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Wednesday, 19th September 2018

Ms Kylie Moore
King and Campbell
PO Box
Port Macquarie NSW 2444

Delivery via: Email [kyliem@kingcampbell.com.au]

Dear Kylie,

RE: Ecological Assessment for Rezoning Proposal over Lot 1 DP 1117908 and Lot 10 DP615775, Houston Mitchell Drive, Lake Cathie

As requested, we have conducted an ecological assessment of the property as per the BAM methodology.

1.0 Background Information

1.1. Location and Description

The subject site comprises a 9.54ha property on the corner of Houston Mitchell Drive and Ocean Drive at Lake Cathie. It largely comprises slashed exotic grassland and scattered trees. A patch of open forest is located in the north. Part of the site is currently used for industrial activities and storage and a dwelling is located in the north if the site.

The site adjoins Queens Lake State Conservation Area to the west. The location of the subject site is shown in Figure 1.

The site is mostly level at 10m elevation, increasing to 15m in the north. There are no watercourses on the site, however a farm dam is located in the southeast. The site is underlain by a bedrock of the Watonga Formation which comprises slate, chert and slaty sandstone. An alluvial formation passes through the central and southern portion of the site. This formation is defined as an Alluvial and Colluvial fan comprising fluvial sand, gravel, clay and silt (Troedson and Hashimoto 2008).

1.2. Rezoning Proposal

The subject site is currently zoned Primary Production (RU1). The proposal is to rezone Lot 1 and Lot 10 to Light Industrial (IN2) and Environmental Management (E3). The area proposed for Industrial is located in the northern half of the site and covers 5.81ha. The remaining 3.73ha of the site is proposed as a conservation offset area which would be rezoned to E3. The rezoning proposal plan is provided in Figure 2.

Most of the forested vegetation in the north of the site will be retained in the offset area. The development area comprises slashed grassland and scattered trees.

The rezoning proposal has been previously subject to an ecological assessment by FloraFauna Consulting in 2016. Since these surveys and assessments, the NSW Biodiversity legislation has changed and the new *Biodiversity Conservation Act 2016* (BC Act) was introduced. This requires certain developments to be assessed under the Biodiversity Offset Scheme (BOS) which requires application of the Biodiversity Assessment Method (BAM).

Council has requested that the rezoning proposal is re-assessed under the BC Act. This requires application of Stage 1 and 2 of the BAM and additional reporting to determine if the rezoning proposal meets the current legislative requirements under the Act.

The site is not mapped on the Biodiversity Values map. The proposal qualifies for the Small Area Development streamlined assessment module as per Section 3.2 of the BAM.

1.3. Key Definitions

The **subject site** is defined as Lot 1 and Lot 10 which are 9.54ha in area. The **locality** is land within 10km of the subject site. The **development site** refers to the 5.81ha development area that is proposed to be rezoned to industrial. The **offset area** refers to the 3.73ha portion of the site to be protected and rezoned to E3.

Figure 1: Location of the subject site

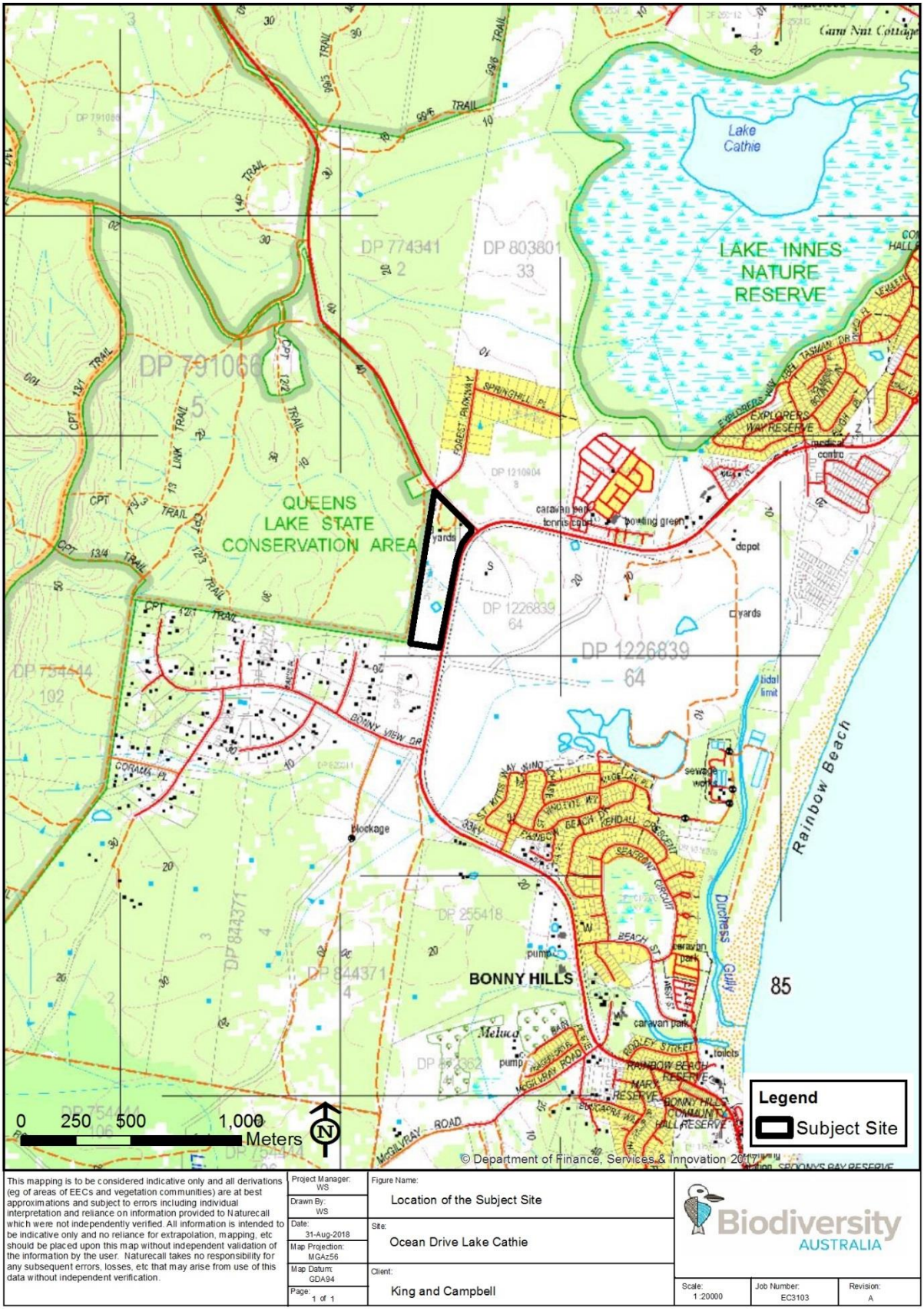
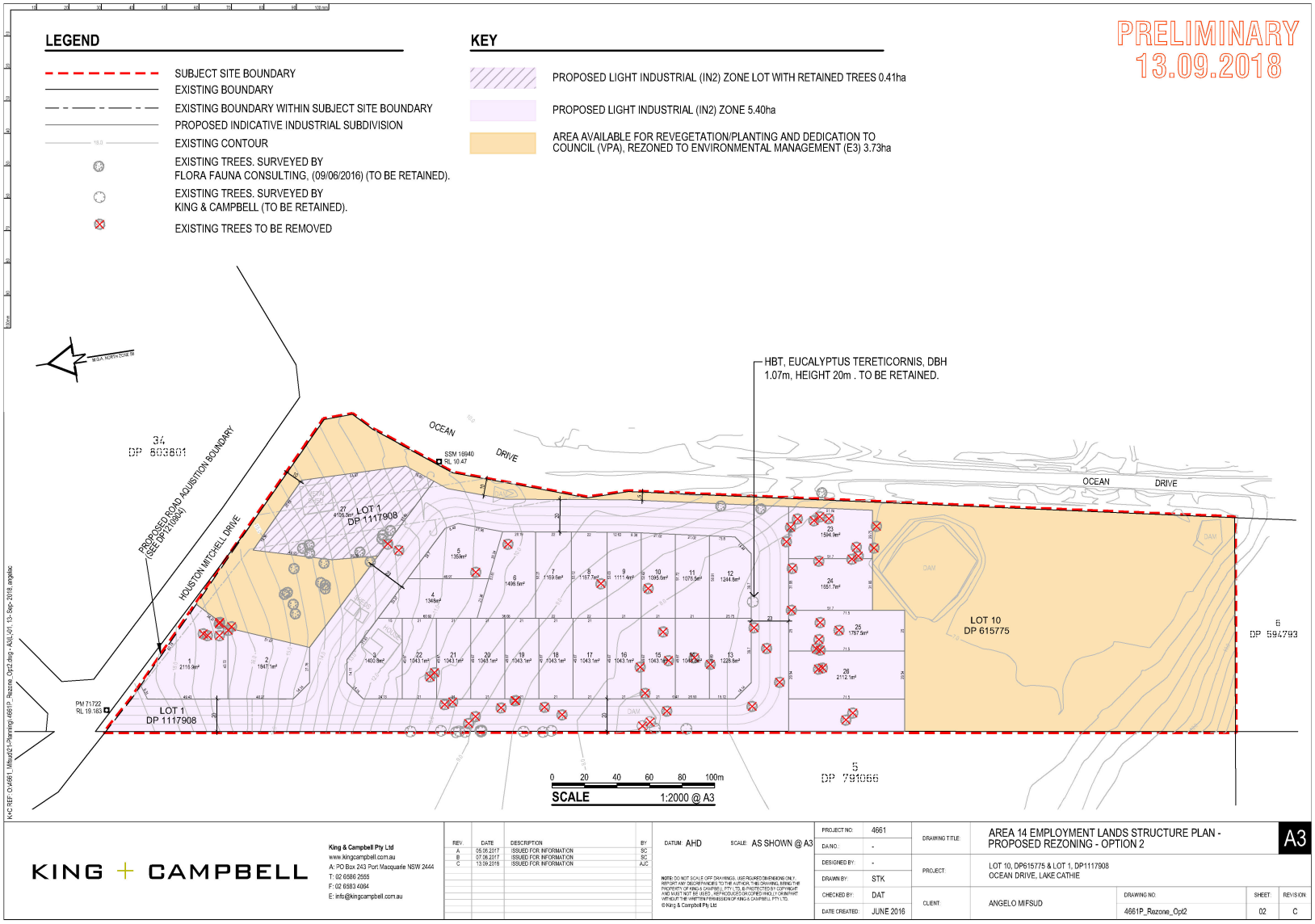


Figure 2: Proposed rezoning layout



2.0 Summary of Previous Ecological Surveys

2.1.1. FloraFauna Consulting

FloraFauna Consulting conducted ecological investigations over the site in 2016. The objectives of the assessment were to:

- Describe the ecological characteristics of the study area including identifying
- protected and threatened flora and fauna species, populations and ecological communities and their habitats;
- Identify the direct and indirect impacts of the proposed activity on flora and fauna species, populations, ecological communities and critical habitat;
- Assess the nature, extent, frequency, duration and timing of impacts;
- Assess the extent to which the proposed activity contributes to processes threatening the survival of biota on the site;
- Assess the significance of the impact of the proposed activities on species, ecological communities and populations listed under the TSC Act, FM Act and
- EPBC Act; and
- Propose management measures to minimise or mitigate and if necessary offset impacts.

