



Kamilaroo Road, Lake Munmorah

Biodiversity Certification Assessment Report

Final

July 2026

Kamilaroo Road, Lake Munmorah

Biodiversity Certification Assessment Report

Final

Prepared by
Umwelt (Australia) Pty Limited

On behalf of
Lakeside Leisure Village and Point Palliser Unit Trust

Project Director: Kate Connolly
Project Manager: Samantha Maher
Report No.: 22152/R02
Date: July 2026



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Acknowledgement of Country

Umwelt acknowledges the Traditional Owners of Country throughout Australia and their continuing values, culture and connection to the land, waters and sky.

We pay our respects to Elders past and present.

The below image is from the artwork *Yapung Maryiyang* (Pathway Forward) by Saretta Fielding.



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Executive Summary

Umwelt has been engaged by Point Palliser Unit Trust and Lakeside Leisure Village to prepare a Biodiversity Certification Assessment Report (BCAR) to support the rezoning and biodiversity certification of land at 31 and 41 Kamilaroo Avenue Lake Munmorah. This BCAR has been prepared in accordance with the requirements of the Biodiversity Assessment Method (BAM) (NSW DPIE 2020a) and Section 6.13 of the NSW *Biodiversity Conservation Act 2016* (BC Act). This BCAR describes the biodiversity values of the Rezoning Area (Study Area) and assesses the impacts of the proposed Biodiversity Certification.

The Planning Proposal is generally in accordance with the Greater Lake Munmorah Structure Plan prepared by Central Coast Council (2022a) and will result in the rezoning of the land from an RU6 Transitional to RE2 Private Recreation zone to allow for the future residential development of the site in the form of manufactured home estates.

The proposed Study Area (rezoning area or Biodiversity Certification Assessment Area) is within the Sydney Basin IBRA and the IBRA Wyong Subregion and covers 9.4 ha, including 1.21 ha of native vegetation. The area of land proposed for biodiversity certification (the Subject Land or Land Proposed for Certification) covers 9.26 ha and includes 1.21 ha of native vegetation. For the purpose of this report the Study Area is defined as the entirety of both Lot 416 DP 75526 and Lot 417 DP 755266, 41 and 31 Kamilaroo Avenue, Lake Munmorah and the Subject Land (Land Proposed for Certification) is defined as the area of the Study Area which is subject to development (**Figure 1.1**).

The native vegetation present in the Subject Land consists of 0.45 ha of scattered paddock trees over an exotic understorey which corresponds to PCT 3583 Hunter Coast Lowland Scribbly Gum Forest and 0.76 ha of scattered paddock trees over an exotic understorey which corresponds to PCT 4020 Coastal Creekflat Layered Grass-Sedge Swamp Forest. The remaining land within the proposed Biodiversity Certification Area consists of 7.87 ha of exotic grassland, which has been assessed against PCT 3583 Hunter Coast Lowland Scribbly Gum Forest as the likely historical vegetation type present.

An assessment of the plant community types present against corresponding threatened ecological communities found that PCT 4020 Coastal Creekflat Layered Grass-Sedge Swamp Forest (Vegetation Zone 3 PCT 4020 Scattered Paddock Trees over Exotic Understorey) forms a highly disturbed relict example of the BC Act listed Swamp Sclerophyll Forest in the New South Wales North Coast, Sydney Basin and South-east Corner Bioregions (endangered). The extent of this TEC in the rezoning and Subject Land is 0.76 ha.

The threatened species, white-bellied sea-eagle, eastern osprey and grey-headed flying-fox were observed flying over the Study Area during surveys, however, these species were not observed nesting on site and no other threatened species were observed within the Study Area. Grey-headed flying-foxes have the potential to use the site as a seasonal foraging resource.

The Study Area includes 0.09 ha mapped as important habitat for the swift parrot and these areas have been identified as Retained/Avoided Lands and will not be impacted. Mapped important habitat for the swift parrot is NSW Government mapping product and is a potential serious and irreversible impact entity.

The Proponent has, where practicable, modified the Project to avoid and minimise direct and indirect ecological impacts and a range of impact mitigation strategies have been included to mitigate the impact on ecological values prior to the consideration of offsetting requirements.

In addition to the retention of the mapped swift parrot important habitats and identification of a tree protection zone, the Masterplan for the future development of the site identifies that a corridor will be replanted with native vegetation along the northern site boundary. The corridor will link intact offsite areas of native vegetation to the tree protection zone as identified in the arborist impact assessment (**Appendix J**). The corridor will link the existing intact offsite areas of native vegetation to the west and east of the Subject Land. An arborist assessment of the native trees along the north west and eastern boundaries of the Subject Land was conducted by a qualified arborist. Majority of these areas were considered to have moderate tree retention value while trees along the north eastern boundary were assessed as high to moderate retention value. These trees will be retained, and indirect impacts minimised through provision of the tree protection zones. The corridor will provide an opportunity for compensatory plantings of trees removed as part of the future development of the site and has generated a requirement for an additional bushfire asset protection zone. The areas immediately surrounding and within the proposed stormwater detention basins will also provide an opportunity for native vegetation plantings.

The Proponent has also engaged AEP to develop a biodiversity management plan (BMP) (**Appendix O**) for the Study Area. The BMP details three management zones, the northern boundary area, the eastern boundary area and a section along the southern boundary. Each management zone has varying management approaches, including but not limited to monitoring, maintenance and planting. All native vegetation plantings will be documented with the BMP prepared for the site.

The residual impact of the Project requires offsetting with a total of 15 ecosystem credits for the loss of 0.76 ha of PCT 4020 Coastal Creekflat Layered Grass-Sedge Swamp Forest (associated with the BC Act listed TEC, Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions), however no credits are required for impacts to PCT 3583 Hunter Coast Lowland Scribbly Gum Forest due to the highly degraded nature of these areas which fall below the biodiversity offset threshold. Species credits have also not been generated as no species credit entities were observed during surveys.

The Proponent is committed to delivering a biodiversity offset strategy that appropriately compensates for the unavoidable loss of ecological values as a result of the Project, with a focus on offsetting impacts through purchase of credits from the market or payment to the Biodiversity Conservation Fund.

Abbreviations

Abbreviation	Definition
AHD	Australian Height Datum
ASL	Above Sea Level
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	<i>Biodiversity Conservation Act 2016</i> (NSW)
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BCAR	Biodiversity Certification Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offsets Scheme
CEEC	critically endangered ecological community
Development Footprint	The area of land proposed to be directly impacted by a proposed development, the disturbance footprint.
DBH	diameter at breast height over bark
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
EEC	endangered ecological community
HTW	high threat weed
IBRA	Interim Biogeographic Regionalisation for Australia
LLS Act	<i>Local Land Services Act 2013</i> (NSW)
MNES	matters of national environmental significance
NSW	New South Wales
PCT	plant community type
Proposal	biodiversity certification of land and related development in the case of an application for biodiversity certification under the BC Act
Retained/Avoided land	Land within a biodiversity certification assessment area that is neither biodiversity certified nor subject to an approved conservation measure. Existing development assessment and approval arrangements under the <i>Environmental Planning and Assessment Act 1979</i> (NSW) will continue to apply to this land.
SAII	serious and irreversible impact
Study Area	The subject allotments including biodiversity certification areas and retained lands
Subject Land	The land subject to the proposed biodiversity certification.
TBDC	Threatened Biodiversity Data Collection
TEC	threatened ecological community
VEC	vulnerable ecological community

Declarations

Certification under clause 6.15 Biodiversity Conservation Act 2016

I certify that this report has been prepared by Umwelt and to the best of my knowledge is based on the requirements of, and information given under, the Biodiversity Assessment Method (BAM) (2020) and clause 6.13 of the *Biodiversity Conservation Act 2016* (BC Act).

Name: Samantha Maher

Signature:

A handwritten signature in black ink that reads 'S. Maher' in a cursive script.

Certification Date: 20 July 2026

BAM Assessor Accreditation no: BAAS24034

Appendix A provides an assessment of compliance with the minimum information requirements outlined in BAM Appendix K.

Conflict of Interest Declaration

I declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest. This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client.

Name: Samantha Maher

Signature:

A handwritten signature in black ink that reads 'S. Maher' in a cursive script.

Date: 20 July 2026

BAM Assessor Accreditation no: BAAS24034

Project Team

Name	BAM Assessor Accreditation no.	Position/ Role	Tasks Performed	Relevant Qualifications	Years of Industry Experience
Samantha Maher	BAAS24034	Senior Ecologist/ Project Manager	Report preparation	BEnvScMgt	6
Kate Connolly	BAAS17005	Project Director	Report review	BEnvScMgt	>16
Jacob Manners	BAAS17099	Project Director	Project management, field surveys, BAM plots, report preparation, document review	GCert ArbCult, BSc, MWldMgt	>17
Bill Wallach	BAAS17068	Principal Ecologist	Report review	BSc	>15
Naomi Buchhorn	-	Principal Ecologist	Report review	BSc	>30
Alaina Casey	BAAS18115	Principal Ecologist	Field surveys, BAM plots, targeted threatened flora/ fauna surveys	BEnvScMgt	>20
James Garnham	BAAS18115	Principal Ecologist	Field surveys, targeted threatened flora/ fauna surveys	PhD, BEnvScMgt	>14
Cassidy Le Busque	-	Ecologist	Report preparation	BSc	3
Alexandra Cottle	BAAS25020	Ecologist	Field surveys, targeted threatened flora/ fauna surveys	BEnvScMgt	5
Jessica Foreman	-	Ecologist	Field surveys, targeted threatened flora/ fauna surveys	BZool	2
Tim Cusack	-	Ecologist	Field surveys, targeted threatened flora/ fauna surveys	BEnvSC, BZool	2
Georgia Perkins	-	Ecologist	Field surveys, targeted threatened flora/ fauna surveys	BEnvScMgt	1
Elroy Bremond	-	Ecologist	Field surveys	BEnvScMgt	1
Logan Shea	BAAS25015	Ecologist	Field surveys, targeted threatened flora/ fauna surveys	BEnvScMgt	5
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Nichole Kelleway		GIS Analyst	GIS mapping	BSc	>16

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1.0 Introduction

Umwelt has been commissioned by Point Palliser Unit Trust and Lakeside Leisure Village to prepare a Biodiversity Certification Assessment Report (BCAR) for a planning proposal at 31 and 41 Kamilaroo Avenue, Lake Munmorah NSW.

This BCAR has been prepared for the rezoning and biodiversity certification of the Subject Land (Land Proposed for Certification) via an amendment to the Central Coast Local Environmental Plan 2022. The Planning Proposal is generally in accordance with the Greater Lake Munmorah Structure Plan prepared by Central Coast Council (2022a) and will result in the rezoning of the land from an RU6 Transitional to RE2 Private Recreation zone to allow for the future residential development of the site.

A 20 m wide corridor along the northern boundary of both Lot 416 & 417 (DP 755266), running parallel to the boundary line from the northwest corner to the northeast corner (**Figure 12.1**) is also proposed to be zoned as C2 – Environmental Conservation.

This BCAR has been prepared in accordance with the Biodiversity Assessment Method (BAM) (NSW DPIE 2020a) and forms part of the documentation to support the application for biodiversity certification under the *Biodiversity Conservation Act 2016* (NSW) (BC Act).

1.1 Proposed Development

1.1.1 Biodiversity Certification and Rezoning Overview

The proposed rezoning area (Study Area or Biodiversity Certification Assessment Area) is part of Precinct 6 of the Greater Lake Munmorah Structure Plan area (Central Coast Council 2022a). The precinct includes areas identified for low density residential land, passive recreation land and a biodiversity corridor. The Proposal involves the rezoning of the Study Area from an RU 6 Transitional Zone to RE2 Private Recreation. A 20 m wide corridor along the northern boundary of both Lot 416 & 417 (DP 755266), running parallel to the boundary line from the northwest corner to the northeast corner (**Figure 12.1**) is also proposed to be zoned as C2 – Environmental Conservation.

1.1.2 Location Description

The land to be rezoned includes Lot 416 DP 75526 and Lot 417 DP 755266, 41 and 31 Kamilaroo Avenue, Lake Munmorah. The boundary of the rezoning area and Land Proposed for Certification (Subject Land) is shown on the Site Map provided as **Figure 1.1** and the Location Map, provided as **Figure 1.2**.

The land currently contains one dwelling with several sheds and areas of heavily pasture improved paddocks which have a long history of use for cattle and horse grazing. The rezoning area is approximately 16 km north-east of Wyong, with surrounding land uses including a Woolworths Shopping Centre and service station to the north, an existing low density residential area to the east, Lake Munmorah to the south and the Lakeside Leisure Village to the west.

FIGURE 1.1
Site Map



- Legend**
- Study Area (Rezoning Area)
 - Subject Land (Biodiversity Certification Assessment Area)
 - Conservation Land
 - Avoidance Area
 - Certified Land
 - Tree Protection Zone
 - Asset Protection Zone
 - Riparian Buffers
 - Pacific Highway
 - Road
- Strahler Stream Order**
- 1
- Legend (Inset Only)**
- IBRA Subregions
- Mitchell Landscapes**
- Estuary/Water Added
 - Gosford - Coorabong Coastal Slopes
 - Sydney - Newcastle Barriers and Beaches
 - Sydney - Newcastle Coastal Alluvial Plains



0 25 50 75
Metres

Scale 1:2,500 at A4
GDA2020 MGA Zone 56



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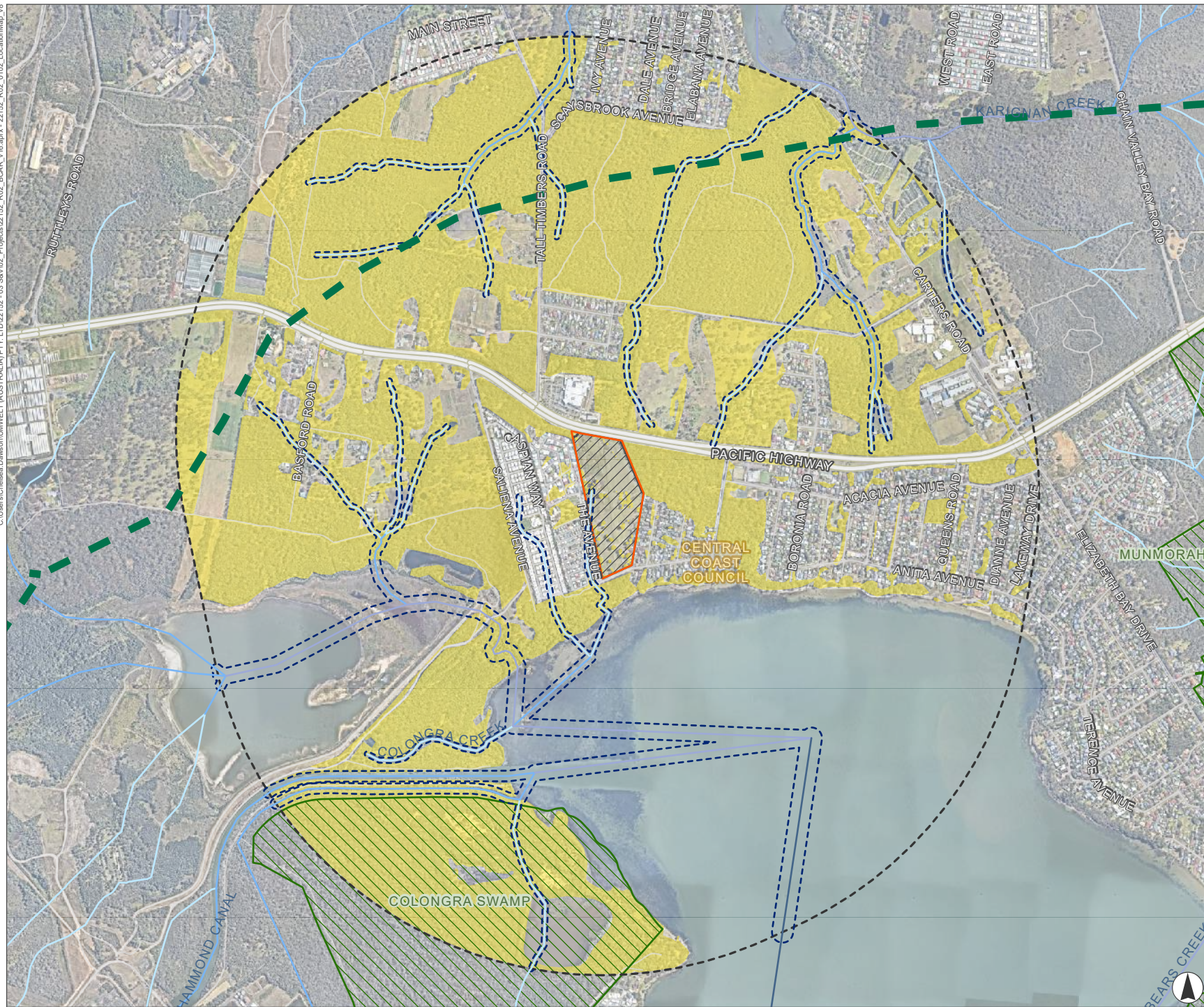


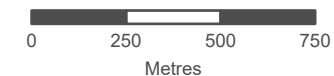
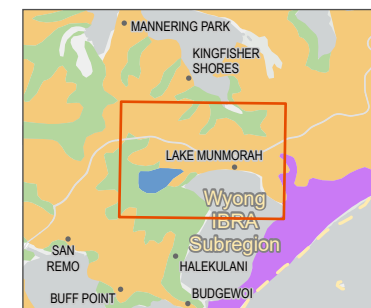
FIGURE 1.2
Location Map

Legend

- Study Area (Rezoning Area)
 - Subject Land (Biodiversity Certification Assessment Area)
 - National Parks (NPWS Estate)
 - Assessment Area
 - Riparian Buffers
 - Native Vegetation Extent
 - Biodiversity Corridors
 - Pacific Highway
 - Road
- Strahler Stream Order
- 1
 - 2
 - 3
 - 4

Legend (Inset Only)

- IBRA Subregions
- Mitchell Landscapes
 - Estuary/Water Added
 - Gosford - Cooranbong Coastal Slopes
 - Sydney - Newcastle Barriers and Beaches
 - Sydney - Newcastle Coastal Alluvial Plains



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1.1.3 Biodiversity Certification and Rezoning Area Details

The Study Area (rezoning area) is located between the Pacific Highway and Lake Munmorah within the Kamilaroo Avenue – Precinct 6 part of the Greater Lake Munmorah Structure Plan (Central Coast Council 2022a) area.

Totals for the Study Area (rezoning area), the Subject Land (Land Proposed for Certification) and the Retained/Avoided Land areas are provided in **Table 1.1**.

Table 1.1 Rezoning and Biodiversity Certification Areas

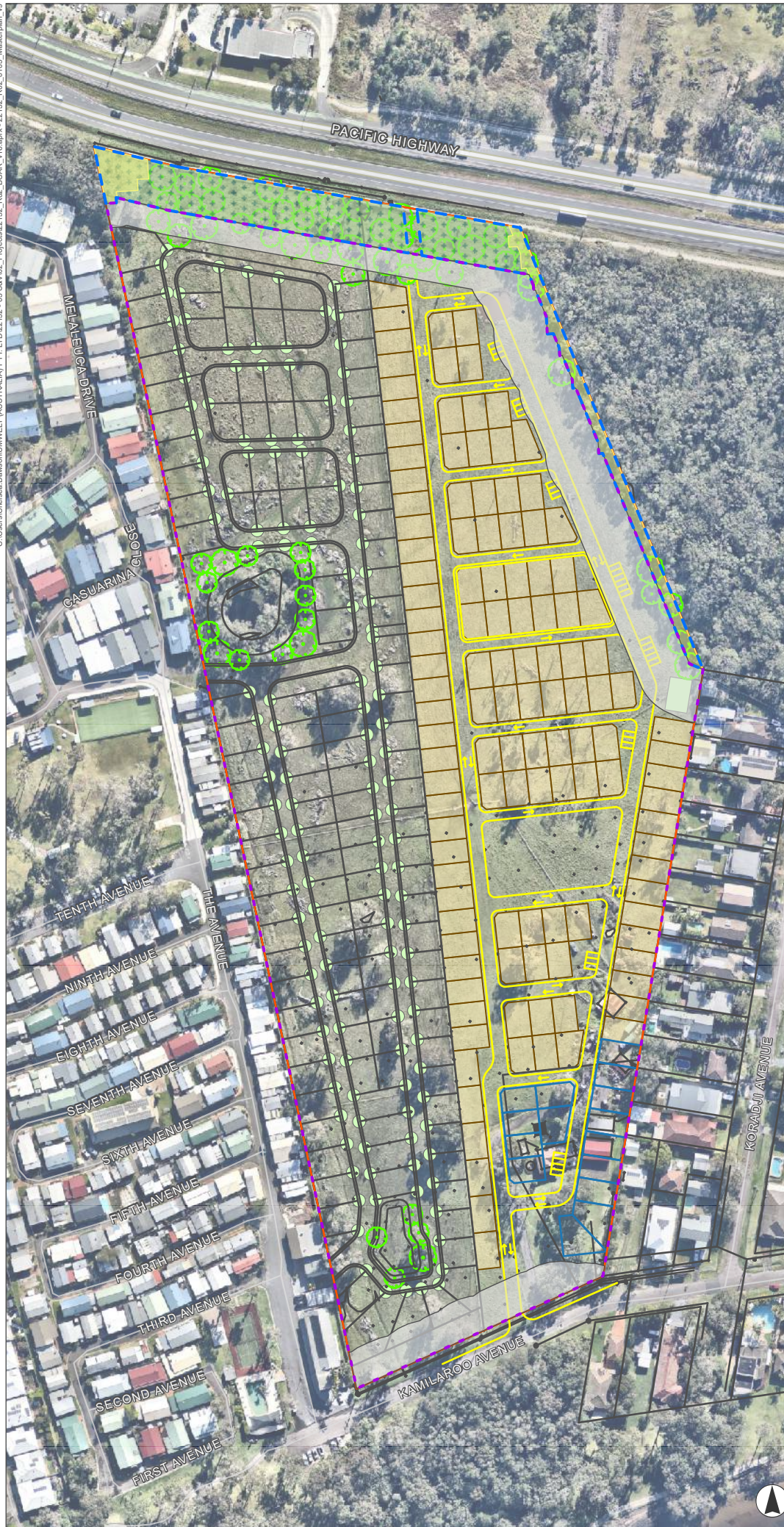
Land Use	Area (ha)	Native Vegetation Extent (Ha)	% Of Biodiversity Certification Assessment Area that is Native Vegetation
Rezoning Area (Study Area)	9.4	1.23*	13.09
Land Proposed for Certification (Subject Land)	9.26	1.21*	12.96
Retained/Avoided Land (land within the study area that is avoided for biodiversity reasons)	0.13	0.02*	-

* Excludes areas of exotic dominated grassland.

1.1.4 Masterplan Footprint

The Masterplan for the future development of the site is shown in **Figure 1.3**. A vegetated corridor, managed by a Biodiversity Management Plan (**Appendix O**), will be replanted along the northern boundary of the site and areas mapped as swift parrot important habitat will be retained. The corridor will also include an access corridor which will double as both emergency egress and a pedestrian path. The access corridor will be 6 m wide and not require any clearing.

FIGURE 1.3
Future Development
Masterplan



Legend

- Study Area (Rezoning Area)
- Avoidance Area
- Certified Land
- Asset Protection Zone
- Tree Protection Zone
- Conservation Land
- Pacific Highway
- Road

Masterplan

- Lot Boundary
- Road
- Tree
- Lot Boundary - Stage 2
- Lot Boundary - Stage 1
- Active Recreation

0 25 50 75
Metres

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1.1.5 Other Documentation

Other information sources relied upon are referenced in the text and are listed in the Reference Section of this BCAR.

1.2 Excluded Impacts/Category 1 Land

Clause 6.8(3) of the BC Act specifies that the Biodiversity Assessment Method (BAM) is to exclude the assessment of the impacts of any clearing of native vegetation and loss of habitat on Category 1 – Exempt land (as defined in Part 5A of the *Local Land Services Act 2013* (LLS Act)), other than prescribed impacts (as defined in clause 6.1 of the Biodiversity Conservation Regulation 2017 (BC Regulation)).

Minor areas of the site are currently mapped as Category 1 Exempt land under the Draft Native Vegetation Regulatory map. These areas do not appear to align with any clear patterns of clearing or historical disturbance and have not been relied upon for the purposes of this assessment.

1.3 Biodiversity Values Map

A copy of the Biodiversity Values Map for the Study Area is provided in **Figure 1.4**.

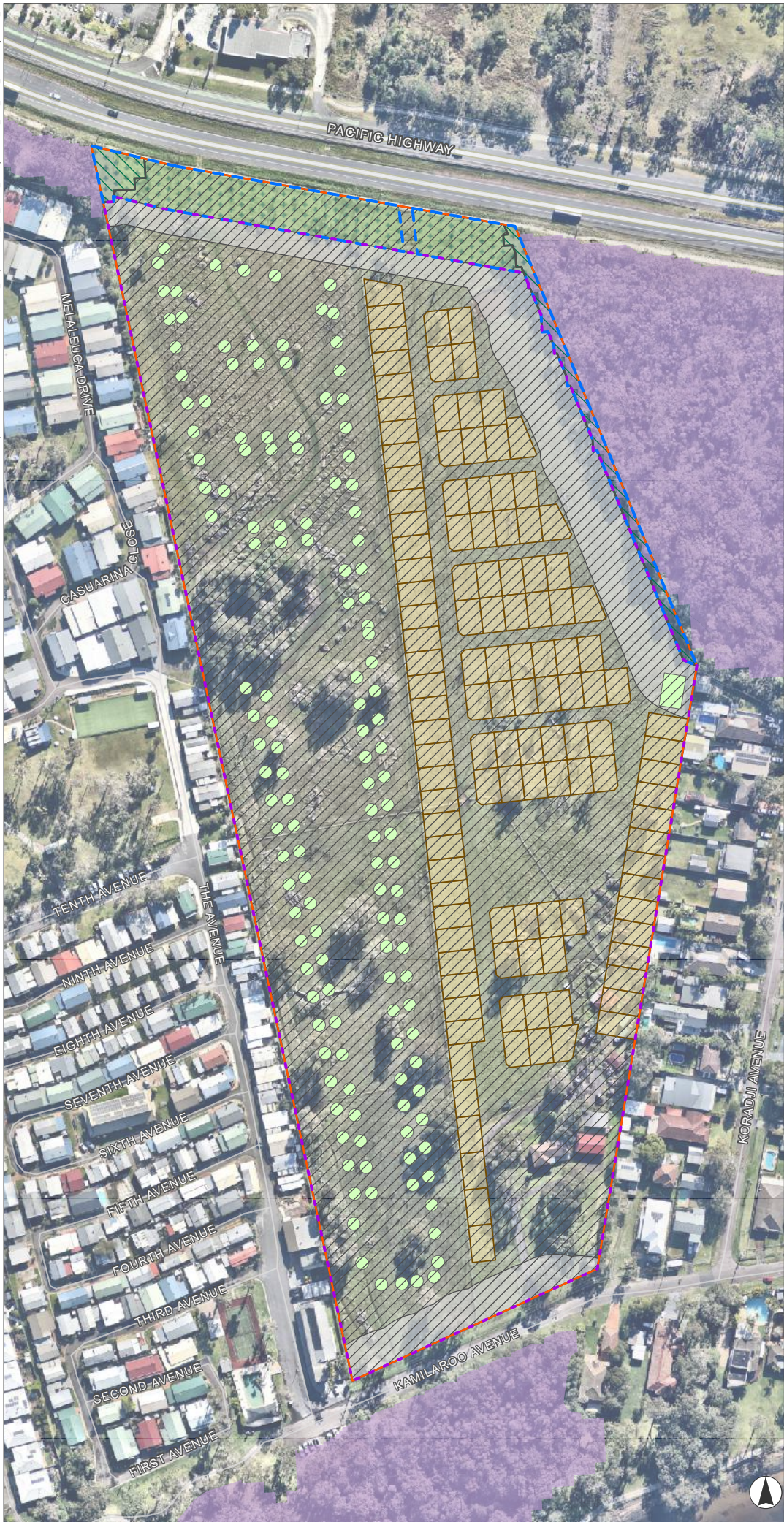
1.4 Matters of National Environmental Significance

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is Australia's main environmental legislation which regulates activities that may significantly impact on Matters of National Environmental Significance (MNES), including:

- world heritage areas
- national heritage places
- wetlands of international importance (listed under the Ramsar Convention)
- listed threatened species and ecological communities
- listed migratory species (protected under international agreements)
- Commonwealth marine areas and the Great Barrier Reef Marine Park
- nuclear actions (including uranium mines)
- water resources (in relation to coal seam gas development and large coal mining development).

The EPBC Act provides for a self-referral process for actions with significant impacts. Impacts to nationally listed threatened species and ecological communities predicted to occur under the BAM (NSW DPIE 2020a) are documented as part of this Report. One MNES entity, the nationally listed threatened fauna species, grey-headed flying-fox (*Pteropus poliocephalus*) was observed foraging within the site during surveys, preliminary consideration of the EPBC Act significant impact guidelines indicates that impacts to this species are not likely to be significant. It is recommended that future formal consideration of the requirement for a referral should be undertaken at the development application stage.

FIGURE 1.4
Biodiversity Values Map



- Legend**
- Study Area (Rezoning Area)
 - Subject Land (Biodiversity Certification Assessment Area)
 - Tree Protection Zone
 - Avoidance Area
 - Certified Land
 - Conservation Land
 - Biodiversity Values
 - Lot Boundary - Stage 1
 - Active Recreation
 - Asset Protection Zone
 - Road
 - Pacific Highway

0 25 50 75
Metres

Scale 1:2,500 at A4
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1.5 Information Sources

The following guidance documents and resources relevant to the preparation of this BCAR were reviewed:

- Biodiversity Assessment Method (NSW DPIE 2020a).
- Biodiversity Assessment Method Operational Manual – Stage 1 (NSW DPE 2022a).
- Biodiversity Assessment Method Operational Manual – Stage 2 (NSW DPE 2023a).
- Biodiversity Assessment Method (BAM) Calculator User Guide (NSW DCCEEW 2024a).
- NSW BioNet including the BioNet Atlas, BioNet Vegetation Database and Threatened Species Data Collection (NSW DCCEEW 2025a).
- Guidance for the Biodiversity Certification Assessment Report Template (including the template) (NSW DPE 2023b).
- Biodiversity Values Map and Threshold Tool (NSW DCCEEW 2025b).

Other information sources relied upon are referenced in the text and are listed in the References Section of this Report.

1.6 Consultation

Consultation has been undertaken with Central Coast Council in relation to the preparation of biodiversity assessments for the planning proposal.

Umwelt (2022) initially prepared a Biodiversity Constraints and Opportunities Report, which was reviewed by Central Coast Council who further requested a Biodiversity Development Assessment Report or a Biodiversity Certification Assessment Report.

This Biodiversity Certification Assessment Report has been prepared to satisfy Central Coast Council's request for detailed assessment of impacts to biodiversity values under the BC Act as part of the rezoning process. Central Coast Council were also consulted throughout the survey program completed for this report to confirm the flowering and survey periods for locally occurring threatened orchid species. A Draft version of this Report was submitted to Central Coast Council for review and comments were received in relation to watercourse setbacks and additional fauna survey requirements. These matters have now been addressed, as documented in Umwelt's response to Central Coast Council's comments provided in **Appendix B**.

A Drainage Line Assessment has been presented to NSW DCCEEW – Water (Licencing and Approvals) (**Appendix H**). The response from NSW DCCEEW – Water (Licencing and Approvals) (**Appendix I**), agreed with the findings in the Drainage Line Assessment Report and determined the first order watercourse mapped on site does not meet the definition of a 'river'. Therefore, the mapped first order water course running along the western site boundary does not need to be assessed under the *Water Management Act, 2000* and no management that may typically relate to riparian zones need to be applied.

Central Coast Council (CCC) have requested an independent review of the draft Biodiversity Certification Assessment Report (BCAR) (Umwelt, 2025) to support rezoning and biodiversity certification of land at 31 and 41 Kamilaroo Road, Lake Munmorah (the Study Area). The independent review was undertaken by Evelyn Cragie and Garon Staines (Future Ecology) on behalf of Matthew Hingee (Central Coast Council) (dated 16 May 2025) (**Appendix L**). The independent review requested an Arborist Impact Assessment to ensure the avoidance of any indirect impacts to mapped swift parrot important habitat (**Appendix J**). An Arborist Impact Assessment has been prepared by a qualified arborist for trees in the north west corner and along the eastern property boundary (refer to **Appendix J**). The Arborist Impact Assessment recommended the implementation of a 5 m tree protection zone which has since been implemented in the Project Layout. All other responses have been outlined in (**Appendix M**).

CCC also sought advice from Conservation Programs, Heritage and Regulation Group (CPHR) of the NSW DCCEE on the draft BCAR in April 2025. CPHR's advice to Council (dated 29 May 2025) is provided in **Appendix K**. CPHR identified four key assessment issues that have been considered (refer to **Appendix K**) in the finalisation of the BCAR. Further comments from CCC and CPHR (dated 13 August 2025) is provided in **Appendix N**. The key issues have been considered in the finalisation of the BCAR.

2.0 Methods

2.1 Site Context Methods

2.1.1 Landscape Features

As detailed in Section 3 of the BAM (NSW DPIE 2020a), a landscape assessment for the biodiversity certification area is required, which was initially conducted as a desktop assessment and confirmed during the field surveys (where practicable). The following landscape and site context features in **Table 2.1** were identified for the Assessment Area (1,500 m buffer) in accordance with Section 3 of the BAM (DPE, 2020e) from analysis and reference to available spatial information:

Table 2.1 Landscape Features Assessed and Data Sources

Landscape and Site Context Features	Data Source
IBRA Bioregions	NSW Interim Biogeographic Regions of Australia Version 7 (Australian Government DEE 2018)
IBRA Subregions	NSW Interim Biogeographic Regions of Australia Version 7 (Australian Government DEE 2018)
NSW Mitchell Landscapes	NSW (Mitchell) Landscapes Version 3.1 (NSW OEH 2017)
Native Vegetation extent within designated assessment buffer area (1,500 m)	Aerial Imagery
Patch Size	Aerial Imagery
Cleared Areas	Aerial Imagery
Rivers and Streams (classified according to stream order)	NSW Hydrography (DCS 2024)
Estuaries and wetlands	Directory of important wetlands in Australia
Connectivity Features	Aerial imagery
Karst, caves, cliffs, rocks and other geological features of significance	Aerial imagery, topographic maps and onsite inspections
Areas of outstanding biodiversity value	Areas of Outstanding Biodiversity Value Register

2.2 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity Methods

2.2.1 Existing Information

The following existing information was reviewed to inform the identification of Plant Community Types (PCTs) (**Section 4.2**) and TECs (**Section 4.3**):

- NSW BioNet including the BioNet Atlas, BioNet Vegetation Database and Threatened Species Data Collection (NSW DCCEEW 2025a).
- EPBC Act Protected Matters Search Tool (DCCEEW 2025).

- NSW State Vegetation Type Map Version C2.0M2.1 (NSW DCCEEW 2024b).
- The NSW Scientific Committee Final Determinations made for various TECs under the BC Act.
- Approved Conservation Advice published for various TECs under the EPBC Act.
- New South Wales Seamless Geology dataset (Single Layer), version 2.1 (Colquhoun *et al.* 2021).

2.2.2 Mapping Native Vegetation Extent

The native vegetation extent (**Section 4.1**) within the Subject Land was determined during site surveys, through GIS Mapping and aerial photograph interpretation using recent aerial imagery. Native vegetation and plant community type mapping was undertaken using best-practice techniques to delineate vegetation communities across the Subject Land. Vegetation mapping involved the following key steps:

- Review of aerial imagery to assess vegetation distribution patterns as dictated by change in canopy texture, tone, and colour, as well as topography.
- Review of the modelled distribution of vegetation communities within broader scale regional based vegetation mapping.
- Preparation of a draft plant community type map based on interpretation of digital aerial imagery.
- Field-based ground-truthing of the draft plant community type mapping.
- Confirmation of vegetation community floristic delineations based on plot data.

Vegetation communities were delineated through the identification of repeating patterns of plant species assemblages in each of the identified strata. Slight variations in species composition are typical across the extent of a community and are often associated with microhabitats or ecotones with other communities.

The extent of native ground-cover vegetation within offsite areas where a canopy of native species is absent has mostly been estimated based on the visual interpretation of aerial imagery, considering areas of cultivation and fenced boundaries. The offsite mapping of native vegetation extent is broad-scale and was prepared specifically for the estimation of native vegetation cover under the BAM (DPIE, 2020a).

2.2.3 Plot-based Vegetation Survey

A stratified plot-based floristic vegetation survey of the development footprint was undertaken in accordance with Table 3 and Section 4.2.1 of the BAM.

Plot-based vegetation surveys were completed to assess vegetation composition, structure, function, enable calculation of the vegetation integrity scores for Vegetation Condition Zones, sample areas of expected environmental variation and verify the results of previous mapping and available site information. Each plot survey consisted of a 20 m x 20 m plot nested within a larger 20 m x 50 m plot. The plot data was collected in accordance with Sections 4.2.1 and Section 4.3.4 of the BAM.

The following was recorded for each plot:

- Unique plot reference.
- Plot GPS coordinates (easting and northing).

- Date of the survey.
- Name of field surveyors.
- Bearing along a 50 m transect through the plot.
- Physiographic features that may assist in PCT identification such as slope, aspect and soil characteristics.
- Signs of disturbance.
- Photographs of the vegetation.
- For the nested 20 m x 20 m/400 m² floristic plot all required vegetation composition and structure variables were recorded including:
- Full species name for all native and exotic flora species (where sufficient diagnostic material was present).
- Foliage cover recorded as a percentage for all alive and dead flora species rooted within and overhanging the boundaries of the plot.
- Abundance rating for all flora species rooted within the plot.
- All vascular plants recorded within floristic plots were identified using keys and nomenclature in PlantNet NSW Flora Online Identification Keys (The Royal Botanic Gardens and Domain Trust 2025).

For the 20 m x 50 m plot all required vegetation function values were recorded including:

- Tree stem size class (presence/absence or estimated abundance).
- Tree regeneration (presence/absence).
- Combined length of all individual fallen logs ≥ 10 cm diameter and ≥ 50 cm in length.
- Hollow-bearing trees (number of trees rooted in the plot with hollows ≥ 5 cm wide).
- Litter cover (all plant material that had detached from a plant and located on the ground surface) assessed as the average percentage cover of five 1 m² sub-plots spaced at 10 m intervals alternating either side of the plot midline.
- Number of large trees with a DBH $\geq$ the large tree benchmark for the PCT.

Plot locations were selected to ensure that they captured attributes relevant to each vegetation condition zone, to provide a representative assessment of the vegetation integrity of the vegetation condition zone, accounting for the level of variation in the broad condition state of the vegetation condition zone.

At each plot, approximately 45 to 60 minutes was spent searching and recording all vascular flora species present within each strata of the 20 m x 20 m floristic plot. Searches were generally undertaken through parallel transects from one side of the plot to another. An effort was made to search the tree canopy and tree trunks for mistletoes, vines, and epiphytes where present.

A total of five (5) BAM Plots were surveyed within the rezoning area by Umwelt on 19 July 2022. Plot survey locations are shown in **Figure 2.1** and plot survey stratification details for each plant community type and vegetation condition zone is listed in **Table 2.2**.

Table 2.2 Plant Community Type Survey Plot Stratification Details

PCT ID	PCT Name	Vegetation Condition Zone	Extent in Rezoning Area (ha)	Extent in Biodiversity Certification Area (ha)	Quantity of Plots Required	Quantity of Plots Completed by Umwelt
3583	Hunter Coast Lowland Scribbly Gum Forest	1 - Paddock trees with exotic understorey	0.47	0.45	1	1
3583	Hunter Coast Lowland Scribbly Gum Forest	2 - Exotic Grassland	7.98	7.87	3	3
4020	Coastal Creekflat Layered Grass-Sedge Swamp Forest	3 - Paddock trees with exotic understorey	0.76	0.76	1	1

FIGURE 2.1
Field Survey Locations -
BAM Plot Locations



Legend

- Study Area (Rezoning Area)
- Subject Land (Biodiversity Certification Assessment Area)
- Tree Protection Zone
- Avoidance Area
- Certified Land
- BAM Plots
- Conservation Land
- Pacific Highway
- Road

Plant Community Types and Vegetation Zones

- Vegetation Zone 1 - PCT 3583 Paddock Trees with Exotic Understory
- Vegetation Zone 2 - Exotic Grassland (Assessed against benchmarks for PCT 3583)
- Vegetation Zone 3 - PCT 4020 Paddock Trees with Exotic Understory
- Non PCT - Cleared Land
- Non PCT - Water
- Non PCT - Built Structures



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2.3 Threatened Flora Survey Methods & Database Review

2.3.1 Review of Existing Information & Survey Guidelines

The following existing information was reviewed to inform preliminary threatened flora species surveys and assessments of habitat constraints and microhabitats:

- NSW Government Biodiversity Assessment Method Calculator (BAMC) (BAM Data Update Version 80/Last updated 28/10/2024) (NSW DCCEEW 2025c).
- NSW Bionet (NSW DCCEEW 2025a) including threatened flora records held on the NSW BioNet Atlas of NSW Wildlife within the Assessment Area and habitat constraints listed in the Threatened Biodiversity Data Collection.
- Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment method (NSW DPIE 2020b).
- BAM Flora species with specific survey requirements spreadsheet (NSW DPE 2023a).

2.3.2 BioNet Atlas Threatened Flora Records

A search of the BioNet Atlas of NSW Wildlife was undertaken to determine the presence of any threatened flora species previously recorded within the development footprint or the Assessment Area (NSW DCCEEW 2025a), and to inform this amended BDAR. Details of the threatened flora species recorded on the BioNet Atlas (NSW DCCEEW 2025a) within a circular 5 km buffer of the Project Area are summarised in **Table 2.3**, including the number of records and date of records within the search area. An assessment of likelihood of occurrence is also provided using the following criteria:

- High/Known – Suitable habitats which are known to support this species are present and the species is known or expected to occur within the Project Area based on observation or historical records.
- Moderate – Suitable habitats which are known to support this species are present within the development footprint and the species may occur (further surveys required).
- Low – Suitable habitats or microhabitats for this species are not present within the development footprint, or the development footprint is too disturbed to support this species, and the species is not known or likely to occur.

