.0	193.0	70.0	17.2
136	3	7	5	29	39	19.8	8.7	3.3	83.0	107.0	25.0	0.0	215.0	29.2	7.2
137	3	6	3	32	33	20.0	11.0	2.5	86.0	49.0	48.4	0.0	183.4	69.2	40.8
138	4	7	3	30	34	19.6	13.0	2.4	38.0	72.0	70.0	0.0	180.0	66.0	32.0
143	2	5	6	23	32	19.0	9.9	1.7	34.0	75.4	18.8	0.0	128.2	86.0	24.0
144	0	7	2	28	32	0.0	11.8	1.3	0.0	127.0	4.4	0.0	131.4	74.4	3.6
Averages*	**2.7 (+0.8)**	**4.9 (+0.6)**	**5.5 (+1.1)**	**32.4 (+5.0)**	**37.0 (+6.7)**	**18.2 (+0.3)****	**9.8 (+0.4)****	**2.8 (-0.1)****	**55.1*** (+11.5)**	**58.5*** (+8.5)**	**13.1*** (+3.2)**	**8.6*** (+1.3)**	**56.4*** (+10.1)**	**45.6 (+14.1)**	**14.5 (+2.2)**

*Note: values in parentheses indicate the percent or actual change in averages since 8th monitoring period.
** Within the margin of error (+/- 0.4%) for this type of assessment and is otherwise identified as 'no change' between two subsequent monitoring periods. Analysis of results from additional monitoring periods will provide a basis for more accurate conclusions.
*** In this monitoring report, values have been adjusted to reflect the Foliage Projected cover. This was also calculated for the previous monitoring period, to determine the average difference in FPC (%).

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6.3 Normalised Difference Vegetation Index (NDVI) monitoring

Although the last three Koala Offset reports presented results for normalised difference vegetation index (NDVI) monitoring across the site, this form of monitoring has been suspended due to delays relating to the aftermath of the COVID-19 pandemic. This monitoring is planned to recommence in the future.

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7 Discussion

An assessment of site species richness and structure was undertaken to compare the 9th monitoring period condition against the 8th monitoring period and to measure against target benchmark parameters, in order to identify priority management areas and guide recommendations for management. The 9th offset monitoring period was undertaken in year 5 of monitoring, therefore, sites will ideally have attained a new minimum of IMO-5 for the benchmark variables. Interestingly, all sites had achieved the IMO-5 benchmark for at least 3 or more variables, confirming positive progression towards the benchmark targets. Furthermore, there were 58 sites that met a FINAL benchmark in at least one benchmark variable (2 more than 8th monitoring period) (Table 11).

7.1 Benchmark overview – trends within variables

In overview, whilst recovery is not consistent across all variables, there is a general trend of improvement for native species richness and native ground cover. The greatest declines were observed in shrub cover and weed cover whilst remaining variables were regarded as 'same'.

There was another significant increase in average species richness and an overall increase in the total number of species, perhaps due to sustained favourable seasonal conditions including increases in rainfall. This was reflected in the overall trend of increase in benchmark results. A total of **44 sites met the FINAL benchmark for species richness (74.6%, 20.4% increase since 8th monitoring period).**

The **significant increase in average T1 canopy cover was congruent with the benchmark results, which had an overall trend of 'improving' compared to the 8th monitoring period**. A total of 37 sites met a benchmark for T1 canopy cover (62.7%, a 5.1% increase since 8th monitoring period). The **non-significant increase (≤0.4%) in average T1 canopy height was congruent with the benchmark results, which had an overall trend of 'same' compared to the 8th monitoring period,** with both monitoring periods having 34 sites meeting a benchmark for T1 canopy height (57.6%).

Again, the **increase in T2-T3 small tree cover was not reflected in the benchmark results, which had an overall trend of 'same'**. A total of 58 sites met a benchmark for T2-T3 small tree cover (98.3%, same as 8th monitoring period). The **non-significant increase in T2-T3 small tree height was not reflected in the benchmark results, which also had an overall trend of 'same'**. A total of 57 sites also met the benchmark for T2-T3 small tree height (96.6%, same as 8th monitoring period).

The significant increase in overall average shrub cover was not reflected in the benchmark results, which had an overall trend of 'same'. A total of 46 sites met a benchmark for shrub cover (77.9%, 6.8% increase since 8th monitoring period), however the value of same was applied due to the closeness in number of sites improving and declining. There was a **non-significant decrease in shrub height,** attributed to succession of individuals migrating into the T2-T3 layer, or redistribution of cover across the centre line due to patterns of shrub growth. The **slight decrease in average shrub height, was congruent with the overall trend of 'same'** due to similarities in the number of sites improving and declining, with 55 sites meeting the benchmark for shrub height (93.2%, 3.4% less than 8th monitoring period).