Survey Methods

Field surveys were conducted from 2-6 June 2016. The survey methods employed were as follows:

- Random meander flora surveys
- Threatened flora searches
- Habitat assessment
- Habitat search
- Diurnal bird survey
- Scat and sign search
- Koala habitat assessment and survey
- Stag watch (2 nights)
- Spotlighting (2 nights)
- Amphibian survey (day and night searches)
- Microbat call detection (2 nights)

Results

Vegetation Communities

The vegetation communities over the site were described as Dry Sclerophyll Forest and Derived Grassland. The Dry Sclerophyll Forest was limited to the north of the site and dominated by White Stringybark and Tallowwood with mid stratum species dominated by Black Oak. Ground cover was largely a mix of native grass species.

The derived grassland was described as being dominated by Whisky grass, Narrow-leaved Carpet grass, Rhodes Grass and Paspalum, along with common pasture weeds such as White Clover, Paddy's Lucerne and Lambs Tongue.

Neither of these communities qualified as Endangered Ecological Communities under the NSW BC Act or EPBC Act.

Habitat Features

Koala Food Trees were recorded and surveyed during the field survey. A total of 22 were recorded and these comprised the primary species Tallowwood, Forest Red Gum, Swamp Mahogany; secondary species Small-fruited Grey Gum and White Stringybark and 'other' species comprising Broad-leaved Paperbark.

Hollow-bearing Trees were recorded and surveyed during the field survey. A total of 3 hollow-bearing trees were recorded. Some of these can be retained and only one hollow-bearing tree is nominated for removal.

Aquatic habitat was recorded on the site. This consisted of four farm dams which had been colonized by native sedge and rush species. The introduced Plague Minnow was recorded in all of the dams.

Recorded and Potentially Occurring Threatened Species

Only two threatened fauna species was confidently recorded during the survey comprising the Little Bent-wing Bat (Vulnerable BC Act) and the Grey-headed Flying Fox (Vulnerable BC Act and EPBC Act). The Koala (Vulnerable BC Act and EPBC Act) was also considered highly likely to occur, although direct evidence was not found.

The following species were listed as potential occurrences:

- Lesser Swamp Orchid
- Green and Golden Bell Frog
- Black-necked Stork
- Square-tailed Kite
- Swift Parrot
- Varied Sittella
- Koala
- Squirrel Glider
- Yellow-bellied Glider
- Eastern Free-tail bat
- Golden-tipped Bat
- Eastern Bent-wing bat
- Southern Myotis
- Greater Broad-nosed Bat
- Eastern Cave Bat

SEPP 44 – Koala Habitat Protection

A Potential and Core Koala habitat assessment was undertaken. This found that the site qualified as Potential Koala Habitat due to the presence of SEPP 44 Listed food trees on the site. The assessment however concluded that the site would be unlikely to comprise Core Koala Habitat due to the lack of evidence of a resident Koala population or breeding females.

TSC Act Significance Assessments

The recorded and potentially occurring threatened species were subject to the 7 Part test. This concluded that the proposal is unlikely to result in a significant impact and a Species Impact Statement is not required.

EPBC Act 1999 – MNES Assessment Results

The recorded and potentially occurring threatened species that are listed under the EPBC Act (Koala, Grey-headed Flying Fox, Swift Parrot) were subject to MNES Assessment of Significance. This concluded that the proposal is unlikely to result in a significant impact on EPBC Act listed species and a referral is not required.

2.1.1.1. Recommendations

The ecological report provided the following recommendations:

- Pre-clearing survey
- Hollow-bearing tree removal protocol
- Replacement nest boxes
- Tree replacement
- Regeneration of retained vegetation
- Weed management

3.0 Survey Methods

3.1. Desktop Study and Literature Review

A desktop study was carried out prior to the field survey to gather relevant information and data. The following databases and Geographic Information System (GIS) layers were searched/obtained:

- Department of Environment and Energy Protected Matters Search Tool (DEE 2018)
- Office of Environment and Heritage NSW Atlas of Wildlife (OEH 2018a)
- Port Macquarie LGA Vegetation Communities and EECs digital data layer (Biolink 2013)
- Port Macquarie LGA Koala Habitat digital data layer (Biolink 2013)
- NSW Biodiversity Value Map (OEH 2018)
- Coastal Quaternary Geology – North and South Coast of NSW digital data layer (Troedson & Hashimoto 2008)

3.2. Vegetation Survey (BAM Methodology)

Vegetation Integrity survey plots were undertaken on the site as per the BAM methodology (OEH 2018). This consisted of a 20x20m plot in which floristic composition and structural attributes are collected, and 20x50m plot which collected ecosystem function attributes.

Seven vegetation plots were undertaken over the site. Location of the vegetation plots was selected based on existing vegetation mapping and analysis of satellite imagery, and aimed to sample a representative coverage of the site vegetation. The location of these plots are shown in Figure 3.

The following information was collected at each of the vegetation plots:

- Observer, location and date;
- Plot dimensions and orientation;
- Photographic record of vegetation;
- Vegetation Class and Plant Community Type (PCT);
- Physical features and disturbance history;
- Full flora list;
- Growth form, cover and abundance of each species;
- Exotic and High Threat Exotic (HTE) plant cover;
- Number of large trees;
- Recruitment;
- Presence of hollow-bearing trees;
- Length of logs; and
- Litter cover.

The field data collected was tallied and input into the BAM calculator to determine a vegetation integrity score for the vegetation zone.

3.2.1. Vegetation Classification and Mapping

The vegetation communities were identified and described from data collected during the vegetation survey. The vegetation classification is based on the NSW Plant Community Type (PCT) Classification.

Flora species were identified to species or subspecies level and nomenclature conforms to that currently recognised by the Royal Botanic Gardens and follows Harden and PlantNET for changes since Harden.

3.3. Credit Assessment

The rezoning proposal qualified for the Small Area Development streamlined module as per Section 3.2 of the BAM.

Vegetation data obtained was entered into the BAM calculator in order to determine the species and ecosystem credits applicable to the subject site. Species credit species are threatened species or species in which elements of their habitat cannot be confidently predicted by vegetation surrogates and landscape features. Ecosystem species are threatened species which can be reliably predicted to occur by vegetation surrogates and landscape features.

Some species which have specialised breeding requirements have dual credit classes to account for differences in foraging and breeding habitat. The BAM calculator produces a list of species and ecosystem credit species based on a number of attributes including bioregion and subregion, patch size and the vegetation and habitat data collected in the field.

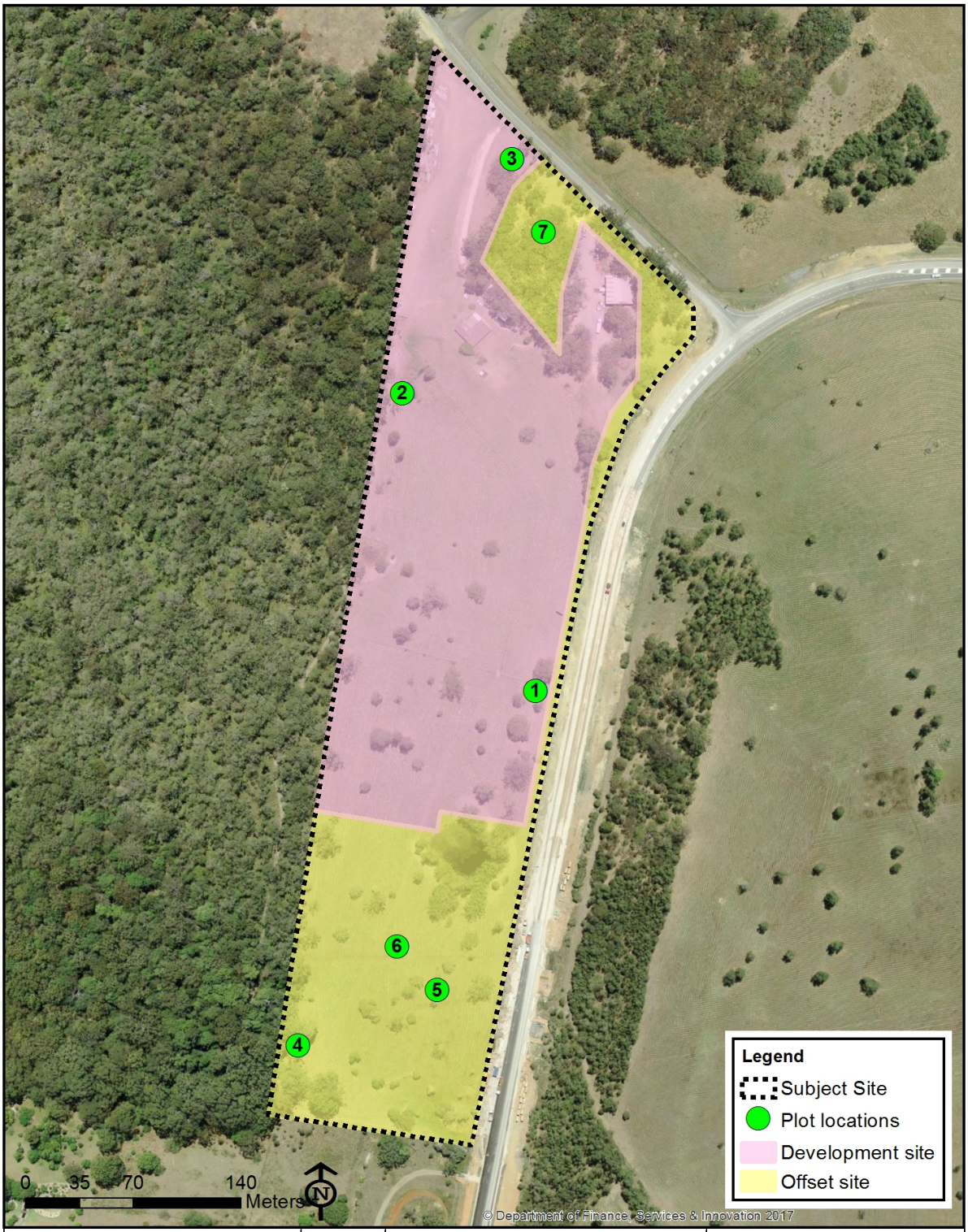
3.4. Habitat Assessment and Opportunistic Fauna Survey

The site was assessed to determine the available potential habitats, and the support value of these habitats for threatened species. This information, along with results of the previous ecological survey was used to determine the potentially occurring threatened species listed in Section 5.

A full fauna survey of the site was not conducted however opportunistic fauna sightings and secondary evidence of fauna were recorded whilst conducting vegetation and habitat tree surveys. This involved the following:

- Active habitat searches
- Binocular searches for birds ,
- Actively listening for birds,
- Scat, track and secondary evidence searches

Figure 3: Vegetation survey plot locations



This mapping is to be considered indicative only and all derivations (eg of areas of EECs and vegetation communities) are at best approximations and subject to errors including individual interpretation and reliance on information provided to Naturecall which were not independently verified. All information is intended to be indicative only and no reliance for extrapolation, mapping, etc should be placed upon this map without independent validation of the information by the user. Naturecall takes no responsibility for any subsequent errors, losses, etc that may arise from use of this data without independent verification.

Project Manager: WS	Figure Name: BAM Plot Locations
Drawn By: LS	
Date: 18-Sep-2018	Site: Ocean Drive Lake Cathie
Map Projection: MGAz56	
Map Datum: GDA94	Client: King and Campbell
Page: 1 of 1	

Biodiversity AUSTRALIA

Scale:	Job Number:	Revision:
1:3000	EC3103	B

4.0 Native Vegetation

4.1. Development Site

4.1.1. Plant Community Types and Description

The following provides a description of the Plant Community Type (PCT) within the development site that will be affected by the proposal. As described below, two PCTs were recorded in the footprint. As per the streamlined BAM methodology, only the dominant PCT is required to be assessed.

