Streamlined Biodiversity Development Assessment Report

Planning Proposal for a Caravan Park Extension.
Lot 2 DP 622229 & Lot 3622 DP 622485, 4029 & 4045 Nelson Bay Road, Bobs Farm, NSW

Prepared for: Hometown Australia Communities Pty Ltd

C/- ADW Johnson Pty Ltd

03 November 2022

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P 0420 624 707 E INFO@ANDERSONEP.COM.AU
10 DARVALL ST CARRINGTON NSW 2294 ABN 57 659 651 537

Document Control

Document Name	Planning Proposal for a Caravan Park Extension. Lot 2 DP 622229 & Lot 3622 DP 622485, 4029 & 4045 Nelson Bay Road, Bobs Farm, NSW
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Client Name	Hometown Australia Communities Pty Ltd
Accredited Assessor	Ian Benson (BAAS 18147)
AEP Project Team	Natalie Black Ian Benson Bonni Yare Angela Metcalfe Simon Purcell Andrew Harker

Revision

Revision	Date	Author	Reviewed	Approved
00	25/11/2021	Andrew Harker	Natalie Black	Natalie Black
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Distribution

Revision	Date	Name	Organisation
00	25/11/2021	Stephanie Van Dissel	ADW Johnson Pty Ltd
01	03/11/2022	Stephanie Van Dissel	ADW Johnson Pty Ltd

EXECUTIVE SUMMARY

Anderson Environment & Planning (AEP) was commissioned by Hometown Australia Communities Pty Ltd to undertake a Streamlined Biodiversity Development Assessment Report (SBDAR) for the Planning Proposal, seeking to amend Port Stephens Local Environmental Plan 2013 (PSCLEP, 2013) to permit caravan parks at Lot 3622 DP622485 and Lot 2 DP622229, 4029 and 4045 Nelson Bay Road, Bobs Farm, NSW.

This report has been prepared to meet the requirements of the Biodiversity Assessment Method 2020 (BAM) established under Section 6.7 of the NSW Biodiversity Conservation Act 2016. This assessment utilises methods detailed within the BAM 2020 to identify biodiversity values inherent within the site, including known and potentially occurring threatened species and ecological communities, and quantifies impacts of the proposal upon these values under a streamlined assessment (small area).

The Study Area is located within a semi-rural landscape within the suburb of Bobs Farm which is located between Nelson Bay Road and Trotters Road within the Port Stephens Council LGA. Approximately 430m to the north lies Tilligerry Nature Reserve with Worimi National Park approximately 50m to the South.

The Subject site (~3.13ha) is situated within the NSW North Coast Bioregion and Karuah Manning IBRA sub-region and is zoned as RU2 Rural Landscape. The vegetation community identified for the Study Area is PCT 1646 – *Smooth-barked Apple – Blackbutt – Old Man Banksia woodland on coastal sands of the Central and Lower North Coast*. The Study Area also contains non-remnant / cleared areas that covers approximately 2.23ha and is dominated by grasses, comprising mostly exotic species due to grazing and land use.

The proposed development referred to in this document as the Subject Site, would remove or modify approximately 0.99ha of native vegetation commensurate with PCT 1646, while retaining 0.32ha of PCT 1646, as well as restoring 0.09ha of cleared land within the proposed C2 lands through a biodiversity management plan. As this development application is being assessed as a Streamlined Biodiversity Assessment (SBAR), PCT 1646 has been determined to be the likely PCT within the Subject Site and is the PCT that was assessed in the BAM calculator.

Fauna species recorded were typical of those expected in this locality, particularly due to the limited nature of the habitat with existing connection to larger patches of habitat offsite. No threatened species were recorded on site during surveys.

To offset residual impacts of the proposal upon identified biodiversity values, the proposal would require retirement of a total of 25 x PCT 1646 Ecosystem Credits (or equivalent).

An assessment of potential Serious and Irreversible Impact (SAII) candidates was carried out against SAII criteria. As a result, it was considered that no SAII are likely to occur as a result of the proposal due to the small size of the area, degraded condition, and current level of vegetation community fragmentation in the locality.

Impacts to biodiversity from the planning proposal to rezone the Study Area have been considered in this report. Avoid and minimise considerations within the planning proposal have been recommended to mitigate any potential impacts and maintain functionality of the existing fauna crossing. A buffer across the length of the eastern boundary and 130m across the northern boundary is suggested (0.40ha). Following assessment by Council's ecologist, the proposed retained buffer has been accepted as fit for purpose. Council ecologist supports the planning proposal proceeding on the basis of the retained native vegetation buffer (0.40ha) being rezoned C2 Environmental Conservation. The purpose of the buffer along the northern boundary is to provide an interface with the remnant vegetation to the north

of Trotter Road. The widened buffer ensures approximately 95m of retained vegetation at the Fauna Crossing Point.

Assessment of the proposal under other relevant environmental policy instruments including the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 and the Port Stephens Council Comprehensive Koala Plan of Management (CKPoM) are also included.

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Study Certification and Licensing

The fieldwork was undertaken by Staff identified in the table below. This report was written by Andrew Harker BEnvSc&Mgt and Angela Metcalfe BEnvSc&Mgt. This report was reviewed by Simon Purcell and certified by Ian Benson BEng(Civil); GradDipSc(Ecology), BAAS: 18147 of Anderson Environment & Planning.

Staff	Title/Qualification	Tasks
Ian Benson	Director / Principal Ecologist BEng(Civil); GradDipSc(Ecology) BAAS: 18147	Report review and certification
Simon Purcell	Senior Ecologist B AppSci (Wildlife Science) Cert III Anima Care & Management	Report review, vegetation mapping.
Bonni Yare	Ecologist BSci (NRM), Cert III Cons & LandMgt	BAM plots, threatened flora survey, Bird survey.
Angela Metcalfe	Ecologist BEnvSc&Mgt - Honours (Ecosystems & Biodiversity)	Bam plots, nocturnal survey, threatened flora survey, bird survey.
Andrew Harker	Ecologist BEnvSc&Mgt (Earth Systems)	Report preparation, BAM plots, Bird survey, Koala SAT, HBT survey.

Research was conducted under the following licences:

- NSW National Parks and Wildlife Service Scientific Investigation Licence SL101313;
- Animal Research Authority (Trim File No: 14/600(2)) issued by NSW Agriculture; and
- Animal Research Establishment Accreditation Number 53724.

Certification:

As the principal author, I, Ian Benson, make the following certification:

This report has been written to comply with the requirements of the BAM 2020 and obligations outlined within the BAM Assessor Code of Conduct and includes, in the opinion of the writer, a true and accurate account of the species recorded, or considered likely to occur within the Survey Area, and inferences of such for biodiversity credit calculations.

Anderson Environment and Planning have no actual, potential or perceived conflicts of interest with Hometown Australia or ADW Johnson. Anderson Environment and Planning has received commercial payment for consulting services and assessment by Hometown Australia for this project.

BAM Assessment methodology, as well as Commonwealth, state and local government policies and guidelines formed the basis of project surveying methodology, unless specified departures from industry standard guidelines are justified for scientific and/or animal ethics reasons.

All research workers have complied with relevant laws and codes relating to the conduct of flora and fauna research, including the Animal Research Act 1995, National Parks and Wildlife Act 1974 and the Australian Code of Practice for the Care and Use of Animals for Scientific Purposes.

Principal Author and Certifier:

Ian Benson
Director & Principal Ecologist

Anderson Environment & Planning

BAAS no. 18147

Calculator Ref: 00028922/BAAS18147/21/00028923

3 November 2022

Glossary of Terms

APZ	Asset Protection Zone
BAM	*Biodiversity Assessment Method Order* (2020) that determines: Methodology applicable to quantifying biodiversity values inherent within a development site; Avoid and mitigation efforts required to be employed as part of any development proposal; and Number and class of credits required to offset residual impacts of the proposal upon the biodiversity values therein.
BC Act	The NSW *Biodiversity Conservation Act 2016.*
Biodiversity Credit Report	Specifies the number and type of biodiversity credits required to offset the impacts of a development.
BAM Calculator (BAM-C)	The online tool used to interpret site survey data and regional location information to quantify ecosystem and species credits required / generated at a development / stewardship site.
Biodiversity credits	Ecosystem or Species Credits required to offset the loss of biodiversity values on a development site.
Biodiversity offsets	Specific measures that are put in place to compensate for impacts on biodiversity values.
Biodiversity values	The composition, structure, and function of ecosystems, and threatened species, populations and ecological communities, and their habitats.
Council	Port Stephens Council.
CKPoM	Comprehensive Koala Plan of Management (**Appendix F**)
DoEE	The Commonwealth Department of the Environment and Energy.
DPI	The NSW Department of Primary Industries.
DPIE	The NSW Department of Planning, Industry and Environment.
Ecosystem credit	The class of biodiversity credits created or required for the impact on EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur within a vegetation type.
EEC	Endangered Ecological Community (under BC Act).
EPBC Act	The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
HBT	Hollow-bearing tree as defined in the BAM.
OEH	The former NSW Office of Environment and Heritage
PFC	Percentage Foliage Cover
Proposal	Planning Proposal for a Caravan Park Extension. Lot 2 DP 622229 & Lot 3622 DP 622485, 4029 & 4045 Nelson Bay Road, Bobs Farm, NSW
Study Area	Lot 2 DP 622229 & Lot 3622 DP 622485 as detailed in **Figure 1** which covers an area of approximately 3.54ha.
Subject Site	The proposed development, which covers an area of approximately 3.13ha (**Figure 1**).
Species credit	Class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area based on habitat surrogates.
TBDC	Threatened Biodiversity Data Collection.
TEC	Threatened Ecological Community.
TSPD	Threatened Species Profile Database.
VIS	Vegetation Integrity Score.

1.0 Stage 1 – Biodiversity Assessment

1.1 Introduction

At the request of Hometown Australia Communities Pty Ltd (the client), Anderson Environment & Planning (AEP) have undertaken the necessary investigations to inform the production of a Streamlined Biodiversity Development Assessment Report (SBDAR) addressing the proposed development.

This SBDAR undertaken adheres to the approach outlined in the Biodiversity Assessment Method (OEH 2020a) (the BAM) and the Biodiversity Assessment Method Calculator User Guide (OEH 2020b).

1.1.1 Assessment Scope

The SBDAR presented herewith aims to quantify impacts of the proposal upon biodiversity values based on the methods described within the Biodiversity Assessment Method Order 2020 (BAM Order), including threatened entities listed under the NSW Biodiversity Conservation Act 2016 (BC Act Regulations).

The proposed development has been assessed under the Streamlined Assessment Module – Small Area of the BAM 2020. The minimum Lot size associated with the property is 20ha. As per Table 12 of the BAM 2020 the maximum area clearing limit for application of the small area development module for this minimum lot size is less than or equal to 2ha. The proposed development is proposing to clear 0.99ha of native vegetation, thus, the clearing threshold for the minimum lot size is not being exceeded and falls within the clearing limits prescribed in the BAM 2020 under the Streamlined Assessment Module – Small Area.

This report includes:

- **Stage 1 – Biodiversity Assessment** – including area limits, mapping of remnant vegetation communities within the location of previously identified threatened species and their habitats, and a list of threatened species, populations and communities with a likelihood of occurrence; and
- **Stage 2 – Impact Assessment (Biodiversity Values) –** identification of impact avoidance and mitigation measures, and the quantifying of offset requirements in the form of biodiversity credits based upon residual impacts of the proposal.

1.1.2 The Proposal

The Planning Proposal seeks to amend Port Stephens Local Environmental Plan 2013 (PSCLEP 2013) to permit caravan parks' on the Subject Land.

The Planning Proposal will regularise the approved existing use on part of the Subject Land (Lot 51 DP 1175028), where an approved caravan park is located. The caravan park is approved under DA-16-2013-790-4 and comprises 193 sites on which manufactured homes are currently located or being installed. It currently operates as a over 55s resort-style community, known as Sunrise Port Stephens.

Although approved, the current zoning of the site no longer permits this use and the development operates relying upon existing use rights.

The planning proposal also seeks to facilitate the extension of this use to the two parcels of land east of Lot 51 DP 1175028, being Lot 3622 DP 622485 and Lot 2 DP 622229. Subject to development consent and further approvals, additional manufactured homes/caravan park sites could potentially be accommodated on the Subject Land. As a part of the planning proposal a buffer to the east of the site will be rezoned as C2 Environmental Conservation. The purpose of the buffer along the northern

boundary is to provide an interface with the remnant vegetation to the north of Trotter Road. The retained buffer should be managed for biodiversity under a Biodiversity Management Plan to be provided at the time of a future development application.

2.0 Site Description

Table 1 provides site context details to assist with the assessment of landscape features and to establish context of the Subject site in the surrounding landscape.

Table 1 – Site Particulars

Detail	Comments
Client	Hometown Australian Communities Pty Ltd
Address	4029 & 4045 Nelson Bay Road, Bobs Farm, NSW
Title(s)	Lot 2 DP 622229 & Lot 3622 DP 622485
LGA	Port Stephens Council
Zoning	As per Port Stephens Council Local Environmental Plan 2013 (LEP), the site is zoned RU-2 – Rural Landscape
Biodiversity Value Mapped Land	Not mapped Biodiversity Value Mapped Land (BV Mapped)
Minimum Lot Size	20ha
Clearing Threshold	0.5ha
Subject Site	The Subject Site comprises the proposed development within Lot 2 DP 622229 & Lot 3622 DP 622485. The proposed development (**Appendix A**) covers a footprint of approximately 3.13ha including approximately 0.99ha of remnant vegetation and 2.23ha non-remnant / cleared areas.
Current Land Use	The Subject Site comprises two residential properties, numerous large and small sheds. Vegetation on the south boundary exists as remnant vegetation consisting of canopy trees, mid and under storey vegetation. The west boundary is cleared to approximately 15m wide and a mix of exotic and native vegetation exists along the northern boundary. The remainder of the site is comprised of canopy trees, mid storey and a managed, generally exotic, understorey. The site is bounded by Nelson Bay Road to the south, Trotter Road to the north, a residential subdivision to the west and a small fenced area of a roadside reserve containing numerous nest boxes to the east.
Surrounding Land Use	The adjoining properties to the north, east, and west are zoned RU-2 – Rural Landscape. The northern and western land consists of remnant vegetation with residential dwellings. To the east lies semi-rural properties and residential subdivisions. To the south lies Worimi National Park land approximately 50m from the Subject Site. Approximately 430m to the north lies E1 lands of Tilligerry Nature Reserve. Remnant vegetation occurs to the south-west of the Subject Site in Moderate condition, with vegetation along the northern and eastern boundary in poor condition. An existing wildlife crossing is located approx. 10m to the east of the Site providing connection between vegetation to the south and north of Nelson Bay Road. As a part of the planning proposal a buffer within the east of the Study Area is proposed to be rezoned as C2 Environmental Conservation (**Section 3.2**)

2.1.1 Information Sources

Information and spatial data provided within this SBDAR has been compiled from various sources including:

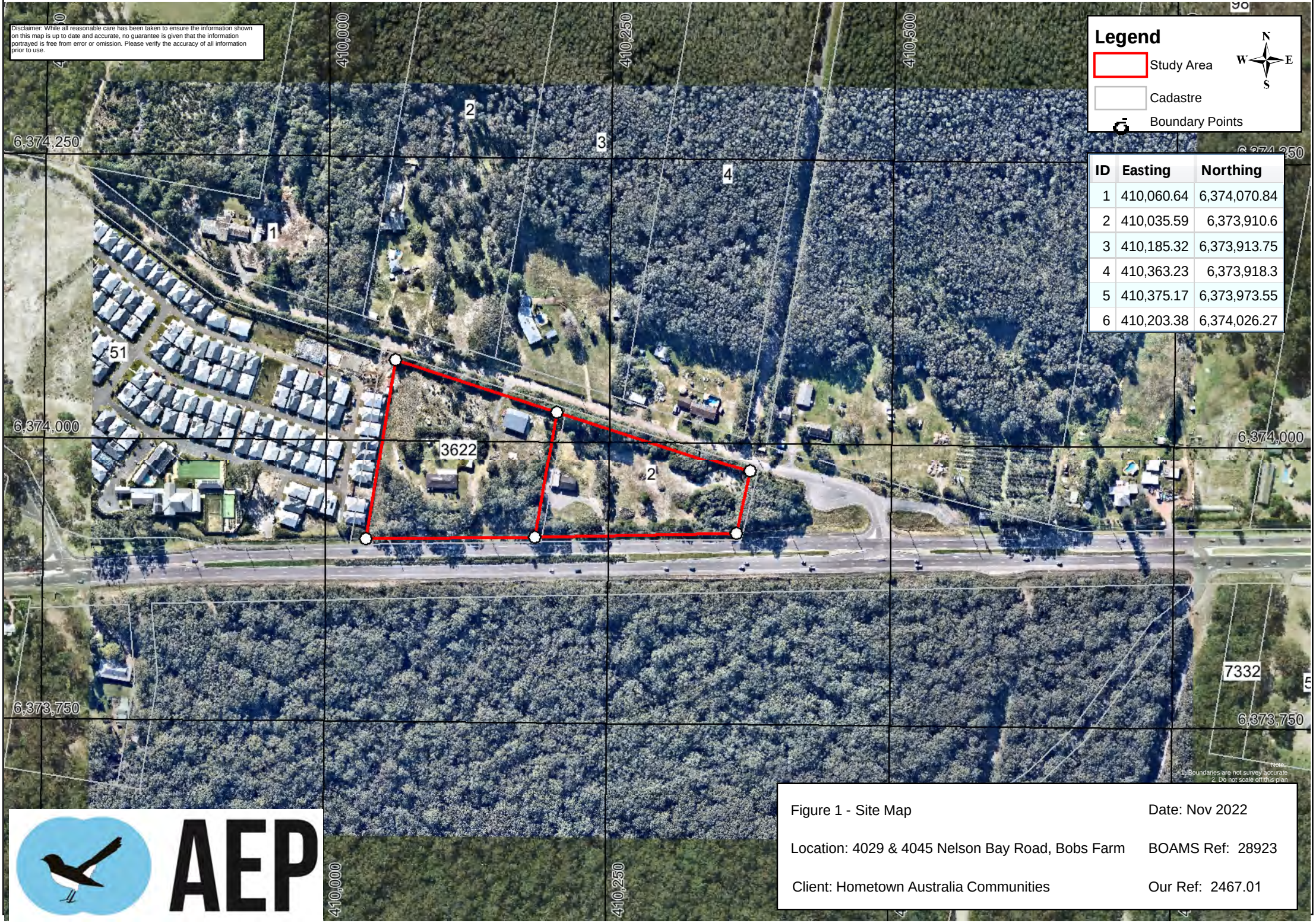
- Aerial Photograph Interpretation (API) of the site and surrounding locality (Nearmaps, 2022).
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities. Working Draft, November 2004.
- A Revised Interim Vegetation Classification of the Central Coast Local Government Area (Bell 2019).

- NSW Guide to Surveying Threatened Plants, NSW Office of Environment and Heritage (2020);
- OEH Threatened Biodiversity Profiles

  (https://www.environment.nsw.gov.au/threatenedSpeciesApp/);
- PlantNET NSW (http://plantnet.rbgsyd.nsw.gov.au/); and
- Anecdotal records.

In addition, database searches were carried out, namely:

- Review of flora and fauna records held by the NSW Office of Environment & Heritage (OEH) Atlas of NSW Wildlife within a 10km radius of the site (October 2022);
- Review of flora and fauna records held by the Commonwealth Department of Energy and Environment (DoEE) Protected Matters Search within a 5km radius of the site (October 2022); and
- Review of Important Area Maps held by the NSW Department of Planning, Industry and Environment (DPIE October 2022).



AEP

Figure 1 - Site Map

Date: Nov 2022

Location: 4029 & 4045 Nelson Bay Road, Bobs Farm

BOAMS Ref: 28923

Client: Hometown Australia Communities

Our Ref: 2467.01

2.2 Landscape Features

2.2.1 Regional Landscapes

The Subject Site was identified as occurring within the following landscape areas:

- *IBRA Bioregion* – North Coast.
- *IBRA Subregion* – Karuah Manning.
- *NSW Mitchell Landscape* – The site is defined as *Sydney – Newcastle Barriers and Beaches*

Delineation of NSW Landscape areas are shown in the Location Map (**Figure 2**).