The significant increase in overall average shrub cover was reflected in the benchmark results, which had an overall trend of 'improving' due to the continued increase in the number of sites that had improved since the previous monitoring period, despite only a slight increase overall in the total number of sites meeting a benchmark.

The significant **increase in average ground cover was reflected in the benchmark results, which had an overall trend of 'improving'** due to the continued increase in the number of sites that had

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improved since the previous monitoring period, despite only a slight increase overall in the total number of sites meeting a benchmark. A total of 56 sites met a benchmark for ground cover (94.9%, 1.7% increase since 8th monitoring period), with 29 sites improving (3 more than 8th monitoring period).

The significant **increase in average weed cover was coupled with an overall trend of 'declining' in benchmark values.** This is due to the lower number of sites (24 sites) meeting the <5% cover benchmark (40.6%, 11.9% decrease since 8th monitoring period), coupled with no sites improving and an increase in the number of sites remaining in the same condition as last monitoring period. The increase in weed cover is most likely attributable to the continuation of favourable seasonal conditions including increased rainfall following the extreme dry period.

7.2 Benchmark overview – site comparison

Within individual sites, there were 12 sites that did not experience any variables that were 'declining' (20.3%, 13.5% decrease since 8th monitoring period), thereby exhibiting a trend of improvement (condition 'improving' or 'same'). Their associated ORU were considered amongst those in best condition and therefore not prioritised for active management at this time. Sites with no declining variables included sites 18 (ORU1), 32 (ORU4), 63 (ORU10), 64 (ORU11), 67 and 69 (ORU9), **102 (ORU13),** 109 (ORU15), 112 and **113 (ORU16), 115 (ORU17)** and 128 (ORU20). A number of these sites were also among those with no declining variables in the 8th monitoring period (indicated in bold). In addition, t**here was a satisfactory result for the number of IMO-5 benchmarks met within sites, with 58 sites (98%) meeting a minimum of four IMO-5 benchmarks**. Furthermore, 52 sites (88%) reached the benchmark of IMO-5 or greater for at least 5 benchmark variables supporting an above satisfactory overall result for the first IMO-5 year monitoring period.

Management priorities aim to target the sites that are in poorest condition, and or in greatest decline and may include assisted natural rehabilitation for improvement of ecological condition and progression towards benchmark goals. Recommendations generally include targeted weed management, with or without infill planting to improve results for species richness or height and cover of targeted strata layers over time, for example, where the T1 canopy layer is lacking. The following provides a detailed discussion of results for the 9th monitoring period to highlight priority areas for management and recommended management actions.

Despite some declines in shrub cover and weed cover benchmarks, the number of variables meeting **any** benchmarks has remained consistent since the 6th monitoring period, with all sites having attained a minimum of 4 or more benchmark variables. **Three sites (sites 49, 56 and 112) met only four benchmark variables, and were therefore regarded among those in poorest condition (despite this, where a benchmark was met, they were consistently at IMO-5 or greater condition). The variables that failed to meet any benchmarks for these sites included species richness, T1 canopy height and cover, shrub cover and weed cover, highlighting these sites as top priority for infill planting of canopy species to facilitate regeneration of this strata layer, combined with weed management for progression towards benchmarks within the longer term.** Assessment of the shrub layer in future monitoring periods will determine if infill planting in this strata is also desirable, however it is considered that this layer will improve naturally in cover and species richness through succession over time. The remaining 95% of sites now meet at least 5 benchmarks across variables indicating a trend of improvement overall.

Additional sites in 'poorest condition' usually include those that failed to attain the minimum IMO benchmark across multiple (4 or more) variables. However, due to the high level of benchmark achievement in this monitoring period, **there was only one site that attained less than 4 IMO-5 benchmarks (site 33 (ORU4)).** Therefore, sites that failed to meet a new target of 5 or more variables attaining the minimum (IMO-5) benchmark were included among those in poorest condition for this

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monitoring period. This resulted in an **additional 6 sites that failed to meet the new target of IMO-5 in 5 or more areas (including failure to meet the benchmark of <5% weed cover), making them among the top priority sites for management.** It is noted that three of these (sites 49, 56 and 112) are also listed above for lowest number of variables reaching **any** benchmark. These sites have been ordered in the following from highest to lower weed cover, with the higher weed cover indicating higher priority for management purposes: **Site 110 (ORU15), 59 (ORU7), 24 (CRU11), 112 (ORU16), 49 (CRU15) and 56 (CRU3).**

In the current monitoring round, **there were 6 sites that were considered in greatest decline** as they had all declined in 3 benchmark variables, whereas other sites had declined in 2 or less variables. These varied from those that were in greatest decline in the 8th monitoring period and **included sites 49 (CRU15), 62 and 68 (ORU9), 136 (ORU22), 137 (ORU23) and 143 (CRU8). Of these, site 49 was already among the top priority, and an additional site (site 143) was added to top priority sites due to significant declines in species richness, T1 canopy height and shrub cover as well as a high weed prevalence (24% cover).** The other sites are regarded to be faring well, with high benchmark achievement for most variables despite the recorded declines; therefore they are not targeted as priority for management at this time, but will be observed for any continued decline in the next monitoring period.