This community is not listed as a Threatened Ecological Community (TEC) or Endangered Ecological Community (EEC) under the EPBC Act or *BC Act*.

The vegetation community sampled is displayed in Photos 1-3 and a map of the vegetation is provided in Figure 4. The vegetation zone details and vegetation integrity score are provided in Appendix 1.

4.1.1.1. Community 1

Table 1: Vegetation community 1 description

Vegetation Community (NSW PCT)	Tallowwood - Small-fruited Grey Gum dry grassy open forest
Vegetation Class	Northern Hinterland Wet Sclerophyll Forests
Mapped PMHC Community	White Stringybark - Tallowwood Dry Forest
EEC Status	Not an EEC
Key Species for ID	Tallowwood, Small-fruited Grey Gum
Vegetation Zone	1
Number of Plots	1
Percent cleared	30%
Location and area	Occurs in the north of the site. The area in the development site totals 0.5ha. This has been split into two management zones of 0.2ha and 0.3ha given that trees will be retained over part of this community post development.
Condition	This community has been largely cleared in the past and currently represents mature regrowth. Understorey and shrub layers are largely absent and weed cover is moderate in the ground layer.

4.1.1.2. Community 2

Table 2: Vegetation community 2 description

Vegetation Community (NSW PCT)	Swamp Mahogany swamp forest on coastal lowlands
Vegetation Class	Coastal Swamp Forests
Mapped PMHC Community	Not mapped
EEC Status	Not an EEC
Key Species for ID	Swamp Mahogany, Broad-leaved Paperbark
Vegetation Zone	2
Number of Plots	2
Percent cleared	75
Location and area	Occurs as small isolated patches in the central portion of the site. Surrounded by managed exotic grassland. Area in the development site totals 0.6ha
Condition	Poor condition - only comprises scattered trees and small patches of native groundcover. Exotic pasture grasses dominate the groundcover.

Photo 1: Community 1 at plot 3

Photo 2: Community 2 at plot 1

Photo 3: Community 2 at Plot 2

4.1.2. Vegetation Integrity Assessment

One PCT has been mapped over the development footprint as required in the streamlined assessment module. This has been split into two vegetation zones based on condition. The table below provides the vegetation integrity score for each zone which has been derived from the BAM field plots undertaken. Figure 4 shows the location of the vegetation zone and PCTs.

Table 3: Vegetation integrity scores

Vegetation Zone	Condition class	Plant Community Type	Patch size category	Area Impacted	Vegetation Integrity Score			
					Composition	Structure	Function	Total
1	Moderate to good	Tallowwood - Small-fruited Grey Gum dry grassy open forest	>100	0.5	42.4	37.2	27	**34.9**
2	Poor	Tallowwood - Small-fruited Grey Gum dry grassy open forest	>100	0.6	21	31.1	80	**37.4**

Figure 4: Vegetation zones and PCTs within the development site

This mapping is to be considered indicative only and all derivations (eg of areas of EECs and vegetation communities) are at best approximations and subject to errors including individual interpretation and reliance on information provided to Naturecall which were not independently verified. All information is intended to be indicative only and no reliance for extrapolation, mapping, etc should be placed upon this map without independent validation of the information by the user. Naturecall takes no responsibility for any subsequent errors, losses, etc that may arise from use of this data without independent verification.

Project Manager: WS	Figure Name: Development Site Vegetation Zones
Drawn By: LS	
Date: 18-Sep-2018	Site: Ocean Drive Lake Cathie
Map Projection: MGAz56	
Map Datum: GDA94	Client: King and Campbell
Page: 1 of 1	

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Scale:	Job Number:	Revision:
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4.2. Offset Site

4.2.1. Plant Community Types and Description

The following provides a description of the Plant Community Types (PCTs) and vegetation zones within the offset area. As described below, three PCTs were recorded in the offset area.

The vegetation communities are displayed in Photos 4-6 and a map of the vegetation distribution is provided in Figure 5.

4.2.1.1. Community 1

Table 4: Vegetation community 1 description

Vegetation Community (NSW PCT)	Blackbutt - Turpentine – Tallowwood shrubby open forest
Vegetation Class	North Coast Wet Sclerophyll Forests
Mapped PMHC Community	White Stringybark - Tallowwood Dry Forest
EEC Status	Not an EEC
Key Species for ID	Blackbutt, Turpentine, Tallowwood
Vegetation Zone	1
Number of Plots	1
Percent cleared	5
Location and area	Located on the southwest corner of the subject site. Comprises the disturbed edge of a larger body of forest contained within Queens Lake SCA
Condition	Moderate condition. Contains mature trees and native shrubs and groundcover species, however understorey vegetation and shrub layer very sparse. Ground layer is dominated by exotic grasses.

4.2.1.2. Community 2

Table 5: Vegetation community 2 description

Vegetation Community (NSW PCT)	Swamp Mahogany swamp forest on coastal lowlands
Vegetation Class	Coastal Swamp Forests
Mapped PMHC Community	Not mapped
EEC Status	Not an EEC
Key Species for ID	Swamp Mahogany, Broad-leaved Paperbark

Vegetation Zone	2
Number of Plots	2
Percent cleared	75
Location and area	Occurs as scattered trees and a small patch around the dam. Surrounded by managed exotic grassland. Area in the offset site totals 2.6ha
Condition	Poor condition - only comprises scattered trees and small patches of native groundcover. Exotic pasture grasses dominate the groundcover.

4.2.1.3. Community 3

Table 6: Vegetation community 3 description

Vegetation Community (NSW PCT)	Tallowwood - Small-fruited Grey Gum dry grassy open forest
Vegetation Class	Northern Hinterland Wet Sclerophyll Forests
Mapped PMHC Community	White Stringybark - Tallowwood Dry Forest
EEC Status	Not an EEC
Key Species for ID	Tallowwood, Small-fruited Grey Gum
Vegetation Zone	3
Number of Plots	1
Percent cleared	30%
Location and area	Occurs in the north of the site. The area in the offset site totals 0.6ha
Condition	This community has been largely cleared in the past and currently represents mature regrowth. Reasonable species diversity is present. Understorey and shrub layers are largely absent and weed cover is moderate in the ground layer.

Photo 4: Vegetation community 1 at Plot 1

Photo 5: Vegetation community 2 at Plot 2

Photo 6: Vegetation community 3 at plot 4

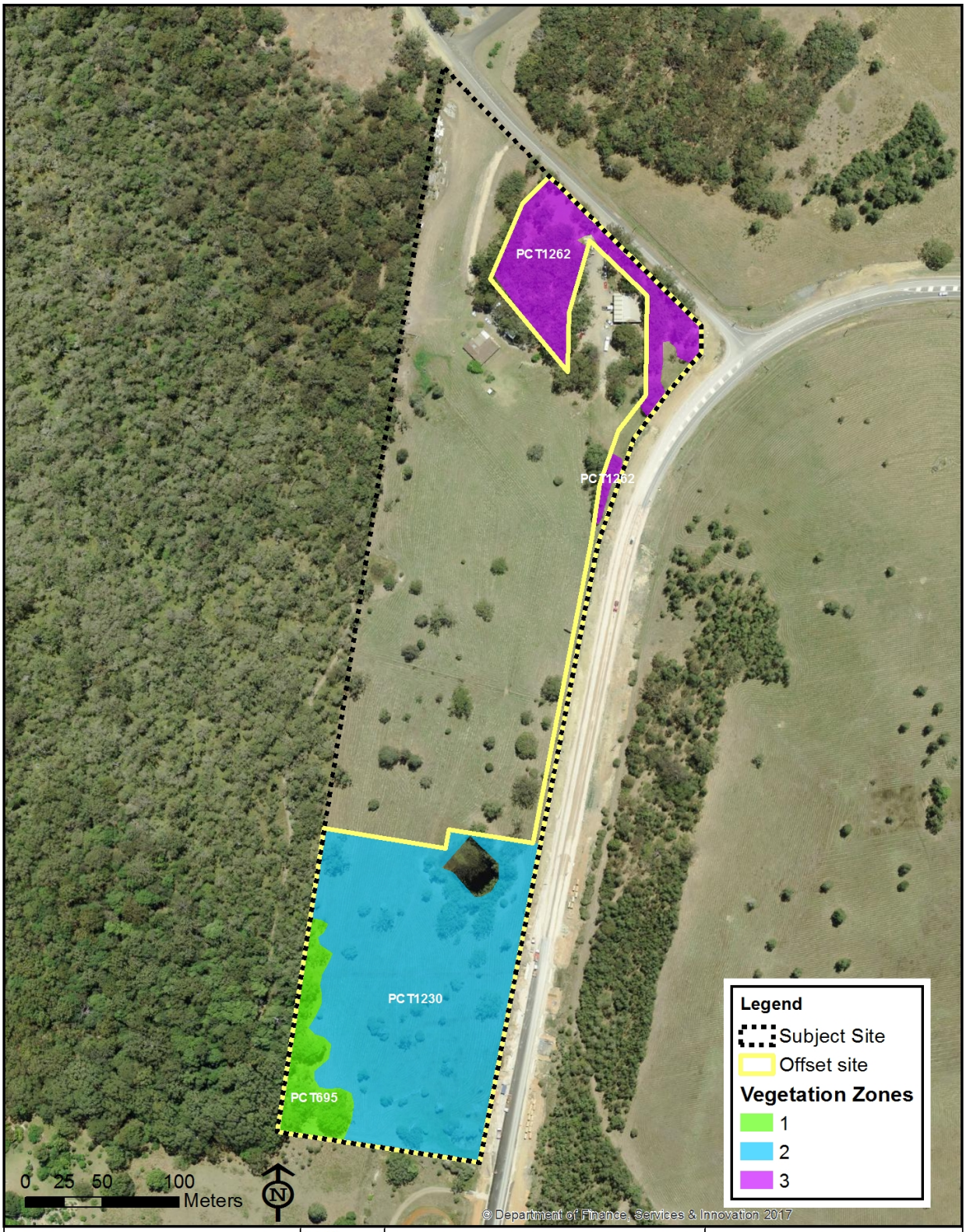
4.2.2. Vegetation Integrity Assessment

Three vegetation zones have been mapped over the offset site. The table below provides the vegetation integrity score for each zone which has been derived from the BAM field plots undertaken. Figure 5 shows the location of the vegetation zone and PCTs.

Table 7: Vegetation zones and integrity scores

Vegetation Zone	Condition class	Plant Community Type	Patch size category	Area	Vegetation Integrity Score			
					Composition	Structure	Function	Total
1	Moderate	Blackbutt - Turpentine - Tallowwood shrubby open forest	>100	0.32	26.4	22.7	62.6	**33.5**
2	Poor	Swamp Mahogany swamp forest on coastal lowlands	>100	2.6	43.3	9	23.7	**21**
3	Moderate	Tallowwood - Small-fruited Grey Gum dry grassy open forest	>100	0.6	60.4	51.4	39.9	**49.8**

Figure 5: Vegetation Zones and PCTs within the Offset site



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Project Manager: WS	Figure Name: Offset Site Vegetation Zones
Drawn By: LS	
Date: 18-Sep-2018	Site: Ocean Drive Lake Cathie
Map Projection: MGAz56	
Map Datum: GDA94	Client: King and Campbell
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1:20000	EC3103	B

5.0 Threatened Species

5.1. Development Site

5.1.1. Ecosystem Credit Species

Ecosystem credit species are threatened species which can be reliably predicted to occur by vegetation surrogates and landscape features. Targeted survey is not required for these species.