2.2.2 Identified Landscape Features

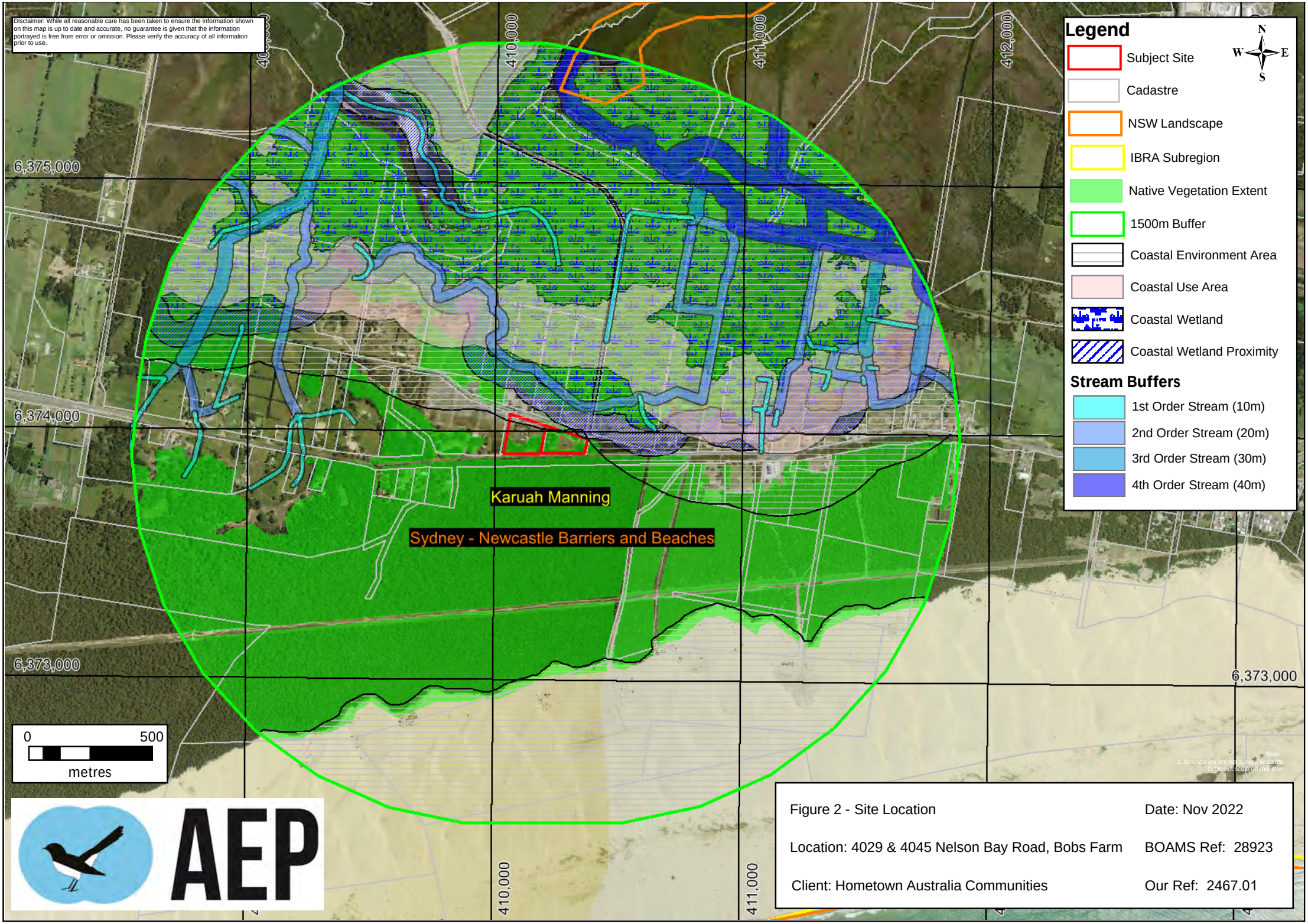
The BAM Calculator identifies nine (9) landscape features that require assessment for their relevance to the Subject Site. These features include:

- ***Rivers and Streams:*** There are no rivers, streams, dams or other water features present within the Subject Site.
- **Wetlands:** No mapped wetlands (Coastal Management SEPP or otherwise) occur within the Subject Site.
- ***Native Vegetation Extent:*** Approximately 0.99ha of native vegetation occurs in the Subject Site, of which 0.99ha is to be impacted. The following Plant Community Type was identified within the Subject Site:
    - PCT 1646 *Smooth-barked Apple - Blackbutt - Old Man Banksia woodland on coastal sands of the Central and Lower North Coast* within the Subject Site, not associated with a TEC; and
- ***Connectivity Features*:** The site is connected to larger tracts of salt marsh and bushland to the north with Tilligerry Nature Reserve at approximately 430m from the Subject Site. Approximately 50m to the south lies Worimi National Park which is densely vegetated. Nelson Bay Road separates the Subject Site from Worimi National Park and represents a significant barrier limiting connectivity for terrestrial and arboreal mammals. Development of the site will not significantly impact connectivity through the locality.
- ***Karst, Caves, Crevices, Cliffs, Rock and other Geological Features of Significance:*** There are no identified karst, caves, crevices, cliffs, rock and other geological features of significance within the Subject Site.
- ***NSW Landscape*** – Sydney – Newcastle Barriers and Beaches (**Figure 2**).
- ***Soil hazard features:*** None known on site.
- ***Features identified in SEARs for major projects*:** Proposal is not a major project.
- ***Areas of Outstanding Biodiversity Value (AOBV) under the BC Act*:** No areas of AOBV are present on the Subject Site and the adjacent lands.

2.2.3 Site Context Components

2.2.3.1 Landscape Native Vegetation Cover

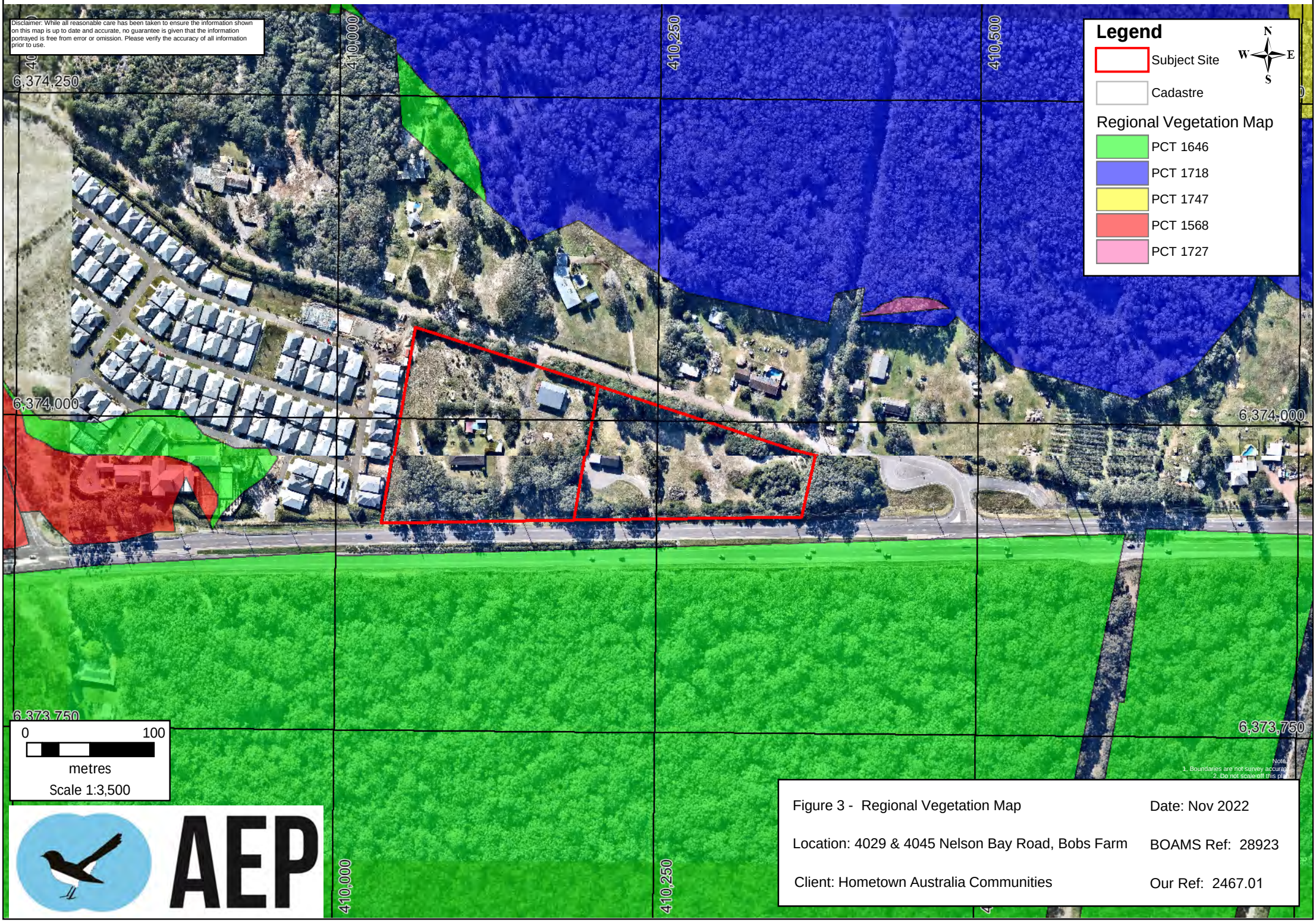
In accordance with Section 3.1.2, 4.2 of the BAM a 1500m was buffer placed around the site, totalling approx. 836.2ha. Of this, approximately 566.6ha comprises native vegetation as per Section 3.2 of the BAM (**Figure 2**). This equates to approximately 67.76% native vegetation cover and was entered as such within the Calculator.


Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.
Legend
N
W
E
S
Subject Site
Cadastre
NSW Landscape
IBRA Subregion
Native Vegetation Extent
1500m Buffer
Coastal Environment Area
Coastal Use Area
Coastal Wetland
Coastal Wetland Proximity
Stream Buffers
1st Order Stream (10m)
2nd Order Stream (20m)
3rd Order Stream (30m)
4th Order Stream (40m)
6,375,000
6,374,000
6,373,000
410,000
411,000
412,000
Karuah Manning
Sydney - Newcastle Barriers and Beaches
0
500
metres
AEP
Figure 2 - Site Location
Date: Nov 2022
Location: 4029 & 4045 Nelson Bay Road, Bobs Farm
BOAMS Ref: 28923
Client: Hometown Australia Communities
Our Ref: 2467.01

2.3 Native Vegetation

2.3.1 Regional Mapping

Previous datasets consulted include Lower Hunter Vegetation Map (SEWPaC, 2013). The Subject site is not mapped as containing regional vegetation, refer **Figure 3**.


Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.
Legend
Subject Site
Cadastre
Regional Vegetation Map
PCT 1646
PCT 1718
PCT 1747
PCT 1568
PCT 1727
N
W
E
S
410,000
410,250
410,500
6,374,250
6,374,000
6,373,750
0
100
metres
Scale 1:3,500
Note:
1. Boundaries are not survey accurate
2. Do not scale off this plan
AEP
Figure 3 - Regional Vegetation Map
Date: Nov 2022
Location: 4029 & 4045 Nelson Bay Road, Bobs Farm
BOAMS Ref: 28923
Client: Hometown Australia Communities
Our Ref: 2467.01

2.3.2 Plot Based Floristic Surveys

Plot Based Floristic surveys were undertaken by AEP from September 2021 to identify the most likely Plant Community Types within the Subject Site. The surveys are stratified and targeted to assess the expected environmental variation and address any areas with gaps in existing mapping and information. Surveys included:

- Ground-truthing of regional vegetation mapping to identify all vegetation communities present onsite as well as segregate vegetation zones according to condition and current management practices.
- The plot-based floristic vegetation survey is based on a 20m × 20m plot (or 400m^2 equivalent for linear areas). The assessor must assess the plot for the information contained in Table 1 of BAM 2020 and record these data in the BAR.
- Three (3) BAM plots were undertaken within the remnant native vegetation present within the Subject Site. One additional plot was undertaken to sample the exotic grassland and compare it with benchmarks for native grassland. Plots were located by producing random points via GIS software. Minor modifications to plot locations were made on site due to factors such as ecotones and proximity to disturbed edges.
- BAM Field sheets are provided in **Appendix D**. Survey effort including plot location is depicted in **Figures 4** and **Figure 5**. A summary of all flora species is provided in **Appendix B**.

2.3.3 Plant Community Types (PCTs) and Vegetation Zones

The Subject Site consists of modified remnant vegetation and exotic grassland and isolated canopy trees. The BAM's assessment module requires the identification of the PCT or the most likely PCTs, and all TECs, on the Subject Land. The identification must be in accordance with the NSW PCT classification as described in the BioNet Vegetation Classification. The identification of TECs must be consistent with the Threatened Species Scientific Committee Final Determination for the TEC. **Tables 2** and **3** analyse the floristic composition and landscape position of the BAM plots in the community against the Vegetation Information System (VIS) classification system provided a conclusive identification of one (1) Plant Communities Type within the Subject Site:

- PCT 1646- *Smooth-barked Apple - Blackbutt - Old Man Banksia woodland on coastal sands of the Central and Lower North Coast*, this PCT is not associated with a TEC.

Fieldwork identified two (2) vegetation zone within the Subject Site (refer **Table 4**) for a summary of vegetation zones and areas. PCT and vegetation mapping for the Subject Site is shown in **Figure 4.** Additional site photographs are included in **Appendix E.**

Table 2 – Species Data for Potential PCT Determination

Search Item	Plots 1 & 3
Dominant Species	*Eucalyptus pilularis, Corymbia gummifera, Themeda triandra*
Diagnostic species present	**Upper stratum:** *Angophora costata*, *Corymbia gummifera*, *Eucalyptus pilularis*
	Mid stratum: *Banksia serrata, Monotoca elliptica, Acacia ulicifolia*
	Ground stratum: *Pteridium esculentum, Lomandra longifolia, Imperata cylindrica, Themeda triandra and Dianella caerulea var. producta*
Potential PCTs	**184, 1626, 1646, 1648**

Table 3 – PCT Determination Plot 1 and 3

Potential PCTs	1184	1626	1646	1648
Plots 1 & 3				
Regional Vegetation	Not mapped onsite	Not mapped on site	This PCT is mapped as occurring within the surrounding locality	Not mapped on site.
IBRA Region	North Coast	North Coast	North Coast	North Coast
IBRA Subregion	Not known in Karuah Manning	Karuah Manning	Karuah Manning	Karuah Manning
NSW Landscape	No information available	Sydney - Newcastle Barriers and Beaches	Sydney - Newcastle Barriers and Beaches	Sydney - Newcastle Barriers and Beaches
Listed Key Diagnostic Species (VIS)	*Angophora costata; Eucalyptus resinifera; Corymbia gummifera; Eucalyptus robusta; Eucalyptus pilularis; Eucalyptus globoidea; Eucalyptus carnea; Acacia spp.; Banksia spp.; Epacris pulchella; Leptospermum spp.; Melaleuca spp.; Pultenaea villosa; Xanthorrhoea fulva; Baloskion tetraphyllum; Empodisma minus; Entolasia stricta; Lomandra longifolia; Ptilothrix deusta; Themeda australis;*	*Angophora costata; Eucalyptus umbra; Corymbia gummifera; Eucalyptus piperita; Eucalyptus capitellata; Eucalyptus pilularis; Pultenaea villosa; Acacia myrtifolia; Lomatia silaifolia; Dodonaea triquetra; Platylobium formosum; Doryanthes excelsa; Bossiaea rhombifolia; Hakea laevipes; Leptospermum polygalifolium; Smilax glyciphylla; Pandorea pandorana; Themeda australis; Imperata cylindrica; Caustis flexuosa; Patersonia glabrata; Dianella caerulea; Lomandra multiflora;*	*Angophora costata; Eucalyptus pilularis; Corymbia gummifera; Banksia serrata; Monotoca elliptica; Macrozamia communis; Acacia ulicifolia; Dianella caerulea; Themeda australis; Pteridium esculentum; Lomandra longifolia; Imperata cylindrica;*	*Angophora costata; Corymbia gummifera; Eucalyptus pilularis; Bossiaea rhombifolia; Banksia serrata; Acacia terminalis; Dillwynia retorta; Eriostemon australasius; Acacia suaveolens; Ricinocarpos pinifolius; Acacia ulicifolia; Persoonia levis; Themeda australis; Leucopogon ericoides; Tetratheca ericifolia; Hypolaena fastigiata; Pteridium esculentum; Epacris pulchella;*
Present Key Diagnostic Species within Subject Site	*Angophora costata; Corymbia gummifera, Eucalyptus pilularis, Acacia spp, Banksia spp, Leptospermum spp, Lomandra longifolia, Themeda triandra*	*Angophora costata; Corymbia gummifera; Eucalyptus pilularis; Dodonaea triquetra; Bossiaea rhombifolia; Pandorea pandorana; Themeda triandra; Imperata cylindrica; Dianella caerulea*	*Angophora costata; Eucalyptus pilularis; Corymbia gummifera; Banksia serrata; Monotoca elliptica; Acacia ulicifolia; Dianella caerulea; Themeda australis; Pteridium esculentum; Lomandra longifolia; Imperata cylindrica;*	*Angophora costata; Corymbia gummifera; Eucalyptus pilularis; Bossiaea rhombifolia; Banksia serrata; Acacia suaveolens; Acacia ulicifolia; Themeda australis; Pteridium esculentum;*

Potential PCTs	1184	1626	1646	1648
Plots 1 & 3				
Absence of Key Diagnostic Species within the Subject Site	*Eucalyptus resinifera; Eucalyptus robusta; Eucalyptus globoidea; Eucalyptus carnea; Epacris pulchella; Melaleuca spp.; Pultenaea villosa; Xanthorrhoea fulva; Baloskion tetraphyllum; Empodisma minus; Entolasia stricta; Ptilothrix deusta;*	*Eucalyptus umbra; Eucalyptus piperita; Eucalyptus capitellata; Pultenaea villosa; Acacia myrtifolia; Lomatia silaifolia; Platylobium formosum; Doryanthes excelsa; Hakea laevipes; Leptospermum polygalifolium; Smilax glyciphylla; Caustis flexuosa; Patersonia glabrata; Lomandra multiflora;*	*Macrozamia communis*	*Acacia terminalis; Dillwynia retorta; Eriostemon australasius; Ricinocarpos pinifolius; Persoonia levis; Leucopogon ericoides; Tetratheca ericifolia; Hypolaena fastigiata; Epacris pulchella;*
PCT Description	Mid high to tall heathy open forest or woodland. On coastal sand masses south from the Clarence River.	Open forests to woodlands with an overstorey dominated by Angophora costata along with a range of other eucalypts. The mid-storey typically consists of a diverse range of shrubs along with scrambling climbers and often has a high cover of Doryanthes excelsa. The ground layer is typically dominated by grasses and graminoids. Low hills on the coastal lowlands of the lower North Coast in the Nelson Bay area; mainly on sands.	Open Forests to Woodlands dominated in the canopy by Angophoras. The sparse mid-stratum is typically two layered the upper characterised by Banksias; the lower comprising a range of shrubs. The ground cover is relatively sparse and is characterised by grasses and ferns.This community extends along the coast from Gosford to Black Head (Darawank Nature Reserve). It is confined to Quaternary dune sands at elevations up to 100m.	Open Forests; the canopy dominated by Angophora. The mid-stratum is two- layered and characterised by Banksia over sclerophyllous shrubs. The ground stratum is made up of a mixture of grasses and forbs. This community is restricted to Quaternary sand lowlands in the Nelson Bay; Fingal Bay area (mostly within Tomaree NP). Elevation is below 50m.
Geographical Restrictions	On coastal sand masses south from the Clarence River.	Low hills on the coastal lowlands of the lower North Coast in the Nelson Bay area; mainly on sands.	Confined to Quaternary dune sands.	This community is restricted to Quaternary sand lowlands in the Nelson Bay; Fingal Bay area (mostly within Tomaree NP).
Elevation	Information not available	Information not available	Up to 100m	Below 50m
Soil Profiles	Information not available	Information not available	Information not available	Information not available

Potential PCTs	1184	1626	1646	1648
Plots 1 & 3				
Habitat Restrictions	Coastal sand masses	Coastal lowlands mainly on sands	Confined to Quaternary sand dunes	Quaternary sand lowlands
Current Land Use (disturbance and weed loads)	Land management practices include irregular underscrubbing, weed incursion and rubbish.			
Previous land use (including disturbance levels, plantings)	Historical disturbance such as land clearing, underscrubbing, sand mining for minerals			
Surrounding Vegetation	Remnant vegetation occurs to the south-west of the Subject Site in Moderate condition, with vegetation along the northern and eastern boundary in poor condition.			
PCT Determination	Based on the information above this PCT was not determined as an accurate description of the vegetation community within the Subject Site and is not known within the Subregion.	Based on the information above this PCT was not determined as an accurate description of the vegetation community within the Subject Site. Species assemblage within this community is large and diverse, PCT 1646 is considered a better fit for the community on site.	Based on above information this PCT was determined as the most accurate description of this vegetation community within the Subject Site due to the number of diagnostic species present within all strata and is consistent with the regional mapping within the surrounding locality.	Based on the information above this PCT was not determined as an accurate description of the vegetation community within the Subject Site.
Result	**PCT 1646 - Smooth-barked Apple - Blackbutt - Old Man Banksia woodland on coastal sands of the Central and Lower North Coast**			
Vegetation Formation (Type)	Dry Sclerophyll Forests (Shrubby sub-formation)			
Vegetation Class	Coastal Dune Dry Sclerophyll Forests			

Potential PCTs	1184	1626	1646	1648
Plots 1 & 3				
Estimate cleared value of PCT (%)	45			
EEC	Not Associated with an EEC.			
Vegetation Zones				
Vegetation Zones of this PCT within Subject Site	• Moderate • Poor			
Moderate Condition				
Description of Vegetation Zone	This vegetation zone comprises native vegetation within the Subject Site towards the south and centre of the site on the southern boundary adjacent to Nelson Bay Road. The vegetation onsite is considered in Moderate condition containing a small degree of weed incursion (mainly exotic grasses) and rubbish. The canopy layer consists of *Angophora costata, Eucalyptus pilularis and Corymbia gummifera.* The mid-storey comprised of *Banksia serrata* and shrub species including *Acacia longifolia, Acacia ulicifolia, Leptospermum ltrinervium, Monotoca elliptica, Glochidion ferdinandi. Pimelea linifolia, Breynia oblongifolia, Hibbertia linearis, Dillwynia glabberima* and *Gonocarpus teucrioides*. Groundcover species included both native and exotic species, natives present were *Dichelachne micrantha, Pteridium esculentum, Poranthera microphylla, Lomandra longifolia, Dianella caerulea var. producta, Imperata cylindrica, Pomax umbellate and Themeda triandra.* Native vines included *Billardiera scandens, Pandorea pandorana* and *Kennedia rubicunda*. Common weeds present across this zone comprised mostly of exotic grasses and forbs, with the occasional *Chrysanthemoides monilifera* subsp. *rotunda* (Bitou Bush). Grasses included, *Eragrostis curvula, Stenotaphrum secundatum, Andropogon virginicus,* and forbs, *Hypochaeris glabra, Hypochaeris radicata, Conyza bonariensis, Hydrocotyle bonariensis* and *Sonchus spp.* Plates 1 and 2 show examples of PCT 1646 (Moderate condition).			
Area of Vegetation Zone (ha)	This vegetation zone covers approx. 0.78ha of the Subject Site.			