Another consideration included sites that had the least improvement overall in the 9th monitoring period. Considering that sites had improved overall in terms of achieving 4 or more minimum benchmarks, the sites with the least improvement (0-1 variables improving overall AND failure to meet any benchmark in 4 or more areas) were regarded as 'high priority least improved'. Of the 14 sites that were among the 'high priority least improved' in the 8th monitoring period, 9 sites had 2 or more variables improving in the current monitoring period. Overall, there were 22 sites among the least improved. Of these, there were 7 sites that were regarded as high priority, including **site 24 (CRU11),** 33 (ORU4), 49 (CRU15), **56 (CRU3), 59 (ORU7), 112 (ORU16)** and 144 (CRU8) (bold indicates those regarded as 'high priority least improved' in 8th monitoring period). Most of these sites had already been identified among the poorest condition sites, however site 144 had attained high benchmarks for most variables including % weed cover yet lacked species richness and a T1 canopy layer, making the site a candidate for infill planting with T1 species to ensure the site progresses towards the desired benchmarks over the longer term. **The remaining sites needed most improvement in native species richness, T1 canopy cover and height, shrub cover and % weed cover. This perspective highlighted a need to focus recommended rehabilitation efforts on assisted natural regeneration through infill planting of T1 canopy tree species combined with weed management at these sites.**

Consistent with the previous 2 monitoring periods, there was a continued trend of decline regarding the number of sites meeting the benchmark of ≤5% cover for weed cover in the ground layer. This was reflected in the results, with 51 sites remaining the same (1 more than 8th monitoring period), 8 declining (same as 8th monitoring period) and none improving (1 less than 8th monitoring period). A total of 35 sites failed to meet the benchmark for weed cover (7 more than 8th monitoring period). **It is recommended to concentrate future management towards reducing weed cover at top priority sites (those listed above as in 'poorest condition') to pause the trend of decline, with a goal for establishing a trend of improvement. This will benefit offset areas through continued restoration of ecological condition towards desired RE's and in some instances (e.g. where large thickets of *Lantana camara* act as barriers) also free up ground space to enhance potential as movement corridors for koalas and other fauna. It is important to take a passive, mosaic approach to removal of weeds where established patches are providing shelter and breeding space for native fauna such as birds, small mammals and amphibians. Therefore, overspray should be avoided, with hand removal recommended for large patches of *L. camara* following close inspection to ensure active nesting sites are not disturbed.**

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Sites that had the highest weed cover recorded (Table 10) and did not meet the benchmark (Table 11) are high priority for management in order to bring them into alignment with benchmark targets. In this monitoring period, the sites with highest weed cover were among the top 5 sites in poorest condition listed above (Site 110 (ORU15), 59 (ORU7), 24 (CRU11) and 112 (ORU16)). **Two additional sites (site 60 (ORU8) and 129 (ORU21)) were identified as among those having highest weed cover and therefore to be included as a top priority site for rehabilitation.** These 2 sites fared well in most other benchmark variables, with room for most improvement in weed cover and T1 Canopy. Therefore, **weed management combined with infill planting for T1 canopy species is recommended for sites 60 and 129.**

Priority species for weed control overall include *Lantana camara* (woody shrub), *Gomphocarpus physocarpus* (herb), *Cinnamomum camphora* (tree), *Pinus elliottii* (tree), and *Passiflora subpeltata* (vine) in the shrub layer. In the ground layer priority weed species were based on species with the greatest cover recorded and most widespread, including *Andropogon virginicus* (grass), *Lantana camara* (woody shrub), *Passiflora suberosa* (vine), *Lantana montevidensis* (creeping herb), *Ageratum houstonianum* (herb) and *Digitaria didactyla* (grass). These may be encountered alongside other mixed exotic grasses and herbs.