Some species which have specialised breeding requirements have dual credit classes to account for differences in foraging and breeding habitat. For example, Glossy Black Cockatoo foraging habitat can be reliable predicted through vegetation associations, however breeding habitat is specialised and requires hollow-bearing trees with hollows greater than 15cm diameter and greater than 5m above the ground (OEH Bionet 2018).

The BAM calculator produces a list of ecosystem credit species based on the vegetation and habitat data that has been collected in the field.

Refer to Appendix 3 for a list of the Ecosystem credit species derived on the development site.

5.2. Species Credit Species

Species credit species are threatened species or elements of their habitat that cannot be confidently predicted by vegetation surrogates and landscape features. Targeted survey is required for these species if the development site contains suitable habitat and is within the predicted range of the species.

Refer to Appendix 5 for a list of species credit species that have been predicted by the BAM calculator.

Suitable habitat and/or breeding habitat requirements do not occur on the site for most of these species. The following species are considered potential occurrences based on local/regional records and habitat types present and level of disturbance:

- Square-tailed Kite
- Squirrel Glider
- Brushtailed Phascogale
- Koala

These species have been surveyed during previous ecological surveys of the site and hence no further targeted survey is required. None of these species were confidently recorded on the site and as such, there is no species credit requirement for the development site.

5.3. Offset Site

5.3.1. Ecosystem Credit Species

Ecosystem credit species are threatened species which can be reliably predicted to occur by vegetation surrogates and landscape features. Targeted survey is not required for these species.

Some species which have specialised breeding requirements have dual credit classes to account for differences in foraging and breeding habitat. For example, Glossy Black Cockatoo foraging habitat can be reliable predicted through vegetation associations, however breeding habitat is specialised and requires hollow-bearing trees with hollows greater than 15cm diameter and greater than 5m above the ground (OEH Bionet 2018).

The BAM calculator produces a list of ecosystem credit species based on the vegetation and habitat data that has been collected in the field.

Refer to Appendix 4 for a list of the Ecosystem credit species derived on the offset site.

5.3.2. Species Credit Species

Species credit species are threatened species or elements of their habitat that cannot be confidently predicted by vegetation surrogates and landscape features. Targeted survey is required for these species if the development site contains suitable habitat and is within the predicted range of the species.

Refer to Appendix 6 for a list of species credit species that have been predicted by the BAM calculator for the offset site.

Suitable habitat and/or breeding habitat requirements do not occur on the site for most of these species. The following species are considered potential occurrences based on local/regional records and habitat types present and level of disturbance:

- Square-tailed Kite
- Squirrel Glider
- Brushtailed Phascogale
- Koala
- Masked Owl (breeding)
- Maundia triglochinoides
- Biconvex Paperbark

These species have been surveyed during previous ecological surveys of the site and hence no further targeted survey has been undertaken. None of these species were confidently recorded on the site and as such, the offset area will not create any species credits.

5.4. Opportunistic Fauna Recorded

The opportunistic fauna surveys mainly detected common medium sized woodland birds on and adjacent to the survey area. These included species such as Scarlet Honeyeater, Pied Currawong, Noisy Friarbird, and Eastern Rosella. Most were heard calling from within the subject site or from adjacent habitats with a seen flying over-head.

One threatened bird species was recorded during the survey comprising the Little Lorikeet (Vulnerable BC Act). A small flock was heard calling and observed flying over the site. The site contains a minor potential foraging resource for this species and a few trees which contain potential hollows for nesting. This species is however unlikely to breed on the site given high competition for hollows with common Lorikeets and Galahs.

No reptiles were recorded and the only amphibian recorded was the Common Eastern Froglet.

Table 8 below provides a list of all the fauna species detected opportunistically during the opportunistic surveys.

Table 8: Fauna species recorded

	Common Name	Species	Detection Method
Amphibians	Common Eastern Froglet	*Crinia signifera*	HC
Birds	Eastern Yellow-robin	*Eopsaltria australis*	HC
	Laughing Kookaburra	*Dacelo novaeguineae*	HC
	Masked Lapwing	*Vanellus miles*	HC
	Noisy Friarbird	*Philemon corniculatus*	HC
	Pied Currawong	*Strepera graculina*	HC
	Scarlet Honeyeater	*Myzomela sanguinolenta*	HC
	Silvereye	*Zosterops lateralis*	HC
	Superb Fairywren	*Malurus cyaneus*	HC
	Torresian Crow	*Corvus orru*	HC
	Yellow-faced Honeyeater	*Lichenostomus chrysops*	HC
	Australian White Ibis	*Threskiornis molucca*	Vis
	Eastern Rosella	*Platycercus eximius*	Vis
	Little Lorikeet	***Glossopsitta pusilla***	Vis
	Scaly-breasted Lorikeet	*Trichoglossus chlorolepidotus*	Vis
	Willy Wagtail	*Rhipidura leucophrys*	Vis
	Magpie Lark	*Grallina cyanoleuca*	Vis, HC
	Rainbow Lorikeet	*Trichoglossus haematodus*	Vis, HC
	Rooster	*Gallus gallus*	Vis, HC
Mammals	Eastern Grey Kangaroo	*Macropus giganteus*	Vis, Sc

6.0 Avoidance and Minimisation

6.1. Impact Avoidance

6.1.1. General

The development proposal has minimised vegetation removal and indirect impacts over the subject site through the following measures:

- Retaining mature open forest in the north of the site and large portion of the south of the site as offset conservation areas.
- Retaining a number of the trees falling within the northern portion of the development site
- Retention of a significant hollow-bearing tree within the development footprint
- Design of the layout using the perimeter road next to the nature reserve

6.1.2. Areas of Outstanding Biodiversity Value

There are no Areas of Outstanding Biodiversity Value listed in the subject site or surrounds.

6.1.3. Serious and Irreversible Impacts

Section 6.5 of the *Biodiversity Conservation Act 2016* requires developments to consider Serious and Irreversible Impacts on threatened species and ecological communities which meet the following criteria:

- are in a rapid rate of decline
- have a very small population size
- have a very limited geographic distribution
- are unlikely to respond to measures to improve habitat.

These criteria have been applied to all threatened species and ecological communities listed under the BC Act. Entities that meet the criteria under one or more principles are identified as 'potential' SAII species/communities in the guidance document *Guide to assist decision-maker to determine a serious and irreversible impact* (OEH 2017).

Review of this document has determined that none of the species recorded on the development site are listed as potential SAII species, and hence no assessment of SAII is required.

6.2. Measures to Minimise Impacts

Future development of the site would be subject to a number of mitigation measures and environmental controls to reduce the overall impact of the development on biodiversity and ensure potential offsite impacts are minimised.

The previous ecological report by FloraFauna Consulting recommended a number of mitigation measures that should be adhered to. No additional recommendations are provided.

6.2.1. Mitigation Measure summary

The following table provides a summary of the proposed mitigation measures and the responsibility.

Table 9: Mitigation measure summary

Mitigation measure	Responsibility
Cessation of slashing in offset site	Landowner
Nest box instillation	Ecologist
Pre-clearing survey	Ecologist
Hollow-tree removal supervision	Ecologist
Preparation of VMP for offset area	Ecologist
Offset plantings	Bush regenerator/Landowner
Erosion and sedimentation control	Earthworks contractor
Weed control	Bush regenerator

6.3. Impacts Unable to be Avoided

6.3.1. Vegetation and Habitat Removal

There will be some vegetation removal associated with the rezoning proposal which comprises approximately 0.2ha of dry sclerophyll/open forest and 0.6ha of poor condition swamp sclerophyll forest. FloraFauna Consulting (2016) calculated that a total of 53 trees would require removal.

This vegetation removal is required to establish the proposed industrial area and the impact of this action would be assessed as part of a subsequent DA once the rezoning has occurred. The vegetation affected may provide foraging habitat for a number of fauna species. This includes a nectar source for birds and flying foxes.

Vegetation removal is likely to be long-term and in line with the lifespan of the overall use of the proposed industrial development area. No further vegetation loss will be required through the operational phase of the development.

The loss of this vegetation is proposed to be offset through dedication of an offset area on the subject site which would be subject to vegetation rehabilitation measures. The number of credits required to offset the development and the number of credits that would be created by the offset area are detailed in the following section.

7.0 Credit Assessment

A full credit assessment has been undertaken to determine the number and type of ecosystem and species credits that would be required to offset the impact of clearing for the subsequent industrial subdivision and the number of credits that would be created by preserving and rehabilitating the vegetation in the offset area.

The objective is to get a match between the development site and offset site in terms of credit numbers and credit type.

7.1. Development Site

7.1.1. Ecosystem Credits Required

The following Ecosystem credit types and numbers were generated from the BAM calculator. The credit summary report is provided in Appendix 7.

Table 10: Ecosystem credits

Zone	PCT*ID/Condition	PCT Name	Area (ha)	No. of Credits required
1	1262_good	Tallowwood - Small-fruited Grey Gum dry grassy open forest	0.5	4
2	1262_poor	Tallowwood - Small-fruited Grey Gum dry grassy open forest	0.6	8
		Total	**1.1**	**12**

7.1.2. Species Credits Required

There is no species credit requirement for the development.

7.2. Offset Site

7.2.1. Ecosystem Credits Generated

The following Ecosystem credit types and numbers were generated from the BAM calculator. The credit summary report is provided in Appendix 8.

Table 11: Ecosystem credits

Zone	PCT*ID/Condition	PCT Name	Area (ha)	No. of Credits generated
1	695_Moderate	Blackbutt - Turpentine - Tallowwood shrubby open forest	0.3	1
2	1230_poor	Swamp Mahogany swamp forest on coastal lowlands	2.6	9
3	1262_moderate	Swamp Mahogany swamp forest on coastal lowlands	0.6	2
Total			**3.5**	**12**

7.2.2. Species Credits

The assessment determined that the offset site did not generate any species credits.

7.3. Justification for Modified Vegetation Integrity Values

7.3.1. Development Site

Canopy trees will be retained over part of vegetation zone 1 in the north of the development site as illustrated in Figure 3. As such, this zone was split into two management zones comprising a 0.2ha tree removal area and a 0.3ha tree retention area. The vegetation integrity scores for the tree removal area will be reduced to zero post development. The tree retention area will however retain tree canopy cover and native species diversity, and as such it will retain some vegetation integrity post development. The scores have been adjusted accordingly in this management zone based on estimated cover and diversity values post development.

7.3.2. Offset Site

The offset site will be subject to both standard management actions such as weeds removal and active management actions including tree planting, instillation of nest boxes and placement of hollow logs. This will largely occur in vegetation zone 2 which is highly degraded.

As per Section 13.3.3 of the BAM, the additional credits can be created where these active management actions are undertaken. The predicted future vegetation integrity scores for vegetation zone 1 have been increased based on the likely outcomes of active management (eg higher species diversity, greater vegetation cover and greater coarse woody debris).

8.0 Conclusion

The proposal is to rezone the 9.54ha subject site to Light Industrial and Environmental Management. Subsequent development of the 5.81ha industrial zoned area will require some native vegetation removal, which is generally in poor condition.

To offset the loss of vegetation and habitat, a 3.73ha offset conservation area is proposed. This area would be rezoned to Environmental Management and subject to rehabilitation measures to assist in restoring native vegetation cover and habitat features, and reducing weeds.

The rezoning proposal has been previously subject to a comprehensive ecological assessment by FloraFauna Consulting in 2016, however due to changes in legislation, the proposal has now been assessed as per the Stage 1 and 2 of the Biodiversity Assessment Method.