Potential PCTs	1184	1626	1646	1648
Plots 1 & 3				

Plate 1 - PCT 1646 BAM Plot 1

Potential PCTs	1184	1626	1646	1648
Plots 1 & 3				
Poor Condition				
Description of Vegetation Zone	This vegetation zone comprises of native vegetation in poor/disturbed condition within the Subject Site towards the north and east of the site on the northern boundary. The vegetation onsite is considered to be in poor condition containing a large degree of weed incursion (including exotic pines, grasses and shrubs) that coincide with the previous land use (mineral mining) which has left the land in a disturbed condition. The canopy layer consisting of primarily exotic pine (*Pinus radiata*) and isolated individuals of *Cinnamomum camphora* (Camphor laurel). Small native trees persist; *Elaeocarpus reticularis* and *Glochidion ferdinandi*. The mid-storey is comprised of native shrubs including *Leptospermum laevigatum, Acacia longifolia var. sopharae, Monotoca elliptica, Breynia oblongifolia, Pittosporum undulatum, and Homalanthus populifolius.* Exotic shrubs including *Lantana camara* and *Chrysanthemoides monilifera subsp. rotundifolia* dominate the mid-stratum in some areas. Groundcover species included both native and exotic species, natives present were *Lomandra longifolia, Dianella caerulea var. producta, Imperata cylindrica* and *Pomax umbellata.* Exotic grasses and forbs included; *Eragrostis curvula, Ehrharta eracta, Asparagus aethiopithicus, Hypochaeris radicata, Plantago lanceolata, Aira cupaniana* and *Briza maxima*. Native vines included *Parsonsia straminea* and *Pandorea pandorana.* Plates 3 and 4 show examples of PCT 1646 (Poor condition).			
Area of Vegetation Zone (ha)	This vegetation zone covers approx. 0.21ha of the Subject Site.			

Potential PCTs	1184	1626	1646	1648
Plots 1 & 3				

Plate 2 - PCT 1646 BAM Plot 3

Plate 3 – Dense layer of Coastal tea tree dominates this zone.

Cleared / Exotic Grassland

The remaining 2.23ha of the Subject Site has been identified as exotic vegetation and cleared land containing dwellings, large and small sheds and managed exotic grassland. Exotic grasses included such as *Eragrostis curvula* (African Lovegrass), *Stenotaphrum secundatum* (Buffalo Grass) and *Andropogon virginicus* (Whisky grass).

The vegetation within this zone was ground-truthed along with the other vegetation zones through random meander technique. Two additional BAM plots were was undertaken within this zone to sample the exotic grassland and compare it with benchmarks for native grassland. It was confirmed that while a minor native component was present, the vegetation was dominated by exotic species and did not meet benchmarks for native grasslands.

Plate 4 - Non-remnant / Cleared Areas – BAM Plot 4.

Table 4 – Summary of Vegetation Zones Areas

Zone	Vegetation Community	Condition	Area of Removal (ha)	Area of Retention (ha)	Total Area (ha)
1	PCT 1646	Moderate	0.78	0	0.78
2	PCT 1646	Poor	0.21	0.32	0.53
		Total	**0.99**	**0.32**	
				Total – Remnant Vegetation	**1.30**
Non- remnant/ cleared areas/dams		Exotic grassland / cleared areas			2.23
				Total – Study Area	**3.54**

Note: Any small discrepancies within areas can be attributed to rounding errors


Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.
410,100
410,200
410,300
6,374,000
6,373,900
Study Area
Proposed C2 Land
N
W
E
S
Vegetation Zones
Non-Remnant/ Cleared Areas
PCT 1646 Moderate
PCT 1646 Poor
BAM Plot Location
BAM Plot Directions
P1 s
P1 e
P2 s
P2 e
P3 s
P3 e
P4 s
P4 e
0
50
metres
AEP
Figure 4 - Ground Truthed Vegetation Map
Date: Nov 2022
Location: 4029 & 4045 Nelson Bay Road, Bobs Farm
BOAMS Ref: 28923
Client: Hometown Australia Communities
Our Ref: 2467.01

2.3.4 Vegetation Integrity Assessment

2.3.4.1 Patch Size

The native vegetation that exists within the Subject Site is connected to vegetation to the north, east, south and west that, as defined by the BAM, extends as a patch for more than 100ha. The maximum patch size of '≥100ha' is therefore appropriate for each vegetation zone and was entered as such within the Calculator.

2.3.5 Vegetation Integrity Score

Plot data was used to determine the composition, structure and function condition score for the vegetation zones within the Subject Site, which informed the vegetation integrity score. Plot data has been tabulated (refer **Table 5**) and includes corresponding condition scores along with the overall vegetation integrity score. Vegetation Condition Class has been rated using the following percentage bands associated with the Vegetation Integrity Scores:

- 75 – 100% Good;
- 50 – 74 % Moderate; and
- 35 – 49% Poor

Table 5 - Vegetation Integrity Score Table

Site Attribute	PCT 1646 (Moderate)	PCT 1646 (Poor)
Plot #	**1**	**3**
Location	56	56
Bearing	345	105
Tree	5	1
Shrub	12	7
Grass & Grass-like	4	2
Forb	6	2
Fern	1	0
Other	3	2
Composition Total Score	**85.7**	**30.5**
Tree	32	0.5
Shrub	7.5	35
Grass & Grass-like	21.1	0.5
Forb	2.3	0.5
Fern	10	0
Other	1.4	2.3
Structure Total Score	**53.7**	**32.6**
Regenerating Stems (<5cm DBH)	Present	Present
Stem Classes (cm DBH)	5-9, 10-19, 20-29, 30-49	5-9, 10-19, 20-29, 30-49
# Large Trees	6	7
Hollow-bearing Trees	0	0
Litter Cover (%)	59	71

Site Attribute	PCT 1646 (Moderate)	PCT 1646 (Poor)
Plot #	**1**	**3**
Coarse Woody Debris (m)	0	15
High Threat Weed Cover	27.6	36.5
Function Total Score	**80**	**95.1**
Overall Vegetation Integrity Score	**71.7**	**45.6**

2.4 Threatened Species

Under the BAM, threatened species are classified into two types: 'Ecosystem Credit' and 'Species Credit' species, as detailed within the BioNet Atlas Threatened Species Profile Database (OEH, 2021).

A predicted Ecosystem Credit Species assessment is presented in **Table 6**, a Species Credit Species assessment is presented in **Table 7**. Other Legislation including assessment for threatened species under the EPBC Act 1999 and Port Stephens CKPoM have been addressed within **Appendix F** Other Legislation.

Field surveys were undertaken on site during September and October 2021. A summary of survey effort within the Subject Site is described **Section 2.4.3** and **Table 7**, species listed are presented in **Appendix B** and **Appendix C.**

A streamlined assessment for small area only requires specific targeted assessment to be carried out when a threatened ecological community and/or a species at risk of a Serious and Irreversible Impact (SAII) is detected on site. Furthermore, if a threatened species is incidentally recorded on site, further assessment must be undertaken to determine if species credits are required.

2.4.1 Ecosystem Credit Species

Ecosystem Credit species are associated with PCTs and other habitat surrogates that are used to predict their occurrence on a particular site.

The 'biodiversity risk weighting' (BRW) for a species is based on the 'sensitivity to loss' and 'sensitivity to potential gain' score using criteria listed in Appendix I of the BAM and are used in credit calculations to assess impacts of the proposal on a threatened species. The sensitivity to gain class is listed within the BAM calculator for Ecosystem Credit species.

Those Ecosystem Credit species predicted to occur within the site are provided in **Table 6** below.

Table 6 - Predicted Ecosystem Credit Species

Scientific name	Common name	Sensitivity to Gain Class	Recorded within 10km (NSW BioNet Wildlife Atlas 2020) Y/N	Recorded within site nearby surrounds Y/N
Anthochaera phrygia	Regent Honeyeater (foraging)	High	Y	N
Callocephalon fimbriatum	Gang-gang Cockatoo	Moderate	N	N
Calyptorhynchus lathami	Glossy Black-Cockatoo	High	Y	N

Scientific name	Common name	Sensitivity to Gain Class	Recorded within 10km (NSW BioNet Wildlife Atlas 2020) Y/N	Recorded within site nearby surrounds Y/N
Chthonicola sagittata	Speckled Warbler	High	N	N
Daphoenositta chrysoptera	Varied Sittella	Moderate	Y	N
Glossopsitta pusilla	Little Lorikeet	High	Y	N
Haliaeetus leucogaster	White-bellied Sea-Eagle	High	Y	Y
Hieraaetus morphnoides	Little Eagle (Foraging)	Moderate	Y	N
Lathamus discolor	Swift Parrot	Moderate	Y	N
Lophoictinia isura	Square-tailed Kite	Moderate	N	N
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Moderate	N	N
Neophema pulchella	Turquoise Parrot	High	N	N
Ninox connivens	Barking Owl	High	Y	N
Ninox strenua	Powerful Owl	High	Y	N
Pandion cristatus	Eastern Osprey	Moderate	Y	N
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Moderate	N	N
Tyto novaehollandiae	Masked Owl (Foraging)	High	Y	N
Dasyurus maculatus	Spotted-tailed Quoll	High	Y	N
Falsistrellus tasmaniensis	Eastern False Pipistrelle	High	Y	N
Hirunduapus caudacutus	White Throated Needletail	Moderate	Y	N
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	High	Y	N
Miniopterus australis	Little Bentwing-bat	Very High	Y	N
Miniopterus orianae oceanensis	Large Bent-winged Bat	High	Y	N
Petaurus australis	Yellow-bellied Glider	High	N	N
Phascolarctos cinereus	Koala (Foraging)	High	Y	N
Phoniscus papuensis	Golden-tipped Bat	High	N	N
Pseudomys gracilicaudatus	Eastern Chestnut Mouse	High	N	N

Scientific name	Common name	Sensitivity to Gain Class	Recorded within 10km (NSW BioNet Wildlife Atlas 2020) Y/N	Recorded within site nearby surrounds Y/N
Pteropus poliocephalus	Grey-headed Flying-fox	High	Y	N
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	High	Y	N
Scoteanax rueppellii	Greater Broad-nosed Bat	High	Y	N
Syconycteris australis	Common Blossom-bat	High	N	N

2.4.2 Species Credit Species

Additional threatened fauna species determined by the BAM calculator that have the potential to use the Subject Site area as suitable habitat are identified in **Table 7**. For the streamlined assessment, targeted surveys for these species are not required. This assessment focuses only on those entities at risk of a serious and irreversible impact (SAII).

The flora and fauna species lists for the site are included in **Appendix B** and **Appendix C**.

Table 7 – Species Credit Species & Survey Effort

Species / Biodiversity	Risk Weighting (BRW)	SAII (Y/N)	Specified Survey Period (BAM – C)	Habitat Requirements / Habitats Searched / General Notes	Survey Guidelines	AEP Survey Method Undertaken
Flora						
Sand Doubletail *Diuris arenaria*	3	Y	August - Sept	Occurs in coastal heath and dry grassy eucalypt forest on sandy flats. Also found in gently undulating country in eucalypt forest with a grassy understorey on clay soil.	5m – 10m Parallel Transects	September & October 2021 Habitat Assessment 5m – 10m Parallel Transects Incidentals
Eastern Australian Underground Orchid *Rhizanthella slateri*	3	Y	Sept - Nov	Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore, usually located only when the soil is disturbed.	5m – 10m Parallel Transects	September & October 2021 Habitat Assessment 5m – 10m Parallel Transects Incidentals
Fauna						
Koala *Phascolarctos cinereus*	2	N	All Year	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Inactive for most of the day, feeding and moving mostly at night. Spend most of their time in trees, but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	Spot Assessment Technique (SAT), one night of nocturnal survey Targeted Searches, Habitat Assessment, Camera Trapping. (Survey effort carried out in line with the Port Stephens CKPoM **Appendix F**)	September & October 2021 Habitat Assessment Three (3) SATs One night of spotlighting and call playback Incidentals

The following candidate threatened species did not require further consideration and were ruled out of the above list as habitat or location constraints were not met:

- *Allocasuarina simulans* (Nabiac Casuarina): The Subject Site is not located between Nabiac and Foster, there are also no BioNet records for the species of the species within the area, therefore no further assessment is required.
- *Lathamus discolor* (Swift Parrot): An enquiry with the Biodiversity Offset Scheme support confirmed that the Subject Site is not mapped areas of important habitat for this species, therefore no further survey is required.
- *Anthochaera phrygia* (Regent Honeyeater - breeding): The Subject Site is not consistent with the known breeding areas in NSW. An enquiry with the Biodiversity Offset Scheme support confirmed that the Subject Site is not mapped areas of important habitat for this species, therefore no further survey is required.
- *Petrogale penicillata* (Brush-tailed Rock-wallaby): The Subject Site does not contain and is not within 1km of land with rocky escarpments, gorges, steep slopes, boulder piles or clifflines.
- *Chalinolobus dwyeri* (Large-eared Pied Bat): The Subject Site is not within 100m of suitable breeding habitat. The house onsite was inspected and deemed not suitable for breeding habitat for this species. As this species is not at risk of SAII no surveys were required. Foraging habitat for the species is not considered to be at risk of SAII.
- *Miniopterus australis* (Little Bent-winged Bat): The Subject Site does not contain known or suspected breeding habitat. The house onsite was inspected and deemed not suitable for breeding habitat for this species, as such no surveys were required as this species is not considered to be at risk of SAII.
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat): The Subject Site does not contain known or suspected breeding habitat. The house onsite was inspected and deemed not suitable for breeding habitat for this species, as such no surveys were required as this species is not considered to be at risk of SAII.
- *Vespadelus troughtoni (*Eastern Cave Bat): The Subject Site does not contain known or suspected breeding habitat. The house onsite was inspected and deemed not suitable for breeding habitat for this species, as such no surveys were required as this species is not considered to be at risk of SAII.

2.4.3 Field Survey Methods

2.4.3.1 Habitat Features

An assessment of the relative habitat values present within the Subject Site was undertaken in September and October 2021. This assessment focused primarily on the identification of specific habitat types and resources within the Subject Site favoured by known threatened species listed in **Section 2.4.2.** The assessment also considered the potential value of the Subject Site (and surrounding areas) for all major guilds of native flora and fauna. The assessment was based on the specific habitat requirements of each threatened fauna species in regards to home range, feeding, roosting, breeding, movement patterns and corridor requirements.

Consideration was given to contributing factors including topography, soil, light and hydrology for threatened flora and assemblages. In particular, focus was put on documenting the presence of key habitat features such as tree hollows. Hollows are an important resource utilised by a variety of forest fauna, and are particularly relevant for several of the likely key threatened species in this locality.

2.4.3.2 Flora Field Survey

All required flora survey techniques were utilised for targeted survey of the species listed in **Table 7** above and guided by the *Threatened Species Survey and Assessment Guidelines* (2004) and the BAM (2020).

The following survey methods were undertaken to record the presence of threatened species on site:

- Ground-truthing of regional vegetation mapping to identify all vegetation communities present onsite as well as segregate vegetation zones according to condition and current management practices.
- Identification of all vascular plant species encountered during fieldwork. Subject Site coverage was both systematic to ensure all key points of the site were checked, and therein the Random Meander Technique (Cropper 1993) was utilised to maximise species encountered.
- Seasonal threatened flora surveys walking 5 – 10m line transects throughout the site, targeting a range of threatened flora.
- Four (4) BAM plots were undertaken in accordance with BAM 2020.
- Updated/Refined Vegetation Community Mapping involving traversal over the entire Subject Site, concentrating particularly on mapping the boundaries between the identified Biometric Vegetation Types of the BAM 2020 and refining the original mapping which involved a larger number of vegetation units.

2.4.3.3 Fauna Field Surveys

All required fauna survey techniques were utilised for targeted survey of the species listed in **Table 7,** above and guided by the Threatened Species Survey and Assessment Guidelines (2004); Threatened species survey and assessment guidelines: field survey methods for fauna – Amphibians (2009) and Port Stephens CKPoM (refer **Appendix F** for koala assessment). Survey effort is shown in **Figure 5**.

2.4.3.4 Incidental Observations

Incidental records of any fauna species observed during fieldwork were noted. This included opportunistic sightings of secondary indications (scratches, scats, diggings, tracks etc.) of any resident or migratory species. Searches were also conducted for whitewash, regurgitation pellets and prey remain from Owls, chewed Casuarina cones from Black-Cockatoos, chewed fruit remains from frugivorous birds etc.

These surveys are deemed to fulfill minimum survey requirement. Details of the flora and fauna survey are presented in **Table 7** and was conducted using relevant guidelines, in particular DPIE survey guidelines for threatened plants (2020c) along with applicable EPBC guidelines (2010; 2011). Flora Survey Effort, Threatened Flora Sightings and Fauna Survey Effort is shown in **Figure 5**.

Field sheets are provided in **Appendix D**, and flora and fauna species list for those species recorded during field surveys are provided in **Appendix B** and **Appendix C**. Refer **Figures 5** for survey effort undertaken on site.

2.4.4 Survey Effort Results

2.4.4.1 Habitat Trees

A total of 3 Hollow-bearing trees (HBTs) are present, with a total of 5 hollows identified within the Subject Site. Hollows present onsite range from small to extra-large and may be suitable for a range of species of arboreal mammals, birds and microbats. Details of the HBT survey is provided in **Table 8** below. Hollow-bearing tree locations are presented in **Figure 5.**

Table 8 - Habitat Tree Detail

ID	GPS ID	Species	DBH (cm)	Hollows				
				S	M	L	XL	Habitat feature
1	HBT 1	*Eucalyptus pilularis*	110	2	0	0	1	Limb & basal hollows
2	HBT 2	*Eucalyptus pilularis*	150	1	0	0	0	Limb hollow
3	HBT 3	*Corymbia gummifera*	95	0	1	0	0	Trunk hollow
			Total	**3**	**1**	**0**	**1**	
			Total	**5**				

Notes for hollow size: XS <5cm, S 5-10cm, M 10-15cm, L 15-20cm, XL >20cm, **DBH** - diameter at breast height

2.4.4.2 Water Features

Mapping of the Subject site has concluded that there are no water features present. The nearest water features are two dams approximately located 400m to the north-east and 480m to the north-west with a drainage gully that, at its closest, is approximately 100m to the northern border of the Subject Site. Mapped biodiversity values lands to the north of the Subject Site encompass Tilligerry Nature Reserve, Bobs Farm Creek and Fenninghams Island Creek.

2.4.4.3 Other habitat features

The Subject Site also possesses other habitat features including large areas of refuse and piles of logs that provide potential habitat for reptiles, amphibians and small mammals.

2.4.5 Species Credit Species Survey Results

Overall survey effort within the site (for plots, targeted searches and habitat assessments) and within the Subject Site (including plots, targeted searches, habitat assessments) are detailed in **Table 7** and **Section 2.4.3**, and was conducted using relevant guidelines, in particular OEH survey guidelines for plants (2016) and amphibians (2020), along with applicable EPBC guidelines (2010; 2011). Survey periods are shown in **Table 7** and survey effort is shown in **Figures 5**.

Species credit species assessment and associated survey results are provided in **Table 9**.