7.3 Priority Precincts for weed management

In this monitoring period, the results indicate a continued decline in the number of sites meeting the benchmark for % weed cover, and a significant increase in overall average weed cover. This may be attributed to seasonal conditions, including increased rainfall providing favourable conditions for the growth of herbaceous weeds and graminoids in the ground layer as well as continued establishment of *L. camara* in areas that have not yet been managed. It is recommended that **rehabilitation continues to prioritise weed control in ORU / CRU containing sites that fail to meet the <5% weed cover benchmark as prescribed above, particularly those in ongoing sensitive areas such as those within or adjacent to conservation areas and greenspace areas adjoining Plunkett Conservation Reserve. This includes the areas in the eastern most reaches of Precinct 3 (ORU9, ORU10 and ORU11) and Precinct 17, previously known as Precincts 14 and 15 (CRU8, ORU15, ORU16, ORU17, ORU18, ORU19, ORU20, ORU21, ORU22 and ORU23).**

There are a total of 27 sites in these ORU / CRU, with 16 of these failing to meet the ≤5% benchmark for weed cover. Four of these sites were already included among the top priority sites for rehabilitation supporting the above recommendations. This included site 110 (ORU15), 112 (ORU16), 143 (CRU8) and 129 (ORU21) from higher to lower priority based on overall results. Other sites have been ordered from higher to lower priority based on % weed cover: site 137 and 138 (ORU23), 113 (ORU16), 115 (ORU17), 133 (ORU19), 130 (ORU21), 135 (ORU22), 128 (ORU20), 111 (ORU15), 132 (ORU19) and 136 (ORU22). All of these sites fall within **Precinct 17, highlighting it as the priority Precinct for rehabilitation management, in order to contain and minimise the potential for weeds to encroach further into conservation areas. Priority species for weed control within Precinct 17 are consistent with the 8th monitoring period and include the most abundant species recorded - *Lantana camara* (woody shrub), *Andropogon virginicus* (graminoid), *Passiflora suberosa* (vine) and *Ageratum houstonianum* (herb).** Low occurrences of other mixed exotic herbs and grasses may be encountered in these areas.

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7.4 Conclusions and recommendations

In conclusion, the results for benchmark indicators and weed cover were used to determine highest priority sites for rehabilitation based on poorest overall condition, least improved, weed benchmark condition and precinct proximity to sensitive areas. **It was determined that there are 9 priority Rehabilitation Units within 4 precincts to be considered highest priority for management action, including ORU4 (Precinct 9), *ORU15 (Precinct 17),* ORU7 (Precinct 3), CRU11 (Precinct 12), *ORU16 (Precinct 17),* CRU15 and CRU3 (Precinct 3), *CRU8 and ORU21 (Precinct 17)* and ORU8 (Precinct 3) from highest to lower priority, with italics indicating those that were included among top priority areas in the 8th monitoring period.** The recommended actions for these sites include **weed management in the ground and shrub layer including removal of *Pinus elliottii* from the upper strata layers where present (primarily sites ORU15 and ORU21). Additionally, infill planting of T1 canopy species in these ORUs is recommended to progress towards benchmark targets for canopy in the long term.** The recommended management actions including recommended species for infill planting for top priority ORU are provided in order of highest to lowest priority in Table 11 below. Recommended species for infill planting are based on species recorded within transect surveys for each site.

Table 11 9th Koala Offset monitoring period top priority ORU (highest to lowest) and recommended management actions

Precinct	Rehabilitation unit	Site	Weed cover %	Management action	Priority weeds	Species for infill planting
9	ORU4	33	10.8	Minimal weed management + infill planting (T1 species)	*Lantana camara*, mixed herbs	*Corymbia intermedia, C. tesselaris*
17	ORU15	110	45.6	Intensive weed management + infill planting (T1 species)	*Andropogon virginicus, Pinus elliottii,* mixed woody weeds / herbs	*Eucalyptus siderophloia, E. resinifera*
3	ORU7	59	39.2	Intensive weed management + infill planting (T1 species)	*Setaria sphacelata, Ageratum houstonianum*	*Eucalyptus tereticornis, Melaleuca linariifolia*
12	CRU11	24	38.4	Intensive weed management + infill planting (T1 species)	*Andropogon virginicus,* mixed other grasses	*Eucalyptus tereticornis, E. siderophloia*
17	ORU16	112	34	Intensive weed management + infill planting (T1 species)	*Andropogon virginicus, Ageratum houstonianum*	*Eucalyptus tereticornis, Melaleuca linariifolia*
3	CRU15	49	10.8	Minimal weed management + infill planting (T1 species)	*Ageratum houstonianum, Lantana montevidensis*	*Eucalyptus tereticornis, E. siderophloia, E. resinifera, E. seeana*
3	CRU3	56	7.2	Minimal weed management + infill planting (T1 species)	*Andropogon virginicus*	*Eucalyptus siderophloia, E. resinifera*
17	CRU8	143	24	Moderate weed management, no planting	*Lantana camara, Passiflora suberosa*	*Eucalyptus tereticornis*
17	ORU21	129	37.2	Intensive weed management with infill planting (T1 species)	*Lantana camara*	*Eucalyptus siderophloia, E. resinifera*