The credit calculations undertaken found that a credit match between the development site and offset has been achieved, and as such, the offset area is considered to be of a sufficient size to offset the impacts of the development. The offset area also contains the same vegetation types as those that will be impacted by the development.

The offset area will need to be subject to active restoration management actions to create the number of credits described in this report. These actions would be detailed in a management plan for the offset site.

In summary, the rezoning proposal is considered to meet the principles of the Biodiversity Conservation Act 2016 and will achieve a balance between development and conservation. Application of the Biodiversity Assessment Method has demonstrated that subsequent industrial development over the site can comply with offset requirements through minimising vegetation removal and dedication of the environmental offset area.

If you have any queries regarding this assessment, please contact the undersigned.

Yours faithfully,

Will Steggall

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9.0 References

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Appendix 1: Vegetation Zone Report – Development Site

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00012287/BAAS17107/18/00012288

Assessment name
Houston Mitchell Drive Rezoning

BAM data last updated *
24/02/2018

Assessor Name
Will Steggall

Report Created
11/09/2018

BAM Data version *
3

Assessor Number
BAAS17107

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	1262_Good	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast	Good	0.5	1	Treeremove (0.2 ha) Treeretain (0.3 ha)

2	1262_Poor	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast	Poor	0.6	1	

Appendix 2: Vegetation Zone Report – Offset Site

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00012289/BAAS17107/18/00012290

Assessment name
Houston Mitchell Drive Rezoning

BAM data last updated *
24/02/2018

Assessor Name
Will Steggall

Report Created
10/09/2018

BAM Data version *
3

Assessor Number
BAAS17107

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	695_Moderate	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion	Moderate	0.32	1	

BAM Vegetation Zones Report

2	1230_Poor	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion	Poor	2.6	2	
3	1262_Moderate	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast	Moderate	0.6	1	

Appendix 3: Ecosystem Credit Species – Development Site

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00012287/BAAS17107/18/00012288	Houston Mitchell Drive Rezoning	24/02/2018
Assessor Name	Report Created	BAM Data version *
Will Steggall	10/09/2018	3
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS17107		

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Eastern Bentwing-bat	Miniopterus schreibersii oceanensis	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Eastern Freetail-bat	Mormopterus norfolkensis	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Greater Broad-nosed Bat	Scoteanax rueppellii	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Grey-headed Flying-fox	Pteropus poliocephalus	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Hoary Wattled Bat	Chalinolobus nigrogriseus	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Koala	Phascolarctos cinereus	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Little Bentwing-bat	Miniopterus australis	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Little Lorikeet	Glossopsitta pusilla	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Masked Owl	Tyto novaehollandiae	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Powerful Owl	Ninox strenua	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast

Regent Honeyeater	Anthochaera phrygia	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Square-tailed Kite	Lophoictinia isura	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Swift Parrot	Lathamus discolor	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Varied Sittella	Daphoenositta chrysoptera	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast

Threatened species not within the area of these PCT's

Common Name	Scientific Name	Vegetation Types(s)
Barking Owl	Ninox connivens	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Barred Cuckoo-shrike	Coracina lineata	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Common Blossom-bat	Syconycteris australis	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Diamond Firetail	Stagonopleura guttata	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Eastern Chestnut Mouse	Pseudomys gracilicaudatus	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Eastern False Pipistrelle	Falsistrellus tasmaniensis	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Glossy Black-Cockatoo	Calyptorhynchus lathami	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Golden-tipped Bat	Kerivoula papuensis	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Long-nosed Potoroo	Potorous tridactylus	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Pale-vented Bush-hen	Amaurornis moluccana	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Spotted-tailed Quoll	Dasyurus maculatus	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Yellow-bellied Glider	Petaurus australis	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast

Appendix 4: Ecosystem Credit Species – Offset Site

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00012289/BAAS17107/18/00012290	Houston Mitchell Drive Rezoning	24/02/2018
Assessor Name	**Report Created**	**BAM Data version ***
Will Steggall	10/09/2018	3
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS17107		

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Black-necked Stork	Ephippiorhynchus asiaticus	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Eastern Bentwing-bat	Miniopterus schreibersii oceanensis	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Eastern False Pipistrelle	Falsistrellus tasmaniensis	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Eastern Freetail-bat	Mormopterus norfolkensis	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion

Eastern Freetail-bat	Mormopterus norfolkensis	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Glossy Black-Cockatoo	Calyptorhynchus lathami	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
Greater Broad-nosed Bat	Scoteanax rueppellii	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Grey-headed Flying-fox	Pteropus poliocephalus	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Hoary Wattled Bat	Chalinolobus nigrogriseus	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Koala	Phascolarctos cinereus	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast

Little Bentwing-bat	Miniopterus australis	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Little Eagle	Hieraaetus morphnoides	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
Little Lorikeet	Glossopsitta pusilla	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Masked Owl	Tyto novaehollandiae	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Powerful Owl	Ninox strenua	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Regent Honeyeater	Anthochaera phrygia	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion

Regent Honeyeater	Anthochaera phrygia	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Spotted-tailed Quoll	Dasyurus maculatus	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
Square-tailed Kite	Lophoictinia isura	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Swift Parrot	Lathamus discolor	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Varied Sittella	Daphoenositta chrysoptera	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast

Threatened species not within the area of these PCT's

Common Name	Scientific Name	Vegetation Types(s)
Australasian Bittern	Botaurus poiciloptilus	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
Barking Owl	Ninox connivens	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion

Barking Owl	Ninox connivens	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Barred Cuckoo-shrike	Coracina lineata	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Black Bittern	Ixobrychus flavicollis	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
Common Blossom-bat	Syconycteris australis	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Diamond Firetail	Stagonopleura guttata	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Eastern Chestnut Mouse	Pseudomys gracilicaudatus	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Eastern False Pipistrelle	Falsistrellus tasmaniensis	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
Eastern Osprey	Pandion cristatus	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
Glossy Black-Cockatoo	Calyptorhynchus lathami	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion

Glossy Black-Cockatoo	Calyptorhynchus lathami	1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Golden-tipped Bat	Kerivoula papuensis	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Long-nosed Potoroo	Potorous tridactylus	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Pale-vented Bush-hen	Amaurornis moluccana	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Red-legged Pademelon	Thylogale stigmatica	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
Spotted-tailed Quoll	Dasyurus maculatus	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Superb Fruit-Dove	Ptilinopus superbus	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
Varied Sittella	Daphoenositta chrysoptera	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion

White-bellied Sea-Eagle	Haliaeetus leucogaster	1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
Wompoo Fruit-Dove	Ptilinopus magnificus	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
Yellow-bellied Glider	Petaurus australis	695-Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
		1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
		1262-Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast

Appendix 5: Species Credit Report – Development Site

BAM Candidate Species Report

Proposal Details

Assessment Id 00012287/BAAS17107/18/00012288	Proposal Name Houston Mitchell Drive Rezoning	BAM data last updated * 24/02/2018
Assessor Name Will Steggall	Report Created 10/09/2018	BAM Data version * 3
Assessor Number BAAS17107	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	

List of Species Requiring Survey

Name	Presence	Survey Months
Lophoictinia isura Square-tailed Kite	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Petaurus norfolcensis Squirrel Glider	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Phascogale tapoatafa Brush-tailed Phascogale	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Phascolarctos cinereus Koala	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

List of Species Not On Site

Name
Acacia courtii North Brother Wattle
Aepyprymnus rufescens Rufous Bettong
Niemeyera whitei Rusty Plum, Plum Boxwood
Burhinus grallarius Bush Stone-curlew
Calyptorhynchus lathami Glossy Black-Cockatoo
Cercartetus nanus Eastern Pygmy-possum

Cryptostylis hunteriana Leafless Tongue Orchid
Diuris disposita Willawarrin Doubletail
Hakea archaeoides Big Nellie Hakea
Hibbertia hexandra Tree Guinea Flower
Hoplocephalus bitorquatus Pale-headed Snake
Hoplocephalus stephensii Stephens' Banded Snake
Melaleuca groveana Grove's Paperbark
Lathamus discolor Swift Parrot
Litoria brevipalmata Green-thighed Frog
Litoria daviesae Davies' Tree Frog
Macropus parma Parma Wallaby
Miniopterus australis Little Bentwing-bat
Miniopterus schreibersii oceanensis Eastern Bentwing-bat
Mixophyes balbus Stuttering Frog
Mixophyes iteratus Giant Barred Frog
Myotis macropus Southern Myotis
Ninox connivens Barking Owl
Tinospora smilacina Tinospora Vine
Tyto novaehollandiae Masked Owl
Vespadelus troughtoni Eastern Cave Bat
Anthochaera phrygia Regent Honeyeater
Turnix maculosus Red-backed Button-quail
Ninox strenua Powerful Owl
Parsonsia dorrigoensis Milky Silkpod
Petrogale penicillata Brush-tailed Rock-wallaby
Planigale maculata Common Planigale
Pomaderris queenslandica Scant Pomaderris
Pteropus poliocephalus Grey-headed Flying-fox

Appendix 6: Species Credit Report – Offset Site

BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00012289/BAAS17107/18/00012290	Houston Mitchell Drive Rezoning	24/02/2018
Assessor Name	**Report Created**	**BAM Data version ***
Will Steggall	10/09/2018	3
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS17107		

List of Species Requiring Survey

Name	Presence	Survey Months
Melaleuca biconvexa Biconvex Paperbark	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Lophoictinia isura Square-tailed Kite	No (surveyed)	Jan Sep Oct Nov Dec
Maundia triglochinoides Maundia triglochinoides	No (surveyed)	Jan Feb Mar Nov Dec
Petaurus norfolcensis Squirrel Glider	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Phascogale tapoatafa Brush-tailed Phascogale	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Phascolarctos cinereus Koala	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

List of Species Not On Site

Name
Acacia courtii North Brother Wattle

Acronychia littoralis Scented Acronychia
Aepyprymnus rufescens Rufous Bettong
Alexfloydia repens Floyd's Grass
Allocasuarina defungens Dwarf Heath Casuarina
Niemeyera whitei Rusty Plum, Plum Boxwood
Argynnis hyperbius Laced Fritillary
Arthropteris palisotii Lesser Creeping Fern
Asperula asthenes Trailing Woodruff
Burhinus grallarius Bush Stone-curlew
Calyptorhynchus lathami Glossy Black-Cockatoo
Cercartetus nanus Eastern Pygmy-possum
Coeranoscincus reticulatus Three-toed Snake-tooth Skink
Crinia tinnula Wallum Froglet
Cryptostylis hunteriana Leafless Tongue Orchid
Dendrobium melaleucaphilum Spider orchid
Diuris disposita Willawarrin Doubletail
Grevillea guthrieana Guthrie's Grevillea
Hakea archaeoides Big Nellie Hakea
Hibbertia hexandra Tree Guinea Flower
Hoplocephalus bitorquatus Pale-headed Snake
Hoplocephalus stephensii Stephens' Banded Snake
Melaleuca groveana Grove's Paperbark
Lathamus discolor Swift Parrot
Gavicalis fasciogularis Mangrove Honeyeater
Litoria aurea Green and Golden Bell Frog
Litoria brevipalmata Green-thighed Frog
Litoria daviesae Davies' Tree Frog
Carterornis leucotis White-eared Monarch
Macropus parma Parma Wallaby