Species known to occur or with a moderate or high likelihood of occurrence have been included for further assessment within this Report.

Table 2.3 BioNet Atlas Threatened Flora Records within 5 km

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Date Last Recorded within 5 km	Number of Recorded Locations within 5 km	Likelihood of Occurrence
<i>Acacia bynoeana</i>	Bynoe's wattle	E	V	8/12/2002	3	Low
<i>Angophora inopina</i>	Charmhaven apple	V	V	1/02/2024	136	Moderate
<i>Callistemon linearifolius</i>	Netted bottle brush	V	-	25/09/2023	7	Low
<i>Chamaesyce psammogeton</i>	Sand spurge	E	-	31/12/1987	1	Low
<i>Corunastylis</i> sp. <i>Charmhaven</i> (Syn. <i>Genoplesium branwhiteorum</i>)	-	CE	CE	19/03/2025	48	Low
<i>Cryptostylis hunteriana</i>	Leafless tongue orchid	V	V	19/11/2023	22	Low
<i>Diuris praecox</i>	Rough doubletail	V	V	5/08/2023	214	Low
<i>Eucalyptus camfieldii</i>	Camfield's stringybark	V	V	13/05/2021	3	Low
<i>Eucalyptus parramattensis</i> subsp. <i>parramattensis</i>	<i>Eucalyptus parramattensis</i> C. Hall. subsp. <i>parramattensis</i> in Wyong and Lake Macquarie local government areas	E pop	-	8/07/2007	2	Low
<i>Genoplesium insigne</i>	Variable midge orchid	CE	CE	23/08/2023	67	Low
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	Small-flower Grevillea	V	V	9/02/2018	1	Low
<i>Macadamia integrifolia</i>	Macadamia nut	-	V	21/10/2021	4	Low
<i>Rhodamnia rubescens</i>	Scrub turpentine	E pop	CE	25/01/2021	1	Low
<i>Rhodomyrtus psidioides</i>	Native guava	E pop	CE	12/08/2021	3	Low
<i>Rutidosia heterogama</i>	Heath wrinklewort	V	V	27/08/2009	118	Low
<i>Syzygium paniculatum</i>	Magenta lilly pilly	E	V	6/02/2015	11	Low
<i>Tetradlea juncea</i>	Black-eyed Susan	V	V	13/09/2023	390	Low

2.3.3 Habitat Constraints Assessment

The following field-based surveys were undertaken to assess habitat constraints for candidate threatened flora species:

- field searches for habitat constraints identified from the desktop review of the Threatened Biodiversity Data Collection (TBDC) (NSW DCCEEW 2025a)
- direct observation of the quality and suitability of micro-habitats present
- collection of site photographs to assess the condition of habitats present.

The results of the site-based habitat constraints assessment were utilised to inform the assessment of the confirmed candidate threatened species for assessment.

2.3.4 Field Surveys

Targeted searches for threatened flora species were completed using the parallel traverse method in accordance with the NSW Survey Guide, '*Surveying threatened plants and their habitats*' (NSW DPIE 2020b) throughout several site visits from 19 July 2022–22 January 2024. Details of the field survey methods used, and species targeted are listed in **Table 2.4** and the locations of the surveys are mapped in **Figure 2.2A** to **Figure 2.2E**.

It is noted that the Subject Land is characterised by the presence of paddock areas which consist of pasture improved vegetation, likely as a result of spreading high levels of nitrogen-based fertiliser. Consequently, these areas provide low suitability habitat for threatened flora species.

Table 2.4 Candidate Threatened Flora Species Targeted and Field Survey Methods Used

Target Species	Species Survey Period	Survey Dates	Survey Method	Plant Community Type Associations/Area Surveyed	
				PCT 3583	PCT 4020
<i>Acacia bynoeana</i>	All year	13 November 2023	Parallel traverse	✓	✓
<i>Angophora inopina</i>	All year	19 July 2022	Parallel traverse	✓	✓
<i>Asperula asthenes</i>	October–December	13 November 2023	Parallel traverse	✓	✓
<i>Callistemon linearifolius</i>	October–January	22 January 2024	Parallel traverse	✓	✓
<i>Corunastylis</i> sp. <i>Charmhaven</i> (Syn. <i>Genoplesium branwhiteorum</i>)	November–April	13 November 2023, 22 January 2024	Parallel traverse	-	✓
<i>Cryptostylis hunteriana</i>	November–January	13 November 2023	Parallel traverse	✓	-
<i>Diuris praecox</i>	August	29 August 2022, 16 August 2023	Parallel traverse	✓	-
<i>Eucalyptus camfieldii</i>	All year	13 November 2023	Parallel traverse	✓	-
<i>Eucalyptus parramattensis</i> ssp. <i>decadens</i>	All year	19 July 2022	Parallel traverse	-	✓
<i>Eucalyptus parramattensis</i> ssp. <i>decadens</i> endangered population	All year	19 July 2022	Parallel traverse	-	✓
<i>Genoplesium insigne</i>	September–November	6 September 2023	Parallel traverse	✓	✓
<i>Grevillea parviflora</i> ssp. <i>parviflora</i>	August–November	19 August 2022	Parallel traverse	✓	-
<i>Maundia triglochinoides</i>	November–March	13 November 2023, 22 January 2024	Parallel traverse	-	✓
<i>Melaleuca biconvexa</i>	All year	19 July 2022	Parallel traverse	-	✓
<i>Persicaria elatior</i>	December–May	22 January 2024	Parallel traverse	-	✓
<i>Rhizanthella slateri</i>	September–November	13 November 2023	Parallel traverse	-	✓
<i>Rhodomyrtus psidioides</i>	All year	13 November 2023	Parallel traverse	-	✓
<i>Rutidosia heterogama</i>	All year	13 November 2023	Parallel traverse	✓	-

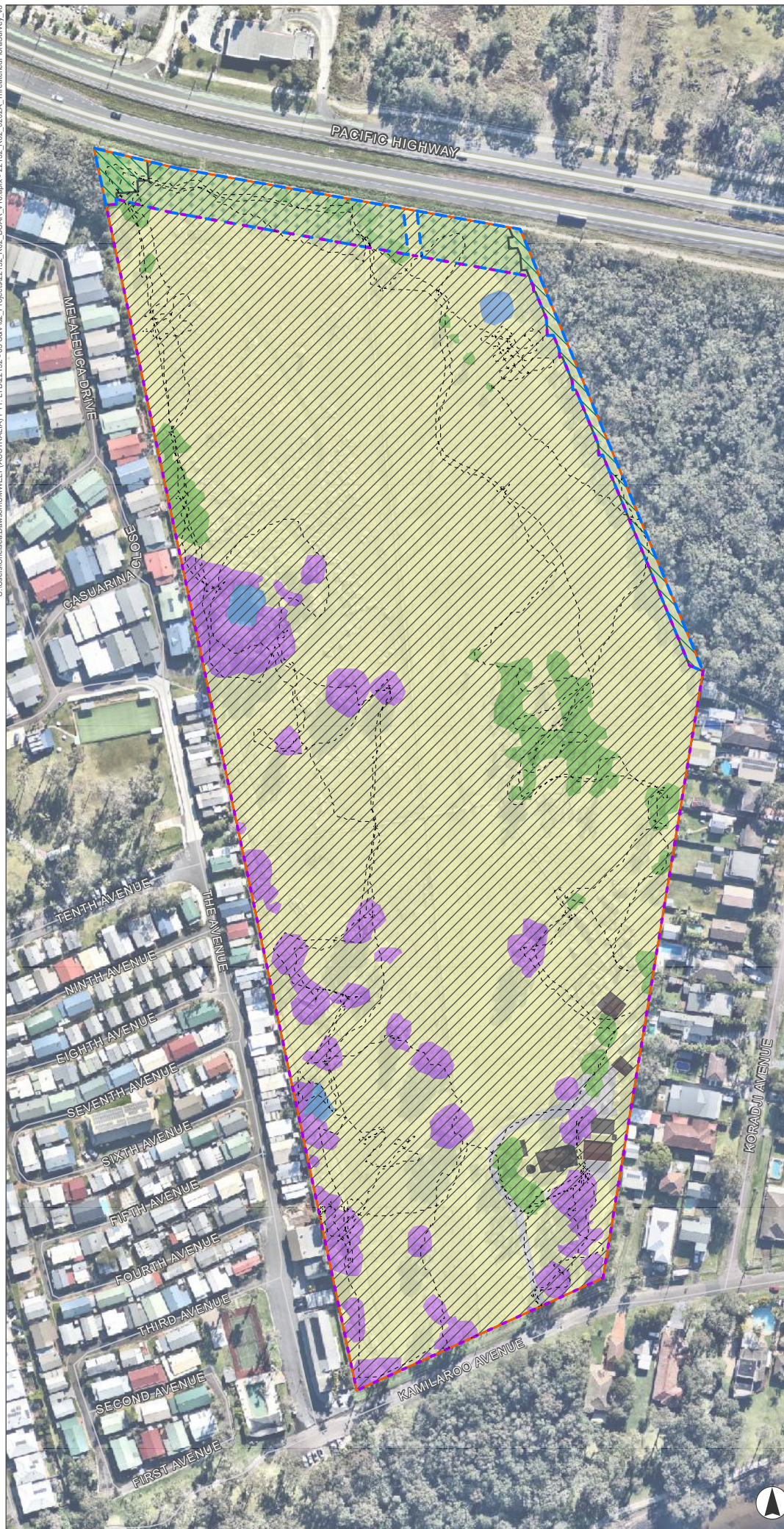
Target Species	Species Survey Period	Survey Dates	Survey Method	Plant Community Type Associations/Area Surveyed	
				PCT 3583	PCT 4020
<i>Syzygium paniculatum</i>	April–June (can be identified by leaf all year round)	15 September 2023	Parallel traverse	-	✓
<i>Tetratheca juncea</i>	September–October	15 September 2023	Parallel traverse	✓	-
<i>Thelymitra adorata</i>	September–October	15 September 2023	Parallel traverse	✓	✓

Key to symbols

✓ = associated PCT, targeted species survey completed in PCT.

Blank cells = if blank non-associated PCT/target survey for species not completed in PCT as no suitable habitat present.

FIGURE 2.2A
Threatened Flora Survey
Locations - July 2022



Legend

- Study Area (Rezoning Area)
 - Subject Land (Biodiversity Certification Assessment Area)
 - Tree Protection Zone
 - Avoidance Area
 - Certified Land
 - Conservation Land
 - Pacific Highway
 - Road
 - Threatened Flora Search Transects - July 2022
- Plant Community Types and Vegetation Zones**
- Vegetation Zone 1 - PCT 3583 Paddock Trees with Exotic Understory
 - Vegetation Zone 2 - Exotic Grassland (Assessed against benchmarks for PCT 3583)
 - Vegetation Zone 3 - PCT 4020 Paddock Trees with Exotic Understory
 - Non PCT - Cleared Land
 - Non PCT - Water
 - Non PCT - Built Structures

0 25 50 75
Metres

Scale 1:2,500 at A4
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FIGURE 2.2B
Threatened Flora Survey
Locations - August
2022/2023

- Legend**
- Study Area (Rezoning Area)
 - Subject Land (Biodiversity Certification Assessment Area)
 - Tree Protection Zone
 - Certified Land
 - Avoidance Area
 - Conservation Land
 - Pacific Highway
 - Road
 - Threatened Flora Search Transects - August 2022/2023
- Plant Community Types and Vegetation Zones**
- Vegetation Zone 1 - PCT 3583 Paddock Trees with Exotic Understory
 - Vegetation Zone 2 - Exotic Grassland (Assessed against benchmarks for PCT 3583)
 - Vegetation Zone 3 - PCT 4020 Paddock Trees with Exotic Understory
 - Non PCT - Cleared Land
 - Non PCT - Water
 - Non PCT - Built Structures

0 25 50 75
Metres

Scale 1:2,500 at A4
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FIGURE 2.2C
Threatened Flora Survey
Locations - September
2023

- Legend**
- Study Area (Rezoning Area)
 - Subject Land (Biodiversity Certification Assessment Area)
 - Tree Protection Zone
 - Avoidance Area
 - Certified Land
 - Conservation Land
 - Pacific Highway
 - Road
 - Threatened Flora Search Transects - September 2023
- Plant Community Types and Vegetation Zones**
- Vegetation Zone 1 - PCT 3583 Paddock Trees with Exotic Understory
 - Vegetation Zone 2 - Exotic Grassland (Assessed against benchmarks for PCT 3583)
 - Vegetation Zone 3 - PCT 4020 Paddock Trees with Exotic Understory
 - Non PCT - Cleared Land
 - Non PCT - Water
 - Non PCT - Built Structures

0 25 50 75
Metres

Scale 1:2,500 at A4
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FIGURE 2.2D
Threatened Flora Survey
Locations - November
2023

- Legend**
- Study Area (Rezoning Area)
 - Subject Land (Biodiversity Certification Assessment Area)
 - Tree Protection Zone
 - Avoidance Area
 - Certified Land
 - Conservation Land
 - Pacific Highway
 - Road
 - Threatened Flora Search Transects - November 2023
- Plant Community Types and Vegetation Zones**
- Vegetation Zone 1 - PCT 3583 Paddock Trees with Exotic Understory
 - Vegetation Zone 2 - Exotic Grassland (Assessed against benchmarks for PCT 3583)
 - Vegetation Zone 3 - PCT 4020 Paddock Trees with Exotic Understory
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FIGURE 2.2E
Threatened Flora Survey
Locations - January 2024

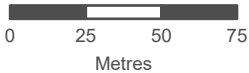


Legend

- Study Area (Rezoning Area)
- Subject Land (Biodiversity Certification Assessment Area)
- Tree Protection Zone
- Avoidance Area
- Certified Land
- Conservation Land
- Pacific Highway
- Road
- Threatened Flora Search Transects - January 2024

Plant Community Types and Vegetation Zones

- Vegetation Zone 1 - PCT 3583 Paddock Trees with Exotic Understory
- Vegetation Zone 2 - Exotic Grassland (Assessed against benchmarks for PCT 3583)
- Vegetation Zone 3 - PCT 4020 Paddock Trees with Exotic Understory
- Non PCT - Cleared Land
- Non PCT - Water
- Non PCT - Built Structures



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2.4 Threatened Fauna Survey Methods & Database Review

2.4.1 Review of Existing Information and Survey Guidelines

The following existing information was reviewed to inform the preliminary surveys completed for threatened fauna species and assessments of habitat constraints and microhabitats:

- NSW Government BAM Calculator (BAM Data Update Version 80/Updated 28/10/2024) (NSW DCCEEW 2025c).
- Threatened fauna records held on the NSW BioNet Atlas of NSW Wildlife within the Subject Land (NSW DCCEEW 2025a).
- Vegetation associations reports for the relevant IBRA Bioregion and IBRA Sub-region for each PCT present to determine threatened fauna species PCT associations.
- Habitat constraints listed in the Threatened Biodiversity Data Collection (TBDC) (NSW DCCEEW 2025a).
- Species Credits' threatened bats and their habitats (NSW DPIE 2021).
- NSW Survey Guide for Threatened Frogs (NSW DPIE 2020c).
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (NSW DEC 2004).
- Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide (NSW DPE 2022a).
- Threatened Reptiles Biodiversity Assessment Method Survey Guide (NSW DPE 2022b).

2.4.2 BioNet Atlas Threatened Fauna Records

Details of the threatened fauna species recorded on the BioNet Atlas within a circular 5 km buffer of the Project Area are summarised in **Table 2.5**. Fauna species with a moderate or high potential to occur have been included for further assessment as either ecosystem credit, species credit or dual credit entities.

A search of the BioNet Atlas of NSW Wildlife was undertaken to determine the presence of any threatened fauna species previously recorded within the development footprint or the Assessment Area (NSW DPE 2025a), and to inform this amended BDAR. Details of the threatened fauna species recorded on the BioNet Atlas (NSW DPIE 2025a) within 5 km of the subject land are summarised in **Table 2.5** including the number of records and date of records within the search area. Species which primarily inhabit marine and estuarine habitats have been excluded. An assessment of likelihood of occurrence is also provided using the following criteria:

- High/Known – Suitable habitats which are known to support this species are present and the species is known or expected to occur within the Project Area based on observation or historical records.
- Moderate – Suitable habitats which are known to support this species are present within the development footprint and the species may occur (further surveys required).
- Low – Suitable habitats or microhabitats for this species are not present within the development footprint, or the development footprint is too disturbed to support this species, and the species is not known and not likely to occur.

Species known to occur or with a moderate or high likelihood of occurrence have been included for further assessment within this Report.

Table 2.5 BioNet Atlas Threatened Fauna Records within 5 km

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Date Last Recorded within 5 km	Number of Recorded Locations within 5 km	Likelihood of Occurrence
<i>Anthochaera phrygia</i>	Regent honeyeater	CE	CE	9/05/1998	7	Low
<i>Artamus cyanopterus cyanopterus</i>	Dusky woodswallow	V	-	13/12/1997	2	Moderate
<i>Calyptorhynchus lathami lathami</i>	South-eastern glossy black-cockatoo	V	V	19/10/2023	16	Low
<i>Cercartetus nanus</i>	Eastern pygmy-possum	V	-	2/04/2019	3	Low
<i>Chalinolobus dwyeri</i>	Large-eared pied bat	V	E	15/03/2022	3	Low
<i>Climacteris picumnus victoriae</i>	Brown treecreeper (eastern sub species)	V	V	19/11/2019	1	Low
<i>Crinia tinnula</i>	Wallum froglet	V	-	9/10/2022	97	Moderate
<i>Daphoenositta chrysoptera</i>	Varied sittella	V	-	27/11/2008	15	High
<i>Dasyurus maculatus</i>	Spotted-tailed quoll	V	E	3/06/2017	5	Low
<i>Ephippiorhynchus asiaticus</i>	Black-necked stork	E	-	16/09/1994	1	Low
<i>Epthianura albifrons</i>	White-fronted chat	V	-	24/08/1971	1	Low
<i>Falsistrellus tasmaniensis</i>	Eastern false pipistrelle	V	-	10/03/2023	8	Moderate
<i>Haliaeetus leucogaster</i>	White-bellied sea-eagle	V	-	23/03/2023	45	High
<i>Hirundapus caudacutus</i>	White-throated needletail	-	V, C, J, K	10/03/2023	15	High
<i>Lathamus discolor</i>	Swift parrot	E	CE	8/10/2022	89	High
<i>Litoria aurea</i>	Green and golden bell frog	E	V	18/10/2010	4	Low
<i>Lophoictinia isura</i>	Square-tailed kite	V	-	8/06/2022	3	High
<i>Micronomus norfolkensis</i>	Eastern coastal free-tailed bat	V	-	5/09/2023	40	High
<i>Miniopterus australis</i>	Little bent-winged bat	V	-	5/09/2023	56	High
<i>Miniopterus orianae oceanensis</i>	Large bent-winged bat	V	-	10/03/2023	24	High
<i>Myotis macropus</i>	Southern myotis	V	-	7/06/2023	31	High
<i>Neophema pulchella</i>	Turquoise parrot	V	-	24/02/2013	1	Low
<i>Ninox connivens</i>	Barking owl	V	-	12/07/2019	1	Moderate

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Date Last Recorded within 5 km	Number of Recorded Locations within 5 km	Likelihood of Occurrence
<i>Ninox strenua</i>	Powerful owl	V	-	21/12/2023	26	Low
<i>Pandion cristatus</i>	Eastern osprey	V	-	7/12/2022	8	High
<i>Parvipsitta pusilla</i>	Little lorikeet	V	-	5/08/2021	89	High
<i>Petalura gigantea</i>	Giant dragonfly	E	-	1/02/2023	1	Low
<i>Petaurus norfolcensis</i>	Squirrel glider	V	-	17/02/2021	37	High
<i>Petroica boodang</i>	Scarlet robin	V	-	23/02/1996	1	Low
<i>Phascolarctos cinereus</i>	Koala	E	E	25/20/2023	9	Low
<i>Potorous tridactylus tridactylus</i>	Northern long-nosed potoroo	V	V	19/09/2023	1	Low
<i>Pseudomys novaehollandiae</i>	New holland mouse	-	V	24/05/2007	110	Low
<i>Pteropus poliocephalus</i>	Grey-headed flying-fox	V	V	20/04/2024	77	High
<i>Ptilinopus regina</i>	Rose-crowned fruit-dove	V	-	21/10/1994	1	Low
<i>Ptilinopus superbus</i>	Superb fruit-dove	V	-	23/05/1996	1	Low
<i>Saccolaimus flaviventris</i>	Yellow-bellied sheath-tail-bat	V	-	15/03/2022	5	Moderate
<i>Scoteanax rueppellii</i>	Greater broad-nosed bat	V	-	7/06/2023	22	Moderate
<i>Tyto novaehollandiae</i>	Masked owl	V	-	8/02/2023	8	Moderate
<i>Vespadelus troungtoni</i>	Eastern cave bat	V	-	10/03/2023	4	Low

2.4.3 Habitat Constraints Assessment

Field-based searches were undertaken to assess the habitat constraints for the candidate threatened fauna species, these searches included observation of habitat constraints identified from the desktop review of the TBDC and recording of the presence, quality and/or suitability of micro-habitats present including:

- hollow-bearing trees, particularly those of suitable size for threatened cockatoo and owls
- feed trees
- stick nests
- koala use trees
- aquatic habitats suitable for amphibians
- rocky habitats suitable for reptiles
- outcrops, caves, tunnels and old buildings suitable for threatened microbat species.

The results of the site-based habitat constraints assessment were utilised to inform the assessment of the confirmed candidate threatened species assessment in the BAM Calculator.

2.4.4 Field Surveys

Targeted surveys for candidate threatened fauna species were completed with reference the following guidelines:

- NSW Survey Guide for Threatened Frogs, A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (NSW DPIE 2020c).
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities, NSW Department of Environment and Conservation (NSW DEC 2004).
- 'Species credit' threatened bats and their habitats, NSW survey guide for the Biodiversity Assessment Method, Office of Environment and Heritage (NSW DPIE 2021).
- Threatened Reptiles Biodiversity Assessment Method Survey Guide (NSW DPE 2022b).
- Fauna surveys were completed onsite and offsite to the south in an area previously investigated for stormwater infrastructure that is not subject to proposed future impacts or biodiversity certification.
- Weather data was collected during each survey event using the Bureau of Meteorology (BoM) (Commonwealth of Australia 2025).
- Field surveys conducted in January and February 2025 by Anderson Environment and Planning (AEP) have also been included within the survey effort for this BCAR (**Appendix C**). This supplementary field work was conducted to address Central Coast Councils' commentary, as documented in **Appendix B**.

2.4.4.1 Diurnal Field Surveys

The following methods were utilised for targeted diurnal fauna surveys:

- Diurnal bird census.
- Nest searches.
- Scat searches.
- Opportunistic observations.
- Hollow-bearing tree inspections.
- Microbat roost searches.

The details of diurnal fauna surveys completed are provided in **Table 2.6** and fauna survey locations are mapped in **Figure 2.3A** and **Figure 2.3B**.

Table 2.6 Details of Diurnal Threatened Fauna Surveys Completed

Survey Date	Survey Methods	Fauna Groups Targeted	Weather Conditions	Survey Effort
19 July 2022	Diurnal census	Threatened birds	Light drizzle	6 hours x 2 people (09:45–15:30)
13 November 2023	Diurnal census, scat search	Threatened birds	19°C, 1/8 cloud, no rain and no wind	3.5 hours x 2 people (16:00–19:30)
21 November 2023	Diurnal census, scat search	Threatened birds	20°C, no cloud, no wind and 1/8 wind	3.75 hours x 2 people (15:45–19:30)
22 November 2023	Diurnal census, scat search	Threatened birds and mammals	18°C, 1/8 cloud, no rain and no wind	1.5 hours x 2 people (18:00–19:30)
23 November 2023	Diurnal census, scat search	Threatened birds and mammals	20°C, 7/8 cloud, no rain and 3/8 wind	0.5 hours x 2 people (19:00–19:30)
21–24 January 2025	Microbat roost searches.	Threatened microbats.	12.7–27.6°C min/max, 0 mm daily total rainfall, 13 km/h average daily windspeed	30 mins per structure x 1 person.
7 March 2025*	Hollow-bearing tree inspections.	Threatened mammals and birds.	21°C, 4.0 mm rainfall, 9 km/h windspeed	0.75 hrs x 2 person (7:45–8:30)

*Fieldwork conducted by AEP (See Appendix C).

2.4.4.2 Nocturnal Fauna Surveys

The following methods were utilised for targeted nocturnal fauna surveys:

- Spotlighting.
- Hollow-bearing tree stag-watching searches.
- Amphibian aural visual and call playback survey.
- Targeted call playback.
- Harp trapping.

Details of these surveys are provided in **Table 2.7**.

Table 2.7 Details of Nocturnal Threatened Fauna Surveys Completed

Survey Date	Survey Methods	Target Fauna Groups	Weather Conditions	Survey Effort
13 November 2023	Hollow-bearing tree stag watch, call playback, spotlighting, amphibian aural visual transect survey around each of 3 dams.	Threatened mammals, reptiles, amphibians and owls.	19°C, 1/8 cloud, no rain and no wind	2 hours x 2 people (19:50–21:50)
21 November 2023	Hollow-bearing tree stag watch, call playback, spotlighting, amphibian aural visual transect survey around each of 3 dams.	Threatened mammals, reptiles, amphibians and owls.	20°C, no cloud, no wind and 1/8 wind	2 hours x 2 people (19:30–21:30)
22 November 2023	Hollow-bearing tree stag watch, call playback, spotlighting, amphibian aural visual transect survey around each of 3 dams.	Threatened mammals, reptiles, amphibians and owls.	18°C, 1/8 cloud, no rain and no wind	2 hours x 2 people (19:30–21:30)
23 November 2023	Hollow-bearing tree stag watch, call playback, spotlighting, amphibian aural visual transect survey around each of 3 dams.	Threatened mammals, reptiles, amphibians and owls.	20°C, 7/8 cloud, no rain and 3/8 wind	1.5 hours x 2 people (19:30–21:00)
30 November 2023	Hollow-bearing tree stag watch, call playback, spotlighting, amphibian aural visual transect survey around each of 3 dams.	Threatened mammals, reptiles, amphibians and owls.	23°C, 1/8 cloud, 1/8 rain and no wind	2 hours x 2 people (19:45–21:45)
8 January 2025*	Amphibian aural visual surveys.	Threatened amphibians.	16°C, 14.4 mm rainfall, 11 km/h windspeed	3 hrs x 2 person (21:00–23:01)
9 January 2025*	Amphibian aural visual surveys.	Threatened amphibians.	20°C, 37.6 mm rainfall, 7 km/h windspeed	2 hrs x 2 people (21:00–23:00)
10 February 2025*	Amphibian aural visual surveys.	Threatened amphibians.	22°C, 0 mm rainfall, 7 km/h windspeed	2 hrs x 2 people (21:00–23:00)
11 February 2025*	Amphibian aural visual surveys.	Threatened amphibians.	22°C, 3 mm rainfall, 4 km/h windspeed	1 hrs x 2 people (23:00–00:05)
03 February 2025*	Stag watch, call playback and spotlighting.	Threatened owls.	28°C, 0 mm rainfall, 13 km/h windspeed	3.5 hrs x 2 people (19:40–23:10)
04 February 2025*	Stag watch, call playback and spotlighting.	Threatened owls.	31°C, 0 mm rainfall, 7 km/h windspeed	2.83 hrs x 2 people
05 February 2025*	Stag watch, call playback and spotlighting.	Threatened owls.	25°C, 0 mm rainfall, 6 km/h windspeed	3 hrs x 2 people (19:40–22:40)

Survey Date	Survey Methods	Target Fauna Groups	Weather Conditions	Survey Effort
06 February 2025*	Stag watch, call playback and spotlighting.	Threatened owls.	27°C, 1.0 mm rainfall, 7 km/h windspeed	3.3 hrs x 2 people (19:10–22:30)
18 February 2025*	Stag watch, call playback and spotlighting.	Threatened owls.	26°C, 0 mm rainfall, 11 km/h windspeed	3.25 hrs x 2 people (19:00–22:15)
19 February 2025*	Stag watch, call playback and spotlighting.	Threatened owls.	25°C, 0 mm rainfall, 13 km/h windspeed	3.25 hrs x 2 people (19:00–22:15)

*Fieldwork conducted by AEP (See **Appendix C**).

2.4.4.3 Remote Detection & Fauna Trapping Surveys

The following methods were utilised for the completion of targeted fauna remote detection surveys:

- Baited remote camera surveys.
- Ultrasonic microbat call recording.

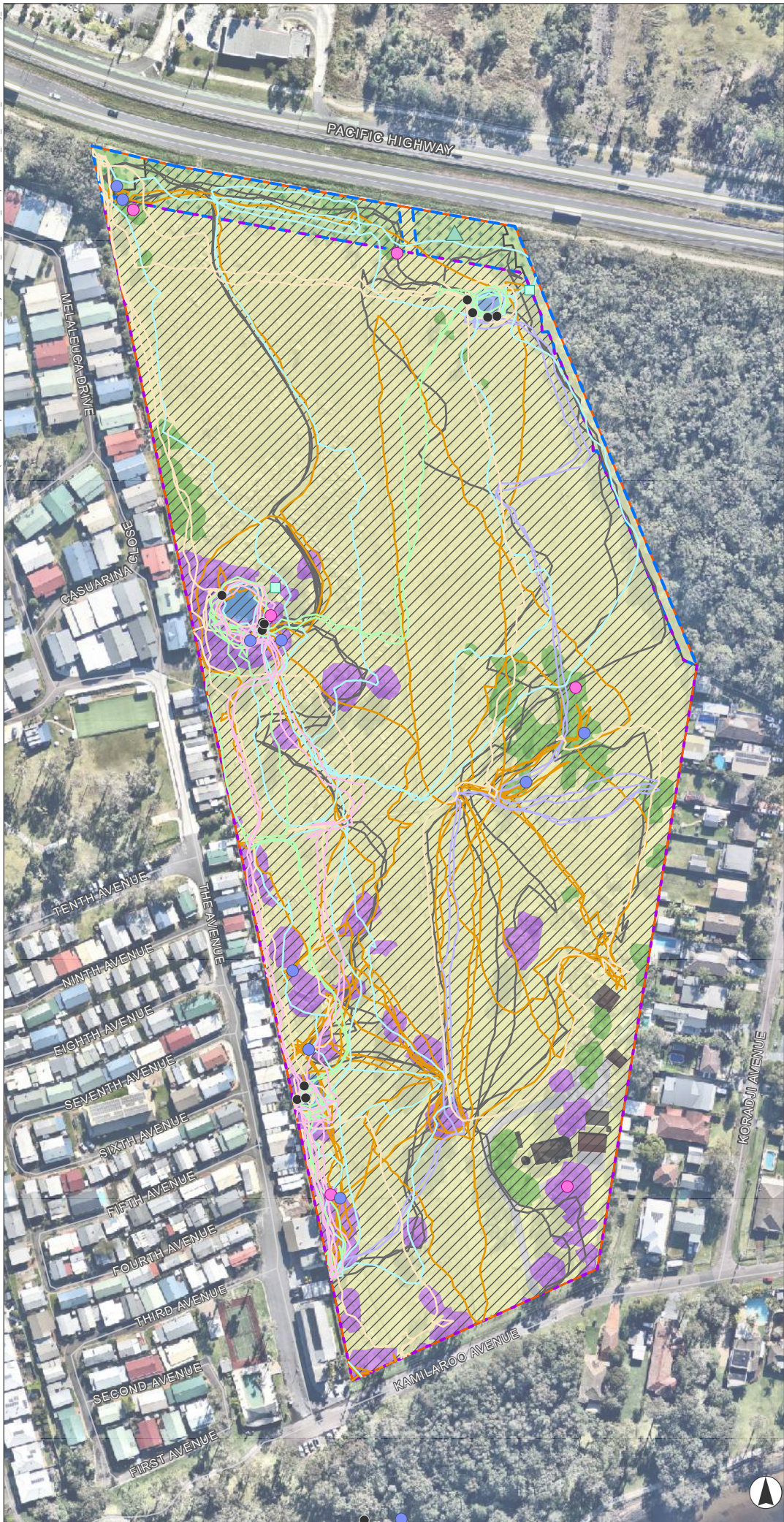
Details of these surveys are provided in **Table 2.8** and the locations are shown in **Figure 2.3A** and **Figure 2.3B**.

Table 2.8 Details of Remote Detection Threatened Fauna Surveys Completed

Survey Date	Survey Methods	Target Fauna Groups/Species	Weather Conditions	Survey Effort/Time
21 November 2023 – 7 December 2023	Microbat ultrasonic call recording (Anabat)	Southern myotis	Variable	22 nights (1 unit x 7 nights/1 unit x 15 nights).
21 November 2023 – 7 December 2023	Baited remote camera survey	Threatened mammals	Variable	5 cameras mounted on trees at 1.5 m x 16 nights/5 cameras mounted at the base of trees for 16 nights.
18 February 2025*	Acoustic call recording (Songmeter)	Threatened owls.	Variable	1x device for 35 hours of nocturnal recording.
21 January 2025*	Harp trapping	Eastern cave bat	12.7–27.6°C min/max, 0 mm daily total rainfall, 13 km/h average daily windspeed	2 traps overnight (18:00–06:00).
22 January 2025*	Harp trapping	Eastern cave bat	16.5–35.5°C min/max, 0 mm daily total rainfall, 6 km/h average daily windspeed	2 traps overnight (18:00–06:00).
23 January 2025*	Harp trapping	Eastern cave bat	18.8–26.4°C min/max, 0 mm daily total rainfall, 7 km/h average daily windspeed	2 traps overnight (18:00–06:00).
24 January 2025*	Harp trapping	Eastern cave bat	18.3–26.8°C min/max, 0 mm daily total rainfall, 11 km/h average daily windspeed	2 traps overnight (18:00–06:00).

*Fieldwork conducted by AEP (See **Appendix C**)

FIGURE 2.3A
Umwelt Threatened Fauna
Survey Locations



- Legend**
- Study Area (Rezoning Area)
 - Subject Land (Biodiversity Certification Assessment Area)
 - Certified Land
 - Avoidance Area
 - Conservation Land
 - Pacific Highway
 - Road
 - Fauna Habitat Search Transects
 - Bird Survey Transects
 - Amphibian Call Playback
 - Baited Remote Camera Locations
 - Microbat Ultrasonic Call Recorder Locations 2023
 - Hollows-bearing Trees (>20cm hollow opening)
 - Koala SAT Locations
- Amphibian Aural Visual Survey Transects**
- 13/11/2023
 - 21/11/2023
 - 22/11/2023
 - 23/11/2023
 - 30/11/2023
- Plant Community Types and Vegetation Zones**
- Vegetation Zone 1 - PCT 3583 Paddock Trees with Exotic Understorey
 - Vegetation Zone 2 - Exotic Grassland (Assessed against benchmarks for PCT 3583)
 - Vegetation Zone 3 - PCT 4020 Paddock Trees with Exotic Understorey
 - Non PCT - Cleared Land
 - Non PCT - Water
 - Non PCT - Built Structures

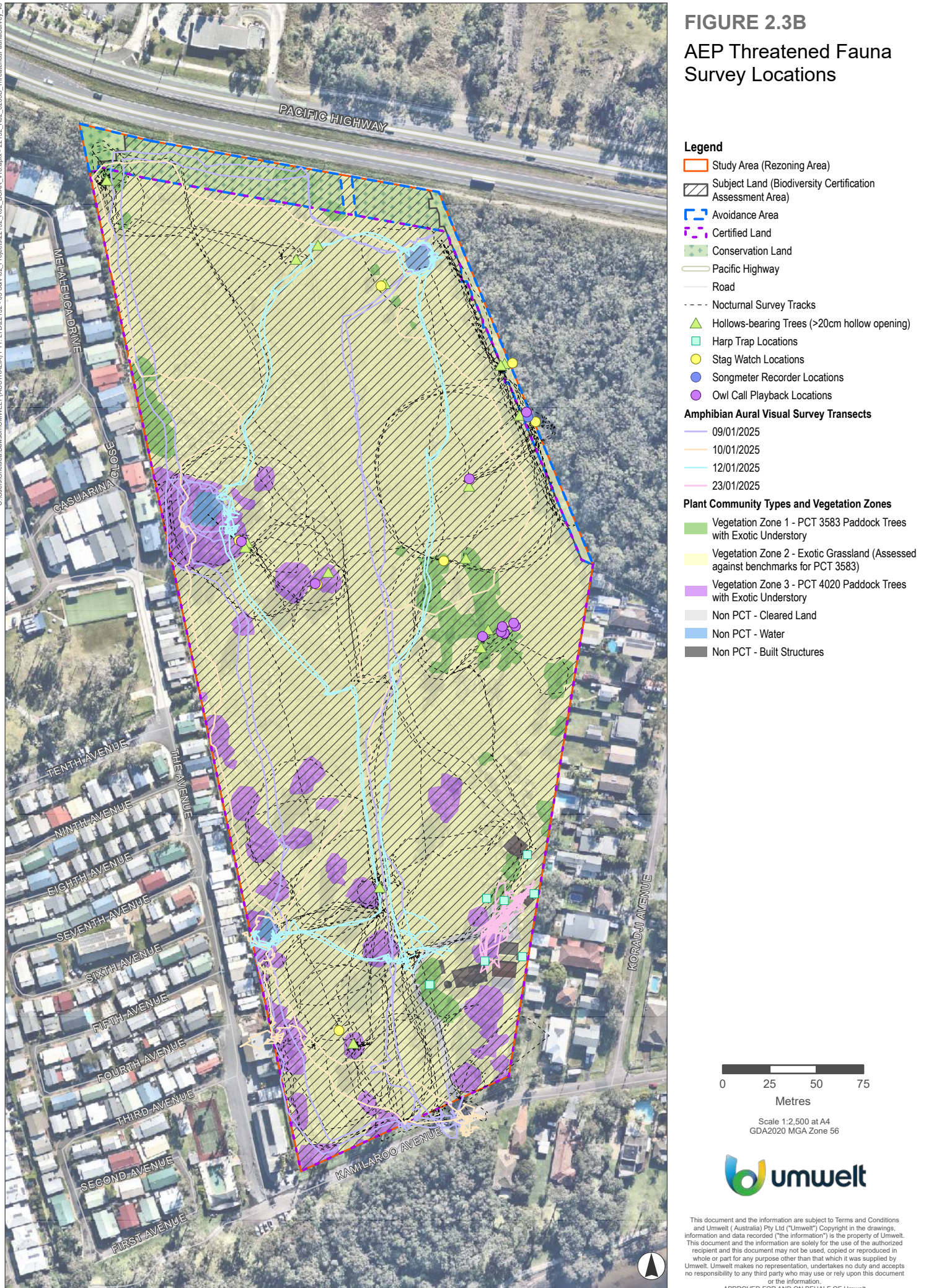
0 25 50 75
Metres

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FIGURE 2.3B
AEP Threatened Fauna
Survey Locations



2.5 Weather Conditions

All surveys were completed during suitable weather conditions. The weather conditions during fauna surveys are listed in **Table 2.6** and **Table 2.7**.

2.6 Limitations

No notable limitations were encountered during the completion of threatened species surveys.

3.0 Site Context

3.1 Assessment Area

The Assessment Area, including the Rezoning Area and the area of land within the 1,500 m buffer zone surrounding the Rezoning Area are shown on the Location Map in **Figure 1.2**.

3.2 Landscape Features

Landscape features identified within the Rezoning Area are shown on the Site Map provided as **Figure 1.1** and landscape features in the assessment area (1,500 m buffer around and including the rezoning area) are shown on the Location Map provided as **Figure 1.2**. Further information on landscape features is provided in **Section 3.2.1** to **Section 3.2.5**.

3.2.1 IBRA Bioregions and IBRA Subregions

The Rezoning Area is located within the Sydney Basin Interim Biogeographic Regionalisation for Australia (IBRA) bioregion and Wyong IBRA subregion.

3.2.2 Rivers, Streams, Estuaries and Wetlands

The locations of the streams within the Rezoning Area are shown on the Site Map provided as **Figure 1.1** and the locations of streams and rivers within the Assessment Area are shown on the Location Map provided as **Figure 1.2**.

The Rezoning Area lies approximately 125 m to the north of Lake Munmorah and there is one first order watercourse mapped within the Rezoning Area which is associated with the spillway of a man-made dam.

An assessment of the mapped first order watercourse was conducted on 6 March 2025 to document and describe its geomorphic characteristics. The findings revealed:

- The mapped hydroline comprises shallow, constructed drainage channels.
- These channels lack native riparian vegetation and do not exhibit natural channel features (bed and banks).
- Water sources include a constructed farm dam to the north and runoff from a nearby manufactured home estate.
- The hydroline mapping is misaligned with actual drainage features in several areas.
- Flow paths are poorly defined and inconsistent with natural watercourse characteristics.
- The channels show signs of mechanical excavation and only carry water intermittently after rainfall.

This information was submitted to NSW DCCEEW as part of a Drainage Line Assessment Report (**Appendix H**). The response from NSW DCCEEW ((Water) Licencing and Approvals) (**Appendix I**), agreed with the findings in the Drainage Line Assessment Report and determined the first order watercourse mapped on site does not meet the definition of a 'river'. Therefore, the mapped first order watercourse along the western site boundary does not need to be assessed under the *Water Management Act 2000* and management that may typically relate to riparian zones does not need to be applied (**Appendix I**).

3.2.3 Habitat Connectivity

Locally habitat connectivity occurs along the foreshore of Lake Munmorah and through intact vegetation on lands to the north of the Rezoning Area and Pacific Highway. The importance of the biodiversity corridor to the north of the Pacific Highway, as shown in **Figure 1.2**, is recognised in the Central Coast Regional Plan 2041 biodiversity network (DPE 2022c). The regional biodiversity network plan does not identify biodiversity corridors through the Rezoning Area or through adjoining lands to the south of the Pacific Highway.