Table 9 – Species Credit Species & Survey Results

Species	Survey Technique Adhere to Guidelines in Table 8 (Y/N)	Surveyed in Season (Y/N)	BioNet Records (10km)	BioNet Records within Subject Site	Geographical Restrictions (Y/N)	Habitat (Present / Condition)	Records from Deployed Equipment	Observed Within Subject Site (Y/N)	Determination	Species Credits Apply (Y /N)
Flora										
Sand Doubletail *Diuris arenaria*	Y	Y	124	N	N	Habitat is present within the Subject Site in varying conditions (poor – good).	N/A	N	Targeted surveys carried out AEP Ecologists during September and October failed to detect any sign of the species.	N
Eastern Australian Underground Orchid *Rhizanthella slateri*	Y	Y	0	N	N	As there is limited information about the species and its habitat, the generally habitat on site is deem Moderate to poor.	NA	N	Targeted surveys carried out AEP Ecologists during September and October failed to detect any sign of the species.	N
Fauna										
Koala *Phascolarctos cinereus*	Y	Y	2058	N	N	Habitat is present within the Subject Site in varying conditions (poor – good).	NA	N	Targeted surveys carried out AEP Ecologists during September and October failed to detect any sign of the species.	N


Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.
Legend
Study Area
Proposed C2 Boundary
Survey Effort
Call Playback
Koala SAT
Hollow Bearing Tree
BAM Plot Location
BAM Plot Directions
Survey Tracks
September Flora and Fauna
September Flora
September Fauna
October BAM
October Fauna
N
W
E
S
P1 s
P2 s
P3 s
P4 s
0
50
metres
AEP
Figure 5 - Survey Effort
Date: Nov 2022
Location: 4029 & 4045 Nelson Bay Road, Bobs Farm
BOAMS Ref: 28923
Client: Hometown Australia Communities
Our Ref: 2467


Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.
Legend
Study Area
Proposed C2 Land
Impact Area
N
W
E
S
RU2
C2
0
50
metres
Note:
1. Boundaries are not surveyed accurately
2. Do not scale off this plan
AEP
Figure 6 - Impact and Retained Areas
Date: Nov 2022
Location: 4029 & 4045 Nelson Bay Road, Bobs Farm
BOAMS Ref: 28923
Client: Hometown Australia Communities
Our Ref: 2467.01

3.0 Stage 2 – Impact Assessment (Biodiversity Values)

3.1 Avoid and Minimise Summary

Section 7 of the BAM provides a list of measures that need to be taken into consideration during project planning and design to minimise impacts upon native vegetation, habitat and other prescribed biodiversity values. Applicable measures taken as part of this project to minimise impacts are provided below.

When detailed designs are finalised for the Subject Site, the preparation of a Biodiversity Development Assessment Report (BDAR) including a detailed review of Section 7 of the BAM will be undertaken.

3.2 Avoid and Minimise Impacts

Parts of the Subject Site are disturbed and have been subjected to historical sand mining and on-going management. Furthermore, waste and rubbish is present within vegetated areas. Where native vegetation remains, it does so in a degraded state. While the vegetation integrity scores indicate a moderate patch of vegetation, site observations have shown that this is represented in the species diversity within the remnant vegetation on site. However, this is not the case for vegetation structure and function. For example, the shrub layer is present but in a regenerating form providing limited suitable habitat opportunities for local fauna. It should also be noted that a significant portion of the vegetation within this zone (approx. 27.6%) are listed as High Threat Weeds, this is indicative of a highly modified and degraded site.

Vegetation within the Site is predominantly fragmented from larger tracts of vegetation to the north and south, as it is located between Nelson Bay and Trotter Road. The site is also located in close proximity to a round-about to the east. The fragmentation and location of the site in relation to roads and high movement of vehicles reduces the suitability of the habitat for local fauna within the site and it also increases the risk of direct impacts such as vehicle strike to local fauna in the area that move across Nelson Bay Road.

To facilitate movement and mitigate risks to local fauna an underground fauna crossing is present within land adjacent to the east of the Site. Avoid and minimise considerations within the planning proposal have been recommended to mitigate any potential impacts and maintain functionality of the existing fauna crossing. A wildlife connectivity buffer, covering 0.40ha, is proposed in the east and north east of the site. The buffer begins at its narrowest point (10m) along the northern boundary. The north east corner expands out to approx 61.5m wide and then tapers down to 41m wide at the south boundary (**Figure 6**). The purpose of the buffer along the northern boundary is to provide an interface with the remnant vegetation to the north of Trotter Road. Following assessment by Council's ecologist, the proposed retained buffer has been accepted as fit for purpose. Council ecologist supports the planning proposal proceeding on the basis of the retained native vegetation buffer being rezoned C2 Environmental Conservation (**Figure 6**). The proposed buffer (~0.40ha) will result in the retention of approx. 0.32ha of PCT 1646 – Smooth-barked Apple – Blackbutt – Old Man Banksia woodland on coastal sands of the Central and Lower North Coast. The widened buffer ensures approximately 95m of retained vegetation at the Fauna Crossing Point.

The retained buffer should be managed for biodiversity under a Biodiversity Management Plan to be provided at the time of a future development application. Details within a Biodiversity Management Plan should include weed control, supplementary planting, fencing and nest boxes.

As the site is located in close proximity to wetlands to the north, measures that can be undertaken to reduce indirect and direct impacts on surrounding environments should be incorporated into the development and include incorporation of Water Sensitive Urban Designs (WSUD) and the development of an Erosion and Sedimentation Control Plan (ESCP) that should be prepared for the proposal following guidelines from *Landcom* (2004). Erosion and sedimentation controls should be put

in place to limit offsite movement of materials into the adjacent vegetation.

Impacts to biodiversity from the planning proposal to rezone the Subject Site have been considered in this report. As part of the rezoning, the greatest factor surrounding avoid and minimise is through the site selection phase. Council ecologist supports the planning proposal proceeding on the basis of the retained native vegetation buffer being rezoned C2 Environmental Conservation. Hometown Australia are looking to expand their operations within Port Stephens, and the subject site represents the least ecologically constrained site available for this purpose. Further, the fact that it adjoins the existing village ensures that servicing and infrastructure can be provided without further impacting surrounding vegetation.

4.0 Conclusion

The vegetation within the site was found to be commensurate with PCT 1646 which is in a moderate to poor condition across the Subject Site. It is evident that the site has previously been cleared for farming practices with historical sand mining, and is in a managed state. The habitat function is limited across most of the Site. Within the east of the site a buffer is proposed to mitigate any potential impacts and maintain functionality of the existing fauna crossing. The purpose of the buffer along the northern boundary is to provide an interface with the remnant vegetation to the north of Trotter Road. The retained buffer should be managed for biodiversity under a Biodiversity Management Plan to be provided at the time of a future development application.

Koalas and or presence of koalas were not detected on site during the survey period. Further to this there were no preferred koala feed trees identified within the site. The site is mapped as `Mainly Cleared' koala habitat and does not contain habitat linking areas over mainly cleared land according to the Port Stephens Koala Habitat Planning Map. As per the Port Stephens Council CKPoM (2002) no further assessment is required and the consent should not be constrained by koala habitat as the site meets the conditions as defined in the Koala Habitat Mapping.

Considering no threatened species were identified on site during the survey period and the site is highly degraded it is unlikely that removal of the vegetation on site will significantly impact threatened flora and fauna species in the area. It has been determined that a referral under the EPBC Act is unlikely to be required for this rezoning proposal.

Impacts to biodiversity from the planning proposal to rezone the Subject Site have been considered in this report and avoid and minimise has been accommodated through the retention of the buffer vegetation and its zoning to C2 Environment Conservation. The retained buffer should be managed for biodiversity under a Biodiversity Management Plan to be provided at the time of a future development application. Details within a Biodiversity Management Plan should include weed control, supplementary planting, fencing and nest boxes.

The client has committed to undertaking Stage 2 of the BAM to quantify the required offsets within a SBDAR. The SBDAR would subsequently be lodged with the DA for the site.

The retention of the vegetation buffer as C2 land has been agreed by Council that this conservation zoning can form the basis of avoid and minimise for the future development application.

5.0 References

Churchill, S (2008) *Australian Bats* (2nd ed.). Allen & Unwin Publishers.

Harden, G (ed.) (2000) *Flora of New South Wales, Volume 1* (rev. ed.). UNSW, Kensington NSW.

Harden, G (ed.) (2002) *Flora of New South Wales, Volume 2* (rev. ed.). UNSW, Kensington NSW.

Harden, G (ed.) (1992) *Flora of New South Wales, Volume 3*. UNSW, Kensington NSW.

Harden, G (ed.) (1993) *Flora of New South Wales, Volume 4*. UNSW, Kensington NSW.

Keith D (2004) *Ocean Shores to Desert Dunes*. DEC, Sydney NSW.

Landcom (2004) *Managing Urban Stormwater: Soils and Construction* 4th edition. New South Wales Government, Parramatta, NSW.

NSW Department of Environment and Conservation (2004) Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (working draft, November 2004). DEC, Sydney NSW.

NSW Department of Planning and Environment [DPE] (2022) Atlas of NSW Wildlife. Accessed April 2021. NSW OEH. https://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx

NSW Department of Planning, Industry and Environment (2020a) Biodiversity Assessment Methodology. August 2020. DPIE, Sydney NSW.

NSW Department of Planning, Industry and Environment (2020b) Biodiversity Assessment Method (BAM) Calculator User Guide. August 2020. DPIE, Sydney NSW.

NSW Department of Planning, Industry and Environment (2020c) Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method. April 2020. DPIE, Sydney NSW.

NSW Department of Planning, Industry and Environment (2020d) NSW Survey Guide for Threatened Frogs – A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method. September 2020. DPIE, Sydney, NSW.

NSW Department of Planning, Industry and Environment (2021) Threatened Species, Populations and Ecological Communities website. https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species

Parsons Brinckheroff (2013). *Lower Hunter Vegetation Mapping*. Report funded by the Department of Sustainability, Environment, Water, Population, and Communities through the Sustainable Regional Development Program. Parsons Brinckerhoff, Canberra.

Pizzey, G (2012) *The Field Guide to the Birds of Australia* (9th ed.). Harper Collins Publishers, Sydney NSW.

Robinson, L (1991) *Field Guide to the Native Plants of Sydney* (rev. 2nd ed.). Kangaroo Press.

Strahan, R (2004) *The Mammals of Australia*. New Holland Publishers, Chatswood NSW.

Wilson, S and Swan, G (2003) *A Complete Guide to Reptiles of Australia*. Reed New Holland Publishers, Chatswood NSW.

Appendix A – Development Plan

TOTAL NO.OF EXISTING SITES	**193 SITES**
PROPOSED TOTAL NO.OF SITES IN EXPANSION AREA LOT 3622 DP 622485 LOT 2 DP622229	**62 SITES** 43 SITES 19 SITES
TOTAL NO.OF EXISTING & PROPOSED SITES	**255 SITES**

ISSUE	DATE	REVISION
E	27/10/22	AMENDED ISSUE
D	26/10/22	AMENDED ISSUE
C	17/02/21	AMENDED ISSUE
B	15/02/21	AMENDED ISSUE
A	19/01/21	DRAFT ISSUE

HOMETOWN AUSTRALIA COMMUNITIES

PROJECT SUNRISE LIFESTYLE RESORT

ADDRESS 4011 NELSON BAY ROAD, BOBS FARM, NSW 2316

SUNRISE PORT STEPHENS

DRAWING TITLE CONCEPT PLAN FOR LOT 3622 DP 622485 & LOT 2 DP622229

N

JOB NO.

DATE	SCALE	DRAWN	DRAWING NO.	ISSUE
01/2021	1:1000 @ A3	HTA	04.5	E

Appendix B – Flora Species List

FLORA SPECIES LIST

The following list includes all species of vascular plants observed on site during fieldwork. It should be noted that such a list cannot be considered comprehensive, but rather indicative of the flora present on the site. It can take many years of flora surveys to record all of the plant species occurring within any area, especially plant species that are only apparent in some seasons such as Orchids.

A number of species cannot always be accurately identified during a brief survey, generally due to a lack of suitable flowering and/or fruiting material. Any such species are identified as accurately as possible, and are indicated in the list as thus:

- specimens that could only be identified to genus level are indicated by the generic name followed by the abbreviation “sp.”, indicating an unidentified species of that genus;
- specimens for which identification of the genus was uncertain are indicated by a question mark (“?”) placed in front of the generic, which is followed by the abbreviation “sp.” and;
- specimens that could be accurately identified to genus level, but could be identified to species level with only a degree of certainty are indicated by a (“?”) placed in front of the epithet.

Authorities for the scientific names are not provided in the list. These follow the references outlined below.

Harden, G. (ed) (2000). *Flora of New South Wales, Volume 1*. Revised edition. UNSW, Kensington, NSW.

Harden, G. (ed) (2002). *Flora of New South Wales, Volume 2*. Revised edition. UNSW, Kensington, NSW.

Harden, G. (ed) (1992). *Flora of New South Wales, Volume 3.* UNSW, Kensington, NSW.

Harden, G. (ed) (1993). *Flora of New South Wales, Volume 4*. UNSW, Kensington, NSW.

Names of families and higher taxa follow a modified Cronquist System (1981).

Introduced species are indicated by an asterisk “*”.

Threatened species listed under the *Biodiversity Conservation Act 2016* (BC Act) or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are indicated in **bold font.**

Family	Scientific Name	Common Name
Fabaceae	*Acacia longifolia subsp. longifolia*	Sydney Golden Wattle
Fabaceae	*Acacia longifolia subsp. sophorae*	Coastal Wattle
Fabaceae	*Acacia suaveolens*	Sweet Scented Wattle
Fabaceae	*Acacia ulicifolia*	Prickly Moses
Asteraceae	*Acanthospermum australe**	
Poaceae	*Aira cupaniana**	Silvery Hairgrass
Asteraceae	*Ambrosia tenuifolia**	Lacy Ragweed
Poaceae	*Andropogon virginicus**	Whisky Grass
Myrtaceae	*Angophora costata*	Smooth-barked Apple
Asparagaceae	*Asparagus aethiopicus**	Asparagus Fern
Proteaceae	*Banksia serrata*	Old Man Banksia
Pittosporaceae	*Billardiera scandens*	Hairy Appleberry
Fabaceae	*Bossiaea rhombifolia*	
Euphorbiaceae	*Breynia oblongifolia*	Coffee Bush
Poaceae	*Briza maxima**	Quaking Grass
Poaceae	*Chloris gayana**	Rhodes Grass
Asteraceae	*Chrysanthemoides monilifera subsp. rotundata**	Bitou Bush
Lauraceae	*Cinnamomum camphora**	Camphor Laurel
Asteraceae	*Conyza bonariensis**	Flax-leaf Fleabane
Myrtaceae	*Corymbia gummifera*	Red Bloodwood
Poaceae	*Cynodon dactylon*	Common Couch
Cyperaceae	*Cyperus spp.*	
Fabaceae	*Daviesia alata*	
Phormiaceae	*Dianella caerulea var. producta*	Blue Flax Lily
Poaceae	*Dichelachne micrantha*	Short-hair Plume Grass
Fabaceae	*Dillwynia glaberrima*	Parrot Pea
Sapindaceae	*Dodonaea triquetra*	Hop-bush
Poaceae	*Ehrharta erecta**	Panic Veldtgrass
Elaeocarpaceae	*Elaeocarpus reticulatus*	Blueberry Ash
Poaceae	*Eragrostis curvula**	African Lovegrass
Myrtaceae	*Eucalyptus fibrosa*	Broad Leaved Ironbark
Myrtaceae	*Eucalyptus pilularis*	Blackbutt
Asteraceae	*Euchiton involucratus*	Star Cudweed
Santalaceae	*Exocarpos cupressiformis*	Native Cherry
Asteraceae	*Facelis retusa**	Annual Trampweed
Phyllanthaceae	*Glochidion ferdinandi*	Cheese Tree
Haloragaceae	*Gonocarpus teucrioides*	Raspwort

Family	Scientific Name	Common Name
Dilleniaceae	*Hibbertia linearis*	
Euphorbiaceae	*Homalanthus populifolius*	Bleeding Heart
Apiaceae	*Hydrocotyle bonariensis**	Kurnell Curse / Pennywort
Asteraceae	*Hypochaeris glabra**	Smooth Catsear
Asteraceae	*Hypochaeris radicata**	Flatweed
Poaceae	*Imperata cylindrica*	Blady Grass
Fabaceae	*Kennedia rubicunda*	Dusky Coral Pea
Verbenaceae	*Lantana camara**	Lantana
Myrtaceae	*Leptospermum laevigatum*	Coast Tea-tree
Myrtaceae	*Leptospermum trinervium*	Slender Tea-tree
Lomandraceae	*Lomandra longifolia*	Spiky-headed Mat-rush
Orchidaceae	*Microtis spp.*	
Ericaceae	*Monotoca elliptica*	Tree Broom-heath
Onagraceae	*Oenothera mollissima**	
Oxalidaceae	*Oxalis perennans*	Yellow-flowered Wood Sorrel
Bignoniaceae	*Pandorea pandorana*	Wonga Vine
Apocynaceae	*Parsonsia straminea*	Common Silkpod
Caryophyllaceae	*Petrorhagia dubia**	
Thymelaeaceae	*Pimelea linifolia*	Slender Rice Flower
Pinaceae	*Pinus radiata**	Radiata or Monterey Pine
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum
Plantaginaceae	*Plantago lanceolata**	Ribwort
Rubiaceae	*Pomax umbellata*	Pomax
Euphorbiaceae	*Poranthera microphylla*	Small Poranthera
Dennstaedtiaceae	*Pteridium esculentum*	Bracken
Rubiaceae	*Richardia humistrata**	
Polygonaceae	*Rumex vulgaris**	Sheep Sorrel
Asteraceae	*Senecio madagascariensis**	Fireweed
Asteraceae	*Sonchus spp.**	Sowthistle
Caryophyllaceae	*Stellaria media**	Common Chickweed
Poaceae	*Stenotaphrum secundatum**	Buffalo Grass
Asteraceae	*Taraxacum officinale**	Dandelion
Poaceae	*Themeda triandra*	Kangaroo Grass
Anthericaceae	*Tricoryne elatior*	Yellow Rush Lily
Poaceae	*Vulpia fasciculata**	
Campanulaceae	*Wahlenbergia gracilis*	Australian Bluebell

Appendix C– Expected Fauna Species List

EXPECTED FAUNA SPECIES LIST

The following list includes fauna species that could be reasonably expected to occur on the Study Area at some point, given site attributes and location.

"●"-species observed or indicated by scats, tracks etc. on, over or near the site during recent surveys by AEP (2020).

A - NSW Atlas of Wildlife record of threatened species for the site.

Threatened species listed under the Biodiversity Conservation Act 2016 (BC Act) or the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) are indicated in **bold font**.