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Precinct	Rehabilitation unit	Site	Weed cover %	Management action	Priority weeds	Species for infill planting
3	ORU8	60	37.6	Intensive weed management with infill planting (T1 species)	*Andropogon virginicus,* mixed herbs	*Corymbia intermedia, Eucalyptus seeana*
17	CRU8	144	3.6	infill planting only (T1 species)	n/a	*Corymbia intermedia, Eucalyptus seeana*

Additional measures:

- Targeted felling of *Pinus elliottii* from the T1 canopy and T2-T3 small tree layers is recommended at sites 23 (CRU11), 26 (ORU2), 115 (ORU17), 128 (ORU20), 129 (ORU21), 132 (ORU19).

- Continued strategic rehabilitation of the shrub layer may be required in priority areas to continue boosting the layer to meet or improve benchmarks, and also to help ensure that weeds are outcompeted and shaded out, thereby reducing the need for reactive management over time.

- Where appropriate, rehabilitation efforts are to also incorporate ongoing maintenance of stock exclusion fencing and installation of new fencing where the need has been identified based on monitoring results, if stock incursion is adversely impacting benchmark achievement due to overgrazing or trampling.

- Seasonal variation should be taken into account when considering any infill planting, which is not recommended during extreme dry conditions.

- Thinning of the ground layer in sites that are dominated by *Imperata cylindrica* or exotic ground cover species may also be considered, in order to provide opportunity for the natural seed bank to propagate and help improve species richness.

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Table 12 9th Koala Offset monitoring period species richness, canopy height within the canopy (T1), sub-canopy (T2-T3) and shrub layer (S1) and cover within the canopy (T1), sub-canopy (T2-T3), shrub layer (S1) and ground layer (G1) measured against benchmarks for each respective RE