The Rezoning Area is highly disturbed and does not contain any intact areas of native vegetation which contain a functioning corridor for flora or fauna species. As part of the future development of the site, a 20 m wide corridor will be replanted along the northern boundary of the Rezoning Area to act as a connectivity pathway between vegetation to the east and west of the site.

The corridor will include the replanting of canopy trees as compensatory plantings for trees removed within the biodiversity certification area. Suitable canopy tree species include *Eucalyptus robusta* (swamp mahogany), *Eucalyptus tereticornis* (forest red gum), *Casuarina glauca* (swamp oak), *Corymbia gummifera* (red bloodwood) and *Melaleuca quinquenervia* (broad-leaved paperbark). The corridor will also include replanting of native shrubs and groundcovers.

3.2.4 Karst, Caves, Crevices, Cliffs, Rocks or Other Geological Features of Significance

No karst, caves, crevices, cliffs, rocks or other geological features of significance were observed within the Rezoning Area or the Biodiversity Certification Area.

3.2.5 Areas of Outstanding Biodiversity Value

The Rezoning Area and Assessment Area do not contain any areas of outstanding biodiversity value, as identified under the BC Act.

3.2.6 NSW (Mitchell) Landscape

The Rezoning Area is mapped as occurring within the Gosford – Cooranbong Coastal Slopes Mitchell Landscape.

3.3 Native Vegetation Cover

The native vegetation cover within the Assessment Area (1,500 m buffer) was determined through site surveys of the Rezoning Area and aerial photograph interpretation using ArcMap software and the current available six maps imagery.

Table 3.1 summarises the extent of native vegetation cover within the assessment area and **Figure 1.2** shows the extent of native vegetation cover within the assessment area.

Table 3.1 Native Vegetation Cover in Assessment Area

Native Vegetation Cover	
Assessment area (ha)	922.85
Total area of native vegetation cover (ha)	422.02
Percentage of native vegetation cover (%)	45.7%
Class (0–10, >10–30, >30–70 or >70%)	>30–70%

4.0 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity

4.1 Native Vegetation Extent

The parts of the Subject Land assessed as native vegetation for the purposes of the vegetation integrity surveys are shown in **Figure 4.1**.

4.1.1 Changes to the Mapped Vegetation Extent

Some clearing of canopy trees was observed along the western site boundary. These areas were mapped according to the canopy cover in available aerial imagery as the stumps had not been removed and regrowth from the existing lignotubers was observed in some instances. Umwelt do not have knowledge of the reason for the clearing, however the area was in a Rural Boundary Clearing Zone and a designated 10/50 vegetation entitlement clearing area. No other notable changes were observed during surveys to the mapped native vegetation extent visible on the aerial imagery utilised for this assessment.

4.1.2 Areas That Are Not Native Vegetation

Areas dominated by exotic vegetation have been assessed as native vegetation as a precautionary measure, to ensure strict compliance with the definition provided for native vegetation under the BAM and LLS Act.

FIGURE 4.1
Native Vegetation Extent



Legend

- Study Area (Rezoning Area)
 - Subject Land (Biodiversity Certification Assessment Area)
 - Tree Protection Zone
 - Avoidance Area
 - Certified Land
 - Conservation Land
 - Pacific Highway
 - Road
- Native Vegetation**
- Native Vegetation
 - Exotic Dominated Grassland (<2.5% native cover)
 - Cleared Land
 - Water
 - Built Structures

0 25 50 75
Metres

Scale 1:2,500 at A4
GDA2020 MGA Zone 56



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4.2 Plant Community Types

4.2.1 Overview

Vegetation within the Rezoning Area has been assessed as aligning with the BioNet Vegetation Classification PCT's listed within **Table 4.1** and their extent is shown in **Figure 4.2**.

Detailed descriptions of each PCT, with reference to the BioNet Vegetation Classification data, are provided in the following subsections.

Table 4.1 Summary of Plant Community Types Present

PCT ID	PCT Name	Land Proposed for Certification (Subject Land)	Rezoning Area (Study Area Biodiversity Certification Assessment Area)
3583	Hunter Coast Lowland Scribbly Gum Forest	1. Paddock Trees with Exotic Understory = 0.45 ha	1. Paddock Trees with Exotic Understory = 0.47 ha
		2. Exotic grassland = 7.87 ha	2. Exotic grassland = 7.98 ha
4020	Coastal Creekflat Layered Grass-Sedge Swamp Forest	3. Paddock Trees with Exotic Understory = 0.76 ha	3. Paddock Trees with Exotic Understory = 0.76 ha
Non-PCT Areas		Water, cleared land, built structures = 0.19 ha	Water, cleared land, built structures = 0.19 ha
Total Area		9.26 ha	9.4 ha

FIGURE 4.2
Plant Community Types and Vegetation Zones



Legend

- Study Area (Rezoning Area)
- Subject Land (Biodiversity Certification Assessment Area)
- Tree Protection Zone
- Avoidance Area
- Certified Land
- Conservation Land
- Pacific Highway
- Road

Plant Community Types and Vegetation Zones

- Vegetation Zone 1 - PCT 3583 Paddock Trees with Exotic Understory
- Vegetation Zone 2 - Exotic Grassland (Assessed against benchmarks for PCT 3583)
- Vegetation Zone 3 - PCT 4020 Paddock Trees with Exotic Understory
- Non PCT - Cleared Land
- Non PCT - Water
- Non PCT - Built Structures

0 25 50 75
Metres

Scale 1:2,500 at A4
GDA2020 MGA Zone 56



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4.2.2 PCT 3583 – Hunter Coast Lowland Scribbly Gum Forest

4.2.2.1 Vegetation Zone 1 - PCT 3583 Scattered Paddock Trees over Exotic Understorey

PCT Name	Hunter Coast Lowland Scribbly Gum Forest
PCT ID	PCT 3583
Condition	Scattered Paddock Trees over Exotic Understorey
Plot IDs	Plot 01
Formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Class	Sydney Coastal Dry Sclerophyll Forests
% Cleared	64.11
Photo	
Location	This vegetation zone occurs in the northern part of the Rezoning Area, in areas with slightly higher elevation than where PCT 4020 occurs. This zone occurs as scattered remnant trees throughout the derived grasslands.
Canopy Description	This vegetation zone comprises a canopy with sparse cover, largely occurring as scattered trees, however some small remnant stands of trees at slightly higher density (up to 20%). The dominant tree species in this zone were smooth-barked apple (<i>Angophora costata</i>), snappy gum (<i>Eucalyptus racemosa</i>), broad-leaved scribbly gum (<i>Eucalyptus haemastoma</i>) and red bloodwood (<i>Corymbia gummifera</i>).
Mid-storey Description	The mid-storey is absent from this vegetation zone.
Ground Cover Description	The ground cover across this PCT was predominantly characterised by a dense (95–100%) cover of the exotic grass kikuyu (<i>Cenchrus clandestinus</i>), with very low cover of a small number of other native species such as kidney weed (<i>Dichondra repens</i>), common rush (<i>Juncus usitatus</i>) and swamp oak (<i>Rumex brownii</i>).
Introduced Species	As described above, this vegetation zone was dominated by the introduced grass kikuyu (<i>Cenchrus clandestinus</i>). Other introduced species recorded in low density include white clover (<i>Trifolium repens</i>), black nightshade (<i>Solanum nigrum</i>), plantain (<i>Plantago lanceolata</i>), Paddy's lucerne (<i>Sida rhombifolia</i>), purple top (<i>Verbena bonariensis</i>) and cobbler's pegs (<i>Bidens pilosa</i>).
PCT Allocation Justification	Location: PCT 3583 is known from between Catherine Hill Bay and Norah Head. The biodiversity certification area is located within this range.

PCT Name	Hunter Coast Lowland Scribbly Gum Forest
	Community structure: PCT 3583 is described as a woodland with low shrubs and grassy understory. This vegetation zone is in a disturbed condition state and therefore this structure is no longer present, however this area is likely to have previously supported a grassy woodland. Species assemblage: there is a high dominance of exotic species in the understorey in this zone (in particular kikuyu) and therefore the floristic evidence of the original vegetation is limited to the canopy species. While PCT 3583 has scribbly gum listed in the name, there are no scribbly gum species listed in the diagnostic species. The two diagnostic tree species for PCT 3583 (<i>Angophora costata</i> and <i>Corymbia maculata</i>) were both recorded in this zone. Other PCTs considered: <u>3586:</u> is described as tall sclerophyll woodland with a heathy shrub layer. The tree canopy very frequently consists of a sparse to mid-dense cover of <i>Eucalyptus haemastoma</i> commonly with <i>Corymbia gummifera</i>. Although these tree species were present, the distribution suggests it occurs further to the south. Also, this PCT is usually found throughout areas with increasing sandstone outcrops. Therefore, PCT 3583 was considered a better fit. <u>3595:</u> is described as tall heathy sclerophyll open forest associated with Hawkesbury Sandstone gullies found along the eastern extent of the Sydney sandstone plateaus. The tree canopy species frequently includes <i>Eucalyptus piperita</i> and <i>Angophora costata</i>. The distribution suggests it occurs further to the south. Also, this PCT is associated with sandstone gullies and plateaus, which are not present over this site. Therefore, PCT 3583 was considered a better fit. <u>3593:</u> is described as tall, heathy sclerophyll open forest or woodland found on exposed residual ironstone or Hawkesbury Sandstone crests and slopes on coastal plateaus north and south of Sydney. The tree canopy species almost always include <i>Corymbia gummifera</i>, <i>Eucalyptus haemastoma</i>, or one or more species of stringybark eucalypts, such as <i>Eucalyptus sparsifolia</i>, <i>Eucalyptus oblonga</i> and <i>Eucalyptus capitellata</i>. Although some of these tree species were present, they were not dominant among the canopy and therefore, PCT 3583 was considered a better fit. <u>4122:</u> is described as a very restricted tall dry shrubby sclerophyll open forest found on low-lying sandy alluvial terraces at Cockle Creek. The tree canopy almost always includes a high cover of <i>Eucalyptus racemosa</i> with a lower cover of <i>Corymbia gummifera</i>, and very frequently <i>Angophora costata</i>. This PCT is restricted to a location further north, Cockle Creek, therefore, has not been further considered.
BC Act Status	This vegetation zone is not consistent with any TEC listed under the BC Act.
EPBC Act Status	This vegetation zone is not consistent with any TEC listed under the EPBC Act.

4.2.2.2 Vegetation Zone 2 – Exotic Grassland (assessed against benchmarks for PCT 3583)

PCT Name	Hunter Coast Lowland Scribbly Gum Forest
PCT ID	PCT 3583
Condition	Exotic Grassland (assessed against benchmarks for PCT 3583)
Plot IDs	Plots 02, 03 and 04
Formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Class	Sydney Coastal Dry Sclerophyll Forests
% Cleared	64.11
Photo	
Location	This is the dominant vegetation zone across the Rezoning Area.
Canopy Description	The canopy is absent from this vegetation zone.
Mid-storey Description	The canopy is absent from this vegetation zone.
Ground Cover Description	The ground cover across this vegetation zone is characterised by a dense (95-100%) cover of the exotic grass kikuyu (<i>Cenchrus clandestinus</i>), with very low cover of native species which commonly occur in areas of dense exotic vegetation such as kidney weed (<i>Dichondra repens</i>), common rush (<i>Juncus usitatus</i>) and swamp dock (<i>Rumex brownii</i>), slender knotweed (<i>Persicaria decipiens</i>) and slender rat's tail grass (<i>Sporobolus creber</i>).
Introduced Species	As described above, this vegetation zone was dominated by the introduced grass kikuyu (<i>Cenchrus clandestinus</i>). Other introduced species recorded in low density include fireweed (<i>Senecio madagascariensis</i>), white clover (<i>Trifolium repens</i>), plantain (<i>Plantago lanceolata</i>), Paddy's lucerne (<i>Sida rhombifolia</i>), purple top (<i>Verbena bonariensis</i>), narrow-leaved carpet grass (<i>Axonopus fissifolius</i>), and cobbler's pegs (<i>Bidens pilosa</i>).
PCT Allocation Justification	This vegetation zone is not consistent with any locally occurring native plant community types due to high levels of clearing, introduction of exotic species and pasture improvement. This PCT has been assessed against the benchmarks for PCT 3583 as the most likely occurring historical PCT for the purposes of assessment under the BAM.
BC Act Status	This vegetation zone is not consistent with any TEC listed under the BC Act.
EPBC Act Status	This vegetation zone is not consistent with any TEC listed under the EPBC Act.

4.2.3 PCT 4020 – Coastal Creekflat Layered Grass-Sedge Swamp Forest

4.2.3.1 Vegetation Zone 3 – PCT 4020 Scattered Paddock Trees over Exotic Understorey

PCT Name	Coastal Creekflat Layered Grass-Sedge Swamp Forest
PCT ID	PCT 4020
Condition	Scattered Paddock Trees over Exotic Understorey
Plot IDs	Plot 05
Formation	Forested Wetlands
Class	Coastal Floodplain Wetlands
% Cleared	65.28
Photo	
Location	This PCT occurs on the more low-lying parts of the Rezoning Area that are frequently inundated. The vegetation zone represents a highly disturbed condition state of this PCT, occurring in the areas of the rezoning area which have been subject to past clearing and horse grazing over many years, the result of which is a sparse canopy and understorey dominated by exotic grasses.
Canopy Description	This vegetation zone comprises a canopy with sparse cover, largely occurring as scattered trees, however some small remnant stands of trees at slightly higher density (up to 25%). Trees present in the canopy include swamp mahogany (<i>Eucalyptus robusta</i>), broad-leaved paperbark (<i>Melaleuca quinquenervia</i>), red mahogany (<i>Eucalyptus resinifera</i>), forest red gum (<i>Eucalyptus tereticornis</i>) and swamp oak (<i>Casuarina glauca</i>).
Mid-storey Description	The mid-storey is absent from this vegetation zone.
Ground Cover Description	The ground cover across this PCT was predominantly characterised by a dense (95-100%) cover of the exotic grass kikuyu (<i>Cenchrus clandestinus</i>), with very low cover of a small number of other native species such as kidney weed (<i>Dichondra repens</i>), native geranium (<i>Geranium solanderi</i>), slender knotweed (<i>Persicaria decipiens</i>), common rush (<i>Juncus usitatus</i>) and pennywort (<i>Hydrocotyle tripartita</i>).
Introduced Species	As described above, this vegetation zone was dominated by the introduced grass kikuyu (<i>Cenchrus clandestinus</i>). Other introduced species recorded in low density include plantain (<i>Plantago lanceolata</i>), Paddy's lucerne (<i>Sida rhombifolia</i>), Mullumbimby couch (<i>Cyperus brevifolius</i>) and flaxleaf fleabane (<i>Conyza bonariensis</i>).
PCT Allocation Justification	Location: PCT 4020 is common from the Central Coast to Forster. The Rezoning Area lies within the south end of this range.

PCT Name	Coastal Creekflat Layered Grass-Sedge Swamp Forest
	Community structure: This zone is in a disturbed condition state, however, is consistent with PCT 4020 which is described as “Myrtaceous Swamp Open Forest”. Species assemblage: This vegetation zone has a strong floristic match. The four diagnostic canopy species for PCT 4020 are present in this vegetation zone (<i>Casuarina glauca</i>, <i>Melaleuca quinquenervia</i>, <i>Eucalyptus robusta</i> and <i>Livistona australis</i>). Of the two mid-storey species listed, one was recorded in this zone (<i>Glochidion ferdinandi</i>). Four of the five ground-cover species were listed in this zone. Other PCTs considered: A number of other swamp sclerophyll forest PCTs were considered, including PCT 3441, 3906, 3998, 3959, 4044 and 4021. PCT 4020 was found to be the most appropriate match based on landscape position, geographic distribution, and floristics. <u>3441:</u> this PCT is defined from four plots on shallow soils in the lower Hunter valley to the west of Newcastle. On present knowledge it may be described as a tall grassy shrubland. This PCT is restricted to a location further north, the lower Hunter Valley, therefore, has not been further considered. <u>3906:</u> is described as a mid-high to very tall heathland, closed heathland, or rarely a tall sclerophyll open forest or woodland with a mid-stratum of heath shrubs and a ground layer of sedges found on low-lying clay alluvium on coastal plains between Wyong and Kempsey. Eucalypt trees are occasionally recorded as an emergent or rarely a canopy, including <i>Eucalyptus resinifera</i>, <i>Angophora costata</i>, <i>Eucalyptus robusta</i>, <i>Angophora inopina</i> or <i>Melaleuca sieberi</i>. This PCT occurs on low elevation creek flats of mainly between 0–20 metres asl and occasionally up to 30 metres asl, in areas that are periodically waterlogged by a rising water table. Although very similar, the floristics of the site is more closely suited to floristics of PCT 4020 than 3906. <u>3998:</u> is described as a tall sclerophyll open forest or woodland with a sub-canopy of <i>Melaleuca</i> trees and a ground layer of sedges found on poorly drained clay alluvium on low-lying creek flats between Gosford and Kempsey. The tree canopy is variable, however, commonly includes <i>Eucalyptus resinifera</i>, <i>Eucalyptus robusta</i> and <i>Angophora costata</i>. <i>Eucalyptus tereticornis</i>, <i>Eucalyptus pilularis</i> or <i>Eucalyptus parramattensis</i> are rarely recorded. This PCT most commonly occurs at 0–25 m asl, and rarely reaches higher elevations. The highest density of plots is in Wyong, Lake Macquarie and Medowie areas, where it is widespread on low relief landscapes that drain Permo-Triassic and Carboniferous sediments. It has also occasionally been recorded on coastal sand plains on impeded clay pans. Although very similar, the floristics of the site is more closely suited to floristics of PCT 4020 than PCT 3998. <u>3959:</u> is described as a very tall <i>Machaerina articulata</i> freshwater sedgeland occurring in closed depressions associated with deep coastal Quaternary sands, usually below 10 metres asl. It is known on the north coast and Central Coast botanical divisions particularly in beach-ridge swales and dune-deflation hollows, however, may occur elsewhere in similar niches in deep coastal deposits, or in alluvial or estuarine plain deposits in close vicinity of coastal barrier deposits. The site is not located in an area associated with deep coastal Quaternary sands, therefore this PCT has not been further considered. <u>4044:</u> is described as a structurally variable coastal swamp forest found on central and lower north coast alluvial creek flats. This PCT ranges from a tall to very tall eucalypt open forest with a sub-canopy of <i>Melaleuca</i> and mesophyll trees, to a mid-high closed forest, commonly with emergent eucalypts. The most frequently occurring emergent species include <i>Eucalyptus resinifera</i>, <i>Eucalyptus robusta</i> and <i>Eucalyptus piperita</i>. Characteristic of the PCT is the open to closed sub-canopy (or upper stratum where eucalypts are absent) of smaller trees. This PCT occurs on low-lying coastal valley alluvial deposits that are positioned between low to gently rising coastal hills. It occurs below 90 metres asl, however unlike other coastal swamp forests it is distributed in the coastal lowlands more

PCT Name	Coastal Creekflat Layered Grass-Sedge Swamp Forest
	than 10 kilometres from the coastline. Although very similar, the floristics of the site is more closely suited to floristics of PCT 4020 than 4044.
BC Act Status	This vegetation zone is consistent with the Swamp Sclerophyll Forest in the New South Wales North Coast, Sydney Basin and South-east Corner Bioregions listed as an endangered ecological community (EEC) listed under the BC Act. Refer to Section 4.3 for more details.
EPBC Act Status	This vegetation zone is consistent with the Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland EEC listed under the EPBC Act. Refer to Section 4.3 for more details.

4.3 Threatened Ecological Communities

4.3.1 Threatened Ecological Community Presence

The TECs determined to be present within the Subject Land are listed in **Table 4.2** and the extent of each TEC is mapped in **Figure 4.3**.

A highly disturbed remnant of the endangered ecological community, Swamp Sclerophyll Forest in the New South Wales North Coast, Sydney Basin and South-east Corner Bioregions as listed under the BC Act, was observed within the rezoning and biodiversity certification areas during surveys. This endangered ecological community corresponds to PCT 4020 Coastal Creekflat Layered Grass-Sedge Swamp Forest, Vegetation Zone 3 PCT 4020 Scattered Paddock Trees over Exotic Understorey.

Assessment for the potential occurrence of the Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland as listed under the EPBC Act was undertaken and was found not to meet the condition class requirements for the listed community. This assessment is provided below in **Section 4.3.2**.

Table 4.2 TECs within the Subject Land

TEC Name	Profile ID (from TBDC)	Act and Listing Status	Associated PCTS and vegetation condition zones within the development footprint	Extent (Rezoning and Biodiversity Certification Areas)
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	10786	Endangered ecological community under the BC Act	PCT 4020 Vegetation Zone 3 - Paddock trees over Exotic Grassland	0.76 ha

FIGURE 4.3
Threatened Ecological
Communities



- Legend**
- Study Area (Rezoning Area)
 - Subject Land (Biodiversity Certification Assessment Area)
 - Tree Protection Zone
 - Avoidance Area
 - Certified Land
 - Conservation Land
 - Swamp Sclerophyll Forest on Coastal Floodplains EEC (BC Act)
 - Pacific Highway
 - Road

0 25 50 75
Metres

Scale 1:2,500 at A4
GDA2020 MGA Zone 56



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4.3.2 Analysis of EPBC Act Listed TECs

Following completion of the site floristic surveys it was determined that there was potential for the EPBC Act listed endangered ecological community, Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland, to occur in correlation with Vegetation Zone 3 PCT 4020 Coastal Creekflat Layered Grass-Sedge Swamp Forest.

Vegetation Zones 1 and 2 were determined to have no potential to correspond to any listed TECs under the EPBC Act.

The Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland is defined as patches of native vegetation meeting the diagnostic and conditions thresholds provided in the approved conservation advice (DAWE 2022a).

Analysis was undertaken for Vegetation Zone 3 (PCT 4020) to determine whether the vegetation present corresponds with the key diagnostic criteria, condition classes, categories and thresholds within the Approved Conservation Advice for this EEC (DAWE 2022a). Assessment against the diagnostic characteristics is provided in **Table 4.3**.

Table 4.3 Assessment Against Diagnostic Characteristics for EPBC Act Listed EEC Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland

Diagnostic Characteristics	Vegetation Zone 3 PCT 4020 Assessment
Occurs on the mainland and islands near to the coast (within 20 km) from South East Queensland to south-eastern NSW specifically within these IBRA Bioregions: South Eastern Queensland (SEQ); NSW North Coast (NNC); Sydney Basin (SYB) and the Bateman sub-region of the South East Corner (SEC).	The Subject Land occurs in the Sydney Basin Bioregion.
Occurs in coastal catchments typically below 20 m ASL, but occasionally up to 220 m ASL.	Vegetation Zone 3 occurs in areas of the Subject Land that are at an elevation of <20 m ASL.
Occurs on hydric soils with inundation patterns ranging from intermittent to episodic.	The landscape where Vegetation Zone 3 sits is at a low elevation and is subject to intermittent inundation from the nearby Lake Munmorah foreshore.
The vegetation structure varies from tall closed to open forest to woodland, to dense (closed) shrubland or scrub forest. Minimum crown cover is at least 10%, but it is more typically in the range 50% to 70%.	The crown cover in this vegetation zone is typically at least 10%.
From South East Queensland to the Sydney Basin Bioregion, the canopy is typically dominated or co-dominated by <i>Melaleuca quinquenervia</i> and/or <i>Eucalyptus robusta</i> . In some areas, the canopy may be locally dominated by other melaleuca species including <i>M. dealbata</i> (SEQ bioregion) (rarely); <i>M. biconvexa</i> (mid-NSW coast to south of Sydney); <i>M. decora</i> (north of Shoalhaven), frequently with <i>Parsonsia straminea</i> climbing on the trunks of canopy species. In the SEC bioregion, <i>M. ericifolia</i> may occur as a dominant canopy or sub-canopy species.	Dominant canopy species in VZ3 are <i>Melaleuca quinquenervia</i> and <i>Eucalyptus robusta</i> . The vine <i>Parsonsia straminea</i> was recorded in low abundance.
Other tree species may occur in the canopy (or sub-canopy) in some areas, but they are not dominant across a patch, including <i>Casuarina glauca</i> , <i>Banksia</i> spp., <i>Callistemon salignus</i> , <i>Corymbia intermedia</i> (pink bloodwood),	<i>Eucalyptus tereticornis</i> and <i>Casuarina glauca</i> were recorded in the zone.

Diagnostic Characteristics	Vegetation Zone 3 PCT 4020 Assessment
<i>E. tereticornis</i>, (forest red gum/Queensland blue gum), <i>E. longifolia</i> (woollybutt), <i>E. botryoides</i> (southern mahogany/bangalay), <i>E. ovata</i> (swamp gum), <i>Livistona australis</i> and/or <i>Lophostemon</i> spp.	
The understorey typically includes a variable ground layer, depending on the canopy cover and inundation rate/period. Tall sedges (typically <i>Gahnia</i> spp.) and/or ferns often dominate the ground layer, mixed with graminoids and other herbs, especially <i>Imperata cylindrica</i> (blady grass).	Due to a history of disturbance, the ground layer of this vegetation zone comprised a dominance of the introduced grass kikuyu.
While they can occur regularly in the ground layer, the ecological community is not present if halophytic species, more typically associated with estuarine/saltmarsh areas, dominate the ground layer of a patch, for example, <i>Apium prostratum</i>, <i>Atriplex cineria</i>, <i>Chenopodium glaucum</i>, <i>Rhagodia candolleus</i> and <i>Samolus repens</i>.	These species, or other halophytic species were not recorded in the ground stratum in the zone.

Despite Vegetation Zone 3 PCT 4020 corresponding with the key diagnostic characteristics for the Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland EEC, it does not meet the condition class requirements from the approved conservation advice for the EEC reproduced in **Table 4.4** as the ground layer vegetation is not predominantly or mostly native, does not have >20% native cover and does not form or contain any discrete mostly continuous patches of >5 ha in area.

Table 4.4 EPBC Act Conservation Advice Condition Classes, Categories and Thresholds (DAWE 2022a)

Patch size thresholds →	Large patch The patch is at least 5 ha. It may or may not be contiguous with other native vegetation.	Medium patch The patch is at least 2 ha and less than 5 ha. It may or may not be contiguous with other native vegetation.	Small contiguous patch The patch is at least 0.25 ha and less than 2 ha and is part of a larger area of native vegetation of at least 5 ha.	Small patch The patch is at least 0.5 ha and less than 2 ha which is isolated or part of a small native vegetation remnant less than 5 ha in total.
Biotic thresholds ↓				
HIGH CONDITION Non-native species comprise < 20% of total ground layer vegetation cover*	CLASS A A <u>large patch</u> that meets key diagnostics AND has a predominantly native ground layer.	CLASS B1 A <u>medium patch</u> that meets key diagnostics AND has a <u>predominantly</u> native ground layer.	CLASS B2 A <u>small patch</u> that meets key diagnostics AND has a <u>predominantly</u> native ground layer AND is <u>contiguous**</u> with another <u>large</u> area of native vegetation.	CLASS C1 A <u>small patch</u> which meets key diagnostics AND has a <u>predominantly</u> native ground layer.
GOOD CONDITION Non-native species comprise 20% to 50% of total ground layer vegetation cover*	CLASS B1 A <u>large patch</u> that meets key diagnostics AND the ground layer is <u>mostly</u> native.	CLASS C1 A <u>medium patch</u> that meets key diagnostics AND the ground layer is <u>mostly</u> native.	CLASS C2 A <u>small patch</u> that meets key diagnostics AND has a <u>mostly</u> native ground layer AND is <u>contiguous**</u> with another large area of native vegetation.	CLASS C2 A <u>small patch</u> that meets key diagnostics AND has a <u>mostly</u> native ground layer.
MODERATE CONDITION Non-native species comprise 50% - 80% of total ground layer vegetation cover*	CLASS C1 A <u>large patch</u> which meets key diagnostics AND the ground layer has at least 20% native vegetation cover.	CLASS C2 A <u>medium patch</u> that meets key diagnostics AND the ground layer has at least 20% native vegetation cover.	Not protected	Not protected
LOW CONDITION Non-native species comprise more than 80% of total ground layer vegetation cover*	CLASS C2 A <u>large patch</u> which meets key diagnostics, but the ground layer has low native vegetation cover.	Not protected	Not protected	Not protected
*Refers to total perennial ground layer vegetation cover for the patch of the ecological community. Includes vascular plant species with a lifecycle of more than two growing seasons. It includes herbs (graminoids and forbs), grasses, shrubs, and juvenile plants of canopy species, but does not include annual plants, cryptogams, leaf litter or exposed soil. **Contiguous means the patch is connected or within 30 m of another area of native vegetation. See Appendix B for further information on non-native/invasive alien plants associated with the Coastal Swamp Sclerophyll Forest.				

4.4 Vegetation Zones

A description of each vegetation Condition Zone within the Rezoning and Biodiversity Certification Areas is provided in **Section 4.2** of this Report. A map of the vegetation condition zones is provided in **Figure 4.2** and the details of each Condition Zone including area, patch size class and the BAM survey plots required and completed are provided in **Table 4.5**.

Table 4.5 Vegetation Condition Zones and Patch Sizes

Vegetation Condition Zone ID	PCT ID and Name	Condition/ other defining feature	Extent Within Biodiversity Certification Area (ha)	Patch Size Class	No. Vegetation Integrity Plots Required	No. Vegetation Integrity Plots Completed	No. Vegetation Integrity Plots Used in Assessment	Plot IDs of Vegetation Integrity Plots Used in Assessment
1	3583 Hunter Coast Lowland Scribbly Gum Forest	Paddock Trees over Exotic Understorey	0.45	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	P1
2	3583 Hunter Coast Lowland Scribbly Gum Forest	Exotic Grassland	7.87	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	P2, P3, P4
3	4020 Coastal Creekflat Layered Grass-Sedge Swamp Forest	Paddock Trees over Exotic Understorey	0.76	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	P5

4.5 Vegetation Integrity (Vegetation Condition)

4.5.1 Vegetation Integrity Survey Plots

Details on the number of BAM plots (floristic and vegetation integrity survey plots) required and completed for each vegetation condition zone, in accordance with Table 3 of the BAM, are provided in **Table 4.5**. The vegetation integrity plot survey locations are shown in **Figure 2.1**, and the vegetation integrity plot survey data is provided in **Appendix D**.

4.5.2 Vegetation Integrity Scores

The vegetation integrity condition scores for the BAM Plots completed are provided in **Table 4.6**. This table represents the combined scores from all plots completed for each vegetation condition zone, including the vegetation integrity score and the presence of hollow-bearing trees.

Table 4.6 Vegetation Integrity Condition Scores

Vegetation Zone ID	Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score	Hollow-bearing Trees Present?
Vegetation Zone 1 PCT 3583	12.3	12	12.2	12.2	Yes
Vegetation Zone 2 PCT 3583	3.2	0	0	1.5	No
Vegetation Zone 3 PCT 4020	61	23.1	46.8	40.4	Yes

4.5.3 Use of Benchmark Data

The standard BAM-C benchmark values were used in this assessment for each vegetation zone.

4.6 Fauna Habitats

4.6.1 Mapped Important Habitats

The Rezoning Area contains mapped important habitat for the swift parrot. The mapping includes some scattered paddock trees in the north-western section of the Subject Land (**Photo 4.1**) and some canopy vegetation which is overhanging the eastern boundary of the Rezoning Area (**Photo 4.2**). All areas of mapped important habitat for the swift parrot have been excluded from the Biodiversity Certification Area and are proposed for retention as part of the masterplan for the future development of the site.



Photo 4.1 Image of the area of mapped Swift Parrot Important habitat in the north-western corner of the rezoning area. The mapped habitat in this location will be retained



Photo 4.2 Image of the area of mapped Swift Parrot Important habitat along the eastern boundary of the rezoning area which consists of eucalypts from the adjoining allotment over-hanging exotic pasture understorey. The mapped habitat in this location will be retained and a tree protection zone provided

4.6.2 Hollow-bearing Trees and Nests

Hollow-bearing tree locations are mapped in **Figure 4.4** and a detailed hollow-bearing tree assessment is contained in **Appendix G**. The hollow-bearing trees observed during surveys, contained small to medium sized hollows of <20 cm aperture, with the exception of one tree which had a >20 cm aperture hollow (**Photo 4.3**). The single tree with a hollow >20 cm aperture is less than 4 m high and not suitable as nest habitat for threatened owls. Umwelt also previously recorded a dead hollow-bearing tree in the centre of the site, with a hollow of approximately 30 cm aperture which was being used as a nest for a pair of sulphur-crested cockatoos, this tree was in a state of decay and had subsequently fallen over when inspected during follow-up site surveys.

A broad-leaved paperbark with a long vertical scar which contained a nesting site for rainbow lorikeets was observed and is shown in **Photo 4.4**.

A stick nest was observed during surveys and checked for activity during the breeding periods for the candidate raptor species. No raptors were observed using the nest and it was likely constructed by a smaller passerine species such as an Australian raven or Australian magpie. The nest observed is shown in **Photo 4.5**.



Photo 4.3 The only large hollow-bearing tree observed with a hollow opening of >20 cm in aperture. The entrance to the hollow in this tree is less than 4 m in height and it therefore does not provide suitable nesting habitat for threatened owl species



Photo 4.4 **Example of a hollow in a broad-leaved paperbark observed, rainbow lorikeets were nesting within the hollow**



Photo 4.5 **Drone photograph of unoccupied stick nest in broad-leaved paperbark observed during surveys**

4.6.3 Winter Flowering Eucalypts

Winter flowering eucalypts provide an important foraging resource for threatened bird and mammal species such as the swift parrot, regent honeyeater and grey-headed flying-foxes. The following winter flowering species observed during surveys include the forest red gum (*Eucalyptus tereticornis*) and swamp mahogany (*Eucalyptus robusta*). Red bloodwood (*Corymbia gummifera*) also occurs as scattered individuals within PCT 3583 and flowers sporadically from December to June. Several mature broad-leaved paperbark trees are also present, this species typically flowers between February and May with some flowers through winter.

4.6.4 Understorey Habitats

The understorey habitats are highly degraded across the site and are dominated by exotic vegetation, the typical condition of these habitats is shown in **Photo 4.6**. The landholder has advised that the site is subject to a regular program of fertiliser application and slashing as part of the management of the site for livestock grazing. Kikuyu is the dominant grass across the site with many other species of exotic species of grasses and groundcovers present.



Photo 4.6 Example of the highly degraded understorey habitats found across the rezoning area

4.6.5 Waterbodies

There are three small farm dams within the Subject Land which provide suitable habitat for waterbirds and amphibians, these areas are shown in **Figure 4.4**. The farm dams along the western boundary are shown in **Photo 4.7** and **Photo 4.8**. Some native vegetation surrounds these dams included a ring of remnant trees along the northernmost dam and some sedges in the southernmost dam. These dams are linked by a shallow ephemeral constructed drainage ditch that is mapped as a first order watercourse. This drainage ditch conveys runoff from the dam spillways and is not a natural or permanent watercourse. It is overgrown by exotic grasses as shown in **Photo 4.9**.

A small dam is also present in the north-eastern section of the site, this dam is devoid of native vegetation and is shown in **Photo 4.10**.



Photo 4.7 Small dam fringed by native trees along the western boundary of the site



Photo 4.8 Small farm dam with some native sedges along the south-western boundary of the site



Photo 4.9 Man-made ephemeral drainage ditch that is mapped as a first order watercourse



Photo 4.10 Small farm dam devoid of native vegetation in the north-eastern section of the site

4.6.6 Rocky Habitats

No rocky habitats are present within the site.

4.6.7 Man-Made Structures

There are sheds, stables, a garage and a residential dwelling within the Rezoning Area. The dwelling and garage are well secured and not likely to provide shelter for any fauna species. The sheds and stables are open and provide potential habitat for fauna species. These open structures are shown in **Photo 4.11** to **Photo 4.14** and were searched several times throughout the survey program for signs of roosting fauna including microbats, with no activity detected. There are also old vehicles present within the site, in particular an old timber-framed lorry (**Photo 4.15**) which was also searched for signs of fauna habitation, with no evidence of use observed.



Photo 4.11 Existing open machinery shed behind the residential dwelling



Photo 4.12 Open horse stables/shed in the eastern section of the site



Photo 4.13 Existing storage shed attached to the stables showing state of structural decay



Photo 4.14 Inside of a portable shed/animal shelter, west of the site access driveway (now completely dilapidated)



Photo 4.15 Inside of an old lorry which contains some potential shelter sites for fauna species

4.6.8 Stockpiled Materials

Stockpiles of logs, building materials and old vehicles were observed throughout the site. Attempts were made to search for fauna under items such as pieces of metal sheeting (**Photo 4.16**) and around log piles (**Photo 4.17**).

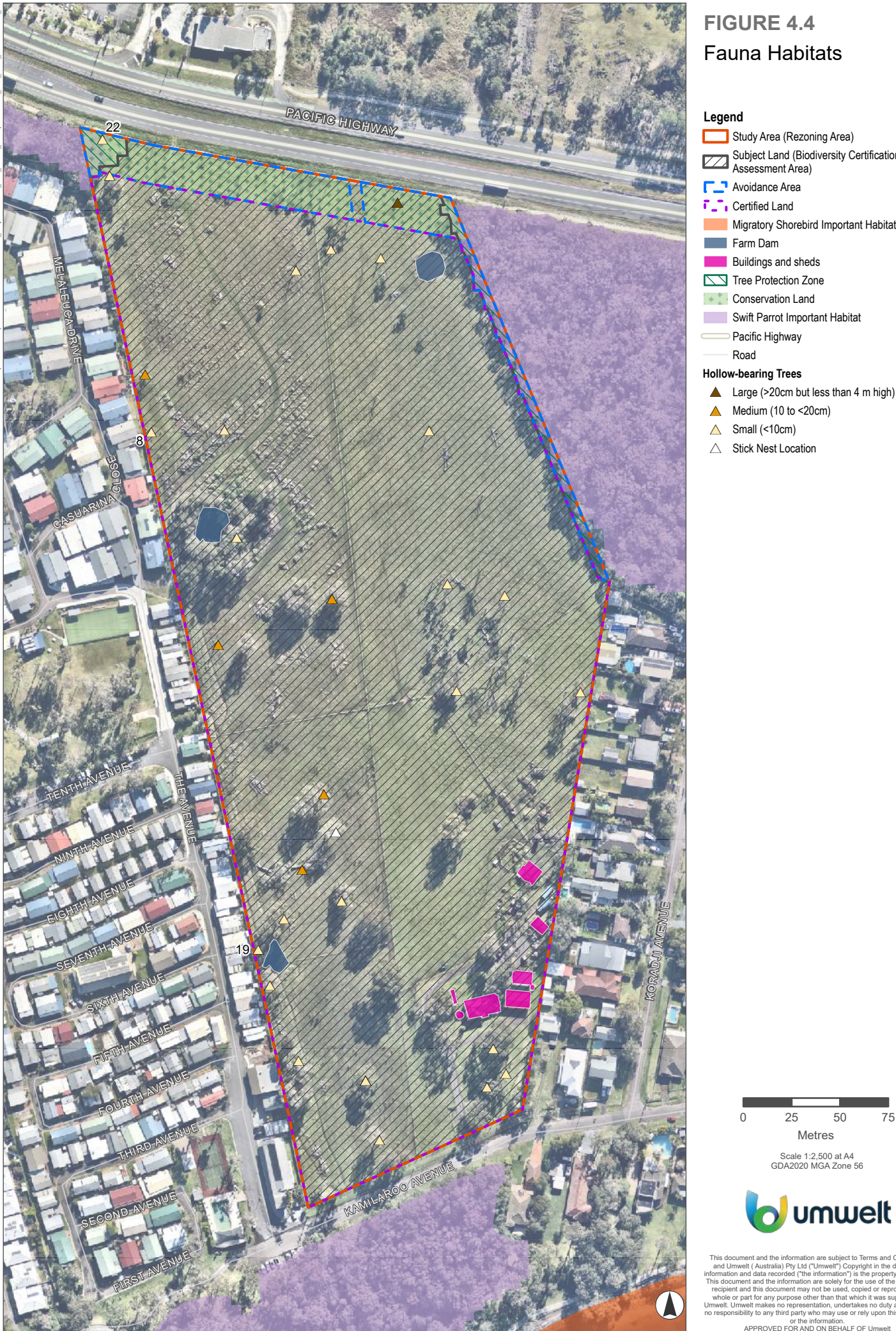


Photo 4.16 Stockpiled metal sheeting



Photo 4.17 Stockpiled logs

FIGURE 4.4
Fauna Habitats



5.0 Habitat Suitability for Threatened Species

5.1 Identification of Threatened Species for Assessment

5.1.1 Ecosystem Credit Species

The ecosystem credit species predicted to occur on or use the Subject Land are identified in **Table 5.1**. Under the BAM ecosystem credit species are described as being considered likely to have suitable habitat present and assessment against listed habitat constraints, listed geographic limitations and species vagrancy are the only accepted methods under the BAM for removal of species from the list of ecosystem credit species. There are several ecosystem credit species retained, which are not permitted to be excluded in the list of ecosystem credit species in **Table 5.1**, which have no reasonable potential to occur within the Subject Land as suitable habitats for them are not present.