Family	Scientific Name	Common Name	Surveyed Observations	Survey Equipment
			Observed (O), Heard (H), Scat (S), Marking (M), Track (T), Nest (N), Burrow (B)	Anabat (A), Songmeter (SM), Camera Trap (CT), Nest (N).
Amphibia				
Myobatrachidae	*Crinia signifera*	Common Eastern Froglet		
Myobatrachidae	*Paracrinia haswelli*	Haswell's Froglet		
Myobatrachidae	*Pseudophryne bibronii*	Bibron's Toadlet		
Myobatrachidae	*Pseudophryne coriacea*	Red-backed Toadlet		
Myobatrachidae	*Uperoleia fusca*	Dusky Toadlet		
Hylidae	*Litoria caerulea*	Green Tree Frog		
Hylidae	*Litoria fallax*	Eastern Dwarf Tree Frog		
Hylidae	*Litoria jervisiensis*	Jervis Bay Tree Frog		
Hylidae	*Litoria latopalmata*	Broad-palmed Frog		
Hylidae	*Litoria nasuta*	Rocket Frog		
Hylidae	*Litoria peronii*	Peron's Tree Frog		
Hylidae	*Litoria tyleri*	Tyler's Tree Frog		
Hylidae	*Litoria verreauxii*	Verreaux's Frog		
Limnodynastidae	*Limnodynastes dumerilii*	Eastern Banjo Frog		
Limnodynastidae	*Limnodynastes peronii*	Brown-striped Frog		
Limnodynastidae	*Limnodynastes tasmaniensis*	Spotted Grass Frog		
Limnodynastidae	*Platyplectrum ornatum*	Ornate Burrowing Frog		
Reptilia				
Scincidae	*Bellatorias major*	Land Mullet		
Scincidae	*Concinnia tenuis*	Barred-sided Skink		
Scincidae	*Ctenotus robustus*	Robust Ctenotus		
Scincidae	*Ctenotus taeniolatus*	Copper-tailed Skink		
Scincidae	*Eulamprus quoyii*	Eastern Water-skink		

Family	Scientific Name	Common Name	Surveyed Observations	Survey Equipment
			Observed (O), Heard (H), Scat (S), Marking (M), Track (T), Nest (N), Burrow (B)	Anabat (A), Songmeter (SM), Camera Trap (CT), Nest (N).
Scincidae	*Lampropholis delicata*	Dark-flecked Garden Sunskink		
Scincidae	*Lampropholis guichenoti*	Pale-flecked Garden Sunskink		
Scincidae	*Saiphos equalis*	Three-toed Skink		
Scincidae	*Tiliqua scincoides*	Eastern Blue-tongue		
Agamidae	*Amphibolurus muricatus*	Jacky Lizard		
Agamidae	*Intellagama lesueurii lesueurii*	Eastern Water Dragon		
Agamidae	*Pogona barbata*	Bearded Dragon		
Varanidae	*Varanus varius*	Lace Monitor		
Typhlopidae	*Anilios nigrescens*	Blackish Blind Snake		
Pythonidae	*Morelia spilota spilota*	Diamond Python		
Colubridae	*Dendrelaphis punctulatus*	Common Tree Snake		
Elapidae	*Cacophis squamulosus*	Golden-crowned Snake		
Elapidae	*Cryptophis nigrescens*	Eastern Small-eyed Snake		
Elapidae	*Demansia psammophis*	Yellow-faced Whip Snake		
Elapidae	*Hemiaspis signata*	Black-bellied Swamp Snake		
Elapidae	*Hydrophis platurus*	Yellow-bellied Seasnake		
Elapidae	*Pseudechis porphyriacus*	Red-bellied Black Snake		
Elapidae	*Pseudonaja textilis*	Eastern Brown Snake		
Aves				
Phasianidae	*Synoicus ypsilophora*	Brown Quail		
Anatidae	*Anas castanea*	Chestnut Teal		
Anatidae	*Anas gracilis*	Grey Teal		
Anatidae	*Anas rhynchotis*	Australasian Shoveler		
Anatidae	*Anas superciliosa*	Pacific Black Duck		

Family	Scientific Name	Common Name	Surveyed Observations	Survey Equipment
			Observed (O), Heard (H), Scat (S), Marking (M), Track (T), Nest (N), Burrow (B)	Anabat (A), Songmeter (SM), Camera Trap (CT), Nest (N).
Anatidae	*Aythya australis*	Hardhead		
Anatidae	*Biziura lobata*	Musk Duck		
Anatidae	*Chenonetta jubata*	Australian Wood Duck		
Anatidae	*Dendrocygna eytoni*	Plumed Whistling-Duck		
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe		
Columbidae	*Columba leucomela*	White-headed Pigeon		
Columbidae	*Columba livia**	Rock Dove		
Columbidae	*Geopelia humeralis*	Bar-shouldered Dove		
Columbidae	*Lopholaimus antarcticus*	Topknot Pigeon		
Columbidae	*Macropygia phasianella*	Brown Cuckoo-Dove		
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		
Columbidae	*Phaps chalcoptera*	Common Bronzewing		
Columbidae	*Spilopelia chinensis**	Spotted Turtle-Dove		
Podargidae	*Podargus strigoides*	Tawny Frogmouth		
Caprimulgidae	*Eurostopodus mystacalis*	White-throated Nightjar		
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar		
Threskiornithidae	*Threskiornis moluccus*	Australian White Ibis		
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		
Accipitridae	*Accipiter cirrocephalus*	Collared Sparrowhawk		
Accipitridae	*Accipiter fasciatus*	Brown Goshawk		
Accipitridae	*Accipiter novaehollandiae*	Grey Goshawk		
Accipitridae	*Aviceda subcristata*	Pacific Baza		
Accipitridae	*Circus approximans*	Swamp Harrier		
Accipitridae	*Elanus axillaris*	Black-shouldered Kite		

Family	Scientific Name	Common Name	Surveyed Observations	Survey Equipment
			Observed (O), Heard (H), Scat (S), Marking (M), Track (T), Nest (N), Burrow (B)	Anabat (A), Songmeter (SM), Camera Trap (CT), Nest (N).
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	OH	
Accipitridae	*Haliastur indus*	Brahminy Kite		
Accipitridae	*Haliastur sphenurus*	Whistling Kite		
Accipitridae	*Milvus migrans*	Black Kite		
Accipitridae	*Pandion cristatus*	Eastern Osprey		
Falconidae	*Falco berigora*	Brown Falcon		
Falconidae	*Falco cenchroides cenchroides*	Nankeen Kestrel		
Falconidae	*Falco longipennis*	Australian Hobby		
Falconidae	*Falco peregrinus*	Peregrine Falcon		
Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo	OH	
Cacatuidae	*Cacatua sanguinea*	Little Corella		
Cacatuidae	*Cacatua tenuirostris*	Long-billed Corella		
Cacatuidae	*Eolophus roseicapilla*	Galah		
Cacatuidae	*Zanda funereus*	Yellow-tailed Black-Cockatoo	OH	
Psittacidae	*Alisterus scapularis*	Australian King-Parrot		
Psittacidae	*Glossopsitta concinna*	Musk Lorikeet		
Psittacidae	*Platycercus elegans*	Crimson Rosella		
Psittacidae	*Platycercus eximius*	Eastern Rosella	OH	
Psittacidae	*Psephotus haematonotus*	Red-rumped Parrot		
Psittacidae	*Trichoglossus chlorolepidotus*	Scaly-breasted Lorikeet		
Psittacidae	*Trichoglossus haematodus*	Rainbow Lorikeet	OH	
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo		
Cuculidae	*Cacomantis variolosus*	Brush Cuckoo		
Cuculidae	*Centropus phasianinus*	Pheasant Coucal		

Family	Scientific Name	Common Name	Surveyed Observations	Survey Equipment
			Observed (O), Heard (H), Scat (S), Marking (M), Track (T), Nest (N), Burrow (B)	Anabat (A), Songmeter (SM), Camera Trap (CT), Nest (N).
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-Cuckoo		
Cuculidae	*Chalcites lucidus*	Shining Bronze-Cuckoo		
Cuculidae	*Eudynamys orientalis*	Eastern Koel		
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo		
Cuculidae	*Scythrops novaehollandiae*	Channel-billed Cuckoo		
Alcedinidae	*Ceyx azureus*	Azure Kingfisher		
Alcedinidae	*Dacelo novaeguineae*	Laughing Kookaburra	OH	
Alcedinidae	*Todiramphus macleayii*	Forest Kingfisher		
Alcedinidae	*Todiramphus sanctus*	Sacred Kingfisher		
Coraciidae	*Eurystomus orientalis*	Dollarbird	OH	
Climacteridae	*Cormobates leucophaea*	White-throated Treecreeper		
Ptilonorhynchidae	*Ptilonorhynchus violaceus*	Satin Bowerbird		
Maluridae	*Malurus cyaneus*	Superb Fairy-wren	OH	
Maluridae	*Malurus lamberti*	Variegated Fairy-wren	OH	
Maluridae	*Stipiturus malachurus*	Southern Emu-wren		
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		
Acanthizidae	*Acanthiza lineata*	Striated Thornbill		
Acanthizidae	*Acanthiza nana*	Yellow Thornbill		
Acanthizidae	*Acanthiza pusilla*	Brown Thornbill		
Acanthizidae	*Acanthiza reguloides*	Buff-rumped Thornbill		
Acanthizidae	*Gerygone levigaster*	Mangrove Gerygone		
Acanthizidae	*Gerygone mouki*	Brown Gerygone		
Acanthizidae	*Gerygone olivacea*	White-throated Gerygone		
Acanthizidae	*Sericornis frontalis*	White-browed Scrubwren		

Family	Scientific Name	Common Name	Surveyed Observations	Survey Equipment
			Observed (O), Heard (H), Scat (S), Marking (M), Track (T), Nest (N), Burrow (B)	Anabat (A), Songmeter (SM), Camera Trap (CT), Nest (N).
Acanthizidae	*Sericornis magnirostra*	Large-billed Scrubwren		
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote		
Pardalotidae	*Pardalotus striatus*	Striated Pardalote		
Meliphagidae	*Acanthorhynchus tenuirostris*	Eastern Spinebill	OH	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird	OH	
Meliphagidae	*Anthochaera chrysoptera*	Little Wattlebird	OH	
Meliphagidae	*Caligavis chrysops*	Yellow-faced Honeyeater	OH	
Meliphagidae	*Entomyzon cyanotis*	Blue-faced Honeyeater		
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		
Meliphagidae	*Manorina melanocephala*	Noisy Miner		
Meliphagidae	*Meliphaga lewinii*	Lewin's Honeyeater	OH	
Meliphagidae	*Melithreptus brevirostris*	Brown-headed Honeyeater		
Meliphagidae	*Melithreptus lunatus*	White-naped Honeyeater		
Meliphagidae	*Myzomela sanguinolenta*	Scarlet Honeyeater		
Meliphagidae	*Nesoptilotis leucotis*	White-eared Honeyeater		
Meliphagidae	*Philemon corniculatus*	Noisy Friarbird		
Meliphagidae	*Phylidonyris niger*	White-cheeked Honeyeater	OH	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		
Meliphagidae	*Plectorhyncha lanceolata*	Striped Honeyeater		
Meliphagidae	*Ptilotula fusca*	Fuscous Honeyeater		
Meliphagidae	*Ptilotula penicillata*	White-plumed Honeyeater		
Falcunculidae	*Falcunculus frontatus frontatus*	Eastern Shrike-tit		
Psophodidae	*Psophodes olivaceus*	Eastern Whipbird		
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		

Family	Scientific Name	Common Name	Surveyed Observations	Survey Equipment
			Observed (O), Heard (H), Scat (S), Marking (M), Track (T), Nest (N), Burrow (B)	Anabat (A), Songmeter (SM), Camera Trap (CT), Nest (N).
Campephagidae	*Edolisoma tenuirostris*	Cicadabird		
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush		
Pachycephalidae	*Pachycephala pectoralis*	Golden Whistler		
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler		
Oriolidae	*Oriolus sagittatus*	Olive-backed Oriole	OH	
Oriolidae	*Sphecotheres vieilloti*	Australasian Figbird	OH	
Artamidae	*Artamus leucoryn*	White-breasted Woodswallow		
Artamidae	*Artamus superciliosus*	White-browed Woodswallow		
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird		
Artamidae	*Cracticus torquatus*	Grey Butcherbird		
Artamidae	*Gymnorhina tibicen*	Australian Magpie	OH	
Artamidae	*Strepera graculina*	Pied Currawong		
Dicruridae	*Dicrurus bracteatus*	Spangled Drongo	OH	
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail		
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail		
Rhipiduridae	*Rhipidura rufifrons*	Rufous Fantail	OH	
Corvidae	*Corvus coronoides*	Australian Raven		
Corvidae	*Corvus orru*	Torresian Crow		
Monarchidae	*Grallina cyanoleuca*	Magpie-lark		
Monarchidae	*Monarcha melanopsis*	Black-faced Monarch		
Monarchidae	*Myiagra cyanoleuca*	Satin Flycatcher		
Monarchidae	*Myiagra inquieta*	Restless Flycatcher		
Monarchidae	*Myiagra rubecula*	Leaden Flycatcher		
Corcoracidae	*Corcorax melanorhamphos*	White-winged Chough		

Family	Scientific Name	Common Name	Surveyed Observations	Survey Equipment
			Observed (O), Heard (H), Scat (S), Marking (M), Track (T), Nest (N), Burrow (B)	Anabat (A), Songmeter (SM), Camera Trap (CT), Nest (N).
Petroicidae	*Eopsaltria australis*	Eastern Yellow Robin	OH	
Petroicidae	*Petroica rosea*	Rose Robin		
Petroicidae	*Tregellasia capito*	Pale-yellow Robin		
Cisticolidae	*Cisticola exilis*	Golden-headed Cisticola		
Acrocephalidae	*Acrocephalus australis*	Australian Reed-Warbler		
Locustellidae	*Cincloramphus timoriensis*	Tawny Grassbird		
Locustellidae	*Poodytes gramineus*	Little Grassbird		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow	OH	
Hirundinidae	*Petrochelidon ariel*	Fairy Martin		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		
Sturnidae	*Acridotheres tristis**	Common Myna		
Sturnidae	*Sturnus vulgaris**	Common Starling		
Zosteropidae	*Zosterops lateralis*	Silvereye	OH	
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird		
Estrildidae	*Neochmia temporalis*	Red-browed Finch	OH	
Motacillidae	*Anthus novaeseelandiae*	Australian Pipit		
Mammalia				
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna		
Dasyuridae	*Antechinus flavipes*	Yellow-footed Antechinus		
Dasyuridae	*Antechinus mimetes*	Mainland Dusky Antechinus		
Dasyuridae	*Antechinus stuartii*	Brown Antechinus		
Peramelidae	*Isoodon macrourus*	Northern Brown Bandicoot		
Peramelidae	*Perameles nasuta*	Long-nosed Bandicoot		
Phascolarctidae	*Phascolarctos cinereus*	Koala		

Family	Scientific Name	Common Name	Surveyed Observations	Survey Equipment
			Observed (O), Heard (H), Scat (S), Marking (M), Track (T), Nest (N), Burrow (B)	Anabat (A), Songmeter (SM), Camera Trap (CT), Nest (N).
Petauridae	*Petaurus breviceps*	Sugar Glider		
Pseudocheiridae	*Pseudocheirus peregrinus*	Common Ringtail Possum		
Acrobatidae	*Acrobates pygmaeus*	Feathertail Glider		
Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum		
Macropodidae	*Macropus giganteus*	Eastern Grey Kangaroo		
Macropodidae	*Notamacropus rufogriseus*	Red-necked Wallaby		
Macropodidae	*Wallabia bicolor*	Swamp Wallaby		
Pteropodidae	*Pteropus alecto*	Black Flying-fox		
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox		
Pteropodidae	*Pteropus scapulatus*	Little Red Flying-fox		
Pteropodidae	*Pteropus sp.*	Flying-fox		
Rhinolophidae	*Rhinolophus megaphyllus*	Eastern Horseshoe-bat		
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat		
Molossidae	*Austronomus australis*	White-striped Freetail-bat		
Molossidae	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat		
Molossidae	*Ozimops ridei*	Eastern Free-tailed Bat		
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat		
Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat		
Vespertilionidae	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle		
Vespertilionidae	*Myotis macropus*	Southern Myotis		
Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat		
Vespertilionidae	*Nyctophilus gouldi*	Gould's Long-eared Bat		

Family	Scientific Name	Common Name	Surveyed Observations	Survey Equipment
			Observed (O), Heard (H), Scat (S), Marking (M), Track (T), Nest (N), Burrow (B)	Anabat (A), Songmeter (SM), Camera Trap (CT), Nest (N).
Vespertilionidae	*Nyctophilus sp.*	long-eared bat		
Vespertilionidae	*Scoteanax rueppellii*	Greater Broad-nosed Bat		
Vespertilionidae	*Scotorepens orion*	Eastern Broad-nosed Bat		
Vespertilionidae	*Vespadelus darlingtoni*	Large Forest Bat		
Vespertilionidae	*Vespadelus pumilus*	Eastern Forest Bat		
Vespertilionidae	*Vespadelus vulturnus*	Little Forest Bat		
Muridae	*Mus musculus**	House Mouse		
Muridae	*Rattus lutreolus*	Swamp Rat		
Muridae	*Rattus rattus**	Black Rat		
Canidae	*Canis familiaris**	Dog	OH	
Canidae	*Vulpes vulpes**	Fox	S	
Felidae	*Felis catus**	Cat		
Leporidae	*Oryctolagus cuniculus**	Rabbit	OH	

Appendix D – BAM Field Sheets

Date: 16/10/21	Job number: 2467	Site: Babs Farm	Plot ID: 1	Bearing: 345	Observers: BY, AH
Starting point Easting / Northing:			End point Easting / Northing:		

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Upper stratum	C	Ab	Mid stratum	C	Ab	Lower stratum	C	Ab	Lower stratum	C	Ab
C. gummifera	5	1	Dodonaea triquetra	0.2	2	Pteridium esculentum	10	50+	Hypochaeris rad.	0.2	5
E. pilularis	25	5	Breynia oblongifolia	2	20	Themeda triandra	20	200	Sonchus sp.	0.1	1
Angophora costata	1	1	Monotoca? elliptica	0.5	5	Lomandra longifolia	0.3	2	Poa - Dichelachne micrantha spreading panicle	~~2.5~~ 0.5	~~100+~~ 20
Banksia serrata	0.5	1	Daviesia alata Pea- Cactus like	0.3	3	Imperata cylindrica	0.3	10	Buffalo grass	2	50
Calochlaena dub	0.5	5	~~Pea - trailing~~	~~0.5~~	~~4~~	Pandorea pandorana	1	5	Hydrocotyle bonariensis	0.1	1
			Acacia suaveolens	0.5	10	Dianella caerulea var. producta	0.5	10	Oxalis perennans?	0.1	10
			Pimelea linifolia	0.3	5	Eragrostis curvula Grass- tussock eragrostis?	2.5	100+	Conyza bon	0.1	5
			Gonocarpus teucrioides?	1	20	Pomax umbellata	0.5	30	Andropogon virginicus	0.3	5
			Pea Bossiaea rhombifolia	0.5	5	Kennedia rubicunda ~~Desmodium~~	0.1				
			Acacia ulicifolia	0.5	10	Hypochaeris glabra	0.1	2			
			Leptospermum sp. 1 cinereum	0.7	3	Billardiera scandens	0.3	1			
			Hibbertia ~~obtusa~~ linearis?	0.7	15	Paranthera microphylla tiny white flower	0.1	1			
			Bitou bush	0.3	3	Microtis sp.	0.1	3			
			Dillwynia ~~floribunda~~ glaberrima?	0.3	5						
			Acacia long var sppL.	1	5						
			~~Shrub red berry~~	~~0.2~~	~~1~~						
			~~Ground cover Conyza bon~~								
Total Cover DO FIRST	35-40			10?							

20mx20m plot = 400m² **Note:** 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% = 2x2m, 5% = 4x5m, 25% = 10x10m

C (%): 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... (to nearest 5%). Include overhanging plants.

Abundance: 1-20, 50, 100, 500, 1000 etc. (numbers >20 are estimates only. For overhanging plants, record abundance as 1.

Outside plot
Persoonia laevis

Date: 18/10/21	Job number: 2467	Site: 4029.. Bobs Farm	Plot ID: 1	Bearing: 345	Observers: BM, AH
Starting point Easting / Northing: 0410062, 6373914			End point Easting / Northing: 0410058, 6373965		

AEP
ECOLOGY | BIOBANKING | OFFSETS | BUSHFIRE

Arrival time: **Departure time:** **Weather:** **TWO** Transect photos (one landscape one Portrait) taken ☐

1000m² plot **Mapped Vegetation community:** Likely PCT 1646 **Transect GPS points taken** ☐

Tree Stem Size Class DBH (1.3m high)	Presence/Absence Count above 50 cm	Count of Hollow Bearing Trees
< 5 cm	(P) / A	
5 - 9 cm	(P) / A	
10 – 19 cm	(P) / A	Total 0
20 – 29 cm	(P) / A	Length of logs (m) **Note:** >10cm diameter, >50cm length
30 – 49cm	(P) / A	
50 -79cm	# III	
>80cm	# II	Total metres 0

Leaf Litter Cover within 5 x 1m² sub-plots
Note: - located at 5m, 15m, 25m, 35m and 45m along the transect - first plot located 5m on the left of the transect
Litter includes leaves, seeds, twigs and branches less than 10cm in diameter.
Also include dead material attached to living plants that is touching the ground.

	Leaf litter	Live vegetation, bare ground, rocks, etc.
1	90	
2	45	
3	80	
4	50	
5	30	
Average	59	

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

minimal shrub layer – past understorubbing? some exotic dust.

Habitat features, comments and incidental fauna observations:

Note: Tree Stem Size Class <5cm refers to any regenerating stems and does not require a height of 1.3m.
Note: Large Trees on the BAM Calculator vary dependant on PCT. We record number of all trees over 50cm, BAM Calculator may have large trees only over 80cm and 50 -79cm as Present or Absent this is PCT dependant.

Date: 18.10.21	Job number:	Site: Bobs Farm	Plot ID: B2	Bearing:	Observers: BY
Starting point Easting / Northing:			End point Easting / Northing:		

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Upper stratum	C	Ab	Mid stratum	C	Ab	Lower stratum	C	Ab	Lower stratum	C	Ab
Ironbark sp. (zebra?)	5	2	Hibbertia linearis	1	10	Grass Eragrostis curvula 1 (tussock)	40	1000+			
(Eucalyptus fibrosa			Acacia 1 leptospermum laevigatum	2	5	~~fuzzy silver fol~~ Plantago?	2	~~500+~~			
						reddish Rumex acetoselia	1	500			
			Bitou bush	0.5	1	Lily like Trirorgne elatior	0.5	50+			
			Bossiaea (diamond leaf) rhombifolia	0.3	1	fuzzy skinny Oenothera mollissima (orange infl	0.2	10			
			Exocarpus cupressiformis	0.2	1	Conyza bonariensis	0.3	10			
			Acacia long var soph	0.3	2	Cyperus sp.	0.3	20			
			Lantana camara	0.1	1	Euchiton involucratus	0.1	10			
						Hypochaeris radicata	1	100			
						~~Orange infl~~ ~~red sl~~ Aira cupariana					
						shiny grass	0.1	1			
						Chloris gayana	0.2	10			
						Lomandra long.	0.5	5			
						Richardia humistrata	0.1	1			
						Hydrocotyle bonariensis	0.1	1			
						Andropogon virginicus	0.1	1			
						Acanthospermum australe	0.5	30			
Total Cover DO FIRST											

20mx20m plot = 400m² **Note:** 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% = 2x2m, 5% = 4x5m, 25% = 10x10m

C (%): 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... (to nearest 5%). Include overhanging plants.

Abundance: 1-20, 50, 100, 500, 1000 etc. (numbers >20 are estimates only. For overhanging plants, record abundance as 1.