Site	Rehab Unit	Pre-Clearing Regional Ecosystem	Species Richness (native)	Canopy Cover (T1)	Canopy Height (T1)	Small Tree Cover (T2-T3)	Small Tree Height (T2-T3)	Shrub Cover (S1)	Shrub Height (S1)	Ground Cover (G1)	Weed Cover (<5%?)
18	ORU1	12.9-10.17/12.9-10.2	FINAL (S)	FMO-15 (I)	IMO-10 (S)	FMO-15 (S)	IMO-5 (S)	FMO-15 (I)	FMO-15 (S)	IMO-10 (I)	X (S)
19	ORU1	12.9-10.17/12.9-10.2	FINAL (S)	IMO-10 (S)	FMO-15 (S)	FINAL (I)	IMO-10 (S)	IMO-3 (I)	FMO-15 (D)	IMO-5 (I)	X (S)
23	CRU11	12.3.11/12.3.6/12.3.7	FINAL (I)	X (S)	X (S)	FINAL (I)	FINAL (I)	IMO-2 (D)	FINAL (S)	FINAL (S)	X (D)
24	CRU11	12.3.11/12.3.6/12.3.7	X (S)	X (S)	X (S)	FMO-15 (S)	FINAL (I)	IMO-2 (D)	FINAL (S)	FINAL (S)	X (S)
25	ORU2	12.3.11/12.3.6/12.3.7	FINAL (S)	IMO-3 (S)	FMO-15 (S)	FINAL (S)	FINAL (S)	IMO-5 (I)	FMO-15 (D)	FINAL (S)	X (S)
26	ORU2	12.3.11/12.3.6/12.3.7	FINAL (I)	X (S)	X (S)	FINAL (I)	FMO-15 (S)	IMO-3 (D)	FMO-15 (S)	FINAL (S)	X (S)
27	ORU2	12.3.11/12.3.6/12.3.7	FINAL (I)	X (S)	X (S)	FINAL (I)	FINAL (I)	IMO-1 (D)	FINAL (S)	FINAL (I)	X (S)
28	ORU2	12.3.11/12.3.6/12.3.7	FINAL (I)	X (S)	X (S)	IMO-10 (I)	FMO-15 (I)	IMO-2 (D)	FMO-15 (D)	FINAL (S)	X (S)
29	ORU4	12.9-10.17/12.9-10.2	FINAL (S)	IMO-3 (I)	IMO-10 (S)	FINAL (S)	IMO-10 (S)	IMO-2 (D)	FMO-15 (S)	FMO-15 (S)	X (S)
30	ORU4	12.9-10.17/12.9-10.2	FINAL (S)	FMO-15 (S)	IMO-10 (S)	IMO-5 (S)	FMO-15 (S)	X (S)	X (D)	FMO-15 (I)	FINAL (S)
31	ORU4	12.9-10.17/12.9-10.2	X (D)	IMO-1 (S)	IMO-10 (S)	FINAL (I)	FMO-15 (I)	IMO-3 (I)	FMO-15 (I)	X (S)	FINAL (S)
32	ORU4	12.9-10.17/12.9-10.2	FINAL (S)	X (S)	X (S)	FMO-15 (S)	IMO-5 (S)	IMO-2 (I)	IMO-10 (I)	X (S)	FINAL (S)
33	ORU4	12.9-10.17/12.9-10.2	X (D)	X (S)	X (S)	FINAL (I)	IMO-5 (S)	IMO-3 (D)	FINAL (S)	IMO-1 (S)	X (S)
44	ORU5	12.3.11/12.3.6/12.3.7	X (S)	X (S)	X (S)	FMO-15 (S)	IMO-5 (S)	FMO-15 (D)	FINAL (S)	FINAL (I)	FINAL (S)
45	ORU5	12.3.11/12.3.6/12.3.7	FINAL (I)	FMO-15 (I)	FMO-15 (S)	FINAL (S)	FMO-15 (S)	IMO-2 (I)	FMO-15 (D)	FMO-15 (S)	X (S)
46	ORU5	12.3.11/12.3.6/12.3.7	FINAL (I)	IMO-5 (I)	FMO-15 (S)	FMO-15 (S)	FMO-15 (D)	IMO-3 (I)	FMO-15 (D)	FMO-15 (I)	X (S)
47	ORU5	12.3.11/12.3.6/12.3.7	X (S)	X (S)	X (S)	FMO-15 (S)	IMO-10 (I)	FMO-15 (D)	FINAL (S)	FINAL (I)	FINAL (S)
49	CRU15	12.3.11/12.3.6/12.3.7	FINAL (S)	X (S)	X (S)	FMO-15 (S)	IMO-10 (S)	X (D)	X (D)	FINAL (S)	X (D)
54	ORU6	12.3.11/12.3.7	FINAL (S)	X (S)	X (S)	IMO-10 (I)	IMO-10 (S)	FMO-15 (D)	IMO-10 (D)	FINAL (S)	X (S)
55	ORU6	12.3.11/12.3.7	FINAL (S)	IMO-3 (S)	FMO-15 (S)	FINAL (S)	FINAL (I)	IMO-10 (D)	FINAL (I)	FINAL (S)	FINAL (S)
56	CRU3	12.3.11/12.3.7	X (S)	X (S)	X (S)	FINAL (S)	FINAL (I)	X (S)	FINAL (S)	FINAL (S)	X (D)
57	CRU3	12.3.11/12.3.6/12.3.7	FINAL (I)	X (S)	X (S)	IMO-5 (I)	FMO-15 (I)	IMO-3 (I)	FMO-15 (S)	FINAL (I)	X (D)
58	ORU7	12.3.11/12.3.6/12.3.7	FINAL (S)	X (S)	X (S)	FINAL (S)	FMO-15 (I)	IMO-2 (D)	FMO-15 (D)	FMO-15 (S)	FINAL (S)
59	ORU7	12.3.11/12.3.6/12.3.7	X (S)	X (S)	X (S)	FMO-15 (S)	IMO-5 (S)	IMO-2 (D)	FMO-15 (I)	FINAL (S)	X (S)
60	ORU8	12.9-10.17/12.9-10.2	FINAL (S)	X (S)	X (S)	IMO-10 (I)	IMO-5 (S)	X (S)	IMO-5 (D)	FMO-15 (I)	X (S)