Table 5.1 Predicted Ecosystem Credit Species

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusion Justification	Associated PCT and Condition Zone species retained within	Sensitivity to Gain Class
		BC Act	EPBC Act							
Regent honeyeater (foraging habitat)	<i>Anthochaera phrygia</i>	CE	CE	Yes	BAM-C	-	Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	High
Dusky woodswallow	<i>Artamus cyanopterus cyanopterus</i>	V	-	No	BAM-C	-	Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	Moderate
Australasian bittern	<i>Botaurus poiciloptilus</i>	E	E	No	BAM-C	Waterbodies, brackish or freshwater wetlands	Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	Moderate
Sanderling (foraging)	<i>Calidris alba</i>	V	-	Yes	BAM-C	-	Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	High
Red knot (foraging)	<i>Calidris canutus</i>	-	E	Yes	BAM-C	-	Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	High
Great knot (foraging)	<i>Calidris tenuirostris</i>	V	CE	Yes	BAM-C	Within 5 km of coast or tidal influenced water bodies	Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	High

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusion Justification	Associated PCT and Condition Zone species retained within	Sensitivity to Gain Class
		BC Act	EPBC Act							
Gang-gang cockatoo (foraging habitat)	<i>Callocephalon fimbriatum</i>	E	E	Yes	BAM-C	-	Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	Moderate
South-eastern glossy black-cockatoo (foraging habitat)	<i>Calyptorhynchus lathami lathami</i>	V	V	Yes	BAM-C	Presence of Allocasuarina and Casuarina species	Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	High
Greater sand plover (foraging)	<i>Charadrius leschenaultii</i>	V	V	No	BAM-C	-	Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	High
Lesser sand-plover (foraging)	<i>Charadrius mongolus</i>	V	E	No	BAM-C	-	Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	High
Speckled warbler	<i>Chthonicola sagittata</i>	V	-	No	BAM-C	-	Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland	High
Spotted harrier	<i>Circus assimilis</i>	V	-	No	BAM-C	-	Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	Moderate

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusion Justification	Associated PCT and Condition Zone species retained within	Sensitivity to Gain Class
		BC Act	EPBC Act							
Brown treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	V	-	No	BAM-C	-	Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	High
Varied sittella	<i>Daphoenositta chrysoptera</i>	V	-	No	BAM-C	-	Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	Moderate
Spotted-tailed quoll	<i>Dasyurus maculatus</i>	V	E	No	BAM-C	-	Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	High

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusion Justification	Associated PCT and Condition Zone species retained within	Sensitivity to Gain Class
		BC Act	EPBC Act							
Black-necked stork	<i>Ephippiorhynchus asiaticus</i>	E	-	No	BAM-C	Shallow, open freshwater or saline wetlands or lakes or shallow edges of deeper wetlands within 300 m of these swamps	Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	Moderate
Black falcon	<i>Falco subniger</i>	V	-	No	BAM-C	-	Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	Moderate
Eastern false pipistrelle	<i>Falsistrellus tasmaniensis</i>	V	-	No	BAM-C	-	Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland	High
Little lorikeet	<i>Glossopsitta pusilla</i>	V	-	No	BAM-C	-	Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	High

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusion Justification	Associated PCT and Condition Zone species retained within	Sensitivity to Gain Class
		BC Act	EPBC Act							
White-bellied sea-eagle (foraging habitat)	<i>Haliaeetus leucogaster</i>	V	-	Yes	BAM-C	Within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines	Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	High
Little eagle (foraging habitat)	<i>Hieraaetus morphnoides</i>	V	-	Yes	BAM-C	-	Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	Moderate
White-throated needletail	<i>Hirundapus caudacutus</i>	-	V	No	BAM-C	-	Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	High

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusion Justification	Associated PCT and Condition Zone species retained within	Sensitivity to Gain Class
		BC Act	EPBC Act							
Black bittern	<i>Ixobrychus flavicollis</i>	V	-	No	BAM-C	Waterbodies, land with 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation	Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland	Moderate
Swift parrot (foraging)	<i>Lathamus discolor</i>	E	CE	Yes	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	Moderate
Bar-tailed godwit (baueri) (foraging)	<i>Limosa lapponica baueri</i>	-	V	Yes	BAM-C		Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	High
Square-tailed kite (foraging)	<i>Lophoictinia isura</i>	-	V	Yes	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	Moderate

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusion Justification	Associated PCT and Condition Zone species retained within	Sensitivity to Gain Class
		BC Act	EPBC Act							
Black-chinned honeyeater (eastern subspecies)	<i>Melithreptus gularis gularis</i>	V	-	No	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland	Moderate
Eastern coastal free-tailed bat	<i>Micronomus norfolkensis</i>	V	-	No	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	High
Little bent-winged bat (foraging habitat)	<i>Miniopterus australis</i>	V	-	Yes	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	High
Large bent-winged bat (foraging habitat)	<i>Miniopterus orianae oceanensis</i>	V	-	Yes	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	High

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusion Justification	Associated PCT and Condition Zone species retained within	Sensitivity to Gain Class
		BC Act	EPBC Act							
Turquoise parrot	<i>Neophema pulchella</i>	V	-	No	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland	High
Eastern curlew (foraging)	<i>Numenius madagascariensis</i>	-	CE	Yes	BAM-C		Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	High
Eastern osprey (foraging habitat)	<i>Pandion cristatus</i>	V	-	Yes	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	Moderate
Yellow-bellied glider	<i>Petaurus australis</i>	V	V	No	BAM-C		Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	High
Scarlet robin	<i>Petroica boodang</i>	V	-	No	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	Moderate

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusion Justification	Associated PCT and Condition Zone species retained within	Sensitivity to Gain Class
		BC Act	EPBC Act							
Flame robin	<i>Petroica phoenicea</i>	V	-	No	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	High
Golden-tipped bat	<i>Phoniscus papuensis</i>	V	-	No	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	High
Grey-crowned babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	V	-	No	BAM-C		Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	Moderate
Eastern chestnut mouse	<i>Pseudomys gracilicaudatus</i>	V	-	No	BAM-C		Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	High
New holland mouse	<i>Pseudomys novaehollandiae</i>	-	V	No	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland	High

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusion Justification	Associated PCT and Condition Zone species retained within	Sensitivity to Gain Class
		BC Act	EPBC Act							
Grey-headed flying-fox (non-breeding habitat)	<i>Pteropus poliocephalus</i>	V	V	Yes	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	High
Rose-crowned fruit-dove	<i>Ptilinopus regina</i>	V	-	No	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	Moderate
Australian painted snipe	<i>Rostratula australis</i>	E	E	No	BAM-C		Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	Moderate
Yellow-bellied sheath-tail-bat	<i>Saccolaimus flaviventris</i>	V	-	No	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	High

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusion Justification	Associated PCT and Condition Zone species retained within	Sensitivity to Gain Class
		BC Act	EPBC Act							
Greater broad-nosed bat	<i>Scoteanax rueppellii</i>	V	-	No	BAM-C		Yes	-	PCT 3583 Paddock trees with Exotic Understorey PCT 3583 Exotic Grassland PCT 4020 Paddock Trees with Exotic Understorey	High
Rosenberg's goanna	<i>Varanus rosenbergi</i>	V	-	No	BAM-C		Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	High
Terek sandpiper (foraging)	<i>Xenus cinereus</i>	V	-	Yes	BAM-C		Yes	-	PCT 4020 Paddock Trees with Exotic Understorey	High

5.1.2 Species Credit Species

5.1.2.1 Predicted Flora Species Credit Entities

The flora species credit species predicted to occur on the Subject Land are identified in **Table 5.2**.

Justification is provided for any species from the BAM-C automatically populated list excluded from assessment. Geographic limitations, habitat constraints, degradation or lack of suitable microhabitats are the permitted reasons for excluding species credit species.

For threatened flora species NSW DPIE (2020b) identify that only the suitable habitat for the target species within the Subject Land needs to be surveyed and includes areas on the Subject Land supporting any listed habitat constraints and PCTs associated with that species in the TBDC. In this context NSW DPIE (2020b) also identify that suitable habitat for threatened flora may encompass entire PCTs or be restricted to niches determined with consideration of habitat constraints, land use history, disturbance events and climatic factors. The TBDC and the Threatened Species Profile website, along with appropriate published or peer-reviewed references and/or data were used to determine suitable habitat (NSW DCCEE 2025a).

Table 5.2 Predicted Threatened Flora Species Credit Species

Scientific Name	Common Name	Listing Status		Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusion Justification	PCT and vegetation condition zone species associated with (retained = Y/ excluded = N/ blank = not associated with PCT)	
		BC Act	EPBC Act					PCT 3583	PCT 4020
<i>Acacia bynoeana</i>	Bynoe's wattle	E	V	BAM-C	-	Yes*	-	Y	Y
<i>Angophora inopina</i>	Charmhaven apple	V	V	BAM-C	-	Yes	-	Y	Y
<i>Asperula asthenes</i>	Trailing woodruff	V	V	BAM-C	-	Yes	-	-	Y
<i>Callistemon linearifolius</i>	Netted bottle brush	V	-	BAM-C	-	Yes*	-	Y	Y
<i>Corunastylis</i> sp. <i>Charmhaven</i> (Syn. <i>Genoplesium branwhiteorum</i>)	-	CE	CE	BAM-C		Yes *	-	-	Y
<i>Cryptostylis hunteriana</i>	Leafless tongue orchid	V	V	BAM-C	-	Yes *	-	Y	-
<i>Diuris praecox</i>	Rough doubletail	V	V	BAM-C	Within the Parish boundaries of Newcastle, Kahibah, Wallarah, Tuggerah and Kincumber. The Subject Land occurs in the Parish of Wallarah.	Yes*	-	Y	-
<i>Eucalyptus camfieldii</i>	Camfield's stringybark	V	V	BAM-C	-	Yes	-	Y	-

Scientific Name	Common Name	Listing Status		Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusion Justification	PCT and vegetation condition zone species associated with (retained = Y/ excluded = N/ blank = not associated with PCT)	
		BC Act	EPBC Act					PCT 3583	PCT 4020
<i>Eucalyptus parramattensis</i> subsp. <i>decadens</i>	-	V	V	BAM-C	-	Yes	-	-	Y
<i>Eucalyptus parramattensis</i> subsp. <i>parramattensis</i> endangered population	-	E. pop	-	BAM-C	Wyong and Lake Macquarie LGAs	Yes	-	-	Y
<i>Genoplesium insigne</i>	Variable midge orchid	CE	CE	BAM-C	-	Yes*	-	Y	Y
<i>Grevillea parviflora</i> ssp. <i>parviflora</i>	Small-flower grevillea	V	V	BAM-C	-	Yes*	-	Y	
<i>Maundia triglochinos</i>	-	V	-	BAM-C	Riparian areas/drainage lines, water ponding, man-made dams and drainage channels up to 1 m deep, Semi-permanent, ephemeral wet areas or Swamps.	Yes	-	-	Y
<i>Melaleuca biconvexa</i>	Biconvex paperbark	V	V	BAM-C	-	Yes	-	-	Y

Scientific Name	Common Name	Listing Status		Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusion Justification	PCT and vegetation condition zone species associated with (retained = Y/ excluded = N/ blank = not associated with PCT)	
		BC Act	EPBC Act					PCT 3583	PCT 4020
<i>Persicaria elatior</i>	Tall knotweed	V	V	BAM-C	Semi-permanent (ephemeral) wet areas or within 50 m of swamps, waterbodies or wetlands.	Yes	-	-	Y
<i>Rhizanthella slateri</i>	Eastern underground orchid	V	E	BAM-C	-	Yes*	-	Y	-
<i>Rhodomirtus psidioides</i>	Native guava	CE	CE	BAM-C	-	Yes*	-	-	Y
<i>Rutidosia heterogama</i>	Heath wrinklewort	V	V	BAM-C	-	Yes*	-	Y	
<i>Syzygium paniculatum</i>	Magenta lilly pilly	E	V	BAM-C	-	Yes	-	-	Y
<i>Tetratea juncea</i>	Black-eyed Susan	V	V	BAM-C	-	Yes*	-	Y	-
<i>Thelymitra adorata</i>	Wyong sun orchid	CE	CE	BAM-C	-	Yes	-	Y	Y

* Species retained for further assessment as a precaution, all vegetation zones are considered to be too disturbed due to historical land management practices to support the species.

5.1.2.2 Threatened Fauna Candidate Species

The fauna species credit species predicted to occur on the Subject Land are identified in **Table 5.3**.

Justification is provided for any species from the BAM-C automatically populated list excluded from assessment. Geographic limitations, vagrant species, habitat constraints, degradation or lack of suitable microhabitats are the permitted reasons for excluding species credit species.

Table 5.3 Predicted Threatened Fauna Species Credit Species

Scientific Name	Common Name	Listing Status		Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusions Justification	PCT and vegetation condition zone species associated with (retained = Y/ excluded = N/ blank = not associated with the PCT)	
		BC Act	EPBC Act					PCT 3583	PCT 4020
<i>Anthochaera phrygia</i> (breeding)	Regent honeyeater	CE	CE	BAM-C	As per Important Habitat Map.	No	No mapped Important Habitat present	N	N
<i>Burhinus grallarius</i>	Bush stone-curlew	E	-	BAM-C	Fallen/ standing dead timber including logs.	Yes	-	Y	Y
<i>Calidris alba</i> (breeding)	Sanderling	V	-	BAM-C	As per Important Habitat Map.	No	No mapped Important Habitat present	-	N
<i>Calidris canutus</i> (breeding)	Red knot	-	E	BAM-C	As per Important Habitat Map.	No	No mapped Important Habitat present	-	N
<i>Calidris tenuirostris</i> (breeding)	Great knot	V	CE	BAM-C	As per Important Habitat Map, within 5 km of coast or tidal influenced water bodies.	No	No mapped Important Habitat present	-	N
<i>Callocephalon fimbriatum</i> (breeding)	Gang-gang cockatoo	V	E	BAM-C	Hollow-bearing trees with hollows >9 cm.	Yes	-	Y	Y
<i>Calyptrorhynchus lathamii</i>	Glossy black-cockatoo (breeding)	V	V	BAM-C	Hollow-bearing trees with hollows >15 cm >8 m above ground level.	Yes		Y	Y

Scientific Name	Common Name	Listing Status		Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusions Justification	PCT and vegetation condition zone species associated with (retained = Y/ excluded = N/ blank = not associated with the PCT)	
		BC Act	EPBC Act					PCT 3583	PCT 4020
<i>Cercartetus nanus</i>	Eastern pygmy-possum	V	-	BAM-C	-	Yes	-	Y	Y
<i>Chalinolobus dwyeri</i>	Large-eared pied bat	V	V	BAM-C	Within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.	No	Habitat constraints not met	N	N
<i>Charadrius leschenaultii</i> (breeding)	Greater sand-plover	V	V	BAM-C	As per Important Habitat Map.	No	No mapped Important Habitat present	-	N
<i>Charadrius mongolus</i> (breeding)	Lesser sand-plover	V	E	BAM-C	As per Important Habitat Map.	No	No mapped Important Habitat present	-	N
<i>Crinia tinnula</i>	Wallum froglet	V	-	BAM-C	-	Yes	-	Y	Y
<i>Delma vescolineata</i>	Hunter Valley Delma	E	E	BAM-C	Within the Hunter River catchment	No	Site is not within the Hunter River catchment	Y	Y
<i>Haliaeetus leucogaster</i> (breeding)	White-bellied sea-eagle	V	-	BAM-C	Living or dead mature trees within suitable vegetation within 1 km of a rivers,	Yes	-	Y	Y

Scientific Name	Common Name	Listing Status		Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusions Justification	PCT and vegetation condition zone species associated with (retained = Y/ excluded = N/ blank = not associated with the PCT)	
		BC Act	EPBC Act					PCT 3583	PCT 4020
					lakes, large dams or creeks, wetlands and coastlines.				
<i>Heleioporus australiacus</i>	Giant burrowing frog	V	V	BAM-C	-	No	Habitat is too degraded	N	N
<i>Hieraaetus morphnoides</i> (breeding)	Little eagle	V	-	BAM-C	Potential nest trees - live (occasionally dead) large old trees within vegetation).	Yes	-	Y	
<i>Hoplocephalus stephensii</i>	Stephens' banded snake	V	-	BAM-C	Hollow-bearing trees/ within 500 m of this habitat. Within 500 m of arboreal vine tangle, fallen/standing dead timber/ including logs/ within 500 m of this habitat.	Yes	-	Y	Y
<i>Lathamus discolor</i> (Important Habitat)	Swift parrot	E	CE	BAM-C	As per Important Habitat Map.	No	All mapped important habitat present will be retained as part of project impact	Y	Y

Scientific Name	Common Name	Listing Status		Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusions Justification	PCT and vegetation condition zone species associated with (retained = Y/ excluded = N/ blank = not associated with the PCT)	
		BC Act	EPBC Act					PCT 3583	PCT 4020
							avoidance measures.		
<i>Limosa lapponica baueri</i> (breeding)	Bar-tailed godwit (baueri)	-	V	BAM-C	As per Important Habitat Map.	No	No mapped Important Habitat present	-	N
<i>Litoria aurea</i>	Green and golden bell frog	E	V	BAM-C	Permanent/ephemeral wet areas or within 1 km of a waterbody.	Yes	-	-	Y
<i>Litoria brevipalmata</i>	Green-thighed frog	V	-	BAM-C	Semipermanent/ephemeral wet areas, swamps or waterbodies.	Yes	Habitat is too degraded but surveyed as a precaution.	-	N
<i>Lophoictinia isura</i> (breeding)	Square-tailed kite	V	-	BAM-C TBDC	Potential nest trees.	Yes	-	Y	Y
<i>Miniopterus australis</i> (breeding)	Little bent-winged bat	V	-	BAM-C	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding.	No	Habitat constraints not met	N	N
<i>Miniopterus orianae oceanensis</i> (breeding)	Large bent-winged bat	V	-	BAM-C	Cave, tunnel, mine, culvert or other structure known or suspected to be	No	Habitat constraints not met	N	N

Scientific Name	Common Name	Listing Status		Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusions Justification	PCT and vegetation condition zone species associated with (retained = Y/ excluded = N/ blank = not associated with the PCT)	
		BC Act	EPBC Act					PCT 3583	PCT 4020
					used for breeding.				
<i>Mixophyes balbus</i>	Stuttering frog	E	V	BAM-C	-	No	Habitat is too degraded	N	N
<i>Mixophyes iteratus</i>	Giant barred frog	E	E	BAM-C	Land within 50 m of semi-permanent and permanent drainages.	No	Habitat is too degraded	N	N
<i>Myotis macropus</i>	Southern myotis	V	-	BAM-C	Hollow-bearing trees, bridges, caves or artificial structures, within 200 m of a riparian zone or waterbody.	Yes	-	Y	Y
<i>Nettapus coromandelianus</i>	Cotton pygmy-goose	E	-	BAM-C	Waterbodies/deep permanent fresh waters on floodplains with floating and submergent vegetation.	No	Habitat constraints not met.	N	N
<i>Ninox connivens</i>	Barking owl	V	-	BAM-C	Hollow-bearing trees with hollows >20 cm diameter and >4 m AGL.	Retained at request of Central Coast Council. Hollow bearing trees observed do not	-	Y	Y

Scientific Name	Common Name	Listing Status		Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusions Justification	PCT and vegetation condition zone species associated with (retained = Y/ excluded = N/ blank = not associated with the PCT)	
		BC Act	EPBC Act					PCT 3583	PCT 4020
						meet habitat constraint requirements.			
<i>Ninox strenua</i>	Powerful owl	V	-	BAM-C TBDC	Hollow-bearing trees with hollows >20 cm diameter.	Retained at request of Central Coast Council. Hollow bearing trees observed do not meet habitat constraint requirements.	-	Y	Y
<i>Numenius madagascariensis</i> (breeding)	Eastern curlew	-	CE	BAM-C	As per important habitat map.	No	No mapped Important Habitat present.	N	N
<i>Pandion cristatus</i>	Eastern osprey	V	-	BAM-C	Presence of stick nests in dead trees or artificial structures within 100 m of a floodplain.	Yes	-	Y	Y
<i>Petauroides volans</i>	Southern greater glider	E	E	BAM-C TBDC	Hollow-bearing trees.	Yes	Habitat is too degraded, retained as targeted in surveys for other species.	N	N
<i>Petaurus norfolcensis</i>	Squirrel glider	V	-	BAM-C	-	Yes	-	Y	Y

Scientific Name	Common Name	Listing Status		Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusions Justification	PCT and vegetation condition zone species associated with (retained = Y/ excluded = N/ blank = not associated with the PCT)	
		BC Act	EPBC Act					PCT 3583	PCT 4020
<i>Petrogale penicillata</i>	Brush-tailed rock-wallaby	E	V	BAM-C	Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines.	No	Habitat constraints not met.	N	-
<i>Phascogale tapoatafa</i>	Brush-tailed phascogale	V	-	BAM-C TBDC	-	No	Habitat is too degraded and isolated from extant populations.	N	N
<i>Phascolarctos cinereus</i>	Koala	E	E	BAM-C	Presence of koala use trees.	No	Habitat is too degraded and isolated from extant populations.	N	N
<i>Planigale maculata</i>	Common planigale	V	-	BAM-C	-	No	Habitat is too degraded and isolated from extant populations.	N	N
<i>Potorous tridactylus</i>	Long-nosed potoroo	V	V	BAM-C	-	No	Habitat is too degraded and isolated from extant populations.	N	N
<i>Pteropus poliocephalus</i> (breeding)	Grey-headed flying-fox	V	V	BAM-C	Breeding camps.	No	Habitat constraints/ breeding camps are not present.	N	N

Scientific Name	Common Name	Listing Status		Sources	Habitat Constraints/ Geographic Limitations	Species Retained for Further Assessment?	Exclusions Justification	PCT and vegetation condition zone species associated with (retained = Y/ excluded = N/ blank = not associated with the PCT)	
		BC Act	EPBC Act					PCT 3583	PCT 4020
<i>Tyto novaehollandiae</i>	Masked owl	V	-	BAM-C	Hollow-bearing trees/ living or dead trees with hollows greater than 20 cm diameter.	Retained at request of Central Coast Council. Hollow bearing trees observed do not meet habitat constraint requirements.	-	Y	Y
<i>Uperoleia mahonyi</i>	Mahony's toadlet	E	-	BAM-C	-	Yes	-	Y	Y
<i>Vespadelus trougtoni</i>	Eastern cave bat	V	-	BAM-C	Caves/within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within 2 km of old mines, tunnels, old buildings or sheds.	Yes	-	N	N
<i>Xenus cinereus</i> (breeding)	Terek sandpiper	V	-	BAM-C	As per Important Habitat Map.	No	No mapped Important Habitat present.	N	N

5.2 Presence of Candidate Species Credit Species

5.2.1 Threatened Flora Species

A summary of the methods used for determination of presence or absence for candidate threatened flora species credit species is provided in **Table 5.4**. Further details on the surveys completed for the candidate threatened species are documented in **Section 5.3**. No candidate threatened flora species were observed during surveys.

Table 5.4 Determining the Presence of Candidate Flora Species Credit Species within the Subject Land

Scientific Name	Common Name	Listing Status		Method used to Determine Presence	Present?	Further Assessment Required?
		BC Act	EPBC Act			
<i>Acacia bynoeana</i>	Bynoe's wattle	E	V	Targeted threatened species survey	No	No
<i>Angophora inopina</i>	Charmhaven apple	V	V	Targeted threatened species survey	No	No
<i>Asperula asthenes</i>	Trailing woodruff	V	V	Targeted threatened species survey	No	No
<i>Callistemon linearifolius</i>	Netted bottle brush	V	-	Targeted threatened species survey	No	No
<i>Corunastylis</i> sp. Charmhaven (Syn. <i>Genoplesium branwhiteorum</i>)	-	CE	CE	Targeted threatened species survey	No	No
<i>Cryptostylis hunteriana</i>	Leafless tongue orchid	V	V	Targeted threatened species survey	No	No
<i>Diuris praecox</i>	Rough doubletail	V	V	Targeted threatened species survey	No	No
<i>Eucalyptus camfieldii</i>	Camfield's stringybark	V	V	Targeted threatened species survey	No	No
<i>Eucalyptus parramattensis</i> subsp. <i>decadens</i>	-	V	V	Targeted threatened species survey	No	No
<i>Eucalyptus parramattensis</i> subsp. <i>parramattensis</i> endangered population	<i>Eucalyptus parramattensis</i> ssp. <i>parramattensis</i> endangered population in Wyong and Lake Macquarie Local Government Areas	E. pop	-	Targeted threatened species survey	No	No
<i>Genoplesium insigne</i>	Variable midge orchid	CE	CE	Targeted threatened species survey	No	No
<i>Grevillea parviflora</i> ssp. <i>Parviflora</i>	Small-flower grevillea	V	V	Targeted threatened species survey	No	No

Scientific Name	Common Name	Listing Status		Method used to Determine Presence	Present?	Further Assessment Required?
		BC Act	EPBC Act			
<i>Maundia triglochinoides</i>	-	V	-	Targeted threatened species survey	No	No
<i>Melaleuca biconvexa</i>	Biconvex paperbark	V	V	Targeted threatened species survey	No	No
<i>Persicaria elatior</i>	Tall Knotweed	V	V	Targeted threatened species survey	No	No
<i>Rhizanthella slateri</i>	Eastern underground orchid	V	E	Targeted threatened species survey	No	No
<i>Rhodomirtus psidioides</i>	Native guava	CE	CE	Targeted threatened species survey	No	No
<i>Rutidosia heterogama</i>	Heath wrinklewort	V	V	Targeted threatened species survey	No	No
<i>Syzygium paniculatum</i>	Magenta lilly pilly	E	V	Targeted threatened species survey	No	No
<i>Tetradlea juncea</i>	Black-eyed Susan	V	V	Targeted threatened species survey	No	No
<i>Thelymitra adorata</i>	Wyong sun orchid	CE	CE	Targeted threatened species survey	No	No

5.2.2 Threatened Fauna Species Observations

5.2.2.1 Summary of Species Credit Threatened Fauna Survey Results

A summary of the methods used for determination of presence or absence of candidate threatened fauna species credit species is provided in **Table 5.5**. Further details on the surveys completed for the candidate threatened species are documented in **Section 5.3**.

Table 5.5 Determining the Presence of Candidate Fauna Species Credit Species within the Subject Land

Scientific Name	Common Name	Listing Status		Method used to Determine Presence	Present?	Further Assessment Required?
		BC Act	EPBC Act			
<i>Burhinus grallarius</i>	Bush Stone-curlew	E	-	Targeted threatened species survey	No	No
<i>Callocephalon fimbriatum</i>	Gang-gang cockatoo	E	E	Targeted threatened species survey	No	No
<i>Calyptorhynchus lathami</i>	Glossy black-cockatoo	V	V	Targeted threatened species survey	No	No
<i>Cercartetus nanus</i>	Eastern pygmy-possum	V	-	Targeted threatened species survey	No	No
<i>Crinia tinnula</i>	Wallum froglet	V	-	Targeted threatened species survey	No	No
<i>Haliaeetus leucogaster</i>	White-bellied sea-eagle	V	-	Targeted threatened species survey	Observed flying over the site, not observed breeding on subject land.	No
<i>Hieraaetus morphnoides</i>	Little eagle	V	-	Targeted threatened species survey	No	No
<i>Hoplocephalus stephensii</i>	Stephens' banded snake	V	-	Targeted threatened species survey	No	No
<i>Lathamus discolor</i>	Swift parrot	E	CE	Important habitat map check	Important Habitat is mapped within the subject land, all impacts to these mapped areas will be avoided and all mapped important habitat will be retained outside of the Biodiversity Certification Area.	No
<i>Litoria aurea</i>	Green and golden bell frog	E	V	Targeted threatened species survey	No	No
<i>Litoria brevipalmata</i>	Green-thighed Frog	V	-	Targeted threatened species survey	No	No

Scientific Name	Common Name	Listing Status		Method used to Determine Presence	Present?	Further Assessment Required?
		BC Act	EPBC Act			
<i>Lophoictinia isura</i>	Square-tailed kite	V	-	Targeted threatened species survey	No	No
<i>Myotis macropus</i>	Southern myotis	V	-	Targeted threatened species survey	No	No
<i>Ninox connivens</i>	Barking owl	V	-	Targeted threatened species survey	No	No
<i>Ninox strenua</i>	Powerful owl	V	-	Targeted threatened species survey	No	No
<i>Pandion cristatus</i>	Eastern osprey	V	-	Targeted threatened species survey	Observed flying over the site, not observed breeding on subject land. Known breeding location is present to the north of the Pacific Highway on a communications tower.	No
<i>Petauroides volans</i>	Southern greater glider	V	V	Targeted threatened species survey	No	No
<i>Petaurus norfolcensis</i>	Squirrel glider	V	-	Targeted threatened species survey	No	No
<i>Pteropus poliocephalus</i>	Grey-headed flying-fox	V	V	Targeted threatened species survey	Observed flying over the site, not observed breeding on subject land. No nearby camps.	No
<i>Tyto novaehollandiae</i>	Masked owl	V	-	Targeted threatened species survey	No	No
<i>Uperoleia mahonyi</i>	Mahony's toadlet	E	-	Targeted threatened species survey	No	No
<i>Vespadelus troughtoni</i>	Eastern cave bat	V	-	Targeted threatened species survey	No	No

5.3 Threatened Species Surveys and Assessment Justifications

A summary of the targeted surveys completed for candidate threatened flora species is provided in Table 5.6.

Table 5.6 Summary of Targeted Surveys Completed for Candidate Threatened Flora Species

Candidate Threatened Flora Species Survey Details
<i>Acacia bynoeana</i> Bynoe's wattle Habitat Description: Grows mainly in heath and dry sclerophyll forest, in sandy soils, south of Dora Creek-Morisset area to Berrima and the Illawarra region, west to the Blue Mountains, also recorded from near Kurri Kurri in the Hunter Valley and from Morton National Park. Habitat or Geographical Constraints: None listed. Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM. Survey Requirement: Use reference population to identify vegetative state. This species is a sub-shrub which requires parallel field traverses at 10 m spacing in dense vegetation and 15 m in open vegetation. Survey Period: Year-round. Surveys Completed: Targeted 10 m parallel traverse surveys were completed on 13 November 2023 (7 person hours). Results: This species was not observed during targeted surveys and has been assessed as not present. The habitats present are also considered to be too disturbed to support this species.
<i>Angophora inopina</i> Charmhaven apple Habitat Description: Grows in open woodland with a dense shrub understorey in sandy and clay soils over sandstone, predominantly on the NSW Central Coast. Habitat or Geographical Constraints: None listed. Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM. Survey Requirement: This species is a tree which requires parallel field traverses at 20 m spacing in dense vegetation and 40 m in open vegetation. Survey Period: Year-round. Surveys Completed: Targeted 10 m parallel traverse surveys were completed during July 2022 (11.5 person hours) and 16 August 2023 (6 person hours). Results: This species was not observed during targeted surveys and has been assessed as not present.
<i>Asperula asthenes</i> trailing woodruff Habitat Description: Occurs in damp sites, often along riverbanks. It is found in scattered locations from the Central Coast (Mandalong area) north to near Kempsey, with several records from the Port Stephens/Karuah/Wallis Lakes/Forster. Habitat or Geographical Constraints: None listed. Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM. Survey Requirement: This species is in the herbs and forbs growth form which requires parallel field traverses at 5 m spacing in dense vegetation and 10 m in open vegetation. Survey Period: October–December. Surveys Completed: Targeted 10 m parallel traverse surveys were completed on 13 November 2023 (7 person hours). Results: This species was not observed during targeted surveys and has been assessed as not present.

Candidate Threatened Flora Species Survey Details

***Callistemon linearifolius* netted bottle brush**

Habitat Description: Grows in dry sclerophyll forest on the coast and adjacent ranges.

Habitat or Geographical Constraints: None listed.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: This species is a shrub which requires parallel field traverses at 10 m spacing in dense vegetation and 20 m in open vegetation. Survey October to January, if not observed in flower, return for re-survey later in the survey period.

Survey Period: October–January.

Surveys Completed: Targeted 10 m parallel traverse surveys were completed on 13 November 2023 (7 person hours) and 22 January 2024 (9 person hours).

Results: This species was not observed during targeted surveys and has been assessed as not present. The habitats present are also considered to be too disturbed to support this species.

***Corunastylis* sp. *Charmhaven* (Syn. *Genoplesium branwhiteorum*)**

Habitat Description: It occurs within low woodland to heathland with a shrubby understorey and ground layer. Distributed from Morisset in the north to Warnervale in the south and as far east as Chain Valley Bay.

Habitat or Geographical Constraints: None listed.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: Requires flowering material to identify. Flowering time is variable depending on rainfall and is limited to about 2 weeks. Survey when a nearby reference population is in flower, somewhere between November–April. Survey in November–December. If not found survey again in January–February and again in March–April, 2 weeks after a rainfall event. This species is an orchid which requires parallel field traverses at 5 m spacing in dense vegetation and 10 m in open vegetation. The PCTs present are considered to be open vegetation as there is no shrub layer.

Survey Period: November–April.

Surveys Completed: Central Coast Council were consulted to identify the peak flowering period for this species for the 2023–2024 flowering season. Council advised that this species was flowering on 17 January 2024 and site surveys were completed on 22 January 2024 (9 person hours), consisting of targeted 10 m parallel traverse surveys. Early parallel traverse searches of the site for this species were also completed on 13 November 2023 (7 person hours).

Results: This species was not observed during targeted surveys and has been assessed as not present. The habitats present are also considered to be too disturbed to support this species.

***Cryptostylis hunteriana* leafless tongue orchid**

Habitat Description: On the Central Coast of NSW, populations have been recorded in woodland dominated by scribbly gum (*Eucalyptus haemastoma*), brown stringybark (*Eucalyptus capitellata*), red bloodwood (*Corymbia gummifera*), also associated with large tongue orchid (*C. subulata*) and the tartan tongue orchid (*C. erecta*). Recorded at Munmorah State Conservation Area, Nelson Bay, Wyee, Washpool National Park, Nowendoc State Forest, Ku-Ring-Gai Chase National Park and Ben Boyd National Park.

Habitat or Geographical Constraints: None listed.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: This species is an orchid which requires parallel field traverses at 5 m spacing in dense vegetation and 10 m in open vegetation. The PCTs present are considered to be open vegetation as there is no shrub layer.

Survey Period: November–January.

Candidate Threatened Flora Species Survey Details

Surveys Completed: Central Coast Council were consulted to identify the peak flowering period for this species for the 2023-2024 flowering season. Council advised that this species was flowering during the week of 12 November 2023 and site surveys were completed on 13 November 2023 (7 person hours) and 22 January 2024 (9 person hours), incorporating 10 m wide belt transect searches.

Results: This species was not observed during targeted surveys and has been assessed as not present. The habitats present are also considered to be too disturbed to support this species.

Diuris praecox rough doubletail

Habitat Description: Grows in sclerophyll forest of coastal and near-coastal districts, from Ourimbah to Nelson Bay.

Habitat or Geographical Constraints: Within the Parish boundaries of Newcastle, Kahibah, Wallarah, Tuggerah and Kincumber.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: This species is an orchid which requires parallel field traverses at 5 m spacing in dense vegetation and 10 m in open vegetation. The PCTs present are considered to be open vegetation as there is no shrub layer.

Survey Period: August (recommend checking a local reference population before surveying to identify flowering times).

Surveys Completed: Central Coast Council were consulted to identify the peak flowering period for this species for the 2023–2024 flowering season. Council advised that this species was flowering during the week of 6 August and Umwelt confirmed the presence of flowering plants in the Munmorah State Conservation Area on 16 August 2023. Targeted 10 m parallel traverse surveys were completed during on 16 August 2022 incorporating 6 person hours of searches completed by two ecologists.

Results: This species was not observed during targeted surveys and has been assessed as not present. The habitats present are also considered to be too disturbed to support this species.

Eucalyptus camfieldii Camfield's stringybark

Habitat Description: Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges. Rare and localised, in coastal shrub heath on sandy soils on sandstone, often of restricted drainage, from Gosford to Royal National Park.

Habitat or Geographical Constraints: None listed.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: This species is a tree which requires parallel field traverses at 20 m spacing in dense vegetation and 40 m in open vegetation. Identifiable throughout year by epicormic growth or juvenile foliage.

Survey Period: Year-round.

Surveys Completed: Targeted 10 m parallel traverse survey were completed during July 2022 (11.5 person hours) and 16 August 2023 (6 person hours).

Results: This species was not observed during targeted surveys and has been assessed as not present.

Eucalyptus parramattensis subsp. *decadens*

Habitat Description: It occurs in dry sclerophyll woodland with dry heath understorey. It also occurs as an emergent in dry or wet heathland. Often where this species occurs, it is a community dominant.

Habitat or Geographical Constraints: None listed.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: This species is a tree which requires parallel field traverses at 20 m spacing in dense vegetation and 40 m in open vegetation.

Survey Period: Year-round.

Surveys Completed: Targeted 10 m parallel traverse surveys were completed during July 2022 (11.5 person hours) and 16 August 2023 (6 person hours).

Candidate Threatened Flora Species Survey Details

Results: This species was not observed during targeted surveys and has been assessed as not present.

Eucalyptus parramattensis subsp. *parramattensis* – endangered population

Habitat Description: The endangered population occurs on sandy alluvium within a floodplain community. The endangered population in the Lake Macquarie and Wyong local government areas is at the north-eastern limit of the species range and is quite separate from other known populations. The majority of the population occurs within Wyong in the Porter's Creek and the Wallarah Creek catchments.

Habitat or Geographical Constraints: Wyong and Lake Macquarie LGAs.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: This species is a tree which requires parallel field traverses at 20 m spacing in dense vegetation and 40 m in open vegetation.

Survey Period: Year-round.

Surveys Completed: Targeted 10 m parallel traverse surveys were completed during July 2022 (11.5 person hours) and 16 August 2023 (6 person hours).

Results: This species was not observed during targeted surveys and has been assessed as not present.

Genoplesium insigne variable midge orchid

Habitat Description: Appears to be associated scribbly gum – red bloodwood – *Angophora inopina* (not always present) heathy woodland on lowlands of the Central Coast and variations containing *Angophora costata* (smooth-barked apple). Recent and historic disturbance regimes (fire, clearing, routine slashing) appear to influence above ground emergence.

Habitat or Geographical Constraints: None listed.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: Requires flowering material to identify. Flowering time is variable depending on recent rainfall and is limited to about 2 weeks. Survey when a nearby reference population is in flower. Survey September to early October. If not located, survey again in mid-October to November. This species is an orchid which requires parallel field traverses at 5 m spacing in dense vegetation and 10 m in open vegetation.

Survey Period: September–November.

Surveys Completed: Central Coast Council were consulted to identify the peak flowering period for this species for the 2023 flowering season. Council advised that this species started flowering during late August and expected peak flowering to commence in early September. Targeted 10 m parallel traverse surveys were completed on 6 September 2023 incorporating 6 person hours of searches as well as 15 September 2023 incorporating 4 person hours of searches.

Results: This species was not observed during targeted surveys and has been assessed as not present. The habitats present are also considered to be too disturbed to support this species.

Grevillea parviflora subsp. *parviflora* small-flower grevillea

Habitat Description: Grows in sandy or light clay soils usually over thin shales, often with lateritic ironstone gravels and nodules. Occurs in a range of vegetation types from heath and shrubby woodland to open forest.

Habitat or Geographical Constraints: None listed.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: This species is a shrub which requires parallel field traverses at 10 m spacing in dense vegetation and 20 m in open vegetation.

Survey Period: August–November.

Surveys Completed: Targeted 10 m parallel traverse surveys were completed on 6 September 2023 incorporating 6 person hours of searches as well as 15 September 2023 incorporating 4 person hours of searches.

Results: This species was not observed during targeted surveys and has been assessed as not present. The habitats present are also considered to be too disturbed to support this species.

Candidate Threatened Flora Species Survey Details

Maundia triglochinos

Habitat Description: Grows in swamps, lagoons, dams, channels, creeks or shallow freshwater 30–60 cm deep on heavy clay, low nutrients.

Habitat or Geographical Constraints: Riparian areas/drainage lines, water ponding, man-made dams and drainage channels up to 1 m deep. Semi-permanent/ephemeral wet areas. Shallow swamps and waterbodies up to 1 m deep.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: This species is in the herbs and forbs growth form which requires parallel field traverses at 5 m spacing in dense vegetation and 10 m in open vegetation. Suitable habitat for this species on the site is considered to be limited to dams and fringing habitats.

Survey Period: November–March.

Surveys Completed: Targeted 10 m parallel traverse surveys were completed during November 2023 and January 2024 incorporating 16 person hours completed over 2 days by two people (13 November 2023 and 22 January 2024).

Results: This species was not observed during targeted surveys and has been assessed as not present. The habitats present are also considered to be too disturbed to support this species.

***Melaleuca biconvexa biconvex* paperbark**

Habitat Description: Biconvex paperbark generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.

Habitat or Geographical Constraints: Within 50 m of semi-permanent/ ephemeral wet areas or swamps, including wetlands.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: This species is a tall shrub which requires parallel field traverses at 20 m spacing in dense vegetation and 40 m in open vegetation.

Survey Period: Year-round.

Surveys Completed: Targeted 10 m parallel traverse surveys were completed during July 2022 incorporating 11.5 person hours of searches over one day (19 July 2022) by two ecologists.

Results: This species was not observed during targeted surveys and has been assessed as not present.

***Persicaria elatior* tall knotweed**

Habitat Description: This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.

Habitat or Geographical Constraints: Within 50 m of semi-permanent/ephemeral wet areas, swamps or waterbodies including wetlands.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: This species is in the herbs and forbs growth form which requires parallel field traverses at 5 m spacing in dense vegetation and 10 m in open vegetation.

Survey Period: December–May.

Surveys Completed: Targeted 10 m parallel traverse surveys were completed during January 2024 incorporating 9 person hours of searches over one day (22 January 2024) by two ecologists.

Results: This species was not observed during targeted surveys and has been assessed as not present.

***Rhizanthella slateri* Eastern Australian underground orchid**

Habitat Description: Habitat requirements are poorly understood, and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. 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.

Candidate Threatened Flora Species Survey Details

Habitat or Geographical Constraints: None listed.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: This species is an orchid which requires parallel field traverses at 5 m spacing in dense vegetation and 10 m in open vegetation.

Survey Period: September–November.

Surveys Completed: Targeted 10 m parallel traverse surveys were completed during September 2023 incorporating 10 person hours of searches over two days (6 and 15 September) by two ecologists and during November 2023 incorporating 7 person hours over one day (13 November 2023) by one ecologist.

Results: This species was not observed during targeted surveys and has been assessed as not present. The habitats present are also considered to be too disturbed to support this species.

Rhodomlyrtus psidioides native guava

Habitat Description: Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines.

Habitat or Geographical Constraints: None listed.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: This species is a shrub which requires parallel field traverses at 10 m spacing in dense vegetation and 20 m in open vegetation.

Survey Period: Year-round.

Surveys Completed: Targeted parallel traverses during July 2022 incorporating 11.5 person hours completed over one day (19 July 22) by two ecologists, as well as, during November 2023 incorporating 7 person hours of searches over one day (13 November 2023) by two ecologists.

Results: This species was not observed during targeted surveys and has been assessed as not present. The habitats present are also considered to be too disturbed to support this species.

Rutidosia heterogama heath wrinklewort

Habitat Description: Grows in heath on sandy soils and moist areas in open forest and has been recorded along disturbed roadsides.