Date: 18/10/21	Job number: 2467	Site: Bobs farm	Plot ID: P2	Bearing: 105	Observers: AM, BY
Starting point Easting / Northing: 0410081, 6374042			End point Easting / Northing: 0410130, 6374025		

AEP ECOLOGY | BIOBANKING | OFFSETS | BUSHFIRE

Arrival time: **Departure time:** **Weather:** **TWO** Transect photos (one landscape one Portrait) taken ☐

1000m² plot **Mapped Vegetation community:** **Transect GPS points taken** ☐

Tree Stem Size Class DBH (1.3m high)	Presence/Absence Count above 50 cm	Count of Hollow Bearing Trees
< 5 cm	(P) / A	
5 - 9 cm	P / A	
10 – 19 cm	P / A	Total 0
20 – 29 cm	(P) / A	Length of logs (m) **Note:** >10cm diameter, >50cm length
30 – 49cm	(P) / A	11
50 -79cm	#	
>80cm	#	Total metres 2

Leaf Litter Cover within 5 x 1m² sub-plots
Note: - located at 5m, 15m, 25m, 35m and 45m along the transect - first plot located 5m on the left of the transect
Litter includes leaves, seeds, twigs and branches less than 10cm in diameter.
Also include dead material attached to living plants that is touching the ground.

	Leaf litter	Live vegetation, bare ground, rocks, etc.
1	20	
2	5	
3	10	
4	5	
5	10	
Average	10	

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Rubbish, exotic grasses, exposed sand - prev ~~sand~~ mining?

Habitat features, comments and incidental fauna observations:

Outside plot – Persoonia lavis, Banksia serrata

Note: Tree Stem Size Class <5cm refers to any regenerating stems and does not require a height of 1.3m.
Note: Large Trees on the BAM Calculator vary dependant on PCT. We record number of all trees over 50cm, BAM Calculator may have large trees only over 80cm and 50 -79cm as Present or Absent this is PCT dependant.

Date: 18/10/21	Job number: 2467	Site: Bobs Farm	Plot ID: P3	Bearing: 105	Observers: AH, BY
Starting point Easting / Northing:			End point Easting / Northing:		

AEP
ECOLOGY | BIOBANKING | OFFSETS | BUSHFIRE

Upper stratum	C	Ab	Mid stratum	C	Ab	Lower stratum	C	Ab	Lower stratum	C	Ab
Pinus radiata	20		Leptospermum laevigatum	30		Lomandra longifolia	0.3	5	Plantago lanceolata	0.5	
Camphor laurel	0.5		Breyna oblongifolia	0.5	5	Parsonsia straminea	2	1	Ehrharta erecta	0.5	
Glochidion ferd	0.5	5	Acacia long var long	0.5	3	Dianella caerulea var producta	0.3	5	Asparagus aethiopicus	0.2	
			Elaeocarpus reticulatus?	3	5	Pandorea pandorana	0.3	1	Briza maxima	1	
			Bitou bush	5	20*	Pomax umbellata	0.2		Eragrostis curvula? Tussock grass	10	
			Pittosporum undulatum	0.5	2	~~Carex sp (small)~~	~~0.1~~		Hypochaeris radicata	0.1	
			Bleeding heart	0.2	1	Aira cupaniana	0.1				
			Monotoca elliptica	0.3	1	Imperata cylindrica	0.2				
			Lantana camara	0.3	1						
Total Cover DO FIRST											

20mx20m plot = 400m² **Note:** 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% = 2x2m, 5% = 4x5m, 25% = 10x10m

C (%): 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... (to nearest 5%). Include overhanging plants.

Abundance: 1-20, 50, 100, 500, 1000 etc. (numbers >20 are estimates only. For overhanging plants, record abundance as 1.

Date: 18/10/21	Job number: 2467	Site: 4029 & 4045 Nelson Bay Rd Bobs Farm	Plot ID: 3	Bearing: 105	Observers: AH BY
Starting point Easting / Northing: 56H UTM 0410239 6374009			End point Easting / Northing: 56H UTM 0410255 6373994		

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Arrival time: 1615 **Departure time:** 1710 **Weather:** fine PtA Cloud

TWO Transect photos (one landscape one Portrait) taken ✓

1000m² plot **Mapped Vegetation community:**

Transect GPS points taken ✓

Tree Stem Size Class DBH (1.3m high)	Presence/Absence Count above 50 cm	Count of Hollow Bearing Trees
< 5 cm	(P) / A	NIL
5 - 9 cm	(P) / A	
10 – 19 cm	(P) / A	**Total**
20 – 29 cm	(P) / A	**Length of logs (m)** **Note:** >10cm diameter, >50cm length ~~2x 5m~~ (No hollows) 1x 5m " "
30 – 49cm	(P) / A	
50 -79cm	# 7	
>80cm	#	**Total metres**

Leaf Litter Cover within 5 x 1m² sub-plots

Note: - located at 5m, 15m, 25m, 35m and 45m along the transect - first plot located 5m on the left of the transect

Litter includes leaves, seeds, twigs and branches less than 10cm in diameter.

Also include dead material attached to living plants that is touching the ground.

		Leaf litter	Live vegetation, bare ground, rocks, etc.
L	1 5m	100%	Pine needles, cones Brayina (coffee bush) Bitou, Parsonsia Straminea
R	2 15m	85%	Some rubbish - treated pine/concrete 5% base ground; 5% tussock grass 5% bitou
L	3 25m	50% 10% bitou bush 10% rubbish (roof sheet)	30% lepto spermum debris — multiple prostrate branches (Stag)
R	4 35m	50%	~~40%~~ lepto spermum debris 2% bitou bush
L	5 45m	70%	30% lepto spermum debris
Average		71% Average cover	

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Exotic Sp.: Pinus, bitou bush

Habitat features, comments and incidental fauna observations:

Pinus Sp (Radiata?), Coastal teatree lepto spermum, ~~spiky teatree~~ Monotoca (eliptica?) Blueberry ash, cheesetree (Glochidion)

Note: Tree Stem Size Class <5cm refers to any regenerating stems and does not require a height of 1.3m.

Note: Large Trees on the BAM Calculator vary dependant on PCT. We record number of all trees over 50cm, BAM Calculator may have large trees only over 80cm and 50 -79cm as Present or Absent this is PCT dependant.

Date: 18/10/21	Job number: 2467	Site: Bobs Farm	Plot ID: P4	Bearing: 106	Observers: AH, BY
Starting point Easting / Northing:			End point Easting / Northing:		

AEP
ECOLOGY | BIOBANKING | OFFSETS | BUSHFIRE

Upper stratum	C	Ab	Mid stratum	C	Ab	Lower stratum	C	Ab	Lower stratum	C	Ab
			(1) Petrorhagia dubia			(1) Petrorhagia dubia (pink inflor)	10		Acanthospermum australe	1	100
						Plantago lance	2		Oenothera mollissima Orange-flower weed	0.5	5
						Euchiton involucratus	2		Senecio madagasca...	0.1	1
						Briza maxima	0.5	50	Wahlenbergia gracilis	0.1	1
						Hypochaeris radicata	0.3		Vulpia fasciculata	0.1	1
						Eragrostis curvula Grass 1- tussock	35				
						Rumex acetoselia Red weed	8				
						Facelis retusa	0.3	20			
						Aira cupaniana	0.4	50			
						Cynodon dactylon	0.5				
						Ambrosia tenuifolia Fragrant forb	0.3	50			
						Cyperus sp.	0.2	50			
						Conyza bon	0.3				
						Taraxicum officinale	0.1	2			
						Chickweed - Stellaria media	0.1	10			
						~~Hetero...~~	~~0.2~~				
						Richardia humistrata	0.2	10			
Total Cover DO FIRST											

20mx20m plot = 400m² **Note:** 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% = 2x2m, 5% = 4x5m, 25% = 10x10m

C (%): 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... (to nearest 5%). Include overhanging plants.

Abundance: 1-20, 50, 100, 500, 1000 etc. (numbers >20 are estimates only. For overhanging plants, record abundance as 1.

Date: 18/10/21	Job number: 2467	Site: 4045 NELSON BAY RD BOBS FARM	Plot ID: 4	Bearing: 181°	Observers: AH BY
Starting point Easting / Northing: 56H UTM 0410253 6373964			End point Easting / Northing: 56H UTM 0410253 6373964		

AEP ECOLOGY | BIOBANKING | OFFSETS | BUSHFIRE

Arrival time: 1715 **Departure time:** **Weather:** Fine Part Cloud

TWO Transect photos (one landscape one Portrait) taken ☑

1000m² plot **Mapped Vegetation community:**

Transect GPS points taken ☑

Tree Stem Size Class DBH (1.3m high)	Presence/Absence Count above 50 cm	Count of Hollow Bearing Trees
< 5 cm	P / (A)	NIL
5 - 9 cm	P / (A)	
10 – 19 cm	P / (A)	Total
20 – 29 cm	P / (A)	Length of logs (m) Note: >10cm diameter, >50cm length
30 – 49cm	(P) / A	NIL
50 -79cm	# —	
>80cm	# —	Total metres

Leaf Litter Cover within 5 x 1m² sub-plots

Note: - located at 5m, 15m, 25m, 35m and 45m along the transect - first plot located 5m on the left of the transect

Litter includes leaves, seeds, twigs and branches less than 10cm in diameter.

Also include dead material attached to living plants that is touching the ground.

		Leaf litter	Live vegetation, bare ground, rocks, etc.
L	1 5	10%; 50% grasses 20% bare ground 20% exotic weeds	Hypacanne radicata, tussock grass, cychiton sp.
R	2 15	2% leaf litter	20% bare ground 60% grasses 18% exotic weeds
L	3 25	0% leaf litter	70% bare ground 25% grasses 5% exotic weeds
R	4 35	60% leaf litter Pinus needles	20% grasses 10% exotic weeds 5% acacia longifolia 5% bitou bush
L	5 45	5% leaf litter	40% bare ground 56% grasses 5% exotic weeds
	Average	15.4%	

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Exotic orange weed, Petalagia dubia, ground veg has been slashed/cleared, piles of tree branches & roots

Habitat features, comments and incidental fauna observations:

Lewins honeyeater WBSE, Magpie butcher birds, pied lark, Red Wattlebird

Note: Tree Stem Size Class <5cm refers to any regenerating stems and does not require a height of 1.3m.

Note: Large Trees on the BAM Calculator vary dependant on PCT. We record number of all trees over 50cm, BAM Calculator may have large trees only over 80cm and 50 -79cm as Present or Absent this is PCT dependant.

Appendix E – Site Photographs

Plate 1 – Wood Piles on Site

Plate 2 – Vegetation on Site.

Plate 3 – Vegetation Northern Boundary

Plate 4 – *Eucalyptus pilularis (Blackbutt)*

Appendix F – Other Legislation

Appendix F – Other Legislation

EPBC Act Assessment

A Protected Matters Search of an area of 5km radius of the Study Area was conducted in October 2021 for Matters of National Environmental Significance as relevant to the Environment Protection & Biodiversity Conservation Act 1999 (EPBC Act). The following Matters of National Significance are considered in this assessment.

World Heritage Properties:

The site is not a World Heritage area and is not in close proximity to any such area.

National Heritage Places:

The site is not a National Heritage place, and it is not in close proximity to any such place.

Wetlands of International Significance (declared Ramsar wetlands):

The site is approximately 10 – 20 km south of Ramsar Listed Myall Lakes and is 20km north of the Ramsar listed Hunter estuary wetlands. The development as proposed will not impact the Ramsar listed wetlands.

Great Barrier Reef Marine Park:

The site is not part of, or within close proximity to, the Great Barrier Reef Marine Park.

Commonwealth Marine Areas:

The site is not part of, or within close proximity to, any Commonwealth Marine Area.

Threatened Ecological Communities:

From a search of the EPBC Protected Matters website (07/09/2021), four (4) listed Threatened Ecological Communities (TECs) were considered likely to occur or may occur within a 5km radius of the Study Area.

One (1) Critically Endangered Ecological Communities:

- Lowland Rainforest of Subtropical Australia;

Two (2) Endangered Ecological Communities:

- Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland;
- *Posidonia australis* seagrass meadows of the Manning-Hawkesbury ecoregion

One (1) Vulnerable Ecological Community:

- Subtropical and Temperate Coastal Saltmarsh

Ground truthing was undertaken against mapped Regional Vegetation maps within the Study Area, and the following Community was identified as being present:

- *PCT 1646 - Smooth-barked Apple - Blackbutt - Old Man Banksia woodland on coastal sands of the Central and Lower North Coast*.

Desktop assessment and ground-truthing during field surveys found that the vegetation community present on site is not commensurate with the aforementioned Threatened Ecological Communities.

Threatened Species:

Threatened species listed under the EPBC Act considered likely to occur on site were assessed from field inspections, Bird Data and using the BioNet Atlas search tool within a 10km search radius to the Study Area with most recent records assessed in **Table 1.**

No other matters of note relating to koala impact are considered relevant to the proposal, and as such it is not considered that a referral is required under the EPBC Act for the Koala.

Migratory Species

A number of EPBC listed migratory species have some potential to visit the site on an irregular basis. However, it is not considered that the development of this land as proposed is likely to significantly impact the potential habitat of such species or disrupt migratory patterns.

EPBC Act Assessment Conclusion

The location of the proposed development is primarily located within highly disturbed areas adjacent to a main road. The site has previously been cleared for farming practices and is in a managed state. Considering no threatened species were identified on site during the survey period and the site is highly degraded it is unlikely that removal of the vegetation on site will significantly impact threatened flora and fauna species in the area. It has been determined that a referral under the EPBC Act is not required for this rezoning proposal, therefore a referral is considered unlikely to be required.

Table 2: EPBC Listed Threatened Species Assessment

Scientific Name	Common Name	EPBC Status	No. of Local Records	Most Recent Record	Assessment
Fauna					
Anthochaera phrygia	Regent Honeyeater	Critically Endangered	7	2017	*Anthochaera phrygia* (Regent Honeyeater) has been recorded seven times within the 10km BioNet search area. All the records are from Tanilba Bay. The site is not mapped under the Important Area Mapping and considering the paucity of records in the local area and degraded nature of the site it is unlikely the development will have a significant impact on this species.
Dasyurus maculatus	Spotted-tailed Quoll	Endangered	3	2009	*Dasyurus maculatus* (Spotted-tailed Quoll) was recorded most recently in 2009 to the north-east of the Subject Site, observed on Nelson Bay Road. The species was not detected during nocturnal surveys or diurnal surveys. As much of the Subject Site is cleared and managed land and there have been no observations in over 10 years within the locality of the Subject Site, it is considered highly unlikely that species is present within the Subject Site and thus the development is not likely to have a significant impact on the species.
Hirundapus caudacutus	White-throated Needletail	Vulnerable	24	2020	*Hirundapus caudacutus* (White-throated Needletail) are a non-breeding terrestrial migrant in Australia. The most recent last record was located to the west of the Subject Site along Nelson Bay Road in 2020. There is a possibility that the species may occasionally forage on flying insects above the Subject Site. The proposed development is unlikely to have a significant impact on the species.
Lathamus discolor	Swift Parrot	Critically Endangered	24	2012	*Lathamus discolor* (Swift Parrot) has been recorded six times within the 10km BioNet search area. All the records are from Tanilba Bay/Lemon Tree Passage/Salamander Bay region. The site is not mapped under the Important Area Mapping and considering the paucity of records in the local area and degraded nature of the site it is unlikely the development will have a significant impact on this species.
Phascolarctos cinereus	Koala	Vulnerable	2058	2058	*Phascolarctos cinereus* (Koala) was not detected on site and no presence of koalas were detected on site during the survey period. Further to this there were no preferred koala feed trees identified within the site. The site is mapped as `Mainly Cleared' koala habitat, according to the Port Stephens Council CKPoM (2002) Koala Habitat Mapping and the site does not contain habitat linking areas over mainly cleared land according to the Port Stephens Koala Habitat Planning Map.

Scientific Name	Common Name	EPBC Status	No. of Local Records	Most Recent Record	Assessment
					As such it is unlikely that this site would support koalas due to the lack of preferred habitat and it is unlikely the development will have a significant impact on koalas in the area.
Pseudomys novaehollandiae	New Holland Mouse	Vulnerable	1	2008	*Pseudomys novaehollandiae* (New Holland Mouse) was not detected on site during field surveys. One record of this species was recorded to the south west of the site in the Worimi Conservation Lands south of Bob's Farm. Considering the paucity of records in the area and disturbed nature of the site, it is unlikely that this development will significantly impact this species
*Pteropus poliocephalus**	Grey-headed Flying-fox	Vulnerable	31	2020	*Pteropus poliocephalus* (Grey-headed Flying-fox) was not detected during nocturnal field surveys. Nor were any camps or roosts identified on site. Given that no maternity or roosting colony was observed within or near the Site Boundary during seasonal surveys, the highly mobile nature of Grey-headed Flying-fox and the presence of a only a small amount of foraging habitat within the Subject Site, it is considered unlikely to impact significantly on this highly mobile species.
Flora					
Cryptostylis hunteriana	Leafless Tongue Orchid	Vulnerable	7		*Cryptostylis hunteriana* (Leafless Tongue Orchid). One BioNet record of this species occurs in the Lemon Tree Passage area. Considering the record is located north of Tilligerry Creek in 2008 and there are substantial tracks of remnant vegetation within the area, it is unlikely the development will significantly impact this species.
Diuris praecox	Newcastle Doubletail	Vulnerable	1172	2018	*Diuris praecox* (Newcastle Doubletail) was not identified on site during seasonal surveys undertaken for this species when local reference populations were flowering. As such it is unlikely that the species occurs on site and unlikely for the development to significantly impact this species.
Angophora inopina	Charmhaven Apple	Vulnerable	1	2016	*Angophora inopina* (Charmhaven Apple). One BioNet record of this species occurs in the Salamander Bay area in 2016. This species was not detected on site during field surveys and it is unlikely to occur on site. As such it is considered unlikely the development will significantly impact this species.
Persicaria elatior	Tall Knotweed	Vulnerable	1		*Persicaria elatior* (Tall Knotweed). One BioNet record of this species

Scientific Name	Common Name	EPBC Status	No. of Local Records	Most Recent Record	Assessment
					occurs in the Salamander Bay area in 2019. This species was not detected on site during field surveys and no suitable habitat was identified on site for this species. As such it is considered unlikely the development will significantly impact this species.
Syzygium paniculatum	Magenta Lilly Pilly	Vulnerable	3		*Syzygium paniculatum* (Magenta Lilly Pilly). Three BioNet record of this species occurs in the Lemon Tree Passage area and have been recorded between 2014 and 2021. This species was not detected during field surveys. Considering the record is located north of Tilligerry Creek and there are substantial tracks of remnant vegetation within the area, it is unlikely the development will significantly impact this species.
Tetratheca juncea	Black-eyed Susan	Vulnerable	1		*Tetratheca juncea* (Black-eyed Susan) was not identified on site during seasonal surveys undertaken for this species when local reference populations were flowering. As such it is unlikely that the species occurs on site and unlikely for the development to significantly impact this species.

Port Stephens Comprehensive Koala Plan of Management Assessment

The report is specifically intended to respond to each of the performance criteria laid out in the Port Stephens Council Comprehensive Koala Plan of Management (CKPoM) for rezoning proposals as detailed in Appendix 2.

The site was inspected by AEP ecologists in September and October 2021 to undertake general site observations, habitat mapping and Plant Community Type determination, koala SAT surveys, nocturnal spotlighting and call playback.

The inspection included general site reconnaissance and traversal, with a view to verifying information that had been gathered at the desktop level, and also to identify the presence of potential important ecological features. Such searches included specific examination for any signs of Koala activity on the site, as well as nocturnal spotlighting and call playback of Koala calls, via a speaker.

No koalas or evidence of koalas were located on site during nocturnal surveys paired with call playback conducted in October 2021.

Performance Criteria for Rezoning Applications

Consideration is to be given to the following matters when assessing rezoning requests including any amendment to the Port Stephens LEP. Prior to approving any such rezoning proposal, Council is to take into consideration the likely impacts of the development made possible by the rezoning including environmental impacts on both the natural and built environment, and social and economic impacts on the locality. In particular Council should be satisfied that the rezoning would:

- **not result in development within areas of Preferred Koala Habitat (PKH) or defined Habitat Buffers;**

According to the Koala Habitat Planning Map (KHPB), the proposed rezoning plan is not located within areas of;

- Preferred Koala Habitat (PKH);
- Supplementary Koala Habitat (SKH);
- Habitat Buffers; or within
- Habitat Linking Areas (excluding those over mainly cleared land);

Additionally, the site does not contain preferred koala food trees *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus parramattensis* (Parramatta Red Gum) or *Eucalyptus robusta* (Swamp Mahogany).

Canopy trees Identified on site included;

- *Eucalyptus fibrosa* (Broad Leaved Ironbark)*;*
- *Eucalyptus pilularis* (Blackbutt);
- *Angophora costata* (Smooth-barked Apple); and
- *Corymbia gummifera* (Red Bloodwood).

Further to this the PCT identified on site (*PCT 1646 - Smooth-barked Apple - Blackbutt - Old Man Banksia woodland on coastal sands of the Central and Lower North Coast*) is not listed as a PCT that is aligned with Preferred Koala Habitat. As such no further koala habitat assessment is required.

- **allow for only low impact development within areas of Supplementary Koala Habitat and Habitat Linking Areas;**

The site is located within 'Mainly Cleared Areas' as per the Port Stephens KHPM and will not impact SKH and Habitat Linking Areas. As such no further assessment is required.