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Site	Rehab Unit	Pre-Clearing Regional Ecosystem	Species Richness (native)	Canopy Cover (T1)	Canopy Height (T1)	Small Tree Cover (T2-T3)	Small Tree Height (T2-T3)	Shrub Cover (S1)	Shrub Height (S1)	Ground Cover (G1)	Weed Cover (<5%?)
61	ORU8	12.9-10.17/12.9-10.2	FINAL (S)	X (S)	X (S)	FMO-15 (S)	IMO-5 (S)	FMO-15 (I)	IMO-10 (D)	FMO-15 (I)	X (D)
62	ORU9	12.9-10.17/12.9-10.19	FINAL (S)	FMO-15 (I)	IMO-10 (D)	IMO-10 (D)	IMO-10 (D)	X (S)	IMO-5 (S)	FMO-15 (I)	FINAL (S)
63	ORU10	12.9-10.17	FINAL (S)	IMO-10 (S)	FMO-15 (S)	FMO-15 (S)	IMO-5 (S)	FMO-15 (I)	IMO-10 (S)	FMO-15 (I)	FINAL (S)
64	ORU11	12.9-10.17	FINAL (S)	FMO-15 (I)	IMO-10 (S)	FMO-15 (I)	FMO-15 (I)	IMO-3 (I)	IMO-10 (S)	IMO-10 (I)	FINAL (S)
65	ORU10	12.9-10.17	FINAL (S)	FMO-15 (S)	IMO-10 (S)	FMO-15 (I)	FMO-15 (I)	IMO-10 (I)	IMO-5 (D)	FMO-15 (I)	FINAL (S)
66	ORU9	12.9-10.17/12.9-10.19	FINAL (S)	IMO-3 (I)	IMO-10 (S)	FMO-15 (S)	IMO-10 (S)	FMO-15 (I)	X (S)	FMO-15 (S)	X (D)
67	ORU9	12.9-10.17/12.9-10.19	FINAL (S)	FMO-15 (S)	IMO-10 (S)	FMO-15 (I)	IMO-5 (S)	IMO-3 (I)	IMO-10 (S)	IMO-10 (I)	FINAL (S)
68	ORU9	12.9-10.17/12.9-10.19	FINAL (S)	FMO-15 (I)	IMO-10 (S)	IMO-10 (D)	FMO-15 (I)	X (D)	IMO-10 (I)	IMO-2 (D)	FINAL (S)
69	ORU9	12.9-10.17/12.9-10.19	FINAL (S)	IMO-10 (S)	IMO-10 (S)	X (S)	X (S)	FMO-15 (I)	IMO-5 (I)	IMO-1 (S)	FINAL (S)
102	ORU13	12.9-10.17/12.9-10.19	X (S)	FMO-15 (S)	IMO-10 (S)	FMO-15 (S)	IMO-10 (S)	X (S)	IMO-10 (S)	X (S)	FINAL (S)
103	ORU13	12.9-10.17/12.9-10.19	FINAL (S)	FMO-15 (S)	IMO-10 (S)	IMO-2 (I)	IMO-5 (D)	IMO-2 (I)	IMO-3 (S)	IMO-2 (I)	FINAL (S)
104	ORU13	12.9-10.17/12.9-10.19	X (S)	IMO-10 (S)	IMO-10 (D)	IMO-10 (D)	FMO-15 (S)	IMO-2 (I)	IMO-10 (S)	IMO-3 (I)	FINAL (S)
109	ORU15	12.9-10.17/12.9-10.2	FINAL (S)	IMO-10 (S)	FMO-15 (S)	IMO-5 (S)	IMO-5 (S)	IMO-1 (S)	IMO-10 (S)	IMO-1 (I)	FINAL (S)
110	ORU15	12.9-10.17/12.9-10.2	X (S)	IMO-1 (I)	X (S)	IMO-2 (I)	IMO-5 (D)	FMO-15 (I)	IMO-10 (I)	FMO-15 (S)	X (S)
111	ORU15	12.9-10.17/12.9-10.2	FINAL (I)	FMO-15 (I)	X (S)	FMO-15 (D)	IMO-10 (S)	FMO-15 (I)	FMO-15 (I)	IMO-10 (I)	X (S)
112	ORU16	12.9-10.17/12.9-10.19	X (S)	X (S)	X (S)	FINAL (S)	IMO-5 (S)	X (S)	FINAL (S)	FMO-15 (S)	X (S)
113	ORU16	12.9-10.17/12.9-10.19	FINAL (I)	X (S)	X (S)	FMO-15 (S)	IMO-5 (S)	IMO-3 (S)	FMO-15 (S)	FMO-15 (I)	X (S)
115	ORU17	12.9-10.17/12.9-10.2	FINAL (I)	X (S)	IMO-10 (S)	IMO-5 (S)	X (S)	IMO-2 (S)	FMO-15 (S)	FMO-15 (S)	X (S)
123	ORU18	12.9-10.17	FINAL (S)	FMO-15 (S)	IMO-10 (S)	IMO-10 (D)	IMO-10 (S)	IMO-2 (S)	IMO-10 (S)	IMO-2 (I)	FINAL (S)
124	ORU18	12.9-10.17	FINAL (S)	FMO-15 (S)	IMO-10 (S)	FMO-15 (S)	IMO-5 (D)	IMO-2 (I)	FMO-15 (D)	IMO-3 (I)	FINAL (S)
127	ORU20	12.9-10.17/12.9-10.2	FINAL (S)	FMO-15 (S)	IMO-10 (S)	FMO-15 (S)	IMO-10 (S)	IMO-1 (I)	IMO-3 (D)	IMO-2 (D)	FINAL (S)
128	ORU20	12.9-10.17/12.9-10.2	FINAL (S)	FMO-15 (S)	FMO-15 (I)	FMO-15 (S)	FMO-15 (I)	X (S)	FMO-15 (S)	FMO-15 (I)	X (S)
129	ORU21	12.11.5/12.11.3	FINAL (I)	IMO-2 (S)	X (S)	FMO-15 (D)	IMO-10 (S)	FMO-15 (D)	FINAL (S)	FINAL (S)	X (S)
130	ORU21	12.11.5/12.11.3	FINAL (S)	IMO-10 (I)	FMO-15 (I)	FINAL (S)	FINAL (S)	X (D)	FINAL (S)	FMO-15 (I)	X (S)
131	ORU19	12.11.5/12.11.3	FINAL (I)	IMO-3 (S)	FMO-15 (S)	FINAL (S)	FINAL (S)	X (D)	FINAL (S)	FINAL (I)	FINAL (S)
132	ORU19	12.11.5/12.11.3	FINAL (I)	IMO-10 (I)	IMO-10 (S)	FINAL (S)	FINAL (S)	X (D)	X (S)	FINAL (I)	X (S)
133	ORU19	12.11.5/12.11.3	FINAL (S)	FMO-15 (I)	FMO-15 (I)	FMO-15 (S)	FMO-15 (I)	IMO-2 (D)	FINAL (I)	FINAL (I)	X (D)