Habitat or Geographical Constraints: None listed.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: This species is in the herbs and forbs growth form which requires parallel field traverses at 5 m spacing in dense vegetation and 10 m in open vegetation.

Survey Period: Year-round.

Surveys Completed: Targeted parallel traverses during July 2022 incorporating 11.5 person hours completed over one day (19 July 22) by two ecologists, as well as, during November 2023 incorporating 7 person hours of searches over one day (13 November 2023) by two ecologists.

Results: This species was not observed during targeted surveys and has been assessed as not present. The habitats present are also considered to be too disturbed to support this species.

Syzygium paniculatum magenta lilly pilly

Habitat Description: On the central coast magenta lilly pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.

Habitat or Geographical Constraints: None listed.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: This species is a tree which requires parallel field traverses at 20 m spacing in dense vegetation and 40 m in open vegetation.

Survey Period: April–June.

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Surveys Completed: Targeted 10 m parallel traverse surveys were completed during July 2022 incorporating 11.5 person hours of searches over one day (22 July 2022) by two ecologists.

Results: Surveys were completed out of the recommended survey period by ~22 days, however, if found on site, *Syzygium* sp. specimens could have been collected based on foliage and then confirmed by the Royal Botanic Gardens. Potential specimens are easily identifiable by foliage. No *Syzygium* species were found on site, therefore, this species has been excluded and has been assessed as not present.

Tetratheca juncea black-eyed Susan

Habitat Description: It is usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also been recorded in heathland and moist forest. Occurs on low nutrient, well drained soils on substrates that are generally sandy skeletal soil on sandstone or sandy-loam, or pH neutral clayey soil from conglomerates.

Habitat or Geographical Constraints: None listed.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: This species is a low prostrate shrub which requires parallel field traverses at 10 m spacing in dense vegetation and 15 m in open vegetation.

Survey Period: September–October.

Surveys Completed: Targeted 10 m parallel traverse surveys were completed during September 2023 incorporating 10 person hours of searches over two days (6 and 15 September 2023) by two ecologists.

Results: This species was not observed during targeted surveys and has been assessed as not present. The habitats present are also considered to be too disturbed to support this species.

Thelymitra adorata Wyong sun orchid

Habitat Description: Occurs from 10-40 m asl in grassy woodland or occasionally derived grassland in well-drained clay loam or shale derived soils. The vegetation type in which the majority of populations occur (including the largest colony) is a spotted gum - ironbark forest with a diverse grassy understorey and occasional scattered shrubs.

Habitat or Geographical Constraints: None listed.

Survey Guideline: DPIE Surveying Threatened Plants and their Habitats NSW Survey Guide for the BAM.

Survey Requirement: Use a nearby reference population to determine most likely time for flowering. This species is an orchid which requires parallel field traverses at 5 m spacing in dense vegetation and 10 m in open vegetation.

Survey Period: September–October.

Surveys Completed: Central Coast Council were consulted to identify the peak flowering period for this species for the 2023 flowering season. Council advised that one of the populations of this species finished flowering during mid-September. Targeted 10 m parallel traverse survey completed on 6 September 2023 incorporating 6 person hours of searches as well as 15 September 2023 incorporating 4 person hours of searches.

Results: This species was not observed during targeted surveys and has been assessed as not present.

A summary of the targeted surveys completed for candidate threatened fauna species is provided in **Table 5.7**.

Table 5.7 Summary of Species Credit Threatened Fauna Surveys Completed

Candidate Threatened Fauna Species Survey Details

***Anthochaera phrygia* regent honeyeater (mapped important habitat)**

Credit type: Dual credit species with mapped important habitat assessed for species credits and as potential SAI Entity and non-important habitat assessed for ecosystem credits.

Habitat Description (mapped important habitat): The mapped areas include areas identified in The National Recovery Plan (DOE 2016) as critical to the survival of the species formed the basis of the mapping for use in the BAM. These were refined to only include areas of suitable habitat based on expert opinion PCTs associated with the species (as per the TBDC). A dataset of occurrence records was generated from BioNet, BirdLife Australia, Australian National University Difficult Bird Research Group and expert opinion of historic, unrecorded breeding. Records were overlayed on the refined areas. All woodland vegetation within 200 m of a record was added. Records of known breeding events that occurred outside of the polygons created above were identified. Radial buffers of 1 km were applied to single breeding events (once off breeding at a location) and 5 km buffers applied to multiple breeding events (multiple events in the same year or over multiple years at one location). All woodland vegetation was selected within 1 km buffers. Within 5 km buffers, PCTs associated with the species were selected, along with all woodland vegetation within 200 m of a record.

Associated PCTs: Not applicable for species assessed via mapped important habitat.

Survey Requirements: No surveys are required for this species under the BAM, as the foraging habitat component will be offset using ecosystem credits and important habitat which requires species credits, is not mapped within the Development Footprint.

Assessment Approach and Justification: Mapped important habitat for this species is not present and accordingly this species has been excluded from further assessment for species credits.

***Burhinus grallarius* bush stone-curlew**

Credit Type: Full species credit.

Habitat Description: This species is mainly found on the western slopes and plains and the Riverina, smaller numbers occur in coastal areas such as on the southern Central Coast and the North Coast with increasing numbers in Tweed Valley. It may be easier to detect during breeding season, possibly calls all year, but it is unclear how well it responds to playback. The species was allocated to a species credit as experts determined that it cannot be predicted to occur at a site based on vegetation surrogates but can be detected reliably from survey (NSW DPE 2024).

Habitat or Geographical Constraints: Fallen/ standing timber including logs.

Survey Requirements: Walking through habitat to flush birds/ day habitat search and spotlighting on foot or from vehicle at any time of year.

Surveys Completed: Daytime habitat searches were completed on by two ecologists over 9 days (55 person hours) on 19 July 2022 (5.75 hrs x 2 ecologists), 16 August 2022 (3 hrs x 2 ecologists), 6 September 2023 (3 hrs x 2 ecologists), 15 September 2023 (2 hrs x 2 ecologists) 13 November 2023 (3.5 hrs x 2 ecologists), 21 November 2023 (3.75 hrs x 2 ecologists), 22 November 2023 (1.5 hrs x 2 ecologists), 23 November 2023 (0.5 hrs x 2 ecologists), 22 January 2024 (4.5 hrs x 2 ecologists). Nocturnal spotlighting searches (with the assistance of a thermal scope) were completed by two ecologists over 5 nights (23 persons hours) on 13 November 2023 (2 hrs x 2 ecologists), 21 November 2023 (2 hrs x 2 ecologists), 22 November 2023 (2 hrs x 2 ecologists), 23 November (2 hrs x 2 ecologists), 30 November 2023 (1.5 hrs x 2 ecologists), 30 November 2023 (2 hrs x 2 ecologists).

Assessment Approach and Justification: This species was not observed during surveys and has been assessed as surveyed and not present.

***Calidris alba* sanderling (mapped important habitat)**

Assessment Approach and Justification: This species is assessed via the presence of mapped important habitat. Mapped important habitat for this species is not present and accordingly this species has been excluded from further assessment for species credits.

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Calidris canutus red knot (mapped important habitat)

Assessment Approach and Justification: This species is assessed via the presence of mapped important habitat. Mapped important habitat for this species is not present and accordingly this species has been excluded from further assessment for species credits.

Calidris tenuirostris great knot (mapped important habitat)

Assessment Approach and Justification: This species is assessed via the presence of mapped important habitat. Mapped important habitat for this species is not present and accordingly this species has been excluded from further assessment for species credits.

Callocephalon fimbriatum gang-gang cockatoo (breeding habitat)

Credit Type: Dual credit species with breeding habitat assessed for species credits and foraging habitat assessed for ecosystem credits.

Habitat Description: In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas (NSW DCCEEW 2025a). Breeding hollows have an average entrance height of 21.3 cm, a minimum entrance height of 12 cm and an entrance width range of 9–24 cm (NSW DCCEEW 2025a). Breeding aggregations occur and are reliant on stands of multiple hollow-bearing trees.

Habitat or Geographical Constraints: Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger.

Survey Requirements: Survey requirements are specified in the TBDC. This is a dual credit species. The identification of breeding habitat will require assumed presence, survey or an expert report. Survey period is October to January.

Step 1. Assessors should look for signs of breeding on site as follows; (a) lone adult males identified during the breeding season (October to January); or (b) an occupied nest. If breeding is presumed present, progress to Step 3.

Step 2. Where signs of breeding on site are present, potential nest trees should be identified. Potential nest trees are forest and woodland eucalypts containing hollows that are; (i) at least 3 m above the ground and (ii) with hollow diameter of 7 cm or larger.

Step 3. Where potential nest trees are identified on site, monitor for this species during the breeding season (October to January) to confirm the presence of any actual nest trees on site. DPIE is currently developing survey guidance for threatened bird species. In the interim, assessors must undertake a species survey using best practice methods that can be replicated for repeat surveys (as per the BAM threatened species survey requirements).

Step 4. If actual nest trees are confirmed on site, then the species polygons are to be drawn around those actual nest trees (i.e. trees that birds of the species are known to have used for nesting). The species polygons should be circular in shape and must include a buffer radius of 200 m around each actual nest tree. The purpose of the buffer is to identify the essential area for breeding and minimise disturbance/ avoid clearing for a development application, or conserve and improve habitat for a biodiversity stewardship agreement. The shape of the buffer can be modified where evidence provided in the Biodiversity Assessment Report indicates an alternative shape would better meet the species needs in the context of the assessment site. For example, extant vegetation is linear, and the nest tree is already located near the edge of the wooded area.

Surveys Completed: Hollow-bearing trees with hollows >7 cm in diameter and >3 m above ground were mapped and targeted during surveys by field ecologists during habitat assessments undertaken. Diurnal bird surveys in accordance with Step 1 to 3 of the survey requirements were undertaken by two ecologists over five days (27.5 person hours) on 13 November 2023 (3.5 hrs x 2 ecologists), 21 November 2023 (3.75 hrs x 2 ecologists), 22 November 2023 (1.5 hrs x 2 ecologists), 23 November 2023 (0.5 hrs x 2 ecologists), 22 January 2024 (4.5 hrs x 2 ecologists). These surveys included diurnal census on foot with watching and listening for signs of activity such as the presence of adult birds and begging chicks around potential nesting trees.

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Assessment Approach and Justification: This species was not observed during surveys and has been assessed as surveyed and not present.

Calyptrorhynchus lathami lathami south-eastern glossy black-cockatoo

Credit Type: Dual credit species with breeding habitat assessed for species credits and foraging habitat assessed for ecosystem credits.

Habitat Description: Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur ((NSW DCCEEW 2025a).

Habitat or Geographical Constraints: Living or dead tree with hollows greater than 15 cm diameter and greater than 8 m above ground for species credit breeding habitat component and presence of allocasuarina or casuarina species for ecosystem credit foraging habitat component.

Survey Requirements: Survey requirements are specified in the TBDC. This is a dual credit species. The identification of breeding habitat will require survey or an expert report. Survey period is January to September.

Step 1. Assessors should look for signs of breeding on site as follows; (a) begging birds of any age or sex; or (b) lone adult males identified during the breeding season (April to August); or (c) an occupied nest.

Step 2. Where signs of breeding on site are present, potential nest trees should be identified. Potential nest trees contain hollows that are; (i) at least 8 m above the ground; and (ii) in stems with a diameter of at least 30 cm; and (iii) hollow diameter is at least 15 cm; and (iv) stem angle is at least 45 degrees and may be near-vertical or vertical.

Step 3. Where potential nest trees are identified on site, monitor for this species during the breeding season (Apr – Aug) to confirm the presence of any actual nest trees on site. DPIE is currently developing survey guidance for threatened bird species. In the interim, assessors must undertake a species survey using best practice methods that can be replicated for repeat surveys (as per the BAM threatened species survey requirements).

Step 4. If actual nest trees are confirmed on site, then the species polygons are to be drawn around those actual nest trees (i.e. trees that birds of the species are known to have used for nesting). The species polygons should be circular in shape and must include a buffer radius of 200 m around each actual nest tree. The purpose of the buffer is to identify the essential area for breeding and minimise disturbance/ avoid clearing for a development application, or conserve and improve habitat for a biodiversity stewardship agreement. The shape of the buffer can be modified where evidence provided in the Biodiversity Assessment Report indicates an alternative shape would better meet the species needs in the context of the assessment site. For example, subject land under assessment is linear, and the nest tree is already located near the edge of the wooded area.

Surveys Completed: Presence of Casuarina sp., which is a habitat constraint for the ecosystem credit for this species were confirmed during flora surveys and habitat searches for this species. Diurnal bird surveys in accordance with Step 1 of the survey requirements were undertaken by 2 ecologists over 3 days (21.5 person hours) on 19 July 2022 (5.75 hrs x 2 ecologists), 6 September 2023 (3 hrs x 2 ecologists) and 15 September 2023 (2 hrs x 2 ecologists).

Assessment Approach and Justification: This species was not directly or indirectly observed (through the presence of chew Allocasuarina seed cones) during surveys and has been assessed as not present.

Cercartetus nanus eastern pygmy-possum

Credit Type: Full species credit.

Habitat Description: Found in a broad range of habitats from rainforest, sclerophyll forest and woodland and heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Feeds largely on nectar and pollen collected from banksia, eucalyptus and bottlebrush species (NSW DCCEEW 2025a).

Habitat or Geographical Constraints: None listed.

Survey Requirements: Survey period is October to March. TBDC provides no species-specific guideline requirements other than mentioning species is difficult to detect especially via spotlighting.

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Surveys Completed: Nocturnal spotlighting searches (with the assistance of a thermal scope) were completed by two ecologists over 5 nights (23 persons hours) on 13 November 2023 (2 hrs x 2 ecologists), 21 November 2023 (2 hrs x 2 ecologists), 22 November 2023 (2 hrs x 2 ecologists), 23 November (2 hrs x 2 ecologists), 30 November 2023 (1.5 hrs x 2 ecologists), 30 November 2023 (2 hrs x 2 ecologists). Camera trapping was completed from 21 November 2023 to 7 December 2023 with 10 cameras deployed for 16 nights (160 camera trap nights).

Cameras were mounted on trees with 5 cameras at approximately 1.5 m height and 5 cameras at the base of tree trunks and lures consisted of a weatherproof bait cannister loosely packed with a sticky rolled oats, honey and peanut butter mixture, mounted on trees sprayed liberally with a honey-water mixture. Cameras were refocussed from factory settings to 2.5 m for optimal detection of small mammals.

Assessment Approach and Justification: This species was not observed during surveys and has been assessed as not present. It is also considered that the Study Area is too disturbed to support this species as there are only scattered trees present over an exotic grass dominated understorey, with large gaps of cleared exotic grassland and no native shrub or ground layer vegetation present between trees. The condition of the habitats present is documented in **Section 4.6**.

***Chalinolobus dwyeri* large-eared pied bat**

Credit Type: Full species credit.

Habitat Description: Found in well-timbered areas containing gullies, roosts in caves, crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the fairy martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features.

Habitat or geographical constraints: Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.

Assessment Approach and Justification: The habitat constraints for this species are not met and accordingly this species has been excluded from further assessment for species credits.

***Charadrius leschenaultii* greater sand-plover (mapped important habitat)**

Assessment Approach and Justification: This species is assessed via the presence of mapped important habitat. Mapped important habitat for this species is not present and accordingly this species has been excluded from further assessment for species credits.

***Charadrius mongolus* lesser sand-plover (mapped important habitat)**

Assessment Approach and Justification: This species is assessed via the presence of mapped important habitat. Mapped important habitat for this species is not present and accordingly this species has been excluded from further assessment for species credits.

***Crinia tinnula* Wallum Froglet**

Credit Type: Full species credit.

Habitat Description: Wallum froglets are found in a wide range of habitats, usually associated with acidic swamps on coastal sand plains. They typically occur in sedgelands and wet heathlands. They can also be found along drainage lines within other vegetation communities and disturbed areas, and occasionally in swamp sclerophyll forests (NSW DCCEW 2025a). DPIE (2020c) identify that suitable breeding and non-breeding habitat consists of still waterbodies located in acid swamplands (pH <5.5), wallum heaths, open vegetation on sand plains, and flooded areas of swamp forests within the PCTs associated with the species. The acidity of the water must be recorded in the BAR to demonstrate suitable breeding habitat.

Habitat or Geographical Constraints: None listed.

Survey Requirements: The NSW Survey Guide for Threatened Frogs (DPIE 2020c) identifies that the survey period is all year after flooding rains. Aural visual 500 m transect surveys completed over 4 repeat surveys should be undertaken. The survey guide identifies that surveys can only be completed after flooding of the target waterbodies, however the waterbodies present within the site are not subject to regular flooding and any flooding at lower elevations would be associated with Lake Munmorah which is a brackish environment unsuitable for this species. It is considered that the microhabitats required to support this species are not

Candidate Threatened Fauna Species Survey Details

present, despite this, surveys targeting the waterbodies present (see **Section 4.6**) were undertaken as a precaution.

Surveys Completed: Nocturnal aural visual call playback and spotlighting searches were completed by two ecologists over 5 nights (23 persons hours) on 13 November 2023 (2 hrs x 2 ecologists), 21 November 2023 (2 hrs x 2 ecologists), 22 November 2023 (2 hrs x 2 ecologists), 23 November (2 hrs x 2 ecologists), 30 November 2023 (1.5 hrs x 2 ecologists), 30 November 2023 (2 hrs x 2 ecologists). Furthermore, AEP conducted nocturnal aural visual call playback and spotlighting searches over 4 nights (16 persons hours) on 8 January 2025 (3 hrs x 2 ecologists), 9 January 2025 (2 hrs x 2 ecologists), 10 February 2025 (2 hrs x 2 ecologists), 11 February 2025 (1 hr x 2 ecologists).

Assessment Approach and Justification: This species was not observed during surveys and has been assessed as not present. It is also considered that the Study Area lacks the microhabitats required to support this species as there are no flood prone areas present.

Haliaeetus leucogaster white-bellied sea-eagle

Credit Type: Dual credit species with breeding habitat (nests) assessed for species credits and foraging habitat assessed for ecosystem credits.

Habitat Description: Typically nests in large emergent eucalypts in areas near the ocean, estuaries and larger freshwater waterbodies and watercourses.

Habitat or Geographical Constraints: Living or dead mature trees within suitable vegetation within 1 km of rivers, lakes, large dams or creeks, wetlands and coastlines (NSW DCCEEW 2025a).

Survey Requirement: Survey July to December. Breeding habitat is live large old trees within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines and the presence of a large stick nest within tree canopy; or an adult with nest material; or adults observed duetting within breeding period. Due to the similarities in nest structure and use of the same nests by white-bellied sea eagles and wedge-tailed eagles, where a nest is observed without a bird present, searches for prey remains/ feathers below the structure should be undertaken. The differing diets of both species and distinctive adult feathers, should provide evidence of nest use, however; where prey items/ feathers are absent, repeat visits to the nest until a bird is observed should be undertaken.

DPIE is currently developing survey guidance for threatened bird species. In the interim, assessors must undertake a species survey using best practice methods that can be replicated for repeat surveys (as per the BAM threatened species survey requirements).

Surveys Completed: Habitat searches looking for white-bellied sea-eagles and signs of large stick nests were undertaken by two ecologists over 8 days (46 person hours) on 19 July 2022 (5.75 hrs x 2 ecologists), 16 August 2022 (3 hrs x 2 ecologists), 6 September 2023 (3 hrs x 2 ecologists), 15 September 2023 (2 hrs x 2 ecologists) 13 November 2023 (3.5 hrs x 2 ecologists), 21 November 2023 (3.75 hrs x 2 ecologists), 22 November 2023 (1.5 hrs x 2 ecologists), 23 November 2023 (0.5 hrs x 2 ecologists).

Assessment Approach and Justification: The white-bellied sea-eagle was observed flying over the Study Area during surveys, however no large stick nests constructed by this species were observed during surveys and breeding habitat for this species has been assessed as not present.

Heleioporus australiacus giant burrowing frog

Credit Type: Full species credit.

Habitat Description: Suitable breeding habitat consists of ephemeral flowing streams that have permanent pools, or in upland swamps, and are located within native vegetation. Most typically breeding occurs in streams with a bed width of up to 5 m (e.g. 2nd order and 3rd order streams) and upland swamps located on suitable geologies. Non-breeding habitat is native vegetation adjacent to the breeding sites. Non-breeding habitat is any area of PCT on the subject land that is located within 300 m of suitable breeding habitat as individuals can be expected to migrate up to 300 m from breeding habitat to establish territories of essential non-breeding habitat (DPIE 2020).

Habitat or Geographical Constraints: None listed.

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Survey Requirements: The NSW Survey Guide for Threatened Frogs (DPIE 2020d) requires 8 repeat aural visual surveys and 8 tadpole surveys for this species within a period of one week of receiving >50 mm of rainfall in 24 hours or > 100 mm of rainfall over 3 days.

Surveys Completed: Surveys not required as no suitable microhabitats present.

Assessment Approach and Justification: Species excluded from surveys due to lack of the microhabitats required to provide suitable habitat as described above. The site is dominated by exotic understorey vegetation and there are no natural watercourses present. There are no ephemeral streams present within native vegetation, as documented in **Section 4.6**. The giant burrowing frog has been assessed as not present and not likely to occur due to a lack of suitable microhabitats required to support the species.

Hieraaetus morphnoides little eagle (breeding habitat)

Credit Type: Dual credit species with breeding habitat (nests) assessed for species credits and foraging habitat assessed for ecosystem credits.

Habitat Description: Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter (DPE 2023c).

Habitat or Geographical Constraints: Nest trees – live (occasionally dead) large old trees within vegetation.

Survey Requirement: Survey August to October. Breeding habitat is live (occasionally dead) large old trees within suitable vegetation AND the presence of a male and female; or any adult with nesting material; or an individual on a large stick nest in the top half of the tree canopy; or pairs displaying (soaring, diving, engaging in chases, or a male observed calling in flight with a female begging from tree).

DPE is currently developing survey guidance for threatened bird species. In the interim, assessors must undertake a species survey using best practice methods that can be replicated for repeat surveys (as per the BAM threatened species survey requirements).

Surveys Completed: Daytime habitat searches were completed on by two ecologists over 3 days (18 person hours) on 16 August 2022 (3 hrs x 2 ecologists), 6 September 2023 (3 hrs x 2 ecologists), 15 September 2023 (2 hrs x 2 ecologists).

Assessment Approach and Justification: One stick nest was observed during surveys, however it was not occupied by this species. No little eagles were observed during surveys, and this species has been assessed as not present.

Hoplocephalus stephensii Stephens banded snake

Credit Type: Dual credit species with breeding habitat (nests) assessed for species credits and foraging habitat assessed for ecosystem credits.

Habitat Description: The species uses very old primary forest with many large old hollow-bearing trees. Habitat needs to be well connected and geographically large. Juveniles and subadults will regularly inhabit small hollows, while adults are usually found in larger hollows. The species reproduces usually triennially or less often, never annually (NSW DCCEEW 2025a). Hollow-bearing trees, arboreal vine tangles, fallen/standing dead timber including logs (or within 500 m of these habitats) located within PCTs associated with the species in the TBDC.

Habitat or Geographical Constraints: Habitat containing or within 500 m of hollow-bearing trees, arboreal vine tangles or fallen/standing dead timber.

Survey Requirement: Survey October to March with spotlighting for 120 person minutes. Undertake spotlight surveys in areas of suitable habitat. Search for snakes climbing on trees, on the ground, or moving in open areas by using eyeshine.

Surveys Completed: The site contains predominantly exotic understorey vegetation and does not support primary forest in a large well connected habitat patch. Despite this, surveys consisting of nocturnal spotlighting were completed targeting the species by two ecologists over 5 nights (23 person hours) on 13 November 2023 (2 hrs x 2 ecologists), 21 November 2023 (2 hrs x 2 ecologists), 22 November 2023 (2 hrs x 2 ecologists), 23 November 2023 (2 hrs x 2 ecologists), 30 November 2023 (1.5 hrs x 2 ecologists), 30 November 2023 (2 hrs x 2 ecologists).

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Assessment Approach and Justification: This species was not observed during surveys, and this species has been assessed as not present.

Lathamus discolor swift parrot

Credit type: Dual credit species with mapped important habitat assessed for species credits and as potential SAll Entity and non-important habitat assessed for ecosystem credits.

Habitat Description (Mapped Important Habitat): The mapped important habitat areas were determined by applying a 2 km radial buffer around verified swift parrot sighting records from 1990–2022 extracted from BioNet and BirdLife Australia Atlas, where sightings of five or more birds recorded over any two or more years, or single sightings of 40 or more birds. The NSW State Vegetation Type Map (SVTM) version C1.1.M1.1 was then used to select Plant Community Types (PCTs) associated with the swift parrot (as per the Threatened Biodiversity Data Collection (TBDC)) within the 2 km buffers to create the important habitat map. Any isolated areas of vegetation less than one hectare were excluded.

Associated PCTs: Not applicable for species assessed via mapped important habitat.

Survey Requirements: No surveys are required for this species under the BAM, as the foraging habitat component will be offset using ecosystem credits and important habitat which requires species credits, which is present will not be impacted by the future development of the site and is not proposed for biodiversity certification.

Assessment Approach and Justification: Important habitat areas for this species are present within the rezoning area, however they will not be impacted and are not proposed for biodiversity certification. Important habitat has been assessed as not present in the biodiversity certification area.

Limosa lapponica baueri bar-tailed godwit (mapped important habitat)

Assessment Approach and Justification: This species is assessed via the presence of mapped important habitat. Mapped important habitat for this species is not present and accordingly this species has been excluded from further assessment for species credits.

Litoria aurea green and golden bell frog

Credit Type: Full species credit species.

Habitat Description: Inhabits a wide range of natural and man-made waterbodies, particularly areas containing typha and eleocharis spp. its range has reduced significantly to isolated remnant populations possibly due to plague minnow (*Gambusia holbrooki*) and frog chytrid fungus.

The NSW Survey Guide for Threatened Frogs identifies that suitable breeding and non-breeding shelter habitat consists of any waterbody with emergent aquatic vegetation and without the plague minnow (*Gambusia holbrooki*), although the green and golden bell frog will still occasionally breed in sites with this introduced pest fish. Foraging habitat and migratory habitat are areas of native and non-native vegetation.

Habitat or Geographical Constraints: Within 1 km of ephemeral wet areas, swamps and waterbodies (although where present the species polygon is only required within a buffer of 200 m of these areas).

Survey Requirement: Survey during November to March using Aural-visual survey transects of 500 m length and 2 hr duration x 4 replicates. Other suitable methods include acoustic recorders and tadpole searches (which can replace up to two of the aural visual survey replicates).

Surveys completed: Nocturnal aural visual call playback and spotlighting searches were completed by two ecologists over 5 nights (23 persons hours) on 13 November 2023 (2 hrs x 2 ecologists), 21 November 2023 (2 hrs x 2 ecologists), 22 November 2023 (2 hrs x 2 ecologists), 23 November (2 hrs x 2 ecologists), 30 November 2023 (1.5 hrs x 2 ecologists), 30 November 2023 (2 hrs x 2 ecologists). Furthermore, AEP conducted nocturnal aural visual call playback and spotlighting searches over 4 nights (16 persons hours) on 8 January 2025 (3 hrs x 2 ecologists), 9 January 2025 (2 hrs x 2 ecologists), 10 February 2025 (2 hrs x 2 ecologists), 11 February 2025 (1 hr x 2 ecologists).

Assessment Approach and Justification: No green and golden bell frogs were observed or heard calling during the surveys completed and this species has been assessed as not present.

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***Litoria brevipalmata* green-thighed frog**

Credit Type: Full species credit.

Habitat Description: The DPIE (2020c) NSW Survey Guide for Threatened Frogs identifies that this species occurs in a range of habitats from rainforest and moist eucalypt forest to dry eucalypt forest and heath, typically in areas where surface water gathers after rain. It prefers wetter forests in the south of its range but extends into drier forests in northern New South Wales and southern Queensland. Surveys should target larger depressions or flooding swamp areas (>5 m x 10 m in diameter), usually identifiable by flood tolerant vegetation (Lemckert *et al.* 2006). Suitable breeding habitat is any semi-permanent or ephemeral waterbody of >25 m² in surface area located within native vegetation or immediately adjacent to or within 10 m of native vegetation. Non-breeding habitat is native vegetation adjacent to the breeding habitat.

Habitat or Geographical Constraints: Semi-permanent/ephemeral wet areas, swamps and waterbodies.

Survey Requirements: The DPIE (2020c) NSW Survey Guide for Threatened Frogs identifies survey period is September to April and the survey requirements include a 500 m transect over 2 hrs for aural visual surveys at suitable breeding habitat repeated on 4 nights.

Surveys Completed: Nocturnal aural visual call playback and spotlighting searches for amphibians were completed by two ecologists over 5 nights (23 persons hours) on 13 November 2023 (2 hrs x 2 ecologists), 21 November 2023 (2 hrs x 2 ecologists), 22 November 2023 (2 hrs x 2 ecologists), 23 November 2023 (2 hrs x 2 ecologists), 30 November 2023 (1.5 hrs x 2 ecologists), 30 November 2023 (2 hrs x 2 ecologists). Furthermore, AEP conducted nocturnal aural visual call playback and spotlighting searches over 4 nights (16 persons hours) on 8 January 2025 (3 hrs x 2 ecologists), 9 January 2025 (2 hrs x 2 ecologists), 10 February 2025 (2 hrs x 2 ecologists), 11 February 2025 (1 hr x 2 ecologists).

Assessment Approach and Justification: This species was not observed during surveys, and it is considered that the Study Area lacks the microhabitats required to support this species. This is due to a lack of the presence of native forest or heath and a lack of ephemeral waterbodies where surface water gathers after rain. This species has been assessed as not present and not likely to occur due to a lack of suitable microhabitats.

***Lophoictinia isura* square-tailed kite**

Credit Type: Dual credit species with breeding habitat (nests) assessed for species credits and foraging habitat assessed for ecosystem credits.

Habitat Description: Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter (DPE 2023c).

Habitat or Geographical Constraints: Nest trees.

Survey Requirement: Survey September to January. Square-tailed kites will need be in attendance to confirm breeding sites. Breeding habitat is live large old trees within suitable vegetation and the presence of a male and female; or female with nesting material; or an individual on a large stick nest in the top half of the tree canopy. DPIE is currently developing survey guidance for threatened bird species. In the interim, assessors must undertake a species survey using best practice methods that can be replicated for repeat surveys (as per the BAM threatened species survey requirements).

Surveys Completed: Habitat searches looking for square-tailed kites and signs of stick nests were completed on by two ecologists over 7 days (36.6 person hours) 6 September 2023 (3 hrs x 2 ecologists), 15 September 2023 (2 hrs x 2 ecologists) 13 November 2023 (3.5 hrs x 2 ecologists), 21 November 2023 (3.75 hrs x 2 ecologists), 22 November 2023 (1.5 hrs x 2 ecologists), 23 November 2023 (0.5 hrs x 2 ecologists), 22 January 2024 (4.5 hrs x 2 ecologists).

Assessment Approach and Justification: One stick nest was observed during surveys, however it was not occupied by this species. No square-tailed kites were observed during surveys, and this species has been assessed as not present.

***Miniopterus australis* little bent-winged bat**

Credit Type: Dual credit, breeding habitat is species credits.

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Habitat or geographical constraints: Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'; observation type code 'E nest-roost'; with numbers of individuals >500; or from the scientific literature.

Assessment Approach and Justification: The habitat constraints for this species are not met and this species has been assessed as not present.

Miniopterus orianae oceanensis large bent-winged bat

Credit Type: Dual credit, breeding habitat is species credits.

Habitat or geographical constraints: Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'; observation type code 'E nest-roost'; with numbers of individuals >500; or from the scientific literature.

Assessment Approach and Justification: The habitat constraints for this species are not met and this species has been assessed as not present.

Mixophyes balbus stuttering frog

Credit Type: Full species credit.

Habitat Description: The DPIE (2020c) NSW Survey Guide for Threatened Frogs identifies that this species is found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Suitable breeding habitat consists of permanent or ephemeral flowing streams with permanent pools located within areas of listed suitable native vegetation (PCTs). Nonbreeding habitat is native vegetation located within 500 m of a breeding site; the species is known to move long distances from breeding sites.

Habitat or geographical constraints: None listed.

Survey requirements: The DPIE (2020c) NSW Survey Guide for Threatened Frogs identifies survey period is September to March and the survey requirements include 480 mins of aural visual surveys at suitable breeding habitat repeated on 4 nights.

The microhabitats present within the Study Area are not consistent with the description of suitable habitat for this species provided in the NSW Survey Guide for Threatened Frogs (DPIE 2020c), documented above. This is due to a lack of the presence of native forest habitat and a lack of ephemeral or permanent flowing streams with permanent pools within 500 m.

Surveys completed: Nocturnal aural visual call playback and spotlighting searches for amphibians were completed by two ecologists over 5 nights (23 person hours) on 13 November 2023 (2 hrs x 2 ecologists), 21 November 2023 (2 hrs x 2 ecologists), 22 November 2023 (2 hrs x 2 ecologists), 23 November 2023 (2 hrs x 2 ecologists), 30 November 2023 (1.5 hrs x 2 ecologists), 30 November 2023 (2 hrs x 2 ecologists). Furthermore, AEP conducted nocturnal aural visual call playback and spotlighting searches over 4 nights (16 person hours) on 8 January 2025 (3 hrs x 2 ecologists), 9 January 2025 (2 hrs x 2 ecologists), 10 February 2025 (2 hrs x 2 ecologists), 11 February 2025 (1 hr x 2 ecologists).

Assessment Approach and Justification: This species was not observed during surveys, and it is considered that the Study Area lacks the microhabitats required to support this as documented above. This species has been assessed as not present and not likely to occur due to a lack of suitable microhabitats.

Mixophyes iteratus giant barred frog

Credit Type: Full species credit.

Habitat Description: The DPIE (2020c) NSW Survey Guide for Threatened Frogs identifies that this species occurs along freshwater streams with permanent or semi-permanent water, generally (but not always) at lower elevation. It may occasionally occupy large open bodies of water (e.g. ponds and dams) in the riparian zone. Moist riparian habitats are favoured for the deep leaf litter, used for shelter and foraging, as well as open perching sites on the forest floor. The species will use streams with a fringe of vegetation in otherwise cleared lands. Males seem to confine most activities to the riparian zone. Suitable breeding habitat consists of large (>4 m wide) permanent and semi-permanent flowing streams located on the subject land. Eggs are laid on undercut banks above large slow-moving or still pools or areas of water (Knowles *et al.* 2015), with breeding

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occurring after periods of rainfall when streams have receded post flooding. Non-breeding habitat is any suitable vegetation (native or non-native) adjacent to identified breeding habitat.

Habitat or Geographical Constraints: None listed.

Survey Requirements: The DPIE (2020c) NSW Survey Guide for Threatened Frogs identifies survey period is September to March and the survey requirements include 480 minutes of aural visual surveys at suitable breeding habitat repeated on 4 nights.

The microhabitats habitats present within the Study Area are not consistent with the description of suitable habitat for this species provided in the NSW Survey Guide for Threatened Frogs (DPIE 2020c), documented above. This is due to a lack of the presence of native forest habitat and a lack of ephemeral or permanent flowing streams with permanent pools within 500 m.

Surveys Completed: Nocturnal aural visual call playback and spotlighting searches for amphibians were completed by two ecologists over 5 nights (23 persons hours) on 13 November 2023 (2 hrs x 2 ecologists), 21 November 2023 (2 hrs x 2 ecologists), 22 November 2023 (2 hrs x 2 ecologists), 23 November (2 hrs x 2 ecologists), 30 November 2023 (1.5 hrs x 2 ecologists), 30 November 2023 (2 hrs x 2 ecologists). Furthermore, AEP conducted nocturnal aural visual call playback and spotlighting searches over 4 nights (16 persons hours) on 8 January 2025 (3 hrs x 2 ecologists), 9 January 2025 (2 hrs x 2 ecologists), 10 February 2025 (2 hrs x 2 ecologists), 11 February 2025 (1 hr x 2 ecologists).

Assessment Approach and Justification: This species was not observed during surveys, and it is considered that the Study Area lacks the microhabitats required to support this as documented above. This species has been assessed as not present and not likely to occur due to a lack of suitable microhabitats.

Myotis macropus southern myotis

Credit Type: Full species credit.

Habitat Description: Generally, roosts in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, wharves, bridges and in dense foliage, forages over streams and pools catching insects and small fish (NSW DCCEEW 2025a).

Under the BAM potential habitats are defined by NSW DPIE (2021) as all PCTs associated with the species (as per the TBDC) within 200 m of the bank of any medium to large permanent creeks, rivers, lakes or other waterways (i.e. with pools/ stretches 3 m or wider) on the subject land.

Habitat or Geographical Constraints: Waterbodies with permanent pools/ stretches 3 m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200 m of the site. There are 3 farm dams within the Study Area with pools >3 m wide.

Survey Requirements: The DPIE (2021) "Species Credit" threatened bats and their habitats NSW Guide for the BAM identifies that suitable survey methods for this species include harp trapping or mist netting, passive acoustic detection, active detection and roost searches. The survey effort recommendation for passive acoustic detection is at least 4 nights, with a total survey effort of 16 nights. Roost searches recommended effort is 1 x 30 min search per structure. The seasonal survey period for this species is October to March.

Surveys Completed: Microbat surveys completed for the development footprint by Umwelt included a total of 22 nights (1 anabat unit x 7 nights and 1 anabat unit x 15 nights). The bat calls were analysed by Greg Ford of Balance Environmental who determined that none of the calls captured were likely to be from this species (see Report in **Appendix F**).

Searches of the open sheds and any other potential roost sites present on the site were also undertaken where safe to do so and no microbats were observed.

Assessment Approach and Justification: This species was not detected during surveys, and this species has been assessed as not present.

Nettapus coromandelianus cotton pygmy-goose

Assessment Approach and Justification: The TBDC identifies that this species is vagrant in NSW, being an occasional visitor to northern NSW from South-east Qld. Habitat constraints for this species are also listed as Deep permanent fresh waters on floodplains with floating and submergent vegetation. This species has been assessed as vagrant and as not having habitat constraints present.

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Ninox connivens barking owl

Credit Type: Full species credit.

Habitat Description: Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Species is likely to breed and forage within very small patches of vegetation (<5 ha), especially when the patch is riparian vegetation or where the small patch is within 400 m of another larger patch of vegetation. They are unlikely to nest in the hollows of a paddock tree if the tree is separated from a larger patch of vegetation by more than 400 m of cleared habitat (NSW DCCEEW 2025a).

Habitat or Geographical Constraints: A living or dead tree with a hollow >20 cm diameter that occurs >4 m above the ground.

Survey Requirement: The survey guidelines for this species were updated for the BAM on 14 March 2024. The BAM Stage 1 Guide identifies that If the department publishes new or revised survey guides, assessors are expected to apply them to all assessments for which the survey component is yet to be completed, and to all new assessments that commence on or after the publication date. This is to ensure that BARs meet the requirements of BAM Section 5.3 (2.b.). Where survey has been completed prior to the publication of a new or revised survey guide, the department expects the assessor (or surveyor) to have applied current best-practice in searching for the target species (in accordance with BAM Section 5.3 (2.c.)). The previous survey guidance in the TBDC required two nights of stag watching for each suitable hollow-bearing tree. The new guidance for surveys for this species identifies a requirement for acoustic recording or call playback surveys, where hollow-bearing trees with hollows >20 cm diameter and >4 m from the ground are present. Acoustic recording can be undertaken in consultation with the DPE year-round, noting that no formal survey effort requirements have been released. Call playback can be undertaken during January to August at night during and dry weather in a central location on the site for up to 100 ha for at least 6 nights. The species polygon must be drawn to include all vegetation zones; 1. within 800 m (being the approximate home range) from the location of a detected owl, and 2. containing a living or dead tree with a hollow >20 cm diameter that occurs >4 m above the ground.

Surveys Completed: A habitat assessment was completed for this species, targeting hollow-bearing trees with a hollow size of >20 cm diameter. One paddock tree containing a hollow >20 cm diameter was observed, however it was a dead tree with a single trunk and hollow with a height of <4 m above the ground. Nocturnal spotlighting surveys were undertaken, however they were not required for this species due to a lack of habitat constraints on the site. At the request of Central Coast Council, supplementary surveys were conducted by AEP. The surveys comprised of six nights of nocturnal surveys conducted by two ecologists using spotlighting, stag watching and call playback techniques (38 persons hours) on 3 February 2025 (3.5 hrs x 2 ecologists), 4 February 2025 (2.83 hrs x 2 ecologists), 5 February 2025 (3 hrs x 2 ecologists), 6 February 2025 (3.3 hr x 2 ecologists), 18 February 2025 (3.2 hr x 2 ecologists), 19 February 2025 (3.25 hr x 2 ecologists).

Assessment Approach and Justification: No barking owls were observed or heard calling during the nocturnal spotlighting surveys completed. The listed habitat constraints for this species are not met and accordingly this species has been excluded from further assessment.

Ninox strenua powerful owl

Credit Type: Full species credit.

Habitat Description: Inhabits a range of vegetation types from woodland to open sclerophyll forest, tall wet forest and rainforest. Requires large tracts of vegetation but can occur in fragmented landscapes with areas occupied being 400 ha to greater than 4000 ha depending on prey density. Nests in large tree hollows (at least 0.5 m deep) in large eucalypts (80–240 cm trunk diameter) that are at least 150 years old. The female and young nest in the hollow and the male roosts nearby during the day often in a dense grove that provides concealment (NSW DCCEEW 2025a).

Habitat or Geographical Constraints: Living or dead trees with hollow greater than 20 cm diameter >4 m off the ground.

Survey Requirement: The survey guidelines for this species were updated for the BAM on 14 March 2024. The BAM Stage 1 Guide identifies that If the department publishes new or revised survey guides, assessors are expected to apply them to all assessments for which the survey component is yet to be completed, and to all

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new assessments that commence on or after the publication date. This is to ensure that BARs meet the requirements of BAM Section 5.3 (2.b.). Where survey has been completed prior to the publication of a new or revised survey guide, the department expects the assessor (or surveyor) to have applied current best-practice in searching for the target species (in accordance with BAM Section 5.3 (2.c.)).