Marsdenia longiloba Slender Marsdenia
Miniopterus australis Little Bentwing-bat
Miniopterus schreibersii oceanensis Eastern Bentwing-bat
Mixophyes balbus Stuttering Frog
Mixophyes iteratus Giant Barred Frog
Myotis macropus Southern Myotis
Ninox connivens Barking Owl
Tinospora smilacina Tinospora Vine
Tyto novaehollandiae Masked Owl
Vespadelus troughtoni Eastern Cave Bat
Anthochaera phrygia Regent Honeyeater
Lindernia alsinoides Noah's False Chickweed
Turnix maculosus Red-backed Button-quail
Banksia conferta subsp. conferta Banksia conferta subsp. conferta
Dracophyllum macranthum Dracophyllum macranthum
Hieraaetus morphnoides Little Eagle
Haliaeetus leucogaster White-bellied Sea-Eagle
Eucalyptus seeana - endangered population Eucalyptus seeana population in the Greater Taree local government area
Ninox strenua Powerful Owl
Oberonia titania Red-flowered King of the Fairies
Ocybadistes knightorum Black Grass-dart Butterfly
Pandion cristatus Eastern Osprey
Parsonsia dorrigoensis Milky Silkpod
Petalura gigantea Giant Dragonfly
Petrogale penicillata Brush-tailed Rock-wallaby
Phaius australis Southern Swamp Orchid
Planigale maculata Common Planigale
Pomaderris queenslandica Scant Pomaderris

Pteropus poliocephalus Grey-headed Flying-fox
Senna acclinis Rainforest Cassia

Appendix 7: Credit Summary Report – Development Site

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00012287/BAAS17107/18/00012288	Houston Mitchell Drive Rezoning	24/02/2018

Assessor Name	Report Created	BAM Data version *
Will Steggall	11/09/2018	3

Assessor Number

BAAS17107

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Candidate SAII	Ecosystem credits
Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast								
1	1262_Good	21.6	0.5	0.25	High Sensitivity to Potential Gain	1.50		4

2	1262_Poor	37.4	0.6	0.25	High Sensitivity to Potential Gain	1.50		8
							Subtotal	**12**
							Total	**12**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Candidate SAII	Species credits

Appendix 8: Credit Summary Report – Offset Site

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00012289/BAAS17107/18/00012290	Houston Mitchell Drive Rezoning	24/02/2018
Assessor Name	Report Created	BAM Data version *
Will Steggall	10/09/2018	3
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS17107		

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Ecosystem credits
Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion					
1	695_Moderate	16.6	0.3	0.25	1
				Subtotal	**1**

Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion					
2	1230_Poor	14.4	2.6	0.25	9
				Subtotal	**9**
Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast					
3	1262_Moderate	13.9	0.6	0.25	2
				Subtotal	**2**
				Total	**12**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Species credits

Appendix 9: Vegetation Plot Data Sheets

BAM Plot - Field Survey Form

Survey Name: EC3103- Houston Mitchell	**Date:** 30.8.18	**Plot #:** 1 - development area
Surveyers: W	**IBRA Region:**	**Plot Dimensions:** 20x20 + 20x50
Likely Vegetation Class		**Zone ID** 1
Plant Community Type		
EEC: Y / N	**Orientation of midline from the 0m point:** S - 177°	north = 0, south=180

Record easting and northing from the plot marker.
Dimensions (shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400m2 plot)		Sum values
Count of **Native Richness**	Trees	4
	Shrubs	2
	Grasses etc.	1
	Forbs	5
	Ferns	0
	Other	2
Sum of **Cover** of native vascular plants by growth form group	Trees	13.2
	Shrubs	5.1
	Grasses etc.	40
	Forbs	0.9
	Ferns	0
	Other	0.3
High Threat Weed cover %		45.50

The totals may be calculated after field component.

BAM Attribute (20 x 50 m plot)	Stem Classes and Hollows		
dbh	Euc*	Non Euc	Hollows^
80 + cm	1		1
50 - 79 cm	1		
30 - 49 cm	✓		Hollows 20cm+
20 - 29 cm	✓		
10 - 19 cm	x		
5 - 9 cm	✓		
< 5 cm	✓		This size class records tree regeneration
Length of logs (m) (≥ 10cm diameter, > 50 cm in length)	3		total 3

Record living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems seperately. Data needed is presence only (tick) unless a 'large tree' for that veg class.

* includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia

^ For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

Each size class is noted as present by the living tree stems only. Depending on the Vegetation Class, DBH values and counts may be needed for a size class. For a multi-stemmed tree, only the largest living stem is included in the count/estimate if it is required by the large tree category for that vegetation class.

Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average of the 5 subplots	100					0					0					0				

The average percentage recorded from five 1m x 1m plots on alternate sides of midline at locations 5, 15, 25, 35 and 45 m along midline. Litter cover includes leaves, seeds, twigs, branchlets and branches <10cm diameter.

Physiography & site features

Morphological type		Soil colour	
Landform element		Soil depth	
Landform pattern		Slope	0
Microrelief		Aspect	-
Lithology		Site drainiage	Impeded
Soil surface texture		Dist. to nearest water and type	Dam 25m to South

Plot Disturbance

	Severity code	Age code		Severity code	Age code
Clearing (inc. logging)	3	0	Fire damage	-	
Cultivation (inc. pasture)	-		Storm damage	-	
Soil erosion	-		Weediness	2	R
Firewood/CWD removal	-		Other slashing		
Grazing (identify native/stock)	?		Other		

Severity: 0= no evidence, 1= light, 2 = moderate, 3= severe.
Age: R= recent (<3yrs), NR= not recent (3-10yrs), O=old (>10yrs).

Height range

Canopy	18-30	Shrub Layer	-
Understory	8-12	Ground Layer	0.05-0.2
Midstory		Vines & scramblers	

Additional Notes:

Survey Name: HMP BAM survey	Date:
Surveyers: Will	Plot: 1

Canopy, Understory, Midstory, Shrub layer, Ground layer

#	GF Code	Species Name	N, E or HTE	Cover	Abund	Dominant top 3 in each stra.	Stratum	Height range
1		Eucalyptus tereticornis		10	2	Y	C	18m
2		Corymbia intermedia		1	1		C	
3		Melaleuca quinquenervia		2	1	Y	U	
4		Melaleuca linariifolia		5	2	Y	U	
5		Glochidion ferdinandi		0.2	1		S	
6	–	Senna pendula		0.2	8		S	
7	–	Lantana camara		0.1	2		S	
8		Melaleuca styphelioides		0.1	1		S	
9		Parsonsia straminea		0.2	2		U	
10		Geitonoplesium cymosum		0.1	3			
11	–	Paspalum dilatatum		50	>1000	Y		
12		Imperata cylindrica		40	>1000	Y		
13		~~Geranium sp.~~ Dianella caerulea		0.1	10			
14	–	Plantago lanceolata		0.5				
15	–	Bidens pilosa		0.1				
16		Dichondra repens		0.1				
17		Ranunculus innundatus . Buttercup		0.5				
18		Ranunculus sp. 2		0.1				
19	–	Fireweed		0.1				
20		Poranthera microphylla		0.1				
21		Hypochaeris radicata		0.5				
22								
23								
24								
25		Offsite:						
26		Swamp Oak						
27		Willow bottlebrush						
28		Swamp Mahogany						
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								
46								
47								
48								

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover). **Note:** 0.1% cover represents an area of approx.. 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approx.. 1.4 x 1.4 m, and 1% = 2 x 2 m, 5% = 4 x 5 m, 25% = 10 x10 m. **Abundance:** 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

BAM Plot - Field Survey Form

Survey Name: EC3103-Houston Mitchell	**Date:** 30.8.18	**Plot #:** 2 - development area
Surveyors: Nill	**IBRA Region:**	**Plot Dimensions:** 20x20 + 20x50
Likely Vegetation Class		**Zone ID** 1
Plant Community Type		
EEC: Y / N	**Orientation of midline from the 0m point:** 180° S	north = 0, south=180

Record easting and northing from the plot marker.
Dimensions (shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400m2 plot)		Sum values
Count of **Native Richness**	**Trees**	1
	Shrubs	1
	Grasses etc.	2
	Forbs	1
	Ferns	0
	Other	1
Sum of **Cover of** native vascular plants by growth form group	**Trees**	8
	Shrubs	0.1
	Grasses etc.	15.1
	Forbs	0.1
	Ferns	0
	Other	0.5
High Threat Weed cover %		23.15

The totals may be calculated after field component.

BAM Attribute (20 x 50 m plot)	Stem Classes and Hollows		
dbh	Euc*	Non Euc	Hollows^
80 + cm	–		0
50 - 79 cm	–		
30 - 49 cm	✓		Hollows 20cm+
20 - 29 cm	–		
10 - 19 cm	–		
5 - 9 cm	–		
< 5 cm	–		This size class records tree regeneration
Length of logs (m) (≥ 10cm diameter, > 50 cm in length)	–		total 0

Record living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems seperately. Data needed is presence only (tick) unless a 'large tree' for that veg class.

* includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia

^ For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

Each size class is noted as present by the living tree stems only. Depending on the Vegetation Class, DBH values and counts may be needed for a size class. For a multi-stemmed tree, only the largest living stem is included in the count/estimate if it is required by the large tree category for that vegetation class.

Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	100	100	95	100	100	–	–	5	–	–	–	–	–	–	–	–	–	–	–	–
Average of the 5 subplots	99					1					0					0				

The average percentage recorded from five 1m x 1m plots on alternate sides of midline at locations 5, 15, 25, 35 and 45 m along midline. Litter cover includes leaves, seeds, twigs, branchlets and branches <10cm diameter.

Physiography & site features

Morphological type		Soil colour	Grey-brown
Landform element		Soil depth	
Landform pattern		Slope	<5
Microrelief		Aspect	
Lithology		Site drainage	Impeded
Soil surface texture		Dist. to nearest water and type	

Plot Disturbance

	Severity code	Age code		Severity code	Age code
Clearing (inc. logging)	3	NR	Fire damage	–	
Cultivation (inc. pasture)			Storm damage	–	
Soil erosion			Weediness	2	R
Firewood/CWD removal	–		Other Slashing	3	R
Grazing (identify native/stock)	?		Other		

Severity: 0= no evidence, 1= light, 2 = moderate, 3= severe.
Age: R= recent (<3yrs), NR= not recent (3-10yrs), O=old (>10yrs).

Height range

Canopy	15-18	Shrub Layer	–
Understory	8-12	Ground Layer	0.05-0.2
Midstory	–	Vines & scramblers	

Additional Notes:

Mound of fill in plot. Covered in weeds

Survey Name:	HMD rezoning.	Date:	30.8.18
Surveyers:	WS	Plot:	2

Canopy, Understory
Midstory
Shrub layer
Ground layer

#	GF Code	Species Name	N, E or HTE	Cover	Abund	Dominant top 3 in each stra.	Stratum	Height range
1		Casuarina glauca		8	4	Y	C, U	
2		Melaleuca styphelioides		0.1	1		U	
3		Parsonsia straminea		0.5	1		U	
4	–	Ageratum houstonianum		2			G	
5	–	Paspalum mandiocanum		60		Y		
6	–	Bidens pilosa		1				
7	–	Paspalum dilatatum		25				
8		Carex appressa		R15				
9		Pratia purpurascens		0.1				
10	–	Hydrocotyle - Pennywort		0.2				
11	–	Scarlet pimpernel		0.1				
12		Lomandra longifolia		0.1	1			
13	-	Setaria sphacelata		0.2				
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								
46								
47								
48								

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover). **Note:** 0.1% cover represents an area of approx.. 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approx.. 1.4 x 1.4 m, and 1% = 2 x 2 m, 5% = 4 x 5 m, 25% = 10 x10 m. **Abundance:** 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

BAM Plot - Field Survey Form

Survey Name: HMO Industrial	**Date:** 30.8.18	**Plot #:** 3 . Development area
Surveyers: Will	**IBRA Region:** NNC	**Plot Dimensions:**
Likely Vegetation Class		**Zone ID** 2
Plant Community Type		
EEC: Y / (N)	**Orientation of midline from the 0m point:** 185°	north = 0, south=180

Record easting and northing from the plot marker.
Dimensions (shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400m2 plot)		Sum values
Count of **Native Richness**	Trees	7
	Shrubs	2
	Grasses etc.	8
	Forbs	4
	Ferns	0
	Other	2
Sum of **Cover of** native vascular plants by growth form group	Trees	26.3
	Shrubs	0.3
	Grasses etc.	37.6
	Forbs	0.3
	Ferns	0
	Other	0.6
High Threat Weed cover %		24.37

The totals may be calculated after field component.