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Site	Rehab Unit	Pre-Clearing Regional Ecosystem	Species Richness (native)	Canopy Cover (T1)	Canopy Height (T1)	Small Tree Cover (T2-T3)	Small Tree Height (T2-T3)	Shrub Cover (S1)	Shrub Height (S1)	Ground Cover (G1)	Weed Cover (<5%?)
134	ORU22	12.11.5/12.11.3	FINAL (I)	X (S)	X (S)	FINAL (S)	FINAL (I)	IMO-2 (D)	FMO-15 (D)	FMO-15 (S)	FINAL (S)
135	ORU22	12.11.5/12.11.3	FINAL (I)	IMO-3 (I)	X (S)	FINAL (S)	FINAL (S)	IMO-5 (D)	FINAL (I)	FINAL (I)	X (S)
136	ORU22	12.11.5/12.11.3	FINAL (I)	FMO-15 (S)	FMO-15 (S)	FINAL (S)	FMO-15 (D)	IMO-3 (D)	FINAL (S)	FMO-15 (I)	X (D)
137	ORU23	12.11.5	X (D)	FMO-15 (S)	FMO-15 (S)	FMO-15 (D)	FINAL (S)	FMO-15 (D)	FINAL (S)	FINAL (S)	X (S)
138	ORU23	12.11.5	X (S)	IMO-5 (D)	FMO-15 (S)	FINAL (S)	FINAL (S)	FMO-15 (D)	FINAL (S)	FINAL (S)	X (S)
143	CRU8	12.11.5/12.11.3	X (D)	IMO-3 (D)	FMO-15 (S)	FINAL (S)	FINAL (S)	IMO-2 (D)	FMO-15 (I)	FINAL (S)	X (S)
144	CRU8	12.11.5/12.11.3	X (S)	X (S)	X (S)	FINAL (S)	FINAL (S)	X (D)	IMO-5 (S)	FINAL (S)	FINAL (S)
Total meeting a benchmark (current mon.)			**44**	**37**	**34**	**58**	**57**	**46**	**55**	**56**	**24**
Total meeting a benchmark (8th mon.)			**32**	**34**	**34**	**58**	**57**	**42**	**57**	**55**	**31**
Total improving (since 8th mon.)			**16**	**14**	**3**	**15**	**16**	**21**	**11**	**29**	**0**
Total declining (since 8th mon.)			**4**	**2**	**2**	**7**	**6**	**27**	**15**	**2**	**8**
Total same (since 8th mon.)			**39**	**43**	**54**	**37**	**37**	**11**	**33**	**28**	**51**
Overall trend			**≥**	**=**	**=**	**=**	**=**	**=**	**=**	**≥**	**≤**

Total sites (excl. removed) = 59

Note: the site meets the following benchmarks: IMO- 1 year; IMO- 2 year, IMO-3 year, IMO-5 year, IMO-10 year, FMO-15 year, FINAL Benchmark condition, and X – does not meet any benchmark.
* D = Decrease, S = Same, I = Increase in all values

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