The previous survey guidance in the TBDC required two nights of stag watching for each suitable hollow-bearing tree. The new guidance for surveys for this species identifies a requirement for acoustic recording or call playback surveys, where hollow-bearing trees with hollows >20 cm diameter and >4 m from the ground are present.

Acoustic recording can be undertaken in consultation with the DPE year-round, noting that no formal survey effort requirements have been released. Call playback can be undertaken during January to August at night during and dry weather in a central location on the site for up to 100 ha for at least 6 nights.

The species polygon must be drawn to include all vegetation zones; 1. within 800 m (being the approximate home range) from the location of a detected owl, and 2. containing a living or dead tree with a hollow >20 cm diameter that occurs >4 m above the ground.

Surveys Completed: A habitat assessment was completed for this species, targeting hollow-bearing trees with a hollow size of >20 cm diameter. One paddock tree containing a hollow >20 cm diameter was observed, however it was a dead tree with a single trunk and hollow with a height of <4 m above the ground. Nocturnal spotlighting surveys were undertaken, however they were not required for this species due to a lack of habitat constraints present on the site. At the request of Central Coast Council, supplementary surveys were conducted by AEP. The surveys comprised of six nights of nocturnal surveys conducted by two ecologists using spotlighting, stag watching and call playback techniques (38 persons hours) on 3 February 2025 (3.5 hrs x 2 ecologists), 4 February 2025 (2.83 hrs x 2 ecologists), 5 February 2025 (3 hrs x 2 ecologists), 6 February 2025 (3.3 hr x 2 ecologists), 18 February 2025 (3.2 hr x 2 ecologists), 19 February 2025 (3.25 hr x 2 ecologists).

Assessment Approach and Justification: No powerful owls were observed or heard calling during the nocturnal spotlighting surveys completed. The listed habitat constraints for this species are not met and accordingly this species has been excluded from further assessment.

Numenius madagascariensis eastern curlew (mapped important habitat)

Assessment Approach and Justification: This species is assessed via the presence of mapped important habitat. Mapped important habitat for this species is not present and accordingly this species has been excluded from further assessment for species credits.

Pandion cristatus eastern osprey

Credit Type: Dual credit species with breeding habitat (nests) assessed for species credits and foraging habitat assessed for ecosystem credits.

Habitat Description: Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Nests are made high up in dead trees, in dead crowns of live trees, or in structures usually within one kilometre of the sea.

Habitat or Geographical Constraints: Presence of stick-nests in living and dead trees (>15 m) or artificial structures within 100 m of a floodplain for nesting.

Survey Requirement: Survey April to November. This species can nest in isolated trees. Nests are distinctive but easiest to identify when birds are in attendance. Where any nest tree is identified to occur on site (e.g. known from existing data, studies or other documented evidence), a species polygon providing a circular buffer with a 100 m radius should be drawn around the known nest tree.

Surveys Completed: Habitat searches looking for this species and signs of large stick nests were undertaken by two ecologists over 8 days (46 person hours) on 19 July 2022 (5.75 hrs x 2 ecologists), 16 August 2022 (3 hrs x 2 ecologists), 6 September 2023 (3 hrs x 2 ecologists), 15 September 2023 (2 hrs x 2 ecologists) 13 November 2023 (3.5 hrs x 2 ecologists), 21 November 2023 (3.75 hrs x 2 ecologists), 22 November 2023 (1.5 hrs x 2 ecologists), 23 November 2023 (0.5 hrs x 2 ecologists).

Assessment Approach and Justification: This species was observed flying over the Study Area during surveys, however no large stick nests were observed during surveys and breeding habitat for this species has been assessed as not present. There is a known nest site for this species on a telecommunications tower

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approximately 220 m to the north-east of the rezoning area, which is more than double the 100 m buffer required under the BAM.

***Petauroides volans* southern greater glider**

Credit Type: Full species credit.

Habitat Description: Inhabits eucalypt forests and woodlands. Hollow dependent species that will have large trees with hollows within its home range. Home range is <5 ha and typically 1 to 3 ha. This species is sensitive to forest clearing and fragmentation as its movements are primarily restricted to gliding between trees over distances of typically 30 m (but up to 100 m) (DCCEEW 2022).

Habitat or Geographical Constraints: None listed.

Survey Requirement: No species-specific survey guideline has been published under the BAM.

The Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities (DEC 2004) is the most directly relevant guide listed on the BAM Assessors webpage, which covers survey methods for non-flying mammals. Spotlighting was chosen as the most effective survey method available for this species due to its arboreal habit and leaf-based diet.

Spotlighting on foot is specified at 2 x 1 hr and 1 km up to 200 ha of stratification unit walking at 1 km/ hr on 2 separate nights.

Surveys Completed: Nocturnal spotlighting searches (with the assistance of a thermal scope) were completed by two ecologists over 5 nights (23 persons hours) on 13 November 2023 (2 hrs x 2 ecologists), 21 November 2023 (2 hrs x 2 ecologists), 22 November 2023 (2 hrs x 2 ecologists), 23 November (2 hrs x 2 ecologists), 30 November 2023 (1.5 hrs x 2 ecologists), 30 November 2023 (2 hrs x 2 ecologists).

Assessment Approach and Justification: This species was not observed during surveys and has been assessed as not present. The Study Area is also considered to be too disturbed to support this species due to large gaps between clumps of paddock trees being greater than this species gliding capability of >30 m.

***Petaurus norfolcensis* squirrel glider**

Credit Type: Full species credit.

Habitat Description: The squirrel glider inhabits floriferous eucalypt open forests and woodlands often with a banksia or acacia shrub layer. It requires den sites in tree cavities and a good winter supply of nectar (NSW Scientific Committee 2008).

Habitat or Geographical Constraints: None listed.

Survey Requirement: No species-specific survey guideline has been published under the BAM.

The TBDC identifies that sites can be surveyed year-round and sites with bipinnate acacia, autumn to spring flowering trees and shrubs such as *Eucalyptus robusta* and *Banksia* sp. (for example, *Banksia integrifolia* etc) should be subject to a more protracted survey period of between March-August. Relies on large old trees with hollows for breeding and nesting. These trees are also critical for movement and typically need to be closely connected (i.e. no more than 50 m apart) to enable gliding.

The NSW Credit Supply Taskforce (CST) has provided draft guidance that identifies arboreal Elliot traps, remote camera traps and spotlighting as suitable methods with a requirement for spotlighting in combination with one of the other two methods.

The EPBC Act Survey Guidelines for Australia's Threatened Mammals (DSEWPac 2011) provides a general guide for spotlighting effort of 2 x 200 m transects per 5 ha spaced at least 100 m and surveyed on two nights.

The EPBC Act Survey Guidelines for Australia's Threatened Mammals (DSEWPac 2011) provides a guide for camera trapping effort of 10 cameras x 14 nights per 5 ha (140 camera trap nights), deployed over a 1 ha sampling area.

Surveys Completed: Nocturnal spotlighting searches (with the assistance of a thermal scope) were completed by two ecologists over 5 nights (23 persons hours) on 13 November 2023 (2 hrs x 2 ecologists), 21 November 2023 (2 hrs x 2 ecologists), 22 November 2023 (2 hrs x 2 ecologists), 23 November (2 hrs x 2 ecologists), 30 November 2023 (1.5 hrs x 2 ecologists), 30 November 2023 (2 hrs x 2 ecologists). Camera trapping was completed from 21 November 2023 to 7 December 2023 with 10 cameras deployed for 16 nights

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(160 camera trap nights). Cameras were mounted on trees with 5 cameras at approximately 1.5 m height and 5 cameras at the base of tree trunks and lures consisted of a weatherproof bait cannister loosely packed with a sticky rolled oats, honey and peanut butter mixture, mounted on trees sprayed liberally with a honey-water mixture. Cameras were refocussed from factory settings to 2.5 m for optimal detection of small mammals.

Assessment Approach and Justification: This species was not observed during surveys and has been assessed as not present.

Petrogale penicillata brush-tailed rock-wallaby

Credit Type: Full species credit.

Habitat Description: This species typically occupies steeply sloped rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. The home range consists of a refuge area and a foraging range linked by habitually used commuting routes (NSW DCCEW 2025a).

Habitat or Geographic Constraints: Land within 1 km of rock escarpments, gorges, steep slopes, boulder piles, rock outcrops and cliff lines.

Assessment Approach and Justification: The habitat constraints for this species are not met and this species has been assessed as not present.

Phascogale tapoatafa brush-tailed phascogale

Credit Type: Full species credit.

Habitat Description: Prefers dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabits heath, swamps, rainforest and wet sclerophyll forest. Agile climber foraging preferentially in rough barked trees of 25 cm DBH or greater. Feeds mostly on arthropods but will also eat other invertebrates, nectar and sometimes small vertebrates. Females have exclusive territories of approximately 20–40 ha, while males have overlapping territories often greater than 100 ha. Nest and shelter in tree hollows with entrances 2.5–4 cm wide and use many different hollows over a short time span. Mating occurs May–July; males die soon after the mating season whereas females can live for up to three years but generally only produce one litter.

Habitat or Geographical Constraints: None listed.

Survey Requirement: Survey must be undertaken using baited cameras. The bait type used must remain as an effective attractant until replaced. Honeyed oat balls will need to be replaced daily. Other effective baiting methods include using a baited canister with small holes and capped at either end, to limit bait theft by other species, or honey-water, sprayed very liberally in front of each camera. The baited canister and honey-water will require less frequent replenishment of the bait compared to a bait ball. Cameras should be set at head height, or above, facing the branch or tree trunk where a honey-based bait has been placed. Cameras must remain in place for a minimum of 4 weeks with cameras checked and baits replaced after 2 weeks. A minimum of 4 cameras, independent of the size of the subject land, must be used for sites up to 1 ha, then an additional 2 cameras for every ha of suitable habitat thereafter. Cameras must be evenly spaced across the site. Where potential habitat is disconnected by gaps of 50 m or more, each habitat patch should have a minimum of 4 cameras for the first ha, and 2 cameras for every ha thereafter. Malfunctioning cameras must be replaced, and additional cameras and time must be invested to address the lost survey effort. That is, at least 22 working, baited, evenly spaced camera traps are required for the first 10 ha of suitable habitat.

Surveys Completed: Nocturnal spotlighting searches (with the assistance of a thermal scope) for mammals were completed by two ecologists over 5 nights (23 persons hours) on 13 November 2023 (2 hrs x 2 ecologists), 21 November 2023 (2 hrs x 2 ecologists), 22 November 2023 (2 hrs x 2 ecologists), 23 November 2023 (2 hrs x 2 ecologists), 30 November 2023 (1.5 hrs x 2 ecologists), 30 November 2023 (2 hrs x 2 ecologists). Camera trapping for arboreal mammals was completed from 21 November 2023 to 7 December 2023 with 10 cameras deployed for 16 nights (160 camera trap nights). Cameras were mounted on trees with 5 cameras at approximately 1.5 m height and 5 cameras at the base of tree trunks and lures consisted of a weatherproof bait cannister loosely packed with a sticky rolled oats, honey and peanut butter mixture, mounted on trees sprayed liberally with a honey-water mixture. Cameras were refocussed from factory settings to 2.5 m for optimal detection of small mammals.

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Assessment Approach and Justification: There are no extant populations of this species within any areas with direct connectivity to the Study Area and the habitats present within the subject land are considered too disturbed to support a population of this species due to the high levels of disturbance including lack of intact understorey and habitat fragmentation. This biodiversity certification area has been assessed as too disturbed to support this species.

Phascolarctos cinereus koala

Credit Type: Full species credit.

Habitat Description: Inhabits eucalypt woodlands and forests where it feeds on the foliage. It feeds on at least 70 eucalypt species and 30- non-eucalypt species, but in any one area will select a limited number of preferred browse tree species. Spends most of its time in trees but descends to the ground to disperse or move throughout its home range which vary between 2 ha to >100 ha (NSW DPE 2022a).

Habitat or geographical constraints: None listed.

Survey Requirement: The current survey guidelines for koalas (NSW DPE 2022a) identify that areas of suitable habitat must be targeted with one direct and one indirect observation method including Spot Assessment Technique (SAT) (scat surveys at 150 m spacing for sites <50 ha) or detection dog searches and spotlighting (1 transect x 2 nights for suitable habitat <5 ha) or acoustic surveys or thermal drone surveys (NSW DPE 2022d).

Surveys Completed: Nocturnal spotlighting searches (with the assistance of a thermal scope) for mammals were completed by two ecologists over 5 nights (23 persons hours) on 13 November 2023 (2 hrs x 2 ecologists), 21 November 2023 (2 hrs x 2 ecologists), 22 November 2023 (2 hrs x 2 ecologists), 23 November (2 hrs x 2 ecologists), 30 November 2023 (1.5 hrs x 2 ecologists), 30 November 2023 (2 hrs x 2 ecologists). Scat searches were also completed on 25 March 2024, with six SAT searches completed within the rezoning area.

Assessment Approach and Justification: This species was not observed during surveys and has been assessed as not present.

Planigale maculata common planigale

Credit Type: Full species credit.

Habitat Description: Inhabits rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas where there is surface cover, and usually close to water (NSW DCCEEW 2025a). The southern limit of this species' distribution is the upper Hunter River (Menkhorst and Knight 2023).

Habitat or geographical constraints: None listed.

Assessment Approach and Justification: Targeted during camera trapping surveys and not observed. The habitats within the Study Area are too disturbed to support this species due to a complete lack of native groundcover and this species has not been recorded within the Wyong IBRA Subregion. This species is considered to be a vagrant for the purposes of assessment under the BAM and has been excluded from further assessment as there is no potential for it to occur within the IBRA subregion and the site is too disturbed.

Potorous tridactylus long-nosed potoroo

Credit Type: Full species credit.

Habitat Description: Inhabits rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas where there is surface cover, and usually close to water (NSW DCCEEW 2025a). The southern limit of this species' distribution is north of the Hunter River.

Habitat or Geographical Constraints: Dense shrub layer or alternatively high canopy cover exceeding 70% (i.e. to capture populations inhabiting wet sclerophyll and rainforest).

Assessment Approach and Justification: The habitat constraints for this species are not present and this species has been excluded from further assessment.

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Pteropus poliocephalus grey-headed flying-fox (breeding habitat)

Credit Type: Dual credit.

Habitat Description: Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths, and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young. Annual mating commences in January, and conception occurs in April or May; a single young is born in October or November. Site fidelity to camps is high; some camps have been used for over a century. Can travel up to 50 km from the camp to forage; commuting distances are more often <20 km. Feed on the nectar and pollen of native trees, in particular eucalyptus, melaleuca and banksia, and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops.

Habitat or Geographical Constraints: None listed.

Survey Requirement: Breeding camps will need to be identified by survey, as per Threatened Bat Survey Guide OEH Guidelines.

The initial search for camps should encompass any recorded camps and roosting habitat likely to occur on the subject land. If a camp is located the survey only needs to take place in the camp (that is the area occupied by the target species) to identify breeding females. Camps used for breeding must be mapped. Use GPS to map outer perimeter of the camp to create the species polygon.

Surveys Completed: Daytime habitat searches were completed on by two ecologists over 9 days (55 person hours) on 19 July 2022 (5.75 hrs x 2 ecologists), 16 August 2022 (3 hrs x 2 ecologists), 6 September 2023 (3 hrs x 2 ecologists), 15 September 2023 (2 hrs x 2 ecologists) 13 November 2023 (3.5 hrs x 2 ecologists), 21 November 2023 (3.75 hrs x 2 ecologists), 22 November 2023 (1.5 hrs x 2 ecologists), 23 November 2023 (0.5 hrs x 2 ecologists), 22 January 2024 (4.5 hrs x 2 ecologists).

Assessment approach and justification: No camp sites were observed during surveys and breeding habitat for this species has been assessed as not present. This species was observed foraging within the site during surveys, foraging habitat is assessed as an ecosystem credit.

Tyto novaehollandiae masked owl

Credit Type: Full species credit.

Habitat Description: A forest owl often hunts along the edges of forests, including roadsides. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting (DPE 2023c). DEC (2006) identifies that this species nests in old hollow eucalypts, live or dead but commonly live, in a variety of topographic positions from gully to upper slope, with hollows greater than 40 cm wide and greater than 100 cm deep; there is no relationship with distance to streams and nest sites may be subject to a variety of disturbance regimes.

Habitat or Geographical Constraints: Living or dead trees with hollow greater than 20 cm diameter >4 m off the ground.

Survey Requirement: The survey guidelines for this species were updated for the BAM on 14 March 2024. The BAM Stage 1 Guide identifies that If the department publishes new or revised survey guides, assessors are expected to apply them to all assessments for which the survey component is yet to be completed, and to all new assessments that commence on or after the publication date. This is to ensure that BARs meet the requirements of BAM Section 5.3 (2.b.). Where survey has been completed prior to the publication of a new or revised survey guide, the department expects the assessor (or surveyor) to have applied current best-practice in searching for the target species (in accordance with BAM Section 5.3 (2.c.)).

The previous survey guidance in the TBDC required two nights of stag watching for each suitable hollow-bearing tree. The new guidance for surveys for this species identifies a requirement for acoustic recording or call playback surveys, where hollow-bearing trees with hollows >20 cm diameter and >4 m from the ground are present.

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Acoustic recording can be undertaken in consultation with the DPE year-round, noting that no formal survey effort requirements have been released. Call playback can be undertaken during January to August at night during and dry weather in a central location on the site for up to 100 ha for at least 6 nights.

The species polygon must be drawn to include all vegetation zones; 1. within 800 m (being the approximate home range) from the location of a detected owl, and 2. containing a living or dead tree with a hollow >20 cm diameter that occurs >4 m above the ground.

Surveys Completed: A habitat assessment was completed for this species, targeting hollow-bearing trees with a hollow size of >20 cm diameter. One paddock tree containing a hollow >20 cm diameter was observed, however it was a dead tree with a single trunk and hollow with a height of <4 m above the ground. Nocturnal spotlighting surveys were undertaken, however they were not required for this species due to a lack of habitat constraints present on the site. At the request of Central Coast Council, supplementary surveys were conducted by AEP. The surveys comprised of six nights of nocturnal surveys conducted by two ecologists using spotlighting, stag watching and call playback techniques (38 persons hours) on 3 February 2025 (3.5 hrs x 2 ecologists), 4 February 2025 (2.83 hrs x 2 ecologists), 5 February 2025 (3 hrs x 2 ecologists), 6 February 2025 (3.3 hr x 2 ecologists), 18 February 2025 (3.2 hr x 2 ecologists), 19 February 2025 (3.25 hr x 2 ecologists).

Assessment Approach and Justification: No masked owls were observed or heard calling during the nocturnal spotlighting surveys completed. The listed habitat constraints for this species are not met and accordingly this species has been excluded from further assessment.

Uperoleia mahonyi Mahony's toadlet

Credit Type: Full species credit species.

Habitat Description: The NSW Survey Guide for Threatened Frogs identifies that this species inhabits ephemeral and semi-permanent swamps and swales. Known records occur in heath or wallum habitats, almost exclusively associated with leached (highly nutrient impoverished) white sand. Commonly associated with acid paperbark swamps, Mahony's toadlet is also known to occur in wallum heath, swamp mahogany-paperbark swamp forest, heath shrubland and Sydney red gum woodland. Recent studies suggest intact vegetation adjacent to and within waterbodies is an important habitat feature for this species.

Suitable breeding habitat consists of ephemeral and semi-permanent swamps and swales that occur within areas of native vegetation. Non-breeding habitat is similar swampy native vegetation located within 400 m of suitable breeding habitat.

Survey Requirement: Survey during October to March using Aural-visual survey transects of 500 m length and 2 hr duration x 4 replicates at potential breeding sites.

Surveys completed: Nocturnal aural visual call playback and spotlighting searches were completed by two ecologists over 5 nights (23 persons hours) on 13 November 2023 (2 hrs x 2 ecologists), 21 November 2023 (2 hrs x 2 ecologists), 22 November 2023 (2 hrs x 2 ecologists), 23 November (2 hrs x 2 ecologists), 30 November 2023 (1.5 hrs x 2 ecologists), 30 November 2023 (2 hrs x 2 ecologists). These surveys targeted the waterbodies (dams present). Furthermore, AEP conducted nocturnal aural visual call playback and spotlighting searches over 4 nights (16 persons hours) on 8 January 2025 (3 hrs x 2 ecologists), 9 January 2025 (2 hrs x 2 ecologists), 10 February 2025 (2 hrs x 2 ecologists), 11 February 2025 (1 hr x 2 ecologists).

Assessment Approach and Justification: This species was not observed during surveys and has been assessed as not present. It is also considered that the Study Area lacks the microhabitats required to support this species as the site is dominated by exotic vegetation and there are no areas present that regularly flood that could be used by the species as breeding habitat.

Vespadelus troughtoni eastern cave bat

Credit Type: Full species credit.

Habitat Description: A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. Occasionally found along cliff-lines in wet eucalypt forest and rainforest (NSW DCCEW 2025a). Under the BAM suitable habitats are defined as the PCTs on the subject land to which the species is associated (listed in the TBDC) that are within 2 km of identified potential roost habitat features. Potential breeding habitat is the PCTs associated with the species (as per the TBDC) within 100 m of rocky areas, caves,

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overhangs crevices, cliffs and escarpments, or old mines or tunnels, old buildings and sheds within the potential habitat.

Law *et al.*, 2005 observed this species roosting in sheds but the record was from an area in Bonalbo in south-eastern NSW which was surrounded by forest with sandstone caves. Law *et al.*, 2005 identify that forests without natural roosting sites (caves or large rock overhangs) do not provide habitat for this species and surveys for this species should target areas with sandstone overhangs or adjacent to caves and cliff lines. Churchill (2008) also identifies that all records for this species are in close proximity to sandstone or volcanic escarpments and that forests without natural roosting sites do not provide habitat for this species.

Habitat or Geographical Constraints: Within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within 2 km of old mines, tunnels, old buildings or sheds.

Survey Requirement: The DPIE (2021) "Species Credit" threatened bats and their habitats NSW Guide for the BAM identifies that suitable survey methods for this species include harp trapping or mist netting, passive acoustic detection, active detection and roost searches. It is noted that acoustic surveys cannot separate this species from other commonly occurring microbat species. Harp trapping survey effort is identified as 16 trap nights over a minimum of 4 nights per 50 ha. Given the small and highly disturbed nature of the site AEP negotiated a reduced level of harp trap survey effort with Central Coast Council, being 8 trap nights completed over 4 nights.

Surveys completed: Surveys were completed by AEP. Eight harp trap nights consisting of two harp traps for four nights over 21-24 January 2025, each set for approximately 11 hours per night. Searches of the open sheds present and any other potential roost sites on the site were also undertaken where safe to do so and no microbats were observed.

Assessment Approach and Justification: There are three records for this species on the BioNet Atlas (NSW DCCEEW 2025a), however these are all from ultrasonic call recordings (possible records only) which cannot be reliably separated from other commonly occurring *Vespadelus* species including the little forest bat *Vespadelus vulturnus*, which commonly occurs in the locality in a range of habitats and does not require caves or rocky overhangs for roosting.

Searches of sheds present were undertaken during July 2022, November 2023, March 2024 and January 2025 and signs or presence of roosting individuals were not observed. The Study Area is located part of a coastal lowland area and is more than 2 km from the nearest forested areas within the potential to contain natural roosting habitats (caves and overhangs) for this species. The nearest location considered likely to have these habitat features is the Munmorah State Conservation Area. This species has been assessed as not present due to a lack of suitable microhabitats (Law *et al.*, 2005; Churchill 2008), being forests with natural roosting features and land within 2 km of these. No threatened microbat species were captured during the harp trapping surveys.

Xenus cinereus curlew sandpiper (mapped important habitat)

Assessment Approach and Justification: This species is assessed via the presence of mapped important habitat. Mapped important habitat for this species is not present and accordingly this species has been excluded from further assessment for species credits.

5.4 Expert Reports and Use of More Appropriate Local Data

No expert reports were utilised in place of targeted surveys for the purposes of this assessment. This assessment has also not relied upon alternative data (more appropriate local data) to assess habitat suitability.

5.5 Threatened Species Observations

The Rezoning Area contains mapped important habitat for the swift parrot and the white-bellied sea-eagle, eastern osprey and grey-head flying-fox were observed during surveys. The following observation details are provided:

***Haliaeetus Leucogaster* White-bellied Sea-eagle**

The white-bellied sea-eagle was observed flying over the Study Area during surveys, however no large stick nests were observed during surveys and breeding habitat for this species is not present. A species polygon and associated species credits are not required for this species.

***Lathamus Discolor* Swift Parrot**

Mapped Important Habitat for this species is present within the proposed Rezoning Area. These areas of mapped important habitat have been excluded from the Biodiversity Certification and will be retained, in accordance with the Masterplan provided in **Figure 1.3**. Due to the retention of all areas of mapped important habitat for this species, a species polygon and associated species credits are not required. Important habitat for this species is also listed as a candidate serious and irreversible impact (SAIL) entity under the BAM. Further consideration of the potential for a serious and irreversible impacts to this species are not required, as all impacts will be avoided.

***Pandion Cristatus* Eastern Osprey**

The eastern osprey was observed flying over the Study Area during surveys, however no large stick nests were observed during surveys and breeding habitat for this species is not present. A species polygon and associated species credits are not required for this species.

***Pteropus Poliocephalus* Grey-headed Flying-fox**

During nocturnal surveys grey-headed flying-fox was observed flying over the Study Area during surveys, however, no observations of any roosting or breeding habitat was made. Grey-headed flying-foxes have the potential to use the site as a seasonal foraging resource. A species polygon and associated species credits are not required for this species.

6.0 Identifying Prescribed Impacts

Prescribed impacts which are predicted to occur as a result of the proposed development are documented in **Table 6.1**.

Table 6.1 Prescribed Impacts Identified

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☐ Yes/ ☒ No	There are no karst, caves, crevices, cliffs, rocks or other geological features of significance within the Subject Land.	Not applicable.
Human-made structures	☒ Yes/ ☐ No	There is an occupied residential dwelling and farm sheds within the Biodiversity Certification Area.	The open small ancillary structures were searched for evidence of use. Given the results of the surveys, it is considered unlikely that any threatened entities would be utilizing these structures.
Non-native vegetation	☐ Yes/ ☒ No	Areas of non-native vegetation occur in the form of exotic dominated grasslands, however these have been assessed against the benchmarks for PCT 3583.	The areas of exotic dominated grasslands are highly disturbed and have been subject to extensive pasture improvement. These areas are regularly grazed by stock and are not likely to support threatened species.
Habitat connectivity	☒ Yes/ ☐ No	The current rezoning proposal does not involve clearing of native vegetation, however future developments may involve clearing including paddock trees. Given these trees are mainly isolated and scattered trees, they are not currently providing important corridor connectivity and rather contribute to minor 'stepping stone' connectivity. Remnant areas adjacent to the Subject Land (east and south) provide superior local habitat connectivity and a regional biodiversity corridor occurs to the north of the Subject Land/Pacific Highway. Future proposals should seek to minimise clearing of the canopy trees where possible, particularly the canopy trees along the northern boundary of the site.	It is possible that the remnant trees on the Subject Land could be utilised by threatened entities. Nearby remnant vegetation areas in higher condition (east and south of the Subject Land) provide stronger habitat links.

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature
Waterbodies, water quality and hydrological processes	☒ Yes/ ☐ No	Three farm dams occur on the Subject Land.	No threatened entities were observed using the dams during preliminary surveys. Appropriate targeted surveys have been completed, and no threatened species were observed.
Wind turbine strikes (wind farm development only)	☐ Yes/ ☒ No	This assessment is not a wind farm development.	Not applicable.
Vehicle strikes	☐ Yes/ ☒ No	The current rezoning proposal would not increase vehicle strikes. Future development may result in increased traffic movement; however, this would likely be low speed movements only.	No threatened entities are likely to be affected by vehicle strikes as vehicle movements will be at low speed.

7.0 Avoid and Minimise Impacts

The following sections document the considerations and measures implemented to avoid and minimise the direct impacts of the future development of the Subject Land.

7.1 Avoid and Minimise Direct and Indirect Impacts

7.1.1 Project Location

The Subject Land has been highly disturbed by historical agricultural use and pasture improvement and should be considered as a higher priority for development over areas of intact remnant vegetation. This proposal for Biodiversity Certification has considered the impact avoidance, minimization and offsetting hierarchy outlined within the Biodiversity Assessment Methodology (NSW DPIE 2020e).

Areas of mapped important swift parrot habitat have been completely excluded from the Biodiversity Certification Area. Additionally, a Tree Protection Zone buffer around the swift parrot habitat mapping has been incorporated into the project and excluded from development areas.

A fully structured 20 m wide revegetated corridor is proposed along the northern boundary of the Subject Land (notwithstanding the 6 m wide shared access corridor for emergency egress and pedestrian movements). This area will be subject to soil nutrient reduction and remediation works including replanting with native vegetation. Tree hollows removed from the areas of proposed development will also be salvaged and modified for installation as nest boxes or utilised as ground habitat in the proposed corridor.

Trees in urban areas contribute to biodiversity, have cooling effects, conserve energy, reduce runoff, and absorb pollutants. Strategically planted or retained trees can provide shade and benefit the future residents of the site. It is therefore recommended that at the development application stage and where feasible, remnant trees in open space areas, in setbacks and landscaped areas and around stormwater basins be considered for retention. Trees which should be prioritised for retention include healthy and structurally sound trees, particularly those that are characteristic of the Swamp Sclerophyll Forest EEC or trees containing hollows. Where trees cannot be retained due to safety reasons or root zone impacts, and landscaping is proposed, locally endemic native species will be selected for plantings.

Sufficient targeted surveys for *Myotis macropus* have been completed which resulted in no observations of any individuals over the Subject Land. Mitigation measure for *Myotis* have been considered due to the Subject Land containing predicted habitat as per the Central Coast Council mapping (2020). The *Myotis* Species Management Plan (Central Coast Council 2023) includes the following relevant mitigation measures which have been addressed throughout the planning phase of the project:

- ‘All streams must have adequate riparian buffers applied during the Planning Proposal stage as per the *Water Management Act 2000*’. An assessment of the mapped first order watercourse was conducted on 6 March 2025 to document and describe its geomorphic characteristics (**Appendix H**). NSW DCCEE (Water) Licencing and Approvals (**Appendix I**), agreed with the

findings in the Drainage Line Assessment Report and determined the first order watercourse does not meet the definition of a 'river'.

Therefore, the mapped first order watercourse does not need to be assessed under the *Water Management Act 2000* and management that may typically relate to riparian zones does not need to be applied (**Appendix I**).

- 'A genuine attempt at avoiding areas shown to be used by Myotis'. Although Myotis has not been found on site a genuine attempt has been made to avoid potential foraging habitat have been minimised.
- 'Improve the aquatic health of Myotis habitat through completing bushland regeneration activities'. The existing dams will undergo landscaping and replanting as a part of site works. Any regeneration activities will be advised by appropriately qualified ecologists.

7.1.2 Project Design

7.1.2.1 Preliminary Biodiversity Constraints

Assessment of biodiversity constraints is an important step in the avoid and minimise process as it allows for the future development of a site to be planned and designed with a reduced risk of impact on high biodiversity value areas. The Greater Lake Munmorah Structure Plan has identified an area to be rehabilitated as a biodiversity corridor along the northern boundary of the Subject Land.

The remainder of the land is proposed to be utilised for residential development. These areas have been identified by Central Coast Council as part of a strategic planning and biodiversity outcome for the future development of the locality and forms part of a wider regional strategy to develop disturbed areas and retain higher quality habitats.

7.1.2.2 Protection and Improvement of Retained Biodiversity Areas

A 20 m wide vegetated corridor is proposed to be replanted along the northern boundary of the Subject Land, which will be protected and regularly maintained and monitored to ensure future rehabilitation is successful. The rehabilitation of these areas is to include soil nutrient reduction and remediation, weed control, fully structured replanting of native vegetation and habitat supplementation, including nest boxes. Plantings should include tree species recognised as locally important for the swift parrot and other locally occurring fauna, including *Eucalyptus robusta*, *E. tereticornis*, *Casuarina glauca*, *Corymbia gummifera* and *Melaleuca quinquenervia*. These planting works will be guided by the Biodiversity Management Plan (**Appendix O**). A tree protection zone has also been implemented along the eastern boundary to ensure there are no indirect impacts to the swift parrot important habitat.

7.2 Avoid and Minimise Prescribed Impacts

Prescribed Impacts are additional impacts which require assessment, however, they are not impacts which require consideration when calculating the number and classes of biodiversity credits required. Clause 6.1 of the BC Regulation defines Prescribed Impacts as:

- the impacts of development on the following habitat of threatened species or ecological communities:
 - karst, caves, crevices, cliffs and other geological features of significance
 - rocks
 - human made structures
 - non-native vegetation
 - the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range
 - the impacts of development on movement of threatened species that maintains their lifecycle
 - the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development)
 - the impacts of wind turbine strikes on protected animals
 - the impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.

During the surveys completed human made structures, dams and exotic vegetation areas were observed, however no threatened species were observed utilising these potential habitat features.

7.2.1 Project Location

The prescribed impact features present are considered to be of low importance to threatened biodiversity and further alteration of the project location is considered not necessary.

7.2.2 Project Design

During the surveys completed prescribed impact features such as dwellings, sheds, dams and exotic vegetation areas were observed, however no threatened species were observed utilising these features. The surveys completed did not identify use by any threatened species. The Masterplan design shown in **Figure 1.3** proposes to retain or reconstruct aquatic habitats associated with the larger dam present in the western section of the site. The existing dwelling and some of the existing sheds are also not identified for removal on the masterplan. Stormwater flows from the site have also been designed to mimic natural runoff to adjoining flood prone vegetated habitats to the south.

7.3 Other Measures Considered

The Subject Land is highly disturbed and suitable mitigation measures have been implemented to ensure that a 20 m wide vegetated corridor will be replanted along the northern site boundary, areas of mapped important habitat for the swift parrot will be buffered and retained and aquatic habitats will be recreated as part of future construction of stormwater detention basins.

Previous design investigations were undertaken in relation to upgrading the stormwater channel to the south of the site, however due to the extent of native vegetation present in this area an alternative

solution has been developed to manage stormwater on site and avoid offsite native vegetation clearing.

7.4 Summary of Measures to Avoid and Minimise Impacts

The development of the site has been identified under the Greater Lake Munmorah Structure Plan prepared by Central Coast Council as part of a strategic planning and biodiversity outcome for the future development of the locality. This site forms part of a wider regional strategy to develop disturbed areas and retain higher quality offsite habitats.

Table 7.1 provides a summary of suggested measures that could be adopted to avoid and minimise direct, indirect and prescribed impacts associated with any proposed development of the Subject Land. This includes considerations in the proposal design and planning stages, and construction and operation phases.

Table 7.1 Avoidance and Minimisation Measures for Direct, Indirect and Prescribed Impacts

Action	Outcome	Timing	Responsibility
Preliminary biodiversity constraints analysis	Preliminary assessment of biodiversity constraints to inform planning proposal design and minimise impacts to areas with high biodiversity values.	Proposal design	Project Ecologist, Planning Team and Proponent
Location and design of works in existing disturbed areas where possible	Focus impacts on areas of low biodiversity value.	Proposal design	Project Ecologist, Planning Team and Proponent
Reduction of Subject Land boundary/ impact footprint	Avoidance and minimisation of impacts to of mapped important swift parrot habitat, areas of TEC (BC Act and EPBC Act Swamp Sclerophyll Forest EEC areas to the south of the site) and a vegetated corridor along the northern site boundary. Avoidance and minimisation of indirect impacts to trees within the swift parrot habitat through identification of and management of a tree protection zone (Appendix J).	Proposal design	Proponent
Seek opportunities to protect and improve retained biodiversity areas	Small areas of retained biodiversity values have been excluded from the Biodiversity Certification Area. Further opportunities for the improvement of these through management (e.g., revegetation, weed control) and protection should occur at the development application stage.	Proposal design and operation	Project Ecologist, Planning Team and Proponent
Workforce education and training	Environmental awareness for workforce.	Pre-construction and during construction and operation	Site Manager
Implement Construction Environmental Management Plan	Management and minimisation of potential environmental impacts.	Project construction	Site Manager
Implementation of vegetation protection zones for areas to be retained	Protect retained habitats.	During construction phase	Project Ecologist and Site Manager
Ecologist pre-clearance surveys and supervision of works	Minimisation of impacts to local fauna and their habitats through identification of fauna present and management to minimise harm. Minimisation of indirect impacts to trees in swift parrot habitat.	Construction/site clearing phase	Project Ecologist, Project Arborist and Site Manager

Action	Outcome	Timing	Responsibility
Fencing and access control	Avoidance of unplanned human and livestock interference and disturbance to retained areas.	Construction and operational phases	Site Manager
Erosion and sedimentation control	Minimise erosion and sedimentation within the Subject Land and downstream habitats through installation and maintenance of appropriate erosion and sediment controls.	Construction and operational phases	Site Manager
Weed management	Prevent weed incursions and spread.	During construction, site clearing and operational phases	Site Manager

8.0 Impact Assessment

8.1 Direct Impacts

8.1.1 Residual Direct Impacts

The parts of the Subject Land which are subject to impacts associated with the Proposal are mapped in **Figure 8.1**. **Table 8.1** summarises the extent of likely residual direct impacts to plant community types on the Subject Land.

Table 8.1 Summary of Residual Direct Impacts

Direct Impact	BC Act Status	EPBC Act Status	Potential SAI Entity	Project Phase/ Timing of Impact	Extent
PCT 3583 Hunter Coast Lowland Scribbly Gum Forest	Not listed	Not listed	No	During construction phase following future development approval	Removal of 0.45 ha of remnant trees over exotic grassland Removal of 7.87 ha of exotic grassland assigned to this PCT.
PCT 4020 Coastal Creekflat Layered Grass-Sedge Swamp Forest	Endangered Ecological Community	Endangered Ecological Community	No	During construction phase following future development approval	Removal of 0.76 ha of remnant trees over exotic grassland.

FIGURE 8.1
Impact and Impact
Avoidance Areas of
Subject Land

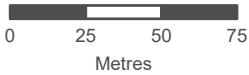


Legend

- Study Area (Rezoning Area)
- Subject Land (Biodiversity Certification Assessment Area)
- Avoidance Area
- Certified Land
- Pacific Highway
- Road

Offsetting Requirements

- Native vegetation below the biodiversity offset threshold (no ecosystem credits required)
- Native vegetation above the biodiversity offset threshold (ecosystem credits required)
- Non-native vegetation (no ecosystem credits required)



Scale 1:2,500 at A4
GDA2020 MGA Zone 56



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8.1.2 Change in Vegetation Integrity Score

The change in vegetation integrity for residual direct impacts on plant community types is documented in **Table 8.2**. For each vegetation zone the change in vegetation integrity is based on the development impacting to a vegetation integrity score of zero during construction.

Table 8.2 Impacts to Vegetation Integrity

PCT and Vegetation Condition Zone	Management Zone	Area (ha)	Before Development				After Development				Change in VI score
			Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	
Vegetation Zone 1 – PCT 3583 Paddock Trees over Exotic Understorey	Impact Footprint	0.45	12.3	12.0	12.2	12.2	0	0	0	0	-12.2
Vegetation Zone 2- PCT 3583 Exotic Grassland	Impact Footprint	7.87	3.2	0	0	1.5	0	0	0	0	-1.5
Vegetation Zone 3 – PCT 4020 Paddock trees over Exotic Grassland	Impact Footprint	0.76	61	23.1	46.8	40.4	0	0	0	0	-40.4

8.2 Indirect Impacts

The parts of the Subject Land which are likely to be subject to indirect impacts associated with the Proposal are mapped in **Figure 8.1**. **Table 8.3** summarises the extent of the proposed residual indirect impacts to plant community types and threatened entities observed or assumed to be present on the Subject Land.

Table 8.3 Summary of Residual Indirect Impacts

Indirect Impact	Threatened Entity Impacted	Project Impact Intensity	Frequency/ Duration	Project Phase/Timing of Impact	Likelihood and Consequences
Increased site occupation	Ecosystem credit species with potential to use the site on occasion may be impacted.	Low	Frequent/ Ongoing	Construction and site occupation	Likely to occur, consequences are likely to include reduction in habitat suitability for ecosystem credit species.
Connectivity and corridors	Ecosystem credit species with potential to use the site on occasion may be impacted.	Low	Frequent/ Ongoing	Construction and site occupation	Connectivity opportunities will be reduced through the Subject Land, however only highly disturbed habitats are present. A revegetated corridor will be provided along the northern boundary of the Subject Land linking the remnant vegetation present to the east and west.

Indirect Impact	Threatened Entity Impacted	Project Impact Intensity	Frequency/ Duration	Project Phase/Timing of Impact	Likelihood and Consequences
					The stormwater infrastructure also has potential to impact connectivity in the waterfront reserve to the south of the Subject Land. Impacts to this area would likely be temporary during construction works, with any disturbance to existing vegetated areas replanted following works.
Damage to root zone of adjoining vegetation and mapped important for the swift parrot	Ecosystem credit species with potential to use the site on occasion may be impacted. mapped important for the swift parrot	Low	Frequent/ short term	Construction	Very low potential for damage to tree roots of native trees and mapped important for the swift parrot to the east and north from excavation and compaction. Tree protection zone identified in Arborist Impact Assessment Report (Appendix J) has been provided to avoid indirect impacts to trees to the north and east.
Light spill impacts	Ecosystem credit species with potential to use the site on occasion may be impacted.	Low	Frequent/ Ongoing	Site occupation	There is potential for light spill impacts on the adjoining vegetated habitats to the east. Avoid facing lights towards habitat. The extent of impacts will be dependent on the final subdivision layout. Consequences likely to include minor alteration to fauna behaviours including avoidance of light and opportunistic utilisation of light spill areas.
Noise impacts	Ecosystem credit species with potential to use the site on occasion may be impacted.	Low	Frequent/ short term	Construction	There is a very low potential for this to occur during construction works, it is expected that this impact would have negligible consequences.
Air quality impacts	No threatened entities likely to be impacted by air quality.	Low	Infrequent/ short term	Construction	Low potential to occur if appropriate dust suppression is undertaken. Consequences include physical injury to airways of fauna species and short term reduced photosynthetic capacity for impacted flora.
Water impacts	Ecosystem credit species with potential to use the site and adjoining areas on occasion have potential to be impacted, however the risks are likely to be mitigated.	Low	Infrequent/ long term	Construction	Low potential to occur if appropriate erosion and sediment controls are implemented during construction works.