- **minimise the removal of any individuals of preferred koala food trees, where ever they occur on the site; and**

No preferred koala feed trees have been identified on site. As such no further assessment is required.

- **not result in development which would sever koala movement across the site. This should include consideration of the need for maximising tree retention on the site generally and for minimising the likelihood of impediments to safe/unrestricted koala movement.**

There is approximately 1.66ha of PCT 1646 in moderate and poor condition within the Subject Site that is proposed to be removed as part of this development. The site is fragmented by Nelson Bay Road to the south and Trotter Road to the north. The vegetation on site may provide some connectivity for koala movement between areas of PKH to the north and SKH to the south, however, movement across Nelson Bay Road is not considered suitable for koalas as this increase's vehicle strikes and impact to koalas. As such it is not considered that the vegetation on site functions as a suitable corridor for koalas given its proximity to Nelson Bay Road.

Conclusion

Koalas and or presence of koalas were not detected on site during the survey period. Further to this there were no preferred koala feed trees identified within the site. The site is mapped as `Mainly Cleared' koala habitat and the site does not contain habitat linking areas over mainly cleared land according to the Port Stephens Koala Habitat Planning Map. As per the Port Stephens Council CKPoM (2002) no further assessment is required and the site meets the conditions as defined in the Koala Habitat Mapping and the consent should not be constrained by koala habitat.

Water Management Act 2000

There are no streams or waterways that pass through the Subject Site. Therefore, no further assessment is required under the Water Management Act 2000.

Fisheries Management Act 1994

No streams or waterways are to be impacted by this development and as such the development will not require assessment under the Fisheries Management Act 1994.

SEPP Coastal Management 2018

The Subject Site is mapped within a small portion of Proximity to Coastal Wetland Area and Coastal Environmental Area, in accordance with the State Environmental Planning Policy (Coastal Management) 2018 (Coastal SEPP.). Therefore, in accordance with Clause 11 and 13 of the Coastal SEPP respectively the following assessment has been undertaken (**Table 1**).

Table 1 – Coastal Environment Area Assessment

Clause Number	Clause	Assessment
11 (1)	Development consent must not be granted to development on land identified as "proximity area for coastal wetlands" or "proximity area for littoral rainforest" on the *Coastal Wetlands and Littoral Rainforests Area Map* unless the consent authority is satisfied that the proposed development will not significantly impact on—	
11 (1a)	(a) the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest, or	No waterways pass through the site. As part of future developments Stormwater assessment and modelling will be required to ensure that the Development meets Port Stephens Council water quality targets and will not have an adverse impact on the downstream environment including the coastal wetlands to the north of the Subject Site. Typical water sensitive urban design is expected to be incorporated into the management of water on site and around the development, to ensure erosion does not occur and water run-off is contained and managed.
11 (1b)	(b) the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest.	As above.
11 (2)	This clause does not apply to land that is identified as "coastal wetlands" or "littoral rainforest" on the *Coastal Wetlands and Littoral Rainforests Area Map*.	Not applicable to this application.
13 (1)	Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following	
13 (1a)	(a) the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,	No waterways pass through the site. As part of future developments Stormwater assessment and modelling will be required to ensure

Clause Number	Clause	Assessment
		that the Development meets Port Stephens Council water quality targets and will not have an adverse impact on the downstream environment including the coastal wetlands to the north of the Subject Site. Typical water sensitive urban design is expected to be incorporated into the management of water on site and around the development, to ensure erosion does not occur and water run-off is contained and managed.
13 (1b)	(b) coastal environmental values and natural coastal processes,	The proposed rezoning area is located approx. 95m from the SEPP Wetland located along Tilligerry Creek, avoiding direct impact on coastal environmental values and natural coastal processes.
13 (1c)	(c) the water quality of the marine estate (within the meaning of the Marine Estate Management Act 2014), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1,	As part of future developments Stormwater assessment and modelling will be required to ensure that the Development meets Port Stephens Council water quality targets and will not have an adverse impact on the downstream environment including the coastal wetlands to the north of the Subject Site. Typical water sensitive urban design is expected to be incorporated into the management of water on site and around the development, to ensure erosion does not occur and water run-off is contained and managed. Direct impacts to coastal lakes should be avoided as part of the Stormwater management plan.
13 (1d)	(d) marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,	The proposed rezoning area is located approx. 95m from the SEPP Wetland located along Tilligerry Creek, avoiding direct impact on coastal environmental values and natural coastal processes.
13 (1e)	(e) existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,	The rezoning is located within private property and will not impact existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with disability.
13 (1f)	(f) Aboriginal cultural heritage, practices and places,	No known Aboriginal cultural heritage, practices or places are known to this Lot and no adverse impacts are expected.

Clause Number	Clause	Assessment
		No known cultural and built environment and heritage places are known to this Lot and no adverse impacts are expected. Searches were carried out on the NSW Public Aboriginal Heritage Map Website. For an extensive search consultation with a registered Heritage Assessor is required (Heritage NSW 2021).
13 (1g)	(g) the use of the surf zone.	The development is set back from the foreshore and is separated by a road. The site will not impact or use the surf zone in the foreshore.
13 (2)	Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that—	
13 (2a)	(a) the development is designed, sited and will be managed to avoid an adverse impact referred to in subclause (1), or	The proposed rezoning area is located away from the foreshore avoiding direct impact on the nearby wetlands.
13 (2b)	(b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or	As above.
13 (2c)	(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.	As above.
13 (3)	This clause does not apply to land within the Foreshores and Waterways Area within the meaning of *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005*.	Not applicable to this application.

As demonstrated in the above assessment it is likely that the proposed rezoning and future development will have minimal to no impact on the catchment area following the use of appropriate stormwater modelling and implementation of a Stormwater Management Plan and Water Sensitive Urban Design.

Appendix G – CVs

IAN BENSON
Curriculum Vitae

Ian works with AEP in the role of Principal Ecologist. He is an experienced field ecologist, bird watcher and a regular participant in wader surveys. Ian has previously had a successful career as a project manager with a local geotechnical engineering firm. His background in project management and soil sciences combined with his ecological knowledge is utilised in a diverse array of applications in his current role.

Qualifications

- Graduate Diploma in Science (Ecology) University of New England (2014)
- Bachelor Engineering (Civil) University of Newcastle (2008)

Further Education & Training (select summary)

- Biobank and Biocertification Assessors Training Course
- Advanced Plant Identification (University of New South Wales)
- NSW Class C Driver's Licence. Experienced 4WD operator
- Occupational Health & Safety Training
- Remoted Piloted Aircraft Excluded Category Training with Aviassist Pty Ltd
- Rail Industry Worker
- ARTC Safety Induction for Contractors (NSW)
- ARTC Hunter Bulk Terminal Induction

Fields of Special Competence

- Biobanking & Biodiversity Offset Commissions – initial scoping and feasibility, BAM impact assessments and BDAR reporting, biobank calculations, Stewardship site creation
- Detailed knowledge of environmental legislation and approval pathways
- Ecological field survey and habitat assessment covering terrestrial and aquatic flora and fauna. Experienced in camera trap methods particularly targeting cryptic and difficult to identify mammal species.
- Highly proficient at avifauna surveys, including challenging wetland and shorebird environs
- High level of experience undertaking nocturnal survey of arboreal mammals and nocturnal birds
- Project Management

Key Project Experience

- Targeted surveys for *Dichanthium setosum* in Glen Innes Region;
- Target surveys for Eucalyptus cannonii, Western Rail Coal Unloader, Pipers Flat;
- White-bellied Sea-Eagle nest locating and monitoring Glenning Valley and Chisholm;
- Powerful Owl nest locating and monitoring: Salamander Bay, Soldiers Point, Anna Bay North, Wallsend, Cameron Park and Edgeworth;
- Accredited Assessor for approved Biodiversity Development Assessment Reports:
    - Berkeley Vale Road, Glenning Valley;
    - Railway Road, Warnervale;
    - Barden Ridge Townhouses;
    - McFarlane's Road, Chisholm;
    - Fairlands Road, Medowie;
    - Rosella Rise, Warnervale;
    - Carr's Road, Neath;
    - Jack Grant Avenue, Warnervale;
    - Minnesota Road, Hamlyn Terrace;
    - Bellbird North;
    - Waterford, Chisholm;
- Ecological Assessment Report for Proposed Modification To Approved Western Rail Coal Unloader At Pipers Flat;
- Spot Analysis Techniques surveys: Nelsons Plains, Wallsend, Anna Bay, Boat Harbour, Salamander Bay, North Arm Cove, Warnervale, Hamlyn Terrace, Kincumber, Palmdale, Wyee, Charlestown, Chisholm, Gillieston Heights, Mount Vincent, Radford Park, Cessnock
- Infrastructure;
    - Gwandalan Recycled Water Main;
    - Lower Belford Water Main;
    - Raymond Terrace Rising Main;
    - Astra Street Landfill Rehabilitation Assessment;
- Cat Tracker Pilot Program Associated With The Hunter Estuary Wetlands for Hunter Local Land Services;
- Surveys for Squirrel Glider (*Petaurus norfolcensis*) Warnervale Area June 2020
- Biodiversity Stewardship Agreements including:

- o • Bobs Farm (approved);
- o • Cedar Brush Creek (ready for signing);
- o • Girvan (final assessment);
- o • Mardi (under assessment);
- o • Wallsend (report being drafted);
- o • Ellalong (report being drafted);
- o • Blueys Beach (surveys continuing);
- o • South-West Rocks (surveys continuing).

Professional Affiliations / Memberships (past / present)

- Hunter Bird Observers Club (HBOC)
- Australasian Seabird Group

Relevant Employment History

2019-Current **Principal Ecologist**
Anderson Environment & Planning, Newcastle

Currently employed by Anderson Environment & Planning in the role of Principal Ecologist overseeing a team of 15 professional ecology staff and all aspects of the business including training and management of field and office staff undertaking ecology and bushfire works to assist in the provision of consulting services to land, property, mining industry, legal and government sectors. Covering ecological, project management, environmental, planning services, advices, strategy and representation.

2018-2019 **Senior Ecologist**
Anderson Environment & Planning, Newcastle

2016-2018 **Ecologist**
Anderson Environment & Planning, Newcastle

2012-2016 **Project Manager**
Douglas Partners, Newcastle

As a project manager with Douglas Partners I was responsible for proposal and tender preparation, planning, implementation and reporting of geotechnical and geo-environmental investigations for a broad range of projects including site classification, foundations, pavements, bridges and slope stability. I was required to liaise with clients regarding project requirements, project goals and deadlines. I was responsible for the development and implementation of Work Health and Safety Plans as well as Environmental Plans and documentation. This included the development of safe work procedures, safety inspections on site and implementing improved safety procedures with staff. I was responsible for ensuring projects were completed on time and on budget whilst meeting the clients' expectations and achieving quality assurance standards.

2008-2012 **Geotechnical Engineer**
Douglas Partners, Newcastle

As a geotechnical engineer for Douglas Partners I was involved in the planning and implementation of geotechnical investigations for a wide range of development in the Hunter Valley area. I was primarily involved in site supervision of geotechnical investigations using drilling rigs for boreholes, truck mounted cone penetration testing and test pit excavations using excavators and backhoes. My role also included site inspections involving the assessment of conditions for piles, piers and shallow footings. I also undertook site walkovers for assessment of mine subsidence and slope stability.

2007-2008 **Undergraduate Geotechnical Engineer**
Douglas Partners, Newcastle

Whilst an undergraduate engineer with Douglas Partners I experienced a broad range of practice areas and developed a diverse range of engineering skills.

Relevant Ecological Experience

2013 - Current **Bird Surveyor**
Hunter Bird Observers Club

Volunteer survey work for Hunter Bird Observers Club for regular wader and water bird counts and Tomago and Kooragang Island.

2017 – Current **Birdata Moderator**
Birdlife Australia

Volunteer moderating and vetting bird surveys from *Birdata* which is the Birdlife Australia Atlas to ensure a robust database for both the Hunter Valley and Central Coast reporting areas totalling approximately 5000 surveys per year.

Andrew Harker

Curriculum Vitae

Andrew works with AEP in the role of Ecologist. He graduated with a Bachelor of Environmental Science and Management, majoring in Earth Systems. Whilst studying at the University of Newcastle he conducted tailored his degree to focus on conservation biology and environmental remediation. Andrew gained experience in a range of ecological field studies as a requirement of his degree courses. Working with Enviropacific Services he gained further experience in ecological field surveys as a graduate environmental scientist working on environmental remediation projects in the civil construction sector. He has experience in bushfire threat assessments, targeted fauna and flora surveys, Koala Spot Assessment Technique (SAT) surveys, fauna handling and tree surveys. Andrew also has extensive experience in the civil construction sector in large scale remediation projects, residential developments, excavation and trades.

Qualifications

- Bachelor of Environmental Science and Management – University of Newcastle (2017)
- Masters Degree in Disaster Resilience and Sustainable Development (2019 – current)
- Diploma of Public Safety (Royal Australian Air Force 2012)
- Diploma of Management (Royal Australian Air Force 2009)
- Cert IV in Training & Assessment (Royal Australian Air Force 2010)
- Cert II in Civil Construction
    - FPIFGM069A – Trim & Cross-cut Felled Tree
    - FPIFGM111A – Fall Trees Manually – Intermediate

Licences/Certificates

- Apply First Aid
- Class HC NSW Drivers Licence
- Light & Heavy 4WD, ATV
- Construction White Card
- PADI Open Water; Advanced Diver; Rescue Diver
- Backhoe/Loader & Forklift
- Bush Firefighter (BF 2003)

Field Survey Experience

- Aquatic & marine water quality surveys, sampling and analysis
- Terrestrial fauna survey, including koala SAT surveys and spotlighting
- Bushfire Treat Assessments

Volunteer Experience

- NSW Rural Fire Service

Employment History

Mar 2021 – Current	**Ecologist**
	Anderson Environment & Planning, Newcastle
Sep 2018 – Mar 2021	**Water Treatment Specialist**
	Water Treatment Services Australia
Nov 2017 – Apr 2019	**Graduate Environmental Scientist / Engineer**
	Enviropacific Services
Oct 1995 – Sep 2012	**Aircraft/Armament Technician/Manager**
	Royal Australian Air Force

ANGELA METCALFE

Curriculum Vitae

Angela works with AEP in the role of Ecologist. She graduated with a Bachelor of Environmental Science and Management (Honours), majoring in Ecosystems and Biodiversity. Angela has previously worked in bush regeneration before coming to AEP. Angela has experience in a variety of environmental work, both paid and unpaid in, flora and fauna terrestrial and aquatic field surveys, reporting, GIS and mapping and habitat restoration. Her background in ecological surveying projects and growing flora knowledge and experience is utilised in a diverse array of applications in her current role.

Qualifications

- Bachelor of Environmental Science and Management (Honours) (Ecosystems and Biodiversity), University of Newcastle (2020)

Further Education & Training

- Class C NSW Driver's Licence
- NSW Construction White Card
- First Aid (Provide first aid HLTAID003)
- Chemcert and EPA ground applicator licence

Fields of Competence

- Ecological field survey, covering terrestrial fauna and flora
- Experience in reptile handling and fauna trapping
- Growing proficiency in botanical surveys
- Adept experience in operating 4x4 vehicles

Relevant Employment History

2021 - Present	**Ecologist** Anderson Environment & Planning, Newcastle
2020	**Conservation Field Officer** SkyLand Management, Bolwarra Heights
2019	**Research Assistant** University of Newcastle, Callaghan

Currently employed by Anderson Environment & Planning to assist in the provision of consulting services to land, property, legal and government sectors. Covering ecological, project management, environmental, planning services, advices, strategy and representation. Expanding knowledge of field survey methodology, report writing, mapping and data manipulation.

BONNI YARE
Curriculum Vitae

Bonni works with AEP in the role of Ecologist has a Bachelor of Science, majoring in Natural Resource Management. Bonni has experience in a variety of environmental work, in a professional and volunteer capacity, including flora, fauna and aquatic field surveys, reporting, GIS and mapping, habitat restoration and community volunteering.

Qualifications

- Bachelor of Science (Natural Resource Management) University of Newcastle, completed in November, 2020

Further Education & Training

- Bush Regeneration Training
- NSW Driver's Licence: Car (Class "C").
- Chemqual (RTO 70207)
- First Aid (Provide first aid HLTAID003)

Fields of Special Competence

- Ecological field surveys, covering terrestrial and aquatic flora and fauna
- Growing proficiency at botanical surveys

Relevant Employment History

2019-present **Ecologist**

Anderson Environmental Planning, Newcastle

Currently employed by Anderson Environment & Planning to assist in the provision of consulting services to land, property, legal and government sectors. Covering ecological, project management, environmental, planning services, advices, strategy and representation.

2015-2016 **Green Army Participant**

Bush regeneration/supporting local land care groups

Supported local land care groups and reserve areas in weed removal and site restoration, including tree planting, seed collection and nursery work. Bird surveying and koala surveys were also carried out.

Relevant Ecological Experience

2018-present **Field assistance**

Participated as a volunteer in various PhD and Honours projects with the University of Newcastle and University of Technology Sydney. I have experience with small mammal trapping for squirrel gliders, nest box construction, aquatic surveys, infaunal sampling and mark recapture population surveys for *Litoria aurea* (Green and Golden Bell Frog).

2019 **Undergraduate Research Project associated with NPWS**

Undertook flora and habitat surveys for a locally threatened orchid, *Diuris praecox*, supervised volunteers, data analysis and project write up.

2019 **Volunteer Botanical Training Program**

Australian National Herbarium

Understanding of Herbarium practices, including fieldwork, use of databases, maps and GPS, botanical terminology and up to date taxonomic information, curatorial experience including identification and processing of specimens.

2018 **Stream sampling using macroinvertebrates as bioindicators**

Newcastle Council

Contracted to finish stream sampling for the community program, Waterbug Blitz, which involved water quality testing of Newcastle's urban streams.

Natalie Black
Curriculum Vitae

Natalie works with AEP in the role of Senior Environmental Manager. She has extensive knowledge in environmental management, environmental planning, and report writing and assessment. With a detail understanding of planning, catchment management, coastal management and rehabilitation. Natalie has had a successful career with both state and local government in conservation, planning and field investigation roles. Natalie has also gained extensive communication skills and project management through her previous career in lecturing. Her background and experience in the ecological and planning fields is utilised in a diverse array of application in her current role.

Qualifications

- B.Sc (Hons), University of Newcastle, 2002 Sustainable Resource Management and Marine Science.
- Master Planning, University of Technology Sydney 2007.
- Certificate IV Training and Assessment at NSW TAFE 2012.
- BAM Assessor; accreditation number: BAAS19076.

Certification

- Evidence Gathering and Legal Process (Australian Institute of Environmental Health).
- Conflict Resolution Course (LGSA).
- Report Writing Course (LGSA).
- Powerful Presentation (LGSA).
- NSW Rural Fire Services Bush Fire Assessment
- Relocation of Threatened Species (Botanical Gardens Sydney).
- Sustainable Home Assessment Reduction Revolution.
- Flora and Fauna Survey Assessments Niche Environment and Heritage.
- First Aid TAFE.

Fields of Special Competence

- Environmental Planning
- Environmental Management and rehabilitation of catchments coastal waterways. Statement of Environmental Effects (preparation and assessing).
- Fish Passage
- Marine ecosystems including; mangroves, seagrasses, algae, Fauna and habitat assessment.
- vegetation.
- Communicating with a wide range of stakeholders.
- Development Application.
- Education in both Environmental and Planning industries.
- Koala Plans of Management.
- Policy Development.

Employment History

2019 to present AEP Senior Environmental Manager

2010 to 2019

Natalie Black is the Principal Environmental Planner for Black EARTH Environmental. Working a a range of projects, Bush Fire Assessments, Landscaping, Development Applications, Statements of Environmental Effect's, Environmental Management Plans, Sustainability Assessment of both private and businesses, sustainable gardens, environmental assessments for proposed projects and environmental advice and volunteering for local Sustainable Community Group and Landcare. During this time Natalie also lectured at Hunter TAFE teaching a range of environmental units both face to face and on-line to a varying range of qualification and levels.

2003 to 2010
Natalie was the Natural Resource Manager and Development Assessment Officer at Lismore City Council working with diverse range of professions such as engineers, town planners, environmental health officer, accountants, building surveyors, arborists, councillors. During this time the main projects were grants application, restoration projects, flora and fauna assessments, environmental legal adviser, bush fire assessments, strategic work, development application assessment (ranging from sheds to Designated Developments) and council development application team for internal projects, Council's for climate change, water wise programs and others. During 2006 -2007 Natalie was the lead Environmental Officer and Development Planner for the development of Council Plans of Management (POM). The POMs were for each parcel of land owned and managed lands, by Council. The parcels of land ranged from easements, parks and recreation areas to urban bushland, each POM provided clear guidelines and procedures for all works including civil, maintence and regeneration etc.

2002 to 2003 was a step into the Policy unit within DPI where Natalie was part of the team working on the Jervis Bay Indigenous Fishing Strategy, and the closure of Port Botany. Dealing with many stakeholders and running workshops with Ministers and community. During 2003 with Natalie was the North Coast Fish Passage Officer. Managing an Environmental Trust Grant of $1 million to remove 50 structures that block fish passage within the catchments of the North Coast. This project had all 50 sites contracted by the end of the 12 months with 70% of these projects commenced. This role allowed for the development of field assessments, independent work and communication with a range of stakeholders.