BAM Attribute (20 x 50 m plot)	Stem Classes and Hollows		
dbh	Euc*	Non Euc	Hollows^
80 + cm	0		0
50 - 79 cm	5		
30 - 49 cm	✓		Hollows 20cm+
20 - 29 cm	✓		
10 - 19 cm	x		
5 - 9 cm	x		
< 5 cm	x		This size class records tree regeneration
Length of logs (m) (≥ 10cm diameter, > 50 cm in length)	3.1, 0.9, 0.8, 1, 0.7		total 6.5

Record living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems seperately. Data needed is presence only (tick) unless a 'large tree' for that veg class.

* includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia

^ For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

Each size class is noted as present by the living tree stems only. Depending on the Vegetation Class, DBH values and counts may be needed for a size class. For a multi-stemmed tree, only the largest living stem is included in the count/estimate if it is required by the large tree category for that vegetation class.

Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	100	100	40	0	0	0	0	10	20	20	0	0	0	0	0	0	0	50	80	80
Average of the 5 subplots	48					8					0					42				

The average percentage recorded from five 1m x 1m plots on alternate sides of midline at locations 5, 15, 25, 35 and 45 m along midline. Litter cover includes leaves, seeds, twigs, branchlets and branches <10cm diameter.

Physiography & site features

Morphological type		Soil colour	
Landform element		Soil depth	
Landform pattern		Slope	<5
Microrelief		Aspect	S
Lithology		Site drainiage	Good
Soil surface texture		Dist. to nearest water and type	

Plot Disturbance

	Severity code	Age code		Severity code	Age code
Clearing (inc. logging)	3	NR	Fire damage	–	
Cultivation (inc. pasture)	–		Storm damage	–	
Soil erosion	–		Weediness	1	R
Firewood/CWD removal	–		Other slashing	3	R
Grazing (identify native/stock)	?		Other		

Severity: 0= no evidence, 1= light, 2 = moderate, 3= severe.
Age: R= recent (<3yrs), NR= not recent (3-10yrs), O=old (>10yrs).

Height range

Canopy	18-25	Shrub Layer	–
Understory	–	Ground Layer	0.05 - 0.2
Midstory	–	Vines & scramblers	–

Additional Notes:

Modified DSDF - regularly slashed, no understorey or shrub layer except few lantana patches

Ground cover is mix of native & exotic grasses

Rock/dirt pile in larger plot.

Survey Name:	EC3103- Houston Mitchell	Date:	30.8.18
Surveyers:	Will	Plot:	3

Canopy,
Understory
Midstory
Shrub layer
Ground layer

#	GF Code	Species Name	N, E or HTE	Cover	Abund	Dominant top 3 in each stra.	Stratum	Height range
1		Eucalyptus microcorys		5	1			
2		E. sideraphloia		3	1			
3		E. propinqua		5	7			
4		E. globoidea		5	1			
5		C. gummifera		8	3			
6		Acacia maidenii		0.2	4			
7		Melaleuca styphelioides		0.1	1			
8		Notelaea longifolia		0.1	1			
9		Breynia oblongifolia		0.2	5			
10	–	Lantana camara	HTE	0.5	15			
11		Eustrephus latifolius		0.5	10			
12		Imperata cylindrica		30	many			
13		Cymbopogon refractus		5	" "			
14		Themeda triandra		1				
15		Entolasia marginata		1				
16		Dianella caerulea		0.1				
17		Desmodium rhytidophyllum		0.1				
18		Dichondra repens		0.1				
19		Hibbertia scandens		0.1	2			
20		Entolasia stricta		0.3				
21	–	Plantago lanceolata		0.2	10			
22	–	Bidens pilosa		0.1	10			
23		Lomandra longifolia		0.3	5			
24	–	Paspalum mandiocanum		30	many			
25	–	Paspalum dilatatum		30	" "			
26		Fireweed		0.1				
27		Poranthera microphylla						
28		Eragrostis (custard lovegrass)						
29		Cranesbill geranium						
30		Sida rhombifolia	E					
31		Lomandra filaformas						
32								
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48								

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover). **Note:** 0.1% cover represents an area of approx.. 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approx.. 1.4 x 1.4 m, and 1% = 2 x 2 m, 5% = 4 x 5 m, 25% = 10 x10 m. **Abundance:** 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

BAM Plot - Field Survey Form

Survey Name: ltmo rezoning EC3103	**Date:** 7.8.18	**Plot #:** 4 . 1-consarea
Surveyers: WS	**IBRA Region:** NNC	**Plot Dimensions:** 20x20
Likely Vegetation Class		**Zone ID**
Plant Community Type		
EEC: Y / N	**Orientation of midline from the 0m point:** N = 0	north = 0, south=180

Record easting and northing from the plot marker.
Dimensions (shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400m2 plot)		Sum values
Count of **Native Richness**	Trees	5
	Shrubs	3
	Grasses etc.	2
	Forbs	4
	Ferns	2
	Other	1
Sum of **Cover** of native vascular plants by growth form group	Trees	33.1
	Shrubs	0.1
	Grasses etc.	26
	Forbs	0.4
	Ferns	0.2
	Other	0
High Threat Weed cover %		0.15

The totals may be calculated after field component.

BAM Attribute (20 x 50 m plot)	Stem Classes and Hollows		
dbh	Euc*	Non Euc	Hollows^
80 + cm	3		0
50 - 79 cm	5		
30 - 49 cm	–		Hollows 20cm+
20 - 29 cm	✓		
10 - 19 cm	–		
5 - 9 cm	–		
< 5 cm	–		This size class records tree regeneration
Length of logs (m) (≥ 10cm diameter, > 50 cm in length)	2.2, 2.5, 3.1, 1.4, 3.4		total 12.6

Record living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems seperately. Data needed is presence only (tick) unless a 'large tree' for that veg class.

* includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia

^ For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

Each size class is noted as present by the living tree stems only. Depending on the Vegetation Class, DBH values and counts may be needed for a size class. For a multi-stemmed tree, only the largest living stem is included in the count/estimate if it is required by the large tree category for that vegetation class.

Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	100	95	100	100	100	–	5	–	–	–	–	–	–	–	–	–	–	–	–	–
Average of the 5 subplots	99					1					0					0				

The average percentage recorded from five 1m x 1m plots on alternate sides of midline at locations 5, 15, 25, 35 and 45 m along midline. Litter cover includes leaves, seeds, twigs, branchlets and branches <10cm diameter.

Physiography & site features

Morphological type		Soil colour	
Landform element		Soil depth	
Landform pattern		Slope	<5
Microrelief		Aspect	N
Lithology		Site drainiage	Good
Soil surface texture		Dist. to nearest water and type	

Plot Disturbance

	Severity code	Age code		Severity code	Age code
Clearing (inc. logging)	3	0	Fire damage	1	10 (O)
Cultivation (inc. pasture)			Storm damage		
Soil erosion			Weediness	1	R
Firewood/CWD removal			Other slashing	3	R
Grazing (identify native/stock)			Other		

Severity: 0= no evidence, 1= light, 2 = moderate, 3= severe.
Age: R= recent (<3yrs), NR= not recent (3-10yrs), O=old (>10yrs).

Height range

Canopy	20-30	Shrub Layer	2
Understory		Ground Layer	0.5
Midstory		Vines & scramblers	

Additional Notes:
Recently slashed

Survey Name: HMD rezoning	Date: 7.9.16
Surveyers: WS	Plot: 4

Canopy, Understory Midstory Shrub layer Ground layer

#	GF Code	Species Name	N, E or HTE	Cover	Abund	Dominant top 3 in each stra.	Stratum	Height range
1		S. glomulifera		20	2	Y	C	
2		E. pilularis		10	2	Y	C	
3		Breynia oblongifolia		0.1	1		S	
4	–	Senna pendula		0.1	2		S	
5		E. microcorys		3	1		C	
6		Glochidion ferdinandi		0.1	1		S	
7		Adiantum aethiopicum - Maidenhair fern		0.1			G	
8	–	Paspalum mandiocanum		70				
9		Entolasia stricta		1				
10		Poranthera microphylla		0.1				
11		Imperata cylindrica		25				
12	–	Plantago lanceolata		0.2				
13		Dichondra repens		0.1				
14	–	Lantana camara		0.1	1			
15		Pratia purpurascens		0.1				
16		Hydrocotyle peduncularis		0.1				
17		Pteridium esculentum		0.1				
18		Synoum glandulosum						
19		Cryptocarya glaucescens						
20		Callistemon salignus						
21		Centrolepis cymosum						
22								
23								
24								
25								
26								
27								
28								
29								
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48								

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover). **Note:** 0.1% cover represents an area of approx.. 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approx.. 1.4 x 1.4 m, and 1% = 2 x 2 m, 5% = 4 x 5 m, 25% = 10 x10 m. **Abundance:** 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

BAM Plot - Field Survey Form

Survey Name: EC3103-HMD rezoning	**Date:** 7.9.18	**Plot #:** 5
Surveyers: WS	**IBRA Region:**	**Plot Dimensions:**
Likely Vegetation Class		**Zone ID**
Plant Community Type		
EEC: Y / N	**Orientation of midline from the 0m point:** N = 0	north = 0, south=180

Record easting and northing from the plot marker.
Dimensions (shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	3
	Shrubs	1
	Grasses etc.	5
	Forbs	4
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	7.5
	Shrubs	5
	Grasses etc.	10.7
	Forbs	0.4
	Ferns	0
	Other	0
High Threat Weed cover %		67.07

The totals may be calculated after field component.

BAM Attribute (20 x 50 m plot)	Stem Classes and Hollows		
dbh	Euc*	Non Euc	Hollows^
80 + cm	–		0
50 - 79 cm	–		
30 - 49 cm	✓		Hollows 20cm+
20 - 29 cm	✓		
10 - 19 cm	–		
5 - 9 cm	–		
< 5 cm	–		This size class records tree regeneration
Length of logs (m) (≥ 10cm diameter, > 50 cm in length)	0		total 0

Record living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems seperately. Data needed is presence only (tick) unless a 'large tree' for that veg class.

* includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia

^ For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

Each size class is noted as present by the living tree stems only. Depending on the Vegetation Class, DBH values and counts may be needed for a size class. For a multi-stemmed tree, only the largest living stem is included in the count/estimate if it is required by the large tree category for that vegetation class.

Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	5	10	85	90	85	95	2	15	10	15	–	–	–	–	–	–	–	–	–	–
Average of the 5 subplots	55					27.4					0					0				

The average percentage recorded from five 1m x 1m plots on alternate sides of midline at locations 5, 15, 25, 35 and 45 m along midline. Litter cover includes leaves, seeds, twigs, branchlets and branches <10cm diameter.