Indirect Impact	Threatened Entity Impacted	Project Impact Intensity	Frequency/ Duration	Project Phase/Timing of Impact	Likelihood and Consequences
Weed invasion	No threatened entities likely to be impacted as the site is already dominated by weeds.	Low	Frequent/ long term	Construction and site occupation	Low potential for additional impacts to occur as Subject Land has already been subject to widespread weed invasion.
Pest animal species	No threatened entities likely to be impacted, as the rezoning of the site is not likely to increase pest species abundance.	Low	Frequent/ long term	Construction and site occupation	Likely already occurring due to historical habitat modification.

8.3 Prescribed Impacts

Prescribed impacts associated with the Proposal are identified in **Section 6.0** of this report and are further documented below.

8.3.1 Karst, Caves, Crevices, Cliffs, Rocks or Other Geological Features of Significance

The proposal is not likely to impact caves, crevices, cliffs or geological features of significance.

8.3.2 Human-Made Structures

Any future removal of sheds or other structures with potential to provide habitat for fauna species will be undertaken under the supervision of an ecologist.

8.3.3 Non-Native Vegetation

8.3.3.1 Nature and Extent

The Subject Land contains mostly exotic dominated pasture vegetation which will be impacted by the future subdivision of the Subject Land. These areas are of no considerable value to threatened biodiversity.

8.3.3.2 Duration

This will be a one-off, permanent impact for the life of the project that will occur during construction and site operation.

8.3.3.3 Consequences

Removal of non-native vegetation is unlikely to significantly impact upon threatened biodiversity as no threatened species dependant on these habitats were recorded.

8.3.4 Habitat Connectivity

8.3.4.1 Nature and Extent

The Subject Land currently contains scattered remnant paddock trees over exotic pasture which provides low levels of potential connectivity for both flora and fauna species.

8.3.4.2 Duration

This will be a one-off, permanent impact for the life of the development that will occur during construction and site operation, following rezoning and approval for future development.

8.3.4.3 Consequences

The consequences include reduced wildlife connectivity, however a replanted vegetated corridor is proposed along the northern site boundary which will maintain and improve connectivity between intact habitats to the east and west of the Subject Land.

8.3.5 Waterbodies, Water Quality and Hydrological Processes

The farm dams present will likely require reshaping as part of the construction of future stormwater detention basins. These small farm dams do not significantly contribute to natural hydrological processes and will be dewatered and filled under the supervision of an ecologist, in accordance with the requirements for future development applications.

8.3.6 Vehicle Strikes

8.3.6.1 Nature

Increased vehicle movements will occur Subject Land, however these are unlikely to result in vehicle strikes due to low-speed limits associated with future internal roads. The project is also likely to increase traffic on external local roads, however appropriate speed limits are present for these existing roads.

8.3.6.2 Duration

The low potential for increased vehicle strikes will occur during site occupation.

8.3.6.3 Consequences

It is unlikely that the future development of the site would directly contribute to vehicle strikes and no significant consequences are considered likely to occur.

8.4 Assessing and Mitigating Residual Impacts on Biodiversity Values

The following management measures are proposed to mitigate the residual impacts (direct, indirect and prescribed) associated with the project. The impact mitigation measures proposed for residential impacts are further summarised in **Table 8.4**, with implementation details provided in **Table 8.5**.

The following impact mitigation measures should be considered as part of future development applications to mitigate biodiversity related impacts associated with the development of the Subject Land:

- Workforce education and training.
- Completion of pre-clearance surveys to ensure fauna species are relocated prior to clearing.
- Installation of fencing and signage and monitoring of trees and native vegetation to be retained in accordance with AS 4970-2025 Protection of trees on development sites.

- Preparation and implementation of a site-specific Soil and Water Management Plan to manage erosion and sediment control.
- Replanting of locally occurring native flora species and completion of weed control in retained areas.
- Use of locally occurring native flora species in site landscaping and revegetation works associated with stormwater infrastructure.
- Implementation of a dam-dewatering plan prior to filling any dams.
- Preparation and implementation of a Construction Environmental Management Plan to document the environmental impact mitigation, performance targets, monitoring requirements and adaptive management strategies for the construction phase works.

It is expected that these measures would be implemented where appropriate, following the approval of a future development application.

Table 8.4 Summary of Proposed Mitigation and Management Measures for Residual Impacts (Direct, Indirect and Prescribed)

Mitigation Measure	Method/Technique	Timing	Frequency	Responsibility	Likely efficacy
Workforce education and training	Environmental awareness for construction and operational site workers.	Construction	For all new contractors and employees as part of the general site induction.	Site Manager	Measure is likely to achieve intended outcome
Ecologist pre-clearance survey of disturbance footprint prior to clearing and construction works, and supervision works	Minimisation of impacts to local fauna and their habitats through identification of fauna present and management to minimise harm.	Site clearing/ construction	Prior to and during site clearing and construction.	Site Manager/ Project Ecologist	Measure is likely to achieve intended outcome
Identification of approved disturbance areas and implementation of vegetation protection zones for areas to be retained	Installation of fencing and signage around vegetation to be retained in accordance with AS 4970-2025 Protection of trees of development sites. Approved tree protection fencing along the proposed 5 m tree protection zone and maintenance of a 'no go' zone. Tree retention within the Biodiversity Certification area will be subject to ongoing arboricultural impact assessment at the development application stage.	Site clearing/ construction	Prior to and during site clearing and construction.	Site Manager/ Project Ecologist/Project Arborist (AQF Level 5)	Measure is likely to achieve intended outcome
Erosion and sediment control	Implementation of a site-specific Soil and Water Management Plan.	Site clearing/ construction	Temporary erosion and sediment controls would be installed prior to commencement of construction and permanent measures such as stormwater detention basins would be maintained for the life of the development.	Site Manager	Measure is likely to achieve intended outcome

Mitigation Measure	Method/Technique	Timing	Frequency	Responsibility	Likely efficacy
Post-clearance residual tree inspection	Trees health should be assessed at the final stage of earthworks to evaluate impacts from the development or environmental factors. A compliance certificate should be issued.	Site clearing/ construction	Post site clearing and construction.	Project Ecologist/ Project Arborist (AQF Level 5)	Measure is likely to achieve intended outcome
Weed management in retained areas	Targeted spraying to suppress weed invasion.	Construction	As required	Site Manager/ Project Ecologist	Measure is likely to achieve intended outcome
Revegetation of locally native flora species in retained areas	Planting of locally occurring native flora species in site landscaping and revegetation works associated with stormwater infrastructure.	Construction	During construction	Site Manager/ Project Ecologist	Measure is likely to achieve intended outcome
Implementation of a Dam-dewatering Plan	Capture and relocate fauna present in dams to be dewatered.	Construction	Prior to filling any dams	Site Manager	Measure is likely to achieve intended outcome
Preparation and implementation of Construction Environmental Management Plan	Develop plan to adequately manage environmental impacts during construction including dam dewatering controls, fencing and access control, weed management and erosion and sediment control.	To be prepared prior to the commencement of works and implemented for all construction works and for the life of the development as necessary.	Prior to and during site clearing and construction	Proponent/ Site Manager	Measure is likely to achieve intended outcome

Table 8.5 Implementation Details for Proposed Impact Mitigation and Management Measures

Measure/Action	Monitoring and Evaluation Strategy	Performance Criteria	Adaptive Management Threshold	Adaptive Management Response
Workforce education and training	Completion and maintenance of a site induction register.	Induction of all construction workers.	Failure of Site Manager to induct workers.	Suspension of the relevant works until construction workers are inducted.
Ecologist pre-clearance survey of disturbance footprint prior to clearing and construction works, and supervision works	Reporting on preclearance surveys and works supervision to be undertaken by Project Ecologist.	Completion of proposed works.	Completion of clearing works without project ecologist supervision.	Ensure ecologist is present during clearing.
Identification of approved disturbance areas and implementation of vegetation protection zones for areas to be retained	Monitoring to be undertaken by the Project Ecologist prior to commencement and monthly during construction works.	Protection of retained vegetation and habitats.	Breach of vegetation protection zones/damage to retained habitats.	Breach to be reported to local consent authority and suspension of the relevant works to occur until appropriate protection measures are implemented and appropriate remedial actions to remedy any adverse impacts are commenced.
Implementation of tree protection zone buffer to minimise indirect impacts to swift parrot habitat.	Engage qualified Project Arborist (AQF level 5 in Arboriculture. Project Arborist to review development plans, inspect tree protection fencing (as describe in Appendix J) prior to construction.	Protection of retained trees.	Breach of vegetation protection zones/damage to retained habitats.	Breach to be reported to local consent authority and suspension of the relevant works to occur until appropriate protection measures are implemented and appropriate remedial actions to remedy any adverse impacts are commenced.
Erosion and sediment control	Monitoring to be undertaken in accordance with requirements of Construction Environmental Management Plan.	Temporary erosion and sediment controls to be installed prior to works. Permanent controls to be maintained for the life of the development.	Monitoring detects lack or failure of required temporary or permanent erosion and sediment controls.	Erosion and sediment control plans to be updated as construction progresses.

Measure/Action	Monitoring and Evaluation Strategy	Performance Criteria	Adaptive Management Threshold	Adaptive Management Response
Weed management in retained areas	Monitoring to be undertaken in accordance with requirements of Construction Environmental Management Plan.	Weed growth to be continually suppressed within the development footprint.	Monitoring detects increased weed infestations which are not being suppressed.	Alternative methods or herbicides to be used to achieve success.
Revegetation of locally native flora species in retained areas in accordance with the Biodiversity Management Plan	Monitoring of completion and success of plantings to be undertaken.	Successful revegetation of target areas.	>20% loss of any planted species.	Additional and/or different more appropriate plantings to be reinstated.
Preparation and implementation of Construction Environmental Management Plan	Implementation to be supervised by Project Ecologist or suitable environmental consultant.	Completion of all proposed environmental protection works and monitoring inspections.	Monitoring detects breach or failure to implement Construction Environmental Management Plan.	Breaches to be reported to local consent authority and actions to be taken to remediate any impacts or issues.

8.5 Adaptive Management Strategy for Uncertain Impacts

It is considered that the impacts associated with the future development of the site are predictable and no uncertain impacts are likely to occur.

9.0 Serious and Irreversible Impacts

9.1 Assessment for Serious and Irreversible Impacts on Biodiversity Values

Under Clause 6.7 (2) of the BC Regulation, an impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because of one of the following four principles:

- Principle 1: The impact will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or
- Principle 2: the impact it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size, or
- Principle 3: it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution, or
- Principle 4: the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable.

The Study Area contains areas of mapped Important Habitat for the swift parrot, as shown in **Figure 4.4**. Impacts to areas of mapped swift parrot Important Habitat are identified as a potential SAIL entity.

There is a small patch of mapped swift parrot important habitat which corresponds to a remnant eucalypt tree in the north-western corner of the Study Area. There is also a sliver of mapped swift parrot important habitat along the eastern boundary of the Study Area, however this area has only been mapped due to the presence of adjacent trees which have an overhanging canopy which will not be removed by future development on the Subject Land. A tree protection buffer around the mapped swift parrot important habitat has also been implemented in order to minimise indirect impacts. No areas of mapped important habitat for the swift parrot will be impacted by the proposed Biodiversity Certification of the site.

The determination of a serious and irreversible impact (SAIL) on biodiversity values is to be made by the decision maker as part of the assessment of a Biodiversity Certification Assessment Report.

9.1.1 Additional Impact Assessment Provisions for Threatened Species at Risk of SAIL

9.1.1.1 Swift parrot (*Lathamus discolor*)

The additional impact assessment provisions for threatened species at risk of an SAIL have been addressed for the swift parrot in **Table 9.1**. This species is listed as endangered under the BC Act and critically endangered under the EPBC Act.

Table 9.1 All Impact Assessment – swift parrot (*Lathamus discolor*)

BAM Section 9.1.2 Criteria	Additional Impact Assessment Provisions	Response
1	The assessor is required to provide further information in the BDAR or BCAR for any species at risk of an SAIL, including the action and measures taken to avoid the direct and indirect impact on the species at risk of an SAIL. Where these have been addressed elsewhere the assessor can refer to the relevant sections of the BDAR or BCAR.	All areas of mapped important habitat for this species will be avoided and are located within the Retained/Avoided Lands. An Arborist Impact Assessment (Appendix J) was conducted at the request of the independent review (Appendix L) to assess indirect impacts to swift parrot habitat. The report identified that a 5 m tree protection buffer is to be included in the concept design along the eastern boundary and the north west corner as per AS 4970-2025 Protection of trees on development sites.
2	The assessor must consult the TBDC and/or other sources to report on the current population of the species including:	The TBDC has been reviewed in relation to the information available swift parrot. Additional sources relied upon are referenced within the text below.
2a	Evidence of rapid decline (Principle 1, clause 6.7(2)(a) BC Regulation) presented by an estimate of the:	
2ai	Decline in population of the species in NSW in the past 10 years or three generations (whichever is longer), or	Garnett and Baker (2021), estimated in 2020 that there were approximately 750 swift parrots left in the wild. Olah <i>et al.</i> , (2021) has also provided an estimate using genetic techniques that has identified an effective population size of potentially less than 300 individuals. It is considered that this species is in a state of rapid decline, however the primary cause of this decline is related to logging of breeding sites and predation of nesting females and young by sugar gliders at breeding sites in Tasmania (Heinsohn <i>et al.</i> , 2019). The TBDC also identifies that this species meets the criteria of a population reduction of >80 % in 10 years or three generations.
2aii	Decline in population of the species in NSW in the past 10 years or three generations (whichever is longer) as indicated by: an index of abundance appropriate to the species; decline in geographic distribution and/or habitat quality; exploitation; effect of introduced species, hybridisation, pathogens, pollutants, competitors or parasites.	Not applicable, see response above.

BAM Section 9.1.2 Criteria	Additional Impact Assessment Provisions	Response
2b	Evidence of small population size (Principle 2, clause 6.7(2)(b) BC Regulation) presented by:	
2bi	An estimate of the species' current population size in NSW	The TBDC does not provide information on the current population size in NSW. This species is migratory and forms a single population which migrates between Tasmania where it breeds and the Australian mainland during the austral winter. The population size is estimated at about 750 birds by Garnett and Baker (2021), and the effective population size is estimated by Olah <i>et al.</i>, (2021) at less than 300 individuals. The proportion of the population within NSW is related to seasonal migration and movement patterns.
2bii	An estimate of the decline in the species' population size in NSW in three years or one generation (whichever is longer), and	Heinsohn <i>et al.</i> , (2019) have modelled an 89.4 % – 94.9 % decline in this species population over three years from 2019 due high sex-specific predation rates at nest sites and reduced reproductive success attributed to predation and the impacts of shared paternity.
2biii	Where such data is available, an estimate of the number of mature individuals in each subpopulation, or the percentage of mature individuals in each subpopulation, or whether the species is likely to undergo extreme fluctuations	Garnett and Baker 2021 estimate the current population size at about 750 birds and an estimate by Olah <i>et al.</i>, (2021) using genetic techniques has identified that the current effective population size may be less than 300 individuals. The population is not likely to undergo extreme fluctuations.
2c	Evidence of limited geographic range for the threatened species (Principle 3, clause 6.7(2)(c) BC Regulation) presented by:	
2ci	Extent of occurrence	This species breeds in Tasmania and migrates to the east coast of mainland Australia for the Austral winter where it disperses widely and ranges from the eastern parts of SA, VIC, the ACT, and the east coast and ranges and tablelands of NSW and southern QLD. The full extent of occurrence for this species was estimated at 57,000 km ² by Garnett <i>et al.</i> , (2011) in the Action Plan for Australian Birds 2010.
2cii	Area of occupancy	The area of occupancy of this species is not possible to estimate accurately due to this species temporal and variable spatial movements across its range.

BAM Section 9.1.2 Criteria	Additional Impact Assessment Provisions	Response
2ciii	Number of threat-defined locations (geographically or ecologically distinct areas in which a single threatening event may rapidly affect all species occurrences), and	There is no threat defined locations listed for this species within the TBDC. It is considered that this species breeding habitat on mainland Tasmania is a threat defined location due to impacts associated with logging and predation by sugar gliders.
2civ	Whether the species' population is likely to undergo extreme fluctuations.	Based on available data it is considered that this species' population is not likely to undergo extreme fluctuations and the population trend reported in the scientific literature is of a continuing decline.
2d	Evidence that the species is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation) because:	
2di	Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g., Species is clonal) on, a biodiversity stewardship site	This species is not clonal; however, it only breeds in Tasmania and would not breed on a Biodiversity Stewardship Site in NSW.
2dii	The species is reliant on abiotic habitats which cannot be restored or replaced (e.g., Karst systems) on a biodiversity stewardship site, or	There is no data to support this in the TBDC or the scientific literature.
2diii	Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g., Frogs severely impacted by chytrid fungus).	It is widely accepted that historical declines in the population of this species are attributable to extensive land clearing. Logging of habitat in Tasmania and lack of breeding success is now considered to be the main reasons for the continuing population decline of the swift parrot. These threats occur in Tasmania and cannot be managed at a biodiversity stewardship site in NSW.
3	Where the TBDC indicates data is 'unknown' or 'data deficient' for a species for a criterion listed in Subsection 9.1.2(2.), the assessor must record this in the BDAR or BCAR.	The TBDC does not specifically indicate that data is unknown or deficient for this species.
4	In relation to the impacts from the proposal on the species at risk of an SAIL, the assessor must include data and information on:	
4a	The impact on the species' population (Principles 1 and 2) presented by:	
4ai	An estimate of the number of individuals (mature and immature) present in the subpopulation on the Subject Land (the site may intersect or encompass the subpopulation) and as a percentage of the total NSW population, and	This species has not been observed on the Subject Land and occurs as one global population.

BAM Section 9.1.2 Criteria	Additional Impact Assessment Provisions	Response
4aii	An estimate of the number of individuals (mature and immature) to be impacted by the proposal and as a percentage of the total NSW population, or	The proposed rezoning is not likely to directly impact any swift parrots, and all areas of mapped important habitat will be retained. Further a buffer has been identified to protect root zone of trees in the mapped important habitat from indirect impacts.
4aiii	If the species' unit of measure is area, provide data on the number of individuals on the site, and the estimated number that will be impacted, along with the area of habitat to be impacted by the proposal.	This species breeds in Tasmania and migrates to the east coast of mainland Australia for the Austral winter where it disperses widely and ranges from the eastern parts of SA, VIC, the ACT, and the east coast and ranges and tablelands of NSW and southern QLD. There is one population of the swift parrot which has an estimated size of 750 birds (Garnett and Baker 2020) or an effective population of less than 300 individuals (Olah <i>et al.</i> , 2021). No swift parrots have been observed within the Subject Land during surveys.
4b	Impact on geographic range (Principles 1 and 3) presented by:	
4bi	The area of the species' geographic range to be impacted by the proposal in hectares, and a percentage of the total AOO, or EOO within NSW.	All areas of mapped important habitat for this species are proposed for retention.
4bii	The impact on the subpopulation as either: all individuals will be impacted (subpopulation eliminated); OR impact will affect some individuals and habitat; OR impact will affect some habitat, but no individuals of the species will be directly impacted.	All areas of mapped important habitat for this species are proposed for retention. A tree protection zone has been identified to avoid direct and indirect impacts to root zone of trees in the mapped important habitat.
4biii	To determine if the persisting subpopulation that is fragmented will remain viable, estimate (based on published and unpublished sources such as scientific publications, technical reports, databases or documented field observations) the habitat area required to support the remaining population, and habitat available within dispersal distance, and distance over which genetic exchange can occur (e.g., Seed dispersal) and pollination distance for the species.	The Proposal will not fragment any subpopulation of the swift parrot, as this species is highly mobile.

BAM Section 9.1.2 Criteria	Additional Impact Assessment Provisions	Response
4biv	To determine changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors including changes to fire regimes (frequency, severity); hydrology, pollutants; species interactions (increased competition and effects on pollinators or dispersal); fragmentation, increased edge effects, likelihood of disturbance; and disease, pathogens and parasites. Where these factors have been considered elsewhere in relation to the target species, the assessor may refer to the relevant sections.	All areas of mapped important habitat for this species are proposed for retention. There is not likely to be changes in threats affecting the remaining population.
5	The assessor may also provide new information that can be used to demonstrate that the principle identifying the species as at risk of an SAIL, is inaccurate.	Not applicable.

10.0 Impact Summary

10.1 Determine an Offset Requirement for Impacts

10.1.1 Impacts on Native Vegetation and TECs (Ecosystem Credits)

The PCTs and associated condition zones which would not generate a require for an offset (as per BAM Subsection 9.2.1(3.)), are listed in **Table 10.1** and the PCTs which are likely to require ecosystem credits are listed in **Table 10.2**, these areas are also mapped in **Figure 10.1**. Biodiversity Credit Reports are provided as **Appendix G**.

Table 10.1 Impacts That Would Not Require an Offset – Ecosystem Credits

Vegetation Zone	PCT Name	TEC	Impact Area (ha)	TEC Association	Entity at Risk of an SAIL?	Current VI Score
VZ1 PCT 3583 Paddock Trees over Exotic Understorey	Hunter Coast Lowland Scribbly Gum Forest	No	0.45	None	No	12.2
VZ2 PCT 3583 Exotic Grassland	Hunter Coast Lowland Scribbly Gum Forest	No	7.87	None	No	1.5

Table 10.2 Impacts That Require an Offset – Ecosystem Credits

Vegetation Zone	PCT Name	TEC	Impact Area (ha)	Current VI Score	Future VI Score	Change in VI Score	Biodiversity Risk Weighting	Number of Ecosystem Credits Required
VZ3 PCT 4020 Paddock Trees over Exotic Understorey	Coastal Creekflat Layered Grass-Sedge Swamp Forest	Yes	0.76	40.4	0	-40.4	2.0	15
Total Ecosystem Credits								15

10.1.2 Impacts on Threatened Species and their Habitats

No species credit threatened species were observed during surveys. The grey-headed flying-fox was observed foraging within the site during surveys, foraging habitat for this species is as assessed as an ecosystem credit.

10.1.3 Indirect and Prescribed Impacts

No offsets are likely to be required for indirect or prescribed impacts.

10.2 Impacts That Do Not Need Further Assessment

Areas within the Subject Land that do not contain native vegetation do not need to be assessed for ecosystem credits (as per BAM Section 9.3(1–2.)). Areas assessed as not containing any native vegetation include farm dams, cleared access tracks and buildings. Areas of exotic vegetation has been assessed against the benchmarks for PCT 3583 Hunter Coast Lowland Scribbly Gum Forest.

Areas requiring offsets and areas not requiring offsets are mapped in **Figure 10.1**.



FIGURE 10.1
Thresholds for Assessing and Offsetting Impacts

- Legend**
- Study Area (Rezoning Area)
 - Subject Land (Biodiversity Certification Assessment Area)
 - Avoidance Area
 - Certified Land
 - Asset Protection Zone
 - Tree Protection Zone
 - Conservation Land
 - Areas Subject to the Biodiversity Management Plan
 - Pacific Highway
 - Road

0 25 50 75
Metres

Scale 1:2,500 at A4
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11.0 Biodiversity Credit Obligations

Biodiversity Credit Reports which identify the like-for-like credit requirements are provided in **Appendix G**. Following the 7 March 2025 commencement of the *Biodiversity Conservation Amendment (Biodiversity Offsets Scheme) Act 2024*, proponents may no longer seek to use variation rules. Further details on the biodiversity credit requirements for the project are provided as follows.

11.1 Ecosystem Credits

The ecosystem credit requirements and those that could be retired in accordance with the offset rules are listed in **Table 11.1**.

11.2 Species Credits

No species credits are required.

Table 11.1 Ecosystem Credit Class and Matching Credit Profiles

Ecosystem Credits	Rule Type	Attributes Shared with Matching Credits					
		Class or Formation	Trading Group	Zone	Hollow-bearing Trees Present	Credits	IBRA Subregion
4020- Coastal Creekflat Layered Grass-Sedge Swamp Forest	Like for like	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 3272, 3906, 3983, 3985, 3986, 3988, 3989, 3990, 3995, 3997, 3998, 4000, 4001, 4004, 4006, 4009, 4013, 4019, 4020, 4021, 4044, 4047, 4057.	Forested Wetlands	Vegetation Zone 3 PCT 4020 Paddock Trees over Exotic Understorey.	Yes	15	Wyong or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.

12.0 Biodiversity Certification Offsets and Strategy

12.1 Offsets Strategy and Land Uses

The biodiversity offsets requirements for the biodiversity certification will be met by purchasing credits from the market or through a payment made to the Biodiversity Conservation Fund.

Table 12.1 Land Uses and Offsets for the Biodiversity Certification Proposal

Land Use	Area (ha)	Native Vegetation Extent (ha)
Within biodiversity certification assessment area		
Land proposed for rezoning	9.4	1.23*
Land proposed for biodiversity certification	9.26	1.21*
Avoided land (land that is avoided for biodiversity reasons)	0.13	0.02

*Excludes exotic dominated grassland areas.

12.2 Proposed Conservation Measures

The proposal is for a standard biodiversity certification and not a strategic biodiversity certification. The proposed conservation measures are the retirement of 15 ecosystem credits for PCT 4020 – Coastal Creekflat Layered Grass-Sedge Swamp Forest.

12.3 Legal Mechanisms

It is proposed that the biodiversity certification will be achieved through a biodiversity certification order under Section 8.2 of the Biodiversity Conservation Act.

12.4 Parties

The Parties to the Biodiversity Certification are:

- Lakeside Leisure Village (Lot 416 DP 755266).
- Point Palliser Unit Trust (Lot 417 DP 755266).

12.5 Timing

It is proposed that the biodiversity credits be retired prior to the provision of a construction certificate or subdivision certificate, or within two years if a construction certificate or subdivision certificate has not been issued.

Proof of the retirement of the Biodiversity Credits is to be provided to the Minister in writing within fourteen business days after retirement of the biodiversity credits.

12.6 Funding

There are no formal conservation actions proposed which require funding. Funding of the works delivered by the Biodiversity Management Plan will be arranged by the Proponents.

12.7 Monitoring, Reporting and Auditing Framework

The Proponent has engaged AEP to prepare a Certified Land Biodiversity Management Plan (**Appendix O**) and submit it to the Department for approval, which will apply to the Certified Land during the development phase. The plan is to include measures in relation to:

- Protection of biodiversity features in retained lands.
- Management of biodiversity during site clearing.
- Monitoring, reporting and auditing of tasks proposed.

The Biodiversity Management Plan is to be implemented along a corridor across the northern boundary of both Lot 416 & 417 (DP 755266), running parallel to the boundary line from the northwest corner to the northeast corner, as well as a section along the northeastern boundary of Lot 417 and a section along the southern boundary of each lot (**Figure 12.1**).

As the east and west lots have two separate owners and operators, each will manage their own lands. Both sites will be a part of a landlease community and funded and managed under the lease scheme.

The BMP (AEP, September 2025) involves a mixed approach given that the BMP lands contains both native regenerating areas, tree protection zones (TPZ) and asset protection zones (APZ). The BMP lands have been divided into three management zones:

- Management Zone 1 (MZ1): Biodiversity Zone: MZ1 involves restoring and maintain habitat inclusive of swift parrot important habitat. Works will include planting, weed management and monitoring.
- Management Zone 2 (MZ2): Management of the established Tree Protection Zones (TPZ): MZ2 includes areas of swift parrot important habitat and the TPZ, works here will be restricted to weeding management and monitoring.
- Management Zone 3 (MZ3): Asset Protection Zone (APZ): Works within MZ3 include weed management and replanting of trees in line with the BTA (**Appendix P**).



FIGURE 12.1
Areas Subject to the Biodiversity Management Plan

- Legend**
- Study Area (Rezoning Area)
 - Subject Land (Biodiversity Certification Assessment Area)
 - Avoidance Area
 - Certified Land
 - Conservation Land
 - Tree Protection Zone
 - Areas Subject to the Biodiversity Management Plan
 - Asset Protection Zone
 - Pacific Highway
 - Road



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Appendix A

BCAR Requirements Compliance Table



Table A.1 specified where each component of the BCAR minimum information requirements has been addressed in accordance with the BAM Appendix K.

Table A.1 Assessment of Compliance with BCAR Minimum Information Requirements

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
Introduction	Chapters 2 and 3	Information	Section 1.0
		Introduction to the biodiversity assessment including:	
		☒ brief description of the proposal ☒ identification of subject land boundary, including the land proposed for biodiversity certification ☒ general description of the subject land ☒ sources of information used in the assessment, including reports and spatial data	
		Maps and tables	
		☒ Map of the subject land boundary	Figure 1.1
Landscape	Sections 3.1, 3.2, Appendix E	Information	
		Identification of site context components and landscape features, including:	
		☒ general description of subject land topographic and hydrological setting, geology and soils	Section 3.2
		☒ percent native vegetation cover in the assessment area (as described in BAM Section 3.2)	Section 3.3
		☒ IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	Section 3.2.1
		☒ rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3.) and Appendix E)	Section 3.2.2
		☒ wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(3.))	Section 3.2.2
		☒ connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	Section 3.2.3
		☒ karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(12.))	Section 3.2.4
		☒ areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8–9.))	Section 3.2.5

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
		☒ NSW (Mitchell) landscape on which the subject land occurs ☒ details of field reconnaissance undertaken to confirm the extent and condition of landscape features and native vegetation cover (as described in Operational Manual Stage 1 Section 2.4)	Section 3.2.5 Section 2.0
		Maps and tables	
		Site Map	
		☒ Property boundary	Figure 1.1
		☒ Boundary of subject land	Figure 1.1
		☒ Cadastre of subject land (including labelling of Lot and DP or section plan if relevant)	Figure 1.1
		☒ Landscape features identified in BAM Subsection 3.1.3	Figure 1.1
		Location Map	
		☒ Digital aerial photography at 1:1,000 scale or finer	Figure 1.2
		☒ Boundary of subject land	Figure 1.2
		☒ Assessment area (i.e. the subject land and either 1500 m buffer area or 500 m buffer for linear development)	Figure 1.2
		☒ Landscape features identified in BAM Subsection 3.1.3	Figure 1.2
		☒ Additional detail (e.g. local government area boundaries) relevant at this scale	Figure 1.2
		Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location Map include:	
		☒ IBRA bioregions and subregions	Figure 1.1, Figure 1.2
		☒ rivers, streams and estuaries	Figure 1.1, Figure 1.2
		☒ wetlands and important wetlands	Figure 1.1, Figure 1.2
		☒ connectivity of different areas of habitat	Figure 1.1, Figure 1.2
		☒ karst, caves, crevices, cliffs, rocks and other geological features of significance and if required, soil hazard features	N/A
		☒ areas of outstanding biodiversity value occurring on the subject land and assessment area	Not applicable
		☒ NSW (Mitchell) landscape on which the subject land occurs	Figure 1.1, Figure 1.2
		Data	
		☒ All report maps as separate jpeg files	See separate data package

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
		Individual digital shape files of: ☒ subject land boundary ☒ assessment area (i.e. subject land and 1500 m buffer area) boundary ☒ cadastral boundary of subject land ☒ areas of native vegetation cover ☒ landscape features	See separate data package
Native vegetation	Chapter 4, Appendix A and Appendix H	Information	
		☒ Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery (as described in BAM Section 4.1(1–3.) and Subsection 4.1.1)	Section 4.0, Figure 4.1
		☒ Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2)	Section 4.1.2
		☒ Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area (described in BAM Section 4.1(3.) and Subsection 4.1.1)	Section 2.2
		☒ Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2	Section 2.2.3
		☒ Where relevant, describe the use of more appropriate local data, provide reasons that support the use of more appropriate local data and include the written confirmation from the decision-maker that they support the use of more appropriate local data (as described in BAM Subsection 1.4.2 and Appendix A)	N/A
		For each PCT within the subject land, describe: ☒ PCT name and ID ☒ vegetation class ☒ extent (ha) within subject land ☒ evidence used to identify a PCT including any analyses undertaken, references/sources, existing vegetation maps (BAM Section 4.2(1–3.)) ☒ plant species relied upon for identification of the PCT and relative abundance of each species ☒ if relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2(1–2.))	Section 4.2

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
		☒ estimate of percent cleared value of PCT (BAM Subsection 4.2.1(5.))	
		Describe the vegetation integrity assessment of the subject land, including:	
		☒ identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1)	Section 4.4, Section 4.5, Figure 4.2 Section 4.4, Section 4.5 Table 4.5 Table 4.5 Table 4.5 Section 4.5.3
		☒ description of vegetation zones within the subject land (as described in Operational Manual Stage 1 Table 2 and Subsection 3.3.2)	
		☒ area (ha) of each vegetation zone	
		☒ assessment of patch size (as described in BAM Subsection 4.3.2)	
		☒ survey effort (i.e. number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1–2.)	
		☒ use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 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).	N/A
		Maps and tables	
		☒ Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of all areas of native vegetation including areas that are ground cover only, cleared areas (as described in BAM Section 4.1(1–3.)) and all parts of the subject land that do not contain native vegetation (BAM Subsection 4.1.2)	Figure 4.1
		☒ Map of PCTs within the subject land (as described in BAM Section 4.2(1.))	Figure 4.2
		☒ Map of vegetation zones within the subject land (as described in BAM Subsection 4.3.1)	Figure 4.2
		☒ Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries	Figure 2.1
		☒ Map of TEC distribution on the subject land and table of TEC listing, status and area (ha)	Figure 4.3
		☒ Map of patch size locations for each native vegetation zone and table of patch size areas (as described in BAM Subsection 4.3.2)	Patch size exceeds 100 ha
		Table of current vegetation integrity scores for each vegetation zone within the site and including:	
		☒ composition condition score	Table 4.6 Table 4.6

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
		☒ structure condition score	Table 4.6
		☒ function condition score	Table 4.6
		☒ presence of hollow-bearing trees	
		Data	
		☒ All report maps as separate jpeg files	See separate data package
		☒ Plot field data (MS Excel format)	See separate data package
		☒ Plot field datasheets	All plot data collected electronically
		Digital shape files of:	See separate data package
		☒ PCT boundaries within subject land	
		☒ TEC boundaries within subject land	
		☒ vegetation zone boundaries within subject land	
		☒ floristic vegetation survey and vegetation integrity plot locations	
Threatened species	Chapter 5	Information	
		Identify ecosystem credit species likely to occur on the subject land, including:	
		☒ list of ecosystem credit species derived from the BAM-C (as described in BAM Subsection 5.1.1 and Section 5.2(1.))	Table 5.1
		☒ justification and supporting evidence for exclusion of any ecosystem credit species based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2)	Table 5.1
		☒ justification for addition of any ecosystem credit species to the list	N/A
		Identify species credit species likely to occur on the subject land, including:	
		☒ list of species credit species derived from the BAM-C (as described in BAM Subsection 5.1.1)	Table 5.2, Table 5.3
		☒ justification and supporting evidence for exclusions based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2)	Table 5.2, Table 5.3
		☒ justification and supporting evidence for exclusions based on degraded habitat constraints and/or microhabitats on which the species depends (as described in BAM Subsection 5.2.2)	Table 5.2, Table 5.3

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
		☒ justification for addition of any species credit species to the list	Table 5.2, Table 5.3
		From the list of candidate species credit species, identify:	
		☒ species assumed present within the subject land (if relevant) (as described in BAM Subsection 5.2.4(2.a.))	Table 5.4, Table 5.5
		☒ species present within the subject land on the basis of being identified on an important habitat map for a species (as described in BAM Subsection 5.2.4(2.d.))	Table 5.4, Table 5.5
		☒ species for which targeted surveys are to be completed to determine species presence (BAM Subsection 5.2.4(2.b.))	Table 5.4, Table 5.5
		☒ species for which an expert report is to be used to determine species presence (BAM Subsection 5.2.4(2.c.))	Table 5.4, Table 5.5
		Present the outcomes of species credit species assessments from:	
		☒ threatened species survey (as described in BAM Section 5.2.4)	Section 5.3
		☒ expert reports (if relevant) including justification for presence of the species and information used to make this determination (as described in BAM Subsection 5.2.4, Section 5.3, Box 3)	Section 5.4
		Where survey has been undertaken include detailed information on:	
		☒ survey method and effort (as described in BAM Section 5.3)	Section 5.3
		☒ justification of survey method and effort (e.g. citation of peer-reviewed literature) if approach differs from the department's taxa-specific survey guides or where no relevant guideline has been published	Section 5.3
		☒ timing of survey in relation to requirements in the TBDC or the department's taxa-specific survey guides. Where survey was undertaken outside these guides include justification for the timing of surveys	Section 5.3
		☒ survey personnel and relevant experience	Section 1.1.1
		☒ describe any limitations to surveys and how these were addressed/overcome	Section 5.3
		Where an expert report has been used in place of survey (as described in BAM Section 5.3, Box 3), include:	N/A
		☒ justification of the use of an expert report	
		☒ identify the expert, provide evidence of their expert credentials and departmental approval of expert status	
		☒ all requirements of Box 3 have been addressed in the expert report	

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
		Where use of local data is proposed (BAM Subsection 1.4.2): ☒ identify relevant species ☒ identify data to be amended ☒ identify source of information for local data, e.g. published literature, additional survey data, etc. ☒ justify use of local data in preference to VIS Classification or TBDC data ☒ provide written confirmation from the decision-maker that they support the use of local data	N/A
		Species polygon completed for species credit species present within the subject land (assumed present or determined on the basis of survey, expert report or important habitat map) ensuring that: ☒ the unit of measure for each species is documented for species assessed by area: ☒ the polygon includes the extent of suitable habitat for the target species within the subject land (as described in BAM Subsection 5.2.5) ☒ a description of, and evidence-based justification for, the habitat constraints, features or microhabitats used to map the species polygon including reference to information in the TBDC for that species and any buffers applied for species assessed by counts of individuals: ☒ the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(3.)) ☒ the method used to derive this number (i.e. threatened species survey or expert report) and evidence-based justification for the approach taken ☒ the polygon includes all individuals located on the subject land with a buffer of 30 m around the individuals or groups of individuals on the subject land	N/A
		☒ Identify the biodiversity risk weighting for each species credit species identified as present within the subject land (as described in BAM Section 5.4)	N/A
		Maps and tables	
		Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1, and identifying: ☒ the ecosystem credit species removed from the list ☒ the sensitivity to gain class of each species	Table 5.1

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
		Table detailing species credit species in accordance with BAM Section 5.2 and identifying: ☒ the species credit species removed from the list of species because the species is considered vagrant, out of geographic range or the habitat or microhabitat features are not present ☒ the candidate species credit species not recorded on the subject land as determined by targeted survey, expert report or important habitat map	Table 5.2, Table 5.3, Table 5.4, Table 5.5, Table 5.6, Table 5.7
		☒ Table detailing species credit species recorded or assumed as present within the subject land, habitat constraints or microhabitats associated with the species, counts of individuals (flora)/extent of suitable habitat (flora and fauna) (as described in BAM Subsection 5.2.6) and biodiversity risk weighting (BAM Section 5.4)	N/A
		Data	
		☒ Digital shape files of suitable habitat identified for survey for each candidate species credit species	See separate data package
		☒ Survey locations including GPS coordinates of any plots, transects, grids	Appendix G
		☒ Digital shape files of each species polygon including GPS coordinates of located individuals	N/A
		☒ Species polygon map in jpeg format	N/A
		☒ Expert reports and any supporting data used to support conclusions of the expert report	N/A
		☒ Field datasheets detailing survey information including prevailing conditions, date, time, equipment used, etc.	Not applicable, data captured electronically for report
Prescribed impacts	Chapter 6	Information	
		Identify potential prescribed biodiversity impacts on threatened entities, including: ☒ karst, caves, crevices, cliffs, rocks and other geological features of significance (as described in BAM Subsection 6.1.1) ☒ occurrences of human-made structures and non-native vegetation (as described in BAM Subsection 6.1.2) ☒ corridors or other areas of connectivity linking habitat for threatened entities (as described in BAM Subsection 6.1.3)	N/A Figure 4.4 Figure 4.4

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
		☒ waterbodies or any hydrological processes that sustain threatened entities (as described in BAM Subsection 6.1.4)	Figure 4.4
		☒ protected animals that may use the proposed wind farm development site as a flyway or migration route (as described in BAM Subsection 6.1.5)	N/A
		☒ where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community (as described in BAM Subsection 6.1.6)	N/A
		☒ Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts	Section 8.3
		☒ Describe the importance of habitat features to the species including, where relevant, impacts on life cycle or movement patterns (e.g. Subsection 6.1.3)	Section 8.3
		Where the proposed development is for a wind farm:	N/A
		☒ identify a candidate list of protected animals that may use the development site as a flyway or migration route, including resident threatened aerial species, resident raptor species and nomadic and migratory species that are likely to fly over the proposal area (as described in BAM Subsection 6.1.5)	
		☒ provide details of targeted survey for candidate species of wind farm developments undertaken in accordance with BAM Subsection 6.1.5(2–3.)	
		☒ predict the habitual flight paths for nomadic and migratory species likely to fly over the subject land and map the likely habitat for resident threatened aerial and raptor species (BAM Subsection 6.1.5(4.))	
		Where the proposal may result in vehicle strike:	N/A
		☒ identify a list of threatened fauna or protected fauna species that are part of a TEC and at risk of vehicle strike due to the proposal	
		Maps and tables	
		☒ Map showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.)	Figure 8.1
		☒ Map showing location of potential vehicle strike locations	N/A
		☒ Maps of habitual flight paths for nomadic and migratory species likely to fly over the site and maps of likely habitat for threatened aerial species resident on the site (for wind farm developments only)	N/A

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
		Data	
		☒ Digital shape files of prescribed impact feature locations	See separate data package
		☒ Prescribed impact features map in jpeg format	See separate data package
Avoid and minimise impacts	Chapter 7	Information	
		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	Section 7.0
		☒ routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route	Section 7.0
		☒ alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location	Section 7.0
		☒ 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	Section 7.0
		☒ Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2)	Section 7.0
		☒ 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.))	Section 7.0
		☒ Detail measures or options considered but not implemented because they are not feasible and/or practical (e.g. due to site constraints)	Section 7.0
		Maps and tables	
		☒ Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	Table 7.1
		☒ Map of alternative footprints considered to avoid or minimise impacts on biodiversity values; and of the final proposal footprint, including construction and operation	Figure 8.1
		☒ Maps demonstrating indirect impact zones where applicable	Figure 8.1