2000 saw the commencement of Natalie's career with NSW Department of Primary Industries (Fisheries Unit) in the Office of Conservation in Sydney. Natalie was part of the Conservation team that reviewed integrated development applications in the Sydney Region, with a focus on the seagrasses present within the estuaries. The assessments ranged from jetties to the Lane Cove Tunnel, North West T-Way and the expansion of the M7 and fish ladders.

BSc Honours Project was research paper into the variations of *Zostera capricorni* wrack located within the Tuggerah Lakes system in comparison to Brisbane Waters and Lake Macquarie.

Simon Purcell
Curriculum Vitae

Simon works with AEP in the role of Senior Ecologist. Simon has over 7 years of professional experience managing projects in the fields of terrestrial ecology, mining and mine rehabilitation and environmental management.

Qualifications

- Bachelor of Applied Science, Major Wildlife Science, University of Queensland Gatton 2013
- Certificate III in Animal Care and Management, Companion Animal Services (2008)

Further Education & Training (select summary)

- Current NSW Class C Driver's Licence. Experienced 4WD operator.
- 2019 First AID, CPR and Remote First AID
- 2019 HLTAID001 Provide Cardiopulmonary Resuscitation
- 2019 HLTAID005 Provide First Aid in Remote Situations
- 2018 Bioacoustic Processing Workshop run by Ted Pedersen- Automated Signal Detection and Acoustic Remote Sensing
- 2017 Venomous Snake Handling
- 2015 Venomous Snake and Fauna Handling – Geckoes Wildlife

Fields of Special Competence

- Terrestrial Ecology field survey, covering terrestrial flora and fauna
- Project Management

<u>Relevant Employment History</u>

2020 (November) -present **Senior Ecologist**
Anderson Environment & Planning, Newcastle

- Currently employed by Anderson Environment & Planning to assist in the provision of consulting services to land, property, mining industry, legal and government sectors. Covering ecological, project management, environmental, planning services, advices, strategy and representation.

2018-2019 **Team Leader / Ecologist**
Ecotone Flora Fauna Consultants, Weipa, QLD

- Conducted client liaison meetings, providing ecological advice and recommendations for flora, fauna and land management, complying with Queensland state and Commonwealth environmental legislation.
- Wrote proposal and executed surveys for Prefeasibility studies and EIS on Western Cape York for multi-national mining company complying with Commonwealth environmental legislation.

- Negotiated increases to budget and survey requirements with the client in relation to ongoing changes and project requirements
- Led high level discussions with the client to provide new services.
- Developed wide scale camera monitoring program to assess presence /absence of EVNT fauna within the survey site.
- Complex logistical planning for remote work
- Co-developed and implemented new safety system within the business
- Mentored project managers through training, and leadership guidance to ensure quality and standards of business were met
- Managed human relation matters within the business
- Digitally transformed infield data collection through roll out of ArcGIS Collector, leading to the reduction in the use of paper in the field.

2014-2018 **Team Leader / Ecologist**
Ecotone Flora Fauna Consultants, Weipa, QLD

- Lead project manager (6 years) for all aspects of mine / drill preclearing environmental surveys across three different mine sites and exploratory sites, including during the construction phase of a new mine in the Weipa region.
- Project managed and participated in numerous annual EVNT projects that led to cultural and process practices changing within a multinational mining company.
- Played a critical role in maintaining client and stakeholder relationships and built stability with onsite leadership to further grow business opportunities.
- Maintained client confidentiality on sensitive and impactful projects.
- Ensured all projects complied with Queensland state and Commonwealth environmental legislation and clients Environmental Authority.
- Assisted in the development of growth and innovation projects such as cloud-based document storage solution to support multi-site users.

2013-2014 **Field Technician / Ecologist**
Ecotone Flora Fauna Consultants, Weipa, QLD

- Pre-clear flora and fauna mining and drilling programs
- Baseline fauna surveys of future mining areas
- Sensitive vegetation ground truthing
- EVNT flora and fauna surveys
- Seed Processing (storing, drying management of inventory)
- Mixing of seed in preparation for annual rehabilitation season

2010-2012 **Mine Operator and Trainer**
Rio Tinto, Weipa, QLD

- Acted as Crew Leader to manage 30 mine operators, production targets and minimising environmental impacts
- Skilled Caterpillar 992G, 993K & Komatsu WA900 Loader and 776D, 777F and 785C Caterpillar haul truck operator
- Crew Trainer/Assessor - completed five certificate IV modules to Training and Assessing.

2009 - 2010 **Parks and Garden Maintainer**
Spotless Group, Weipa, QLD

- Attained six competencies towards Certificate III Forest Growing and Management.
- Maintained local green spaces and houses.

2009-2009 **Vet Nurse**
Tableland Veterinary Service, Weipa, QLD

- Prepared surgery for surgeries including use of autoclave to sterilise implements
- Administered sedation via injections in the muscle and intravenously
- Prepared and monitored animals before, during and after surgeries
- Monitored animal and anaesthetic during surgery focussing on breath rate, colour of gum and pupil movements
- Took blood samples from veins and prepared samples of foreign bodies for analysis
- Successfully directed and carried out on-call emergency cases with vet assistance over the phone

2003 – 2009 **Manager**
The Pet Centre, Sydney, NSW

2001 – 2003 **Sales Assistant**
The Pet Centre, Sydney, NSW

- Implemented standard procedures for staff to follow
- Focussed on achieving a high level of OHS standards within the store
- Responsible for daily takings up to five thousand dollars per day
- Accountable for people management including rosters, recruitment and managing employee issues
- Responsible for management of store inventory
- Developed skills in handling a range of domestic animals
- Maintained animal's health and welfare in store and complied with state laws and regulations
- Analysed store's and customer's aquarium water quality
- Developed sound knowledge of animals including their origin, identification and general requirements

Relevant Volunteer Experience

2012 **Fauna Spotter / Field Assistant**
Humble Bee Films

- Volunteered as a fauna spotter/field assistant with Dr Brad Purcell and Humble Bee Films in a ten day research camp, during the production of the natural history documentary "Dingo".

2012 **Volunteer Ecological Field Assistant**
Rio Tinto, Weipa, QLD

- Participated in an ethno-botanical workshop with Rio Tinto Alcan Land and Rehabilitation team.
- Participated as a field technician during pre-mining survey work. The work included assessing flora and the land formations to identify buffer zones for natural drainage systems and sensitive areas in the Andoom mine site Weipa.

2012 **Fauna Technician**
Brad Purcell PhD, Greater Blue Mountains World Heritage Area

- Field technician for Brad Purcell during his doctoral research project on dingoes in the Greater Blue Mountains World Heritage Area. Developed skills in use of VHF radio tracking to retrieve collars, triangulation method to determine positioning of dingoes or deployed collars and traversing bushland.

Biodiversity Development Assessment Report: Streamlined assessment module – Small area

BAM Reference	Information	SBDAR Section	Completed
Report			
Introduction - Chapters 2 and 3	Introduction to the biodiversity assessment including: • brief description of proposed development • identification of subject land3 boundary, including: operational footprint and construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure • general description of the subject land	**1.1, 1.1.2**	✓
	Sources of information used in the assessment, including reports and spatial data	**1.1.4, 4.0**	✓
	Identification of assessment method applied (i.e. linear or site-based)	**1.2.3.1**	✓
Landscape - Section 3.1, 3.2 and Appendix E	General description of subject land topographic and hydrological setting, geology and soils	**1.2**	✓
	Percent native vegetation cover in the assessment area (as described in BAM Subsection 3.2(4.)	**1.2.2**	✓
	IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	**1.2.1**	✓
	Rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3–4.) and Appendix E)	**1.2.2**	✓
	Wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(4.))	**1.2.2**	✓
	Connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	**1.2.2**	✓
	Areas of geological significance and soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(10.)	**1.2.2**	✓
Native vegetation, TECs and vegetation integrity - Chapter 4	Patch size (in accordance with BAM Subsection 4.3.2)	**1.3.4.1**	✓
	Identification of the dominant PCT on the subject land and extent (ha) with justification of method used (existing information or plot-based survey data)	**1.3.3**	✓
	Identification of any TEC associated with the PCT (BAM Subsection 4.2.2)	**1.3.3**	✓

BAM Reference	Information	SBDAR Section	Completed
		Table 2	
	Estimate of percent cleared value of dominant PCT (BAM Subsection 4.2.1(5.)	**1.3.3** **Table 2**	✓
	Identification of any TEC on site that is not associated with the dominant PCT (Note: This TEC is required to be assessed and offset.)	**N/A**	
	Equivalence with mapping units of previous vegetation maps reviewed as part of the assessment (i.e. equivalent mapping units)	**1.3.1**	✓
	Vegetation integrity of the PCT(s) on the subject land as individual vegetation zones	**1.3.5.1, 1.3.5.2**	✓
	Justification for how this was determined (i.e. qualitatively by observing values for the condition attributes set out in Table 2 of the BAM or quantitatively by collecting field data for the condition attributes at a plot in accordance with BAM Subsection 4.3.4)	**1.3.5.1, 1.3.5.2**	✓
	Use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsections 4.3.3(5.)) Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A): • identify the PCT or vegetation class for which local benchmark data will be applied • identify published sources of local benchmark data (if benchmarks obtained from published sources) • describe methods of local benchmark data collection (if reference plots used to determine local benchmark data) • provide justification for use of local data rather than BioNet Vegetation Classification benchmark values	**1.3.5**	✓
Chapter 5 and Section 9.1	Describe the review of existing information and any field survey undertaken to assess habitat constraints and microhabitats for threatened species within the subject land	**1.3.4, 1.3.5, 1.4**	✓
	Determination of the suite of threatened species likely to occur on or use the proposed site according to Steps 1 and 2 in BAM Section 5.2 including species to be assessed for ecosystem credits and the list of species to be assessed for species credits	**1.4**	✓

BAM Reference	Information	SBDAR Section	Completed
	List of ecosystem credit species derived from the TBDC (as described in BAM Subsections 5.2.1 and 5.2.2) with justification for the exclusion of any ecosystem credit species based on habitat constraints (as described in BAM Subsection 5.2.2)	**1.4.1**	✓
	Identification of candidate species credit species that are at risk of an SAII and therefore, must be further assessed (BAM Section 9.1). Note: Candidate species credit species that are not at risk of an SAII and not incidentally recorded on the subject land do not require further assessment.	**1.4.2**	✓
	For candidate species credit species that are at risk of an SAII, a description of the species, any habitat constraints or microhabitats associated with the species on the subject land and information used to create the species polygon/s in accordance with Steps 3 to 5 of BAM Section 5.2 including: • justification for determining that a candidate species credit species at risk of an SAII is unlikely to have suitable habitat on the subject land or specific vegetation zone (based on a field assessment of the subject land and published literature or an expert report prepared in accordance with Box 3 of the BAM) • determination of the presence of remaining candidate species credit species at risk of an SAII (by assuming presence, conducting a threatened species survey or an expert report). Note: If the subject land is mapped on an important habitat map for a species, or for a component of its habitat, the subject land is considered to have suitable habitat for the species to be present. • species polygons identifying the location and area of suitable habitat for each candidate threatened species at risk of an SAII that is recorded on the subject land and is measured by area, OR • species polygons identifying the area of suitable habitat and targeted surveys identifying the count and location of individuals on the subject land for each candidate threatened flora species at risk of an SAII that is recorded on the subject land and is measured by count • species polygons for each threatened species identified on the subject land that is not at risk of an SAII (i.e. incidentally observed during site visit)	**1.4 (all)**	✓
	Determination of habitat condition within species polygon/s for each threatened species (measured by area) at risk of an SAII or incidentally observed during the site visit (Step 6 of BAM Section 5.2)	**1.3.5**	✓
	For flora species credit species at risk of an SAII or incidentally observed during site visit, provide a count, or an estimation, of the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(4.))	**N/A**	

BAM Reference	Information	SBDAR Section	Completed
Prescribed impacts Chapter 6	Any prescribed impacts from the small area proposal must be set out in the BDAR consistent with Appendix K	**2.1, 2.2**	✓
Avoid and minimise impacts – Chapter 7	Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative: • modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology • alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location • alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site	**2.1, 2.2** **Table 8**	✓
	Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Subsections 7.1.2 and 7.2.2	**2.1, 2.2** **Table 8**	✓
	Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Subsection 7.2.1(3.)	**Table 8**	✓
Assessment of Impacts - Chapter 8, Section 8.1 and 8.2	Determine the impacts on native vegetation and threatened species habitat, including: • description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Sections 8.1) • description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal (as described in BAM Subsection 8.2	**2.2** **Table 8**	✓
Mitigation and Management of Impacts - Chapter 8, Section 8.4 and 8.5	Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Subsections 8.4.1 and 8.4.2, including (as described in BAM Subsection 8.4.1(2.): • techniques, timing, frequency and responsibility • identify measures for which there is risk of failure • evaluate the risk and consequence of any residual impacts • document any adaptive management strategy proposed	**2.2** **Table 10** **Table 11**	✓
	Identification of measures for mitigating impacts related to: • displacement of resident fauna (as described in BAM Subsection 8.4.1) • indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.))	**2.2** **Table 10**	✓

BAM Reference	Information	SBDAR Section	Completed
	• mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2)		
	Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	**2.1, 2.2**	✓
Thresholds for assessing and offsetting the impacts of the proposal - Chapter 9	Information from the TBDC and/or other sources to report on the current status of threatened species, threatened populations at risk of an SAII and TEC/s for the proposal, and	**2.2.2**	✓
	Report on impacts of the proposal on TEC/s in accordance with BAM Subsection 9.2.1	**2.2**	✓
	Report on impacts of the proposal on threatened species and/or threatened populations at risk of an SAII in accordance with BAM Section 9.1	**2.2**	✓
	Identification of impacts requiring offset in accordance with BAM Section 9.2	**2.2.3**	✓
	Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	**N/A**	
	Identification of areas not requiring assessment in accordance with BAM Section 9.3	**2.2.4**	✓
Applying the no net loss standard - Chapter 10	Description of the impact on PCTs/TECs	**2.2**	✓
	Description of the impact on threatened species at risk of an SAII or incidentally observed via site visit	**2.2** **Table 16**	✓
	Number of ecosystem credits required for impacts on biodiversity values according to BAM Subsection 9	**2.2.3.1** **Table 17**	✓
	Number of species credits required for impacts on biodiversity values according to BAM Subsection 10.1.3, including any species credit species that has been incidentally observed on the subject land Note: Species credits for any species at risk of an SAII are calculated in the event that the decision-maker forms the opinion that the proposed impact is unlikely to be serious and irreversible and therefore can be offset.	**2.2.3.2** **Table 18**	✓
	Identification of credit class for ecosystem credits and species credits according to BAM Section 10.2 (this can be generated from BAM-C)	**Appendix E**	✓
Maps			
Introduction - Chapters 2 and 3	Map of the subject land boundary showing the final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure (if BDAR)	**Appendix A**	✓

BAM Reference	Information	SBDAR Section	Completed
Landscape - Section 3.1, 3.2 and Appendix E	Site Map • boundary of subject land • cadastre of subject land • landscape features identified in BAM Subsection 3.1.3 • areas of outstanding biodiversity value within the subject land	**Figure 1**	✓
	Location Map - digital aerial photography at 1:1,000 scale or finer • boundary of subject land • 1500 m buffer area *or* 500 m buffer for linear development • landscape features identified in BAM Subsection 3.1.3 • additional detail (e.g. local government area boundaries) relevant at this scale • areas of outstanding biodiversity value within the assessment area	**Figure 2**	✓
	Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or • IBRA bioregions and subregions • rivers, streams and estuaries • wetlands and important wetlands • connectivity of different areas of habitat • areas of geological significance and soil hazard features	**Figure 2**	✓
Native vegetation, TECs and vegetation integrity - Chapter 4	Map of native vegetation extent for the subject land (as described in BAM Section 3.1)	**Figure 4**	✓
	Map of PCT/vegetation zones within the subject land (as described in BAM Section 4.2(1.)	**Figure 4**	✓
	Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries	**Figure 5**	✓
	Map of TEC distribution on the subject land	**Figure 4**	✓
	Patch size of native vegetation (as described in BAM Subsection 4.3.2)	**Figure 2, Figure 4**	✓
Chapter 5 and Section 9.1	Map of species credit species records within the subject land and species polygons for flora and fauna species at risk of an SAII or incidentally observed during the site visit (as described in BAM Subsection 5.2.5(1–7.))	**Figure 6** (incidentally observed)	✓

BAM Reference	Information	SBDAR Section	Completed
Prescribed impacts Chapter 6	If relevant, maps showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, humanmade structures, etc.)	**N/A**	
Avoid and minimise impacts – Chapter 7	Map of final proposal footprint, including construction and operation	**Appendix A**	✓
	Maps demonstrating indirect impact zones where applicable	**Appendix A**	✓
Assessment of Impacts - Chapter 8, Section 8.1 and 8.2	No Maps		
Mitigation and Management of Impacts - Chapter 8, Section 8.4 and 8.5	No Maps		
Thresholds for assessing and offsetting the impacts of the proposal - Chapter 9	Map showing the extent of TECs at risk of an SAII within the subject land	**Figure 4**	✓
	Map showing the location of threatened species at risk of an SAII within the subject land	**N/A**	✓
	Map showing location of: • impacts requiring offset • impacts not requiring offset • areas not requiring assessment	**Appendix A**	✓
Applying the no net loss standard - Chapter 10	No Maps		
Tables			
Native vegetation, TECs and vegetation integrity - Chapter 4	Table of current vegetation integrity scores for vegetation zone within the site including: • composition condition score • structure condition score • function condition score	**Table 5**	✓

BAM Reference	Information	SBDAR Section	Completed
	Report from BAM-C (Small area module) including vegetation integrity scores (BAM Section 4.4)	**Appendix E**	✓
Chapter 5 and Section 9.1	Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1, and: • identifying any ecosystem credit species removed from the list of species on the basis of further assessment in accordance with BAM Subsections 5.2.2 and 5.2.3 • identifying the sensitivity to gain class of each species (BAM Section 5.4)	**Table 17**	✓
	Table detailing species credit species within the subject land at risk of an SAII (BAM Section 9.1) or incidentally observed during the site visit including any associated habitat feature/components and its abundance (flora)/extent of habitat (flora and fauna) and biodiversity risk weighting (BAM Sections 5.2–5.4)	**Table 18**	✓
Prescribed impacts Chapter 6	No tables		✓
Avoid and minimise impacts – Chapter 7	Table of measures to be implemented before, during and after construction to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	**Table 10 to 16**	✓
Assessment of Impacts - Chapter 8, Section 8.1 and 8.2	Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	**N/A**	
Mitigation and Management of Impacts - Chapter 8, Section 8.4 and 8.5	Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	**Table 10 to 16**	✓
Thresholds for assessing and offsetting the impacts of the proposal - Chapter 9	No Tables		✓
Applying the no	Table showing biodiversity risk weightings	**Table 9**	✓

BAM Reference	Information	SBDAR Section	Completed
net loss standard - Chapter 10	Table of BC Act listing status for PCTs and threatened species requiring offset	**Table 6**	✓
	Table of PCTs requiring offset and number of ecosystem credits required (Subsection 10.2.1)	**Table 17**	✓
	Table of species at risk of an SAII or incidentally observed on site assessed for species credits and the number of credits required	**Table 18**	✓
	BAM-C credit report	**Appendix E**	✓
Data			
Landscape - Section 3.1, 3.2 and Appendix E	All report maps as separate jpeg files / Individual digital shape files of: • subject land boundary • assessment area (i.e. buffer area) boundary • cadastral boundary of subject land • areas of native vegetation cover • areas of habitat connectivity	**Attached Files**	✓
Native vegetation, TECs and vegetation integrity - Chapter 4	All report maps as separate jpeg files • Plot field data (MS Excel format) • Digital shape files for all maps and spatial data • Field data sheets (if relevant) for determining vegetation integrity (BAM Subsection 4.3.4)		✓
Chapter 5 and Section 9.1	Digital shape files of species polygons • Species polygon map in jpeg format • Expert reports and any supporting data used to support conclusions of the expert report • Field data sheets (if relevant) for threatened species surveys		✓
Prescribed impacts Chapter 6	• If relevant, digital shape files of prescribed impact feature locations • Prescribed impact features map in jpeg format		✓
Avoid and minimise impacts – Chapter 7	Digital shape files of: • final proposal footprint • direct and indirect impact zones • Maps in jpeg format		✓

BAM Reference	Information	SBDAR Section	Completed
Assessment of Impacts - Chapter 8, Section 8.1 and 8.2	No data.		✓
Mitigation and Management of Impacts - Chapter 8, Section 8.4 and 8.5	No Data		✓
Thresholds for assessing and offsetting the impacts of the proposal - Chapter 9	Digital shape files of: extent of TECs at risk of an SAII within the subject land • threatened species at risk of an SAII within the subject land • boundary of impacts requiring offset • boundary of impacts not requiring offset • boundary of areas not requiring assessment Maps in jpeg format		✓
Applying the no net loss standard - Chapter 10	No Data		✓