*remain at 15m was living grass.

Physiography & site features

Morphological type		Soil colour	
Landform element		Soil depth	
Landform pattern		Slope	–
Microrelief		Aspect	–
Lithology		Site drainage	Poor
Soil surface texture		Dist. to nearest water and type	

Plot Disturbance

	Severity code	Age code		Severity code	Age code
Clearing (inc. logging)	3	0	Fire damage	–	
Cultivation (inc. pasture)			Storm damage		
Soil erosion			Weediness	2	R
Firewood/CWD removal			Other slashing		
Grazing (identify native/stock)	?		Other		

Severity: 0= no evidence, 1= light, 2 = moderate, 3= severe.
Age: R= recent (<3yrs), NR= not recent (3-10yrs), O=old (>10yrs).

Height range

Canopy	12-18	Shrub Layer	
Understory		Ground Layer	0.1-0.5
Midstory	6-8	Vines & scramblers	

Additional Notes:

Slashed pasture grassland with scattered Paperbarks & swamp mahogany
No understorey. Saturated clay soils
Exotic dominated groundcover

Survey Name: HMD rezoning	Date: 7.9.16
Surveyers: WS	Plot: 5

Canopy, Understory, Midstory, Shrub layer, Ground layer

#	GF Code	Species Name	N, E or HTE	Cover	Abund	Dominant top 3 in each stra.	Stratum	Height range
1		M. quinquenervia		2	1			
2		M. linariifolia		5	2			
3		E. robusta		5	2			
4		E. patentinervis Red FRAx SM hybrid		0.5	1			
5		Lomandra longifolia		0.2				
6	—	Hydrocotyle ~~pedicellata~~ bonariensis		0.1				
7	—	Paspalum dilatatum		50				
8		Viola hederacea		0.1				
9		Dianella caerulea		0.1				
10		Imperata cylindrica		10				
11	—	Fireweed		0.1				
12		Cyperus gracilis		0.2				
13		Sedge sp.		0.1				
14		Baumea sp.		0.2				
15		Phyllanthus lamprophyllus		0.1				
16		Gonocarpus sp.		0.1				
17								
18								
19								
20								
21								
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45								
46								
47								
48								

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... 100% (foliage cover). **Note:** 0.1% cover represents an area of approx.. 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approx.. 1.4 x 1.4 m, and 1% = 2 x 2 m, 5% = 4 x 5 m, 25% = 10 x10 m. **Abundance:** 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

BAM Plot - Field Survey Form

Survey Name: EC3103 - HMD rezoning	**Date:** 7.9.18	**Plot #:** 6
Surveyers: WS	**IBRA Region:** NNC	**Plot Dimensions:**
Likely Vegetation Class		**Zone ID**
Plant Community Type		
EEC: Y / N	**Orientation of midline from the 0m point:** N - O	north = 0, south=180

Record easting and northing from the plot marker.
Dimensions (shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400m2 plot)		Sum values
Count of **Native Richness**	Trees	0
	Shrubs	0
	Grasses etc.	1
	Forbs	6
	Ferns	0
	Other	0
Sum of **Cover** of native vascular plants by growth form group	Trees	0
	Shrubs	6
	Grasses etc.	5
	Forbs	1.5
	Ferns	0
	Other	0
High Threat Weed cover %		91.13

The totals may be calculated after field component.

BAM Attribute (20 x 50 m plot)	Stem Classes and Hollows		
dbh	Euc*	Non Euc	Hollows^
80 + cm			0
50 - 79 cm			
30 - 49 cm			Hollows 20cm+
20 - 29 cm			
10 - 19 cm			
5 - 9 cm			
< 5 cm			This size class records tree regeneration
Length of logs (m) (≥ 10cm diameter, > 50 cm in length)	-		total 0

Record living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems seperately. Data needed is presence only (tick) unless a 'large tree' for that veg class.

* includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia

^ For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

Each size class is noted as present by the living tree stems only. Depending on the Vegetation Class, DBH values and counts may be needed for a size class. For a multi-stemmed tree, only the largest living stem is included in the count/estimate if it is required by the large tree category for that vegetation class.

Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	95	98	100	90	100	5	2	0	10	0	-	-	-	-	-	-	-	-	-	-
Average of the 5 subplots	96.6					3.4					0					0				

The average percentage recorded from five 1m x 1m plots on alternate sides of midline at locations 5, 15, 25, 35 and 45 m along midline. Litter cover includes leaves, seeds, twigs, branchlets and branches <10cm diameter.

Physiography & site features

Morphological type		Soil colour	
Landform element		Soil depth	
Landform pattern		Slope	-
Microrelief		Aspect	-
Lithology		Site drainiage	poor
Soil surface texture		Dist. to nearest water and type	

Plot Disturbance

	Severity code	Age code		Severity code	Age code
Clearing (inc. logging)	3	0	Fire damage		
Cultivation (inc. pasture)			Storm damage		
Soil erosion			Weediness	3	R
Firewood/CWD removal			Other slashing	3	R
Grazing (identify native/stock)	?		Other		

Severity: 0= no evidence, 1= light, 2 = moderate, 3= severe.
Age: R= recent (<3yrs), NR= not recent (3-10yrs), O=old (>10yrs).

Height range

Canopy		Shrub Layer	
Understory		Ground Layer	
Midstory		Vines & scramblers	

Additional Notes: slashed exotic grassland. Rare scattered trees

Survey Name: HMD rezoning	Date: 7.9.18
Surveyers: WS	Plot: 6

Canopy, Understory Midstory Shrub layer Ground layer

#	GF Code	Species Name	N, E or HTE	Cover	Abund	Dominant top 3 in each stra.	Stratum	Height range
1		Paspalum dilatatum		80			G	
2	-	Medicago sp.		0.1				
3		Hydrocotyle pelicellata		1				
4		Ranunculus inundatus		0.5				
5		Ranunculus sp.		0.5				
6		Hydrocotyle pedunculoris		0.2				
7		Cyperus gracilis		5				
8	-	Plantago lanceolata		0.2				
9		Centella asiatica		0.1				
10		Gonocarpus sp. -wide round leaves		0.1				
11		Philydrum lanuginosum		0.1				
12	-	Fireweed		0.1				
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
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42								
43								
44								
45								
46								
47								
48								

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover). **Note:** 0.1% cover represents an area of approx.. 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approx.. 1.4 x 1.4 m, and 1% = 2 x 2 m, 5% = 4 x 5 m, 25% = 10 x10 m. **Abundance:** 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

Biodiversity AUSTRALIA

BAM Plot - Field Survey Form

Survey Name: EC303 - HMD rezoning	**Date:** 7.9.18	**Plot #:** 7
Surveyers: WS	**IBRA Region:** NNC	**Plot Dimensions:**
Likely Vegetation Class		**Zone ID**
Plant Community Type		
EEC: Y / N	**Orientation of midline from the 0m point:** N = 0	north = 0, south=180

Record easting and northing from the plot marker.

Dimensions (shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	5
	Shrubs	5
	Grasses etc.	8
	Forbs	5
	Ferns	1
	Other	5
Sum of Cover of native vascular plants by growth form group	Trees	48.2
	Shrubs	0.5
	Grasses etc.	28.6
	Forbs	0.5
	Ferns	0.1
	Other	0.5
High Threat Weed cover %		6.08

The totals may be calculated after field component.

BAM Attribute (20 x 50 m plot) dbh	Stem Classes and Hollows: Euc*	Non Euc	Hollows^
80 + cm	—		0
50 - 79 cm	4		
30 - 49 cm	✓		Hollows 20cm+
20 - 29 cm	—		
10 - 19 cm	—		
5 - 9 cm	—		
< 5 cm	—		This size class records tree regeneration
Length of logs (m) (≥ 10cm diameter, > 50 cm in length)	1.1, 0.9, 0.9, 0.8, 0.7, 1.1, 0.7, 0.9, 0.6, 0.9, 2.2, 2.0, 1.0		total 13.8

Record living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems seperately. Data needed is presence only (tick) unless a 'large tree' for that veg class.

* includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia

^ For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

Each size class is noted as present by the living tree stems only. Depending on the Vegetation Class, DBH values and counts may be needed for a size class. For a multi-stemmed tree, only the largest living stem is included in the count/estimate if it is required by the large tree category for that vegetation class.

Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	50, 95, 5, 95, 40	40, 5, 85, 5, 60	10, –, 10, –, –	–, –, –, –, –
Average of the 5 subplots	57	39	4	0

The average percentage recorded from five 1m x 1m plots on alternate sides of midline at locations 5, 15, 25, 35 and 45 m along midline. Litter cover includes leaves, seeds, twigs, branchlets and branches <10cm diameter.

Physiography & site features

Morphological type		Soil colour	
Landform element		Soil depth	
Landform pattern		Slope	5
Microrelief		Aspect	Sth
Lithology		Site drainage	Good
Soil surface texture		Dist. to nearest water and type	

Plot Disturbance

	Severity code	Age code		Severity code	Age code
Clearing (inc. logging)			Fire damage		
Cultivation (inc. pasture)			Storm damage		
Soil erosion			Weediness		
Firewood/CWD removal			Other		
Grazing (identify native/stock)			Other		

Severity: 0= no evidence, 1= light, 2 = moderate, 3= severe.
Age: R= recent (<3yrs), NR= not recent (3-10yrs), O=old (>10yrs).

Height range

Canopy		Shrub Layer	
Understory		Ground Layer	
Midstory		Vines & scramblers	

Additional Notes:

Survey Name: HMD rezoning	Date: 7.9.18
Surveyers: WS	Plot: 7

Canopy,
Understory
Midstory
Shrub layer
Ground layer

#	GF Code	Species Name	N, E or HTE	Cover	Abund	Dominant top 3 in each stra.	Stratum	Height range
1		E. propinqua		15	4			
2		E. microcorys		25	6			
3		E. resinifera		3	1			
4		E. sideroph[illegible]a		5	2			
5		Acacia maidenii		0.2	2			
6	–	Lantana camara		0.1				
7		Polyscias sambucifolia		0.1				
8		Breynia oblongifolia		0.1				
9		Cheilanthes sieberi		0.1				
10		Lomandra longifolia		1				
11		Imperata cylindrica		10				
12		Themeda triandra		10				
13		Rubus parviflorus		0.1				
14		Eustrephus latifolius		0.1				
15		Oplismenus aemulus		0.1				
16		Lomandra filiformis		2				
17		Eragrostis brownii		5				
18		Desmodium rhytidophyllum		0.1				
19		Glycine clandestina		0.1				
20		Pratia purpurascens		0.1				
21	–	Fireweed		0.1				
22	–	Paspalum dilatatum		5				
23		Dichondra repens		0.1				
24		Billardiera scandens		0.1				
25		Poranthera microphylla		0.1				
26	–	Verbena bonariensis		0.1				
27		Paspalum mandiocanum		5				
28		Pastel flower		0.1				
29		Ozothamnus diosmifolius		0.1				
30		Bidens pilosa		0.1				
31		Grass sp. 1		0.2				
32		Daviesia ulicifolia		0.1				
33		maidenhair fern Adiantum		0.1				
34		Echinopogon caespitosus		0.2				
35		Kennedia rubicunda		0.1				
36								
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43								
44								
45								
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47								
48								

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover). **Note:** 0.1% cover represents an area of approx.. 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approx.. 1.4 x 1.4 m, and 1% = 2 x 2 m, 5% = 4 x 5 m, 25% = 10 x10 m. **Abundance:** 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...