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
		Data	
		Digital shape files of: ☒ alternative and final proposal footprint ☒ direct and indirect impact zones	See separate data package. No alternative footprint is proposed.
		☒ Maps in jpeg format	See separate data package
Assessment of impacts	Chapter 8, Sections 8.1 and 8.2	Information	
		☒ Determine the impacts on native vegetation and threatened species habitat, including a description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Section 8.1)	Table 8.1
		Assessment of indirect impacts on vegetation and threatened species and their habitat including (as described in BAM Section 8.2):	
		☒ description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal	Table 8.3
		☒ documenting the consequences to vegetation and threatened species and their habitat including evidence-based justifications	Table 8.3
		☒ reporting any limitations or assumptions, etc. made during the assessment	Table 8.3
		☒ identification of the threatened entities and their habitat likely to be affected	Table 8.3
		Assessment of prescribed biodiversity impacts (as described in BAM Section 8.3) including: assessment of the nature, extent frequency, duration and timing of impacts on the habitat of threatened species or ecological communities associated with:	
		☒ karst, caves, crevices, cliffs, rocks and other features of geological significance	Section 8.3.1
		☒ human-made structures	Section 8.3.2
		☒ non-native vegetation	Section 8.3.3
		☒ connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	Section 8.3.4
		☒ movement of threatened species that maintains their life cycle	Section 8.3.4
		☒ water quality, waterbodies and hydrological processes that sustain threatened species and threatened ecological communities	Section 8.3.5
		☒ assessment of the impacts of wind turbine strikes on protected animals	N/A

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
		☒ assessment of the impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC	Section 8.3.6
		☒ evaluate the consequences of prescribed impacts	Section 8.0
		☒ describe impacts that are uncertain	Section 8.0
		☒ document limitations to data, assumptions and predictions	Section 8.0
		Maps and tables	
		☒ Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Table 8.2
		Data	
		N/A	
Mitigation and management of impacts	Chapter 8, Sections 8.4 and 8.5	Information	
		Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Sections 8.4 and 8.5 including:	
		☒ techniques, timing, frequency and responsibility	Table 8.4
		☒ identify measures for which there is risk of failure	Table 8.4
		☒ evaluate the risk and consequence of any residual impacts	Table 8.4
		☒ document any adaptive management strategy proposed	Section 8.5
		Identification of measures for mitigating impacts related to:	
		☒ displacement of resident fauna (as described in BAM Subsection 8.4.1(2.))	Section 10.0
		☒ indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.))	Section 10.0
		☒ mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2)	Section 10.0
		☒ Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	Table 8.5

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
		Maps and tables	
		☒ 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 8.4
		Data	
		N/A	
Impact summary	Chapter 9	Information	
		Identification and assessment of impacts on TECs and threatened species that are at risk of a serious and irreversible impacts (SAIL, in accordance with BAM Section 9.1) including:	
		☐ addressing all criteria in Subsection 9.1.1 for each TEC listed as at risk of an SAIL present on the subject land	N/A
		☐ for each TEC, report the extent of the TEC in NSW	N/A
		☒ addressing all criteria in Subsection 9.1.2 for each threatened species at risk of an SAIL present on the subject land	Section 9.1.1
		☒ for each threatened species, report the population size in NSW	Section 9.1.1
		☒ documenting assumptions made and/or limitations to information	Section 9.1.1
		☒ documenting all sources of data, information, references used or consulted	Section 9.1.1
		☒ clearly justifying why any criteria could not be addressed	Section 9.1.1
		☒ Identification of impacts requiring offset in accordance with BAM Section 9.2	Section 10.0
		☒ Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	Section 10.1
		☒ Identification of areas not requiring assessment in accordance with BAM Section 9.3	Section 10.2
		Maps and tables	
		☒ Map showing the extent of TECs at risk of an SAIL within the subject land	Figure 4.4
		☒ Map showing location of threatened species at risk of an SAIL within the subject land	Figure 4.4
		Map showing location of:	
		☒ impacts requiring offset	
		☒ impacts not requiring offset	
		☒ areas not requiring assessment	

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
		Data	
		Digital shape files of: ☐ extent of TECs at risk of an SAIL within the subject land ☒ location of threatened species at risk of an SAIL within the subject land ☒ boundary of impacts requiring offset ☒ boundary of impacts not requiring offset ☒ boundary of areas not requiring assessment	See separate data package
		☒ Maps in jpeg format	See separate data package
Impact summary	Chapter 10	Information	
		Ecosystem credits and species credits that measure the impact of the development on biodiversity values, including:	
		☒ future vegetation integrity score for each vegetation zone within the subject land (Equation 25 and Equation 26 in BAM Appendix H)	Table 10.2
		☒ change in vegetation integrity score (BAM Subsection 8.1.1)	Table 10.2
		☒ number of required ecosystem credits for the direct impacts of the proposal on each vegetation zone within the subject land (BAM Subsection 10.1.2)	Table 10.2
		☒ biodiversity risk weighting for each	Table 10.2
		☒ number of required species credits for each candidate threatened species that is directly impacted on by the proposal (BAM Subsection 10.1.3)	N/A
		Maps and tables	
		☒ Table of PCTs requiring offset and the number of ecosystem credits required	Table 10.2
		☒ Table of threatened species requiring offset and the number of species credits required	N/A
		Data	
		☒ Submitted proposal in the BAM Calculator	
Biodiversity credit report	Chapter 10	Information	
		☒ Description of credit classes for ecosystem credits and species credits at the development or clearing site or land to be biodiversity certified (BAM Section 10.2)	Table 11.1

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
		☒ BAM credit report in pdf format	Appendix G
		Maps and tables	
		☒ Table of credit class and matching credit profile	Table 11.1
		Data	
Biodiversity certification offsets and strategy	Chapter 12 and Appendix J	☒ BAM credit report in pdf format	Appendix G
		Information	
		Land-based conservation measures including (strategic biodiversity certification only):	
		☒ identification of parcels subject to land-based conservation measures	N/A
		☒ identification of land-based conservation measures proposed for each parcel	N/A
		☒ supporting information to demonstrate suitability of land-based conservation measures (Appendix J)	N/A
		☒ credit score of land-based conservation measures (Appendix J)	N/A
		Biodiversity certification strategy including:	
		☒ land proposed for biodiversity certification	Section 12.0
		☒ land proposed for biodiversity conservation	Section 12.0
		☒ proposed conservation measures	Section 12.0
		☒ legal mechanisms for securing delivery of proposed conservation measures	Section 12.0
		☒ parties to the biodiversity certification and responsibilities, noting where biodiversity certification agreements are proposed	Section 12.4
		☒ timing for delivery of conservation measures	Section 12.5
		☒ funding sources for delivery of conservation measures	Section 12.6
		☒ framework for monitoring, reporting or auditing implementation of conservation measures	Section 12.7
		Maps and tables	
		☐ Maps of parcels of land proposed for land-based conservation measures	N/A
		☐ Maps as per Appendix M as required in relation to any land-based conservation measures	N/A
		☐ Tables as per Appendix M as required in relation to any land-based conservation measures	N/A
		☐ Table of credit scores for land-based conservation measures, including scores produced by BAM and weighting adjusted scores as per Appendix J	N/A

BCAR Section	BAM Ref.	BAM Requirement	Section Reference(s) in the BCAR
Data			
		☐ Digital shape files of parcels of land proposed for land-based conservation measures	N/A
		☐ Maps in jpeg format	N/A

Appendix B

Response to Central Coast Council's Review Comments



Summary of Central Coast Council Review Comments and Additional Information Provided

Central Coast Council (CCC) have undertaken an assessment of the draft Biodiversity Certification Assessment Report (BCAR) (Umwelt, 2024) to support rezoning and biodiversity certification of land at 31 and 41 Kamilaroo Road, Lake Munmorah (the site) and have requested additional information. Umwelt's response to the additional information requested is included in **Table B.1**.

Table B.1 Response to CCC Request for Further Information, Dated 25 September 2024

CCC Comment	Umwelt Response
Update BCAR and all material associated with the planning proposal to show: - A 10 m buffer to riparian land, and - All infrastructure (including roads) and buildings located outside of the 10 m buffer to the riparian land.	A site inspection was completed by Umwelt on 6 March 2025 with the aim of documenting and describing the geomorphic characteristics of the first order hydroline mapped within the site. The site investigations identified that the mapped hydroline consists of a series of shallow man-made/constructed drainage channels. The man-made drainage channels present show signs of mechanical excavation and do not contain any natural riparian bed or bank structure or natural riparian vegetation. The flows within these drainage channels are also not permanent and only present after periods of rainfall. A Drainage Line Assessment has been presented to NSW DCCEW Water Operations/Licensing and Approvals for further merits-based assessment, as it is considered that the hydroline mapped within the site is unlikely to constitute Waterfront Land for the purposes of the <i>Water Management Act 2000</i>. A 10 m buffer has therefore not been provided.
Resurvey for threatened frogs post 'flooding' rains in accordance with NSW Survey Guide for Threatened Frogs; or utilise and alternate option available under the BAM. Or Alternate options available under the BAM, include the following: - Assume presence and offset. - Conduct appropriately timed on-ground surveys (i.e., post flooding rains), or - Obtain an expert report.	The survey guide identifies that surveys can only be completed after flooding of the target waterbodies, however the waterbodies present within the site are not subject to regular flooding and any flooding at lower elevations would be associated with Lake Munmorah which is a brackish environment unsuitable for this species. It is considered that the microhabitats required to support this species are not present, despite this, surveys targeting the waterbodies present were undertaken as a precaution. Additional targeted surveys for Wallum froglet, green-thighed frog and green and golden bell frog were conducted by Anderson Environment and Planning (AEP) in early February 2025, following heavy rainfall (a total of 186.6 mm of rainfall in the month of January 2025). The NSW Survey Guide for Threatened Frogs – A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (NSW DPIE, 2020c) was used to define the survey methodology. The surveys comprised of four nights of aural-visual surveys around and in close proximity waterbodies, after suitable rainfall. Each survey duration was 120 person-minutes between 8–11 February 2025. No threatened species were observed during these supplementary surveys. Sufficient survey effort has been met to rule out these species, and necessary updates have been made to the BCAR to reflect the additional surveys completed.

CCC Comment	Umwelt Response
Provide threatened owl survey plan in accordance with TBDC guidelines.	Additional targeted surveys for powerful owl, barking owl and masked owl were conducted by Anderson Environment and Planning (AEP) in February 2025 (Appendix C). Threatened Biodiversity Data Collection (DCCEE, 2025), for threatened Forest Owl species, was used to define the survey methodology. The surveys comprised of six nights of nocturnal surveys conducted by two ecologists using spotlighting, stag watching and call playback techniques. Six nights (3–6, 18–19 February 2025) of call playback was undertaken by playing the species call for 15 seconds followed by 30 seconds of listening time and owl searches in suitable habitat within a one-hectare circular plot. An acoustic recorder (Songmeter) was also deployed to supplement the survey. The acoustic recorder was deployed and recorded nocturnal activity for 35 hrs from 19 February 2025. No threatened owl species were observed during these supplementary surveys. Sufficient survey effort has been met to rule out these species, and necessary updates have been made to the BCAR to reflect the additional surveys completed.
Survey microbats such as little bent-winged bat (<i>Miniopterus australis</i>), large bent-winged bat (<i>Miniopterus orianae oceanensis</i>) and eastern cave bat (<i>Vespadelus troughtoni</i>) in accordance with survey guide for BAM.	After consultation and agreement with Central Coast Council, additional targeted surveys for eastern cave bat were conducted by Anderson Environment and Planning (AEP) in January 2025 (Appendix C). ‘Species credit’ threatened bats and their habitats - NSW survey guide for the Biodiversity Assessment Method (OEH, 2018), was used to define the survey methodology. The surveys comprised of two harp traps set over four consecutive nights between 8–11 January 2025. Each harp trap was checked and relocated every night. Any potential areas for roosts were also search by a qualified ecologist. No threatened species were observed during these supplementary surveys. Sufficient survey effort has been met to rule out the presence of breeding habitat for the little bent-winged bat and the large bent-winged bat and the presence of any habitat for the eastern cave bat, and necessary updates have been made to the BCAR to reflect the additional surveys completed.
Consider integrating vegetation and dam into a north-south corridor along western boundary to reconnect swift parrot habitat, with EEC.	The dam in the north-western part of the site will likely require reshaping and/or relocation. Future stormwater basins will be constructed to specific design requirements and will include replanting of native vegetation in accordance with the Biodiversity Management Plan, which will provide for some compensatory plantings. A vegetated wildlife corridor will also be replanted along the northern boundary of the site, which will include supplementary plantings for the swift parrot.
Connectivity of native vegetation will be maintained between the east and west in the northern portion of this land. This vegetation will need to be managed to ensure the high risk of edge effects will	Central Coast Council Regional Strategy biodiversity network map (DPE 2022c) identifies a regional biodiversity corridor to the north of the Pacific Highway that provides connectivity between larger remnants of native vegetation and conservation areas. This has

CCC Comment	Umwelt Response
be reduced over time. This bushland is valuable to a range of threatened fauna and has been mapped as core habitat under Council's Wildlife Corridor mapping. Please indicate the proposed width of this vegetation corridor.	been shown in Figure 1.2. The Subject Land will not impact the regional biodiversity corridor. It is proposed that native vegetation will be planted east to west along the northern boundary to support swift parrot habitat. The proposed width of this vegetation corridor is 20 m (Figure 1.3 of the BCAR). Compensatory canopy tree plantings will be undertaken, suitable species include <i>Eucalyptus robusta</i>, <i>E. tereticornis</i>, <i>Casuarina glauca</i>, <i>Corymbia gummifera</i> and <i>Melaleuca quinquenervia</i>.

Appendix C

AEP Fauna Survey Report



AEP Ref: 2629
To: Point Palliser Unit Trust and Lakeside Leisure Village
C/- Mavid Development Pty Ltd
Attention: Chris Speek
Via Email: chrisspeek@mavidgroup.com.au

18 March 2025

Dear Chris,

RE: Fauna surveys at 31-41 Kamilaroo Avenue, Lake Munmorah NSW 2259

Survey context

As requested by the Client and Central Coast Council, Anderson Environment and Planning (AEP) has undertaken targeted survey in compliance with NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW)'s relevant survey guidelines, for Wallum Froglet, Eastern Cave Bat, Masked Owl, Barking Owl and Powerful Owl, at the above site.

The following guidelines and information sources were relied upon to define the survey methodology:

- *NSW Survey Guide for Threatened Frogs - A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method* (DPIE, 2020);
- *'Species credit' threatened bats and their habitats - NSW survey guide for the Biodiversity Assessment Method* (OEH, 2018);
- *Threatened Biodiversity Data Collection* (DCCEEW, 2025), for threatened Forest Owl species, accessed at:

<https://profile.bionet.nsw.gov.au/account/login?ReturnUrl=https%3a%2f%2fatlaseditor.bionet.nsw.gov.au%2fDefault.aspx>

Survey methodology

Surveys were conducted under the following licensing:

- 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 80700.

The following survey methods were used:

- Wallum Froglet survey: Aural-visual surveys around and in close proximity waterbodies, after suitable rainfall. Each survey's duration was 120 person-minutes.

- Forest Owl survey: Six (6) nights of nocturnal survey using spotlighting, stagwatching and call playback techniques. Songmeter deployment and analysis supplemented the survey.
- Microbat survey: Deployment and rotation of two (2) harp traps over four (4) consecutive nights.

Table 1 provides details of the surveys undertaken and compliance with applicable guidelines.

Table 1: Survey methodology

Scientific name	Common name	Guideline survey method	AEP survey method
<i>Litoria brevipalmata</i>	Green-thighed Frog	Aural visual surveys – 2 replicates of 120mins each after flooding rains Tadpole surveys – 2 replicates of 10mins per 50 m ² of surface area	Four nights of spotlighting near waterbodies, each with two staff on site. No ephemeral waterbody identified that would be suitable for the species. Hence no tadpole search was deemed to be necessary
<i>Litoria aurea</i>	Green and Golden Bell Frog	Aural visual surveys – 4 replicates of 120mins each	Four nights of spotlighting near waterbodies, each with two staff on site
<i>Vespadelus troughtoni</i>	Eastern Cave Bat	As agreed with Council (16/12/2024): 8 harp trap nights, with 4 harp traps over 2 locations, checked and relocated every night and roost search by a qualified ecologist	8 harp trap nights, with 4 harp traps over 2 locations, checked and relocated every night and roost search by a qualified ecologist
<i>Ninox strenua</i>	Powerful Owl	Six nights of call playback (15s) followed by listening (30s) and owl search in suitable habitat within a one hectare circular plot.	As per guideline. Each night's survey was undertaken with two staff on site. A songmeter was also deployed and recorded approx. 35hrs of nocturnal activity from 19/2/2025.
<i>Ninox connivens</i>	Barking Owl		
<i>Tyto novaehollandiae</i>	Masked Owl		
<i>Crinia tinnula</i>	Wallum Froglet	Aural visual surveys – 4 replicates of 120mins each after flooding rains	Four nights of spotlighting near waterbodies, each with two staff on site

Survey results

Details of survey effort and results are presented in **Table 1**, and illustrated in **Figures 1, 2 and 3**.

Table 2: Survey effort and results

Date	Time	No. of Persons on Site	Hours	Rainfall data ¹ (mm)	Wind data (speed in km/h) ²	Field activity	Observations
08/01/2025	21:00 23:01	1	3	14.4	11	Nocturnal targeted survey for Wallum Froglet, Green-thighed Frog and Green and Golden Bell Frog	Incidental Observations: Laughing Kookaburra, <i>Litoria peronii</i> , <i>Crinia signifera</i> , <i>Litoria fallax</i> <i>Limnodynastes peronii</i> , Masked Lapwing, Leopard slug, sedge moth, Australian Wood Duck, and Gambusia holbrooki (species of fish identified as a serious threat to many frog species)
09/01/2025	21:00 20:00	2	2	37.6	7		
10/02/2025	21:00 23:00	2	6	0 (rainfall observed locally)	7		
11/02/2025	23:00 00:05	2	2	3.0	4		
20/01/2025	17:30 22:30	1	5	0	9	Harp Trapping for Eastern Cave Bat	No target species found <i>Nyctophilus gouldi</i> identified on the last night of harp trapping
21/01/2025	05:00 06:00	1	1	0	13		
	18:00 22:00	1	4				

Date	Time	No. of Persons on Site	Hours	Rainfall data ¹ (mm)	Wind data (speed in km/h) ²	Field activity	Observations
22/01/2025	05:00 06:00	1	1	0	6		
	18:00 22:00	1	4				
23/01/2025	05:00 06:00	1	1	2.4	7		
	18:00 22:00	1	4				
24/01/2025	05:00 06:00	1	1	0	11		
03/02/2025	19:40 23:10	2	7	0	13	Forest Owl Surveys - Stagwatch, Call Play Back and Spotlighting for Powerful Owl (<i>Ninox strenua</i>), Barking Owl (<i>Ninox connivens</i>), Masked Owl (<i>Tyto novaehollandiae</i>)	No target species found, however the following incidental were recorded onsite: Australian Wood Duck, Black Swan, Common Brushtail Possum, unidentified microbats, Grey-headed Flying-fox No threatened species detected on songmeter.
04/02/2025	19:40 22:30	2	5.5	0	7		
05/02/2025	19:40 22:40	2	6	0	6		
06/02/2025	19:10 22:30	2	7	1.0	7		
18/02/2025	19:00 22:15	2	6.5	0	11		
19/02/2025	19:00 22:15	2	6.5	0	13		
7/3/2025	7:45 8:30	1	0.75	4.0	9 ³	Hollow inspection	No threatened species identified

Notes:

(1) Source: Bureau of Meteorology (BOM) climate data – Morisset (Balcolyn (Bay Street)) weather station ID 61041. Rainfall measured on the day at 9am from the previous 24 hours.

(http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=136&p_display_type=dailyDataFile&p_startYear=&p_c=&p_stn_num=061041)

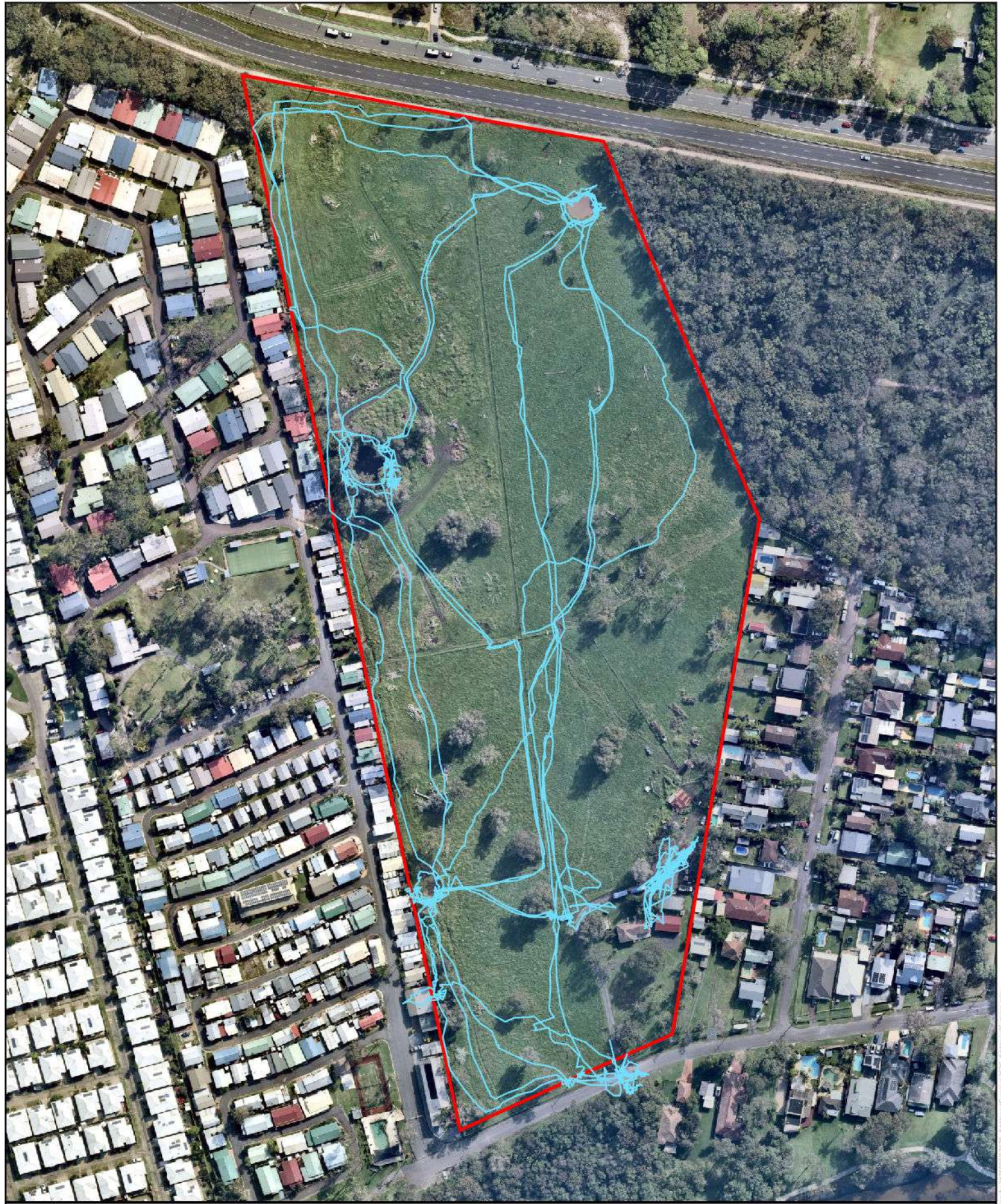
(2) Source: Bureau of Meteorology (BOM) climate data – Cooranbong (Lake Macquarie AWS) station ID 061412. Wind speed measured at 3pm.

(<http://www.bom.gov.au/climate/dwo/202501/html/IDCJDW2159.202501.shtml>)

(3) As above but measured at 9am

No target species were identified. However, an unidentified bird was sighted flying into a hollow located approx. 10m offsite to the east on 18 February 2025. Upon receiving consent from Council, the hollow was inspected on 7 March 2025 using a pole camera as well as by climbing the tree, and it was deemed to be unsuitable for threatened Owl species.

Furthermore, Grey-headed Flying-fox were sighted foraging on site on one (1) night. However, the site does not contain a roost camp.

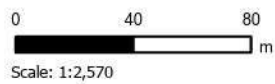


- Site boundary
- Amphibian survey track

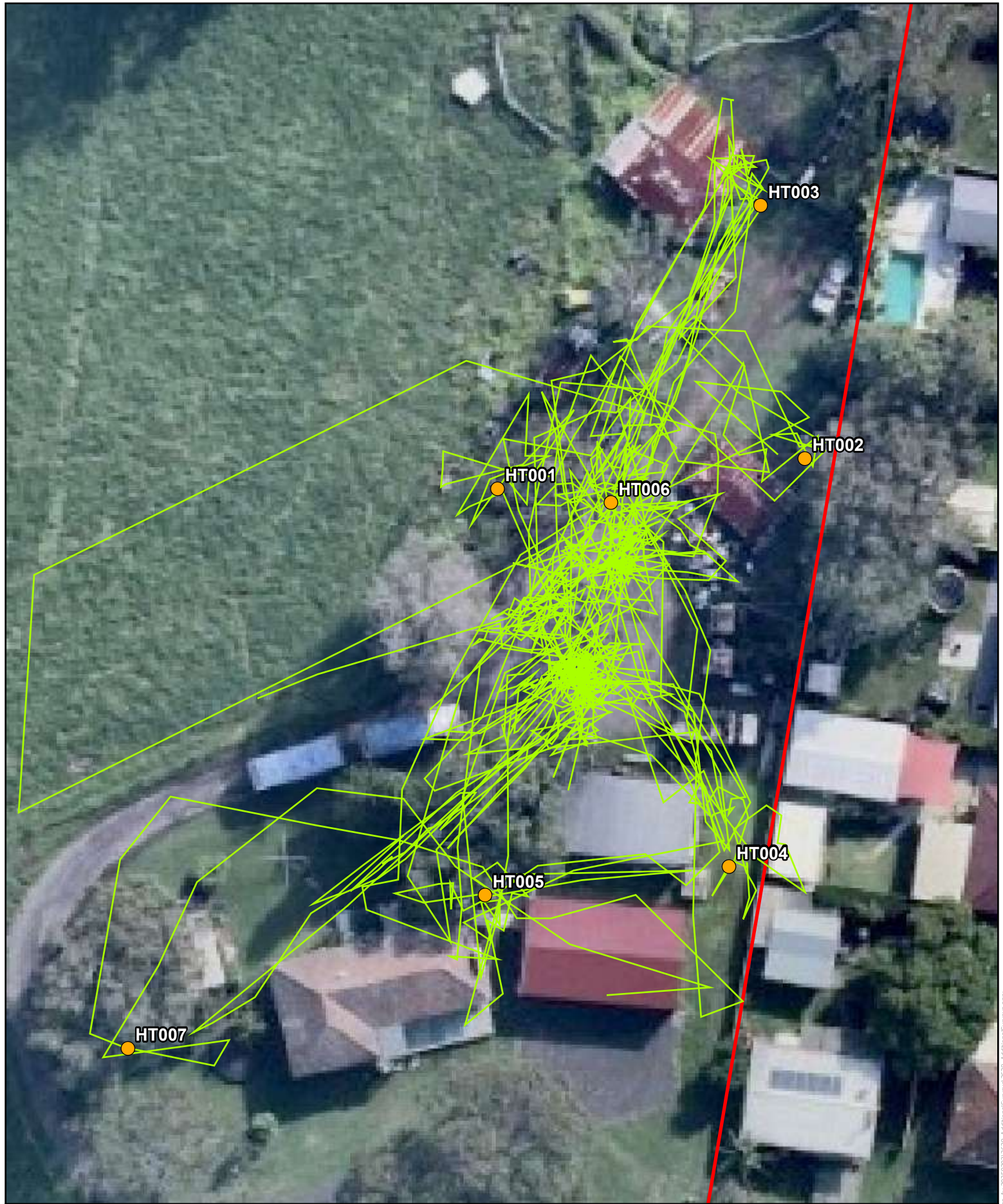
Figure 1 - Amphibian survey

Address: 31-41 Kamilaroo Avenue, Lake Munmorah, NSW
Clients: Point Palliser Unit Trust and Lakeside Leisure Village
AEP Ref: 2629 | Date: 18 March 2025

Imagery: ESRI
Spatial Reference: GDA2020 MGA Zone 56



Disclaimer: While reasonable care has been taken to ensure the information on this map is accurate and up-to-date, errors or omissions may still occur. Please verify the accuracy of all information before use. Note that boundaries are not survey accurate and do not scale off this plan.

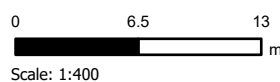


- ▬ Site boundary
- ▬ Microbat survey
- Harp trap

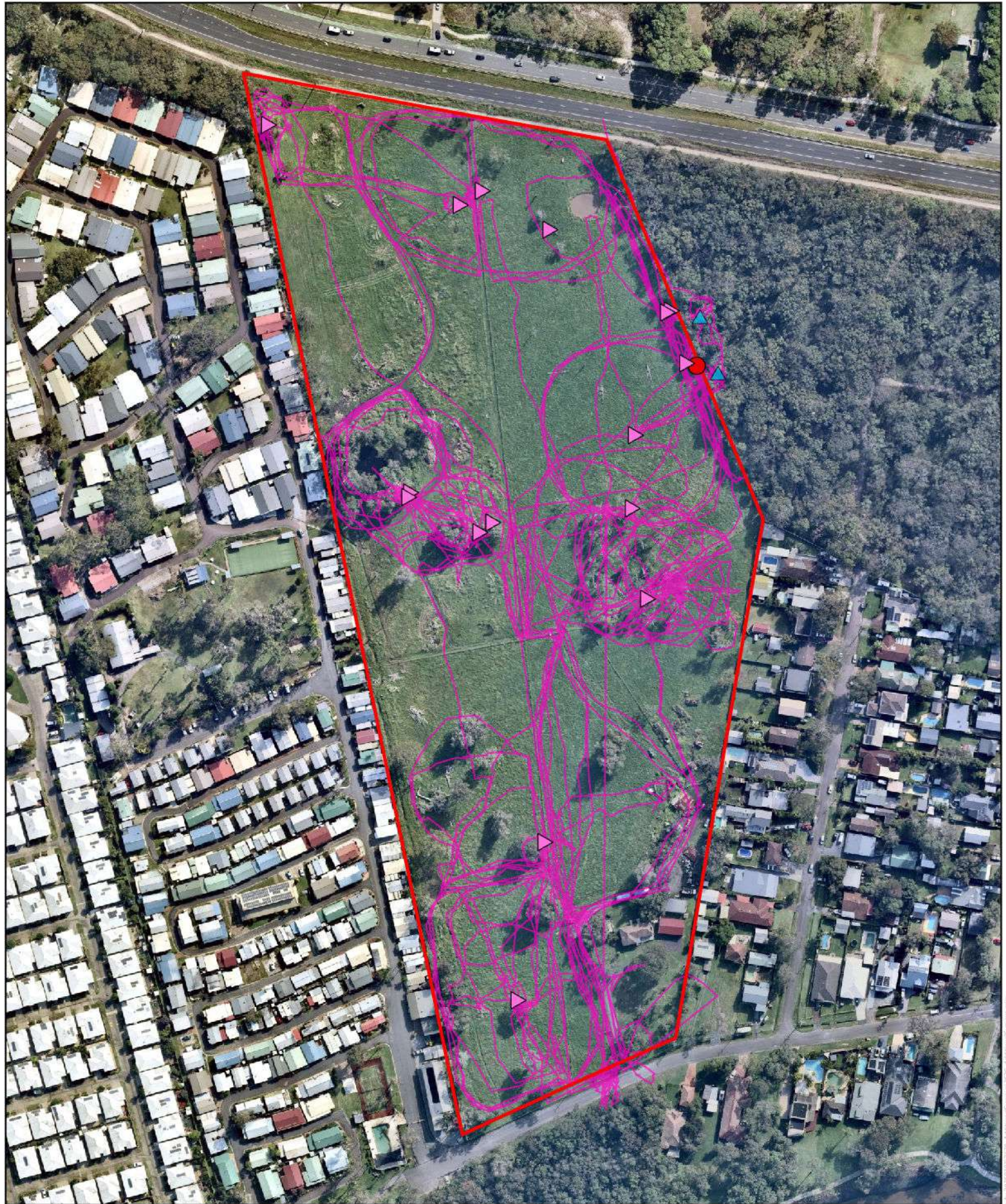
Figure 2 - Microbat survey

Address: 31-41 Kamilaroo Avenue, Lake Munmorah, NSW
 Clients: Point Palliser Unit Trust and Lakeside Leisure Village
 AEP Ref: 2629 | Date: 18 March 2025

Imagery: ESRI
 Spatial Reference: GDA2020 MGA Zone 56



Disclaimer: While reasonable care has been taken to ensure the information on this map is accurate and up-to-date, errors or omissions may still occur. Please verify the accuracy of all information before use. Note that boundaries are not survey accurate and do not scale off this plan.



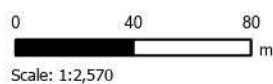
▮ Site boundary
— Forest Owl survey

● Songmeter
▲ Inspected hollow

Figure 3 - Forest Owl survey

Address: 31-41 Kamilaroo Avenue, Lake Munmorah, NSW
 Clients: Point Palliser Unit Trust and Lakeside Leisure Village
 AEP Ref: 2629 | Date: 18 March 2025

Imagery: ESRI
 Spatial Reference: GDA2020 MGA Zone 56



Disclaimer: While reasonable care has been taken to ensure the information on this map is accurate and up-to-date, errors or omissions may still occur. Please verify the accuracy of all information before use. Note that boundaries are not survey accurate and do not scale off this plan.

We trust this meets the client's and Central Coast Council's requirements. Should you require additional information, please contact the undersigned.

Kind regards,

Anderson Environment and Planning



Edouard Loisan

Director and General Manager

0422 791 947

Appendix D

BAM Plot Data



Table D.1 Floristic Plot Data

Species Name/Growth Form	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5	
	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance
Native Trees										
<i>Angophora costata</i>	15	4	0	0	0	0	0	0	0	0
<i>Casuarina glauca</i>	0	0	0	0	0	0	0.1	5	5	1
<i>Corymbia gummifera</i>	3	1	0	0	0	0	0	0	0	0
<i>Eucalyptus racemosa</i>	2	1	0	0	0	0	0	0	0	0
<i>Eucalyptus robusta</i>	0	0	0	0	0	0	0	0	10	2
<i>Glochidion ferdinandi</i>	0	0	0	0	0	0	0	0	0.1	1
<i>Melaleuca quinquenervia</i>	0	0	0	0	0	0	0	0	15	3
Native Shrubs										
<i>Melaleuca sieberi</i>	0	0	0	0	0	0	0	0	5	3
Native Forbs										
<i>Centella asiatica</i>	0	0	0	0	0	0	0	0	0.1	10
<i>Commelina cyanea</i>	0	0	0	0	0	0	0	0	0.1	2
<i>Dichondra repens</i>	0.1	10	0	0	0.1	5	0	0	0	0
<i>Geranium homeanum</i>	0	0	0	0	0	0	0	0	0.5	100
<i>Hydrocotyle tripartita</i>	0	0	0	0	0	0	0	0	0.1	25
<i>Oxalis</i> sp.	0.1	10	0	0	0	0	0	0	0	0
<i>Persicaria decipiens</i>	0	0	0.1	2	0	0	0	0	2	10
<i>Phyllanthus</i> spp.	0	0	0	0	0	0	0	0	0.1	10
<i>Portulaca oleracea</i>	0	0	0	0	0	0	0.1	10	0.1	10
<i>Rumex brownii</i>	0.2	10	0.1	1	0.2	5	0.1	5	0.1	10
Native Grasses and Grass-Like										
<i>Bolboschoenus caldwellii</i>	0	0	0	0	0	0	0	0	0.1	1
<i>Cynodon dactylon</i>	0	0	0	0	0	0	0	0	0.1	5

Species Name/Growth Form	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5	
	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance
<i>Echinopogon caespitosus</i>	0	0	0	0	0	0	0	0	0.1	5
<i>Juncus usitatus</i>	0.1	30	0.1	1	0.1	20	0.1	15	0.1	10
<i>Microlaena stipoides</i>	0	0	0	0	0	0	0	0	0.1	5
<i>Oplismenus aemulus</i>	0	0	0	0	0	0	0	0	0.1	10
<i>Poa</i> sp.	0	0	0.1	1	0	0	0	0	0	0
<i>Sporobolus creber</i>	0.1	10	0	0	2	100	0	0	0	0
Native Ferns										
<i>Nephrolepis cordifolia</i>	0	0	0	0	0	0	0	0	0.1	1
High Threat Exotics										
<i>Axonopus fissifolius</i>	0	0	0	0	2	1000	0	0	0.1	10
<i>Bidens pilosa</i>	0.1	5	0.1	1	0	0	0	0	0.1	5
<i>Ehrharta erecta</i>	0	0	0	0	0	0	0	0	0.1	5
<i>Senecio madagascariensis</i>	0.1	2	15	200	20	200	0.2	10	0	0
<i>Stenotaphrum secundatum</i>	0	0	0.1	1	0	0	0	0	0	0
Other Exotic Species										
<i>Aster subulatus</i>	0	0	0	0	0	0	0.1	5	0.1	1
<i>Briza minor</i>	0	0	0	0	0	0	0	0	0.1	2
<i>Cenchrus clandestinus</i>	95	1000	95	5000	95	5000	95	5000	95	5000
<i>Cirsium vulgare</i>	0.1	3	0	0	0	0	0	0	0.1	5
<i>Conyza bonariensis</i>	0.1	5	0	0	0	0	0	0	0.1	10
<i>Cyperus brevifolius</i>	0	0	0	0	0.1	10	0.1	10	0.1	20
<i>Gamochaeta americana</i>	0	0	0	0	0	0	0	0	0.1	1
<i>Gomphocarpus fruticosus</i>	0	0	0.1	1	0	0	0	0	0	0
<i>Hydrocotyle bonariensis</i>	0	0	0	0	0	0	0	0	0.1	10
<i>Lolium perenne</i>	0	0	0	0	0.1	5	0	0	0	0

Species Name/Growth Form	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5	
	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance
<i>Lysimachia arvensis</i>	0.1	5	0.1	1	0.1	5	0	0	0	0
<i>Melinis repens</i>	0	0	0	0	0.1	1	0	0	0	0
<i>Modiola caroliniana</i>	0	0	0	0	0	0	0	0	0.1	5
<i>Oxalis corniculata</i>	0	0	0	0	0.1	5	0	0	0.1	10
<i>Paspalum urvillei</i>	0	0	0	0	0.1	5	0	0	0	0
<i>Plantago lanceolata</i>	0.1	20	0.1	10	0.1	10	0.1	10	0.1	20
<i>Richardia brasiliensis</i>	0.1	5	0	0	0	0	0	0	0	0
<i>Rubus anglocandicans</i>	0	0	0	0	0	0	0	0	0.2	5
<i>Sida rhombifolia</i>	0.1	5	0.1	5	0	0	0.1	5	0.3	15
<i>Solanum nigrum</i>	0.2	5	0	0	0	0	0	0	0.1	1
<i>Sonchus oleraceus</i>	0	0	0	0	0.1	5	0	0	0.1	5
<i>Stellaria media</i>	0.1	5	0	0	0	0	0	0	0	0
<i>Tagetes minuta</i>	0	0	0.1	2	0	0	0	0	0	0
<i>Trifolium campestre</i>	0	0	0	0	0.1	1	0	0	0	0
<i>Trifolium repens</i>	1	20	0.1	50	0.1	10	0.1	10	0.1	50
<i>Verbena bonariensis</i>	0.2	20	0	0	0.1	5	0.2	10	0	0
<i>Verbena hispida</i>	0	0	0	0	0.1	10	0	0	0	0

Table D.2 BAM Plot Vegetation Integrity Data

Plot Number	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
Plant Community Type	3583	3583	3583	3583	4020
Condition Zone	1 Paddock Trees	2 Exotic Grassland*	2 Exotic Grassland*	2 Exotic Grassland*	3 Paddock trees
Patch Size	101	101	101	101	101
Zone	56	56	56	56	56
Easting	365871	365864	365709	365806	365785
Northing	6326491	6326687	6326704	6326331	6326293
Bearing	330	150	140	140	155
Composition Tree	3	0	0	1	4
Composition Shrub	0	0	0	0	1
Composition Grass	2	2	2	1	6
Composition Forbs	3	2	2	2	8
Composition Ferns	0	0	0	0	1
Composition Other	0	0	0	0	0
Structure Tree	20	0	0	0.1	30.1
Structure Shrub	0	0	0	0	5
Structure Grass	0.2	0.2	2.1	0.1	0.6
Structure Forbs	0.4	0.2	0.3	0.2	3.1
Structure Ferns	0	0	0	0	0.1
Structure Other	0	0	0	0	0
Function Large Trees	0	0	0	0	5
Function Hollow Trees	1	0	0	0	0
Function Litter Cover	0	0	0	0	0
Function Fallen Log Length	12	0	0	0	3
Function Tree Stem 5 to 9 cm	0	0	0	0	0
Function Tree Stem 10 to 19 cm	0	0	0	0	0
Function Tree Stem 20 to 29 cm	1	0	0	0	1
Function Tree Stem 30 to 49 cm	1	0	0	0	1
Function Tree Stem 50 to 79 cm	0	0	0	0	1
Function Tree Regeneration	0	0	0	0	0
Function High Threat Exotics	0.2	15.2	22	0.2	0.3

* Exotic vegetation assessed against benchmark for PCT 3583.

Appendix E

Hollow-bearing Tree Assessment Report



E.1 Hollow-bearing Tree Assessment Method

A hollow-bearing tree assessment was undertaken by Umwelt field ecologists as part of habitat assessments completed at the site. The site in its entirety was searched on foot to identify, assess and map the locations of any hollow-bearing trees. All trees were inspected via a 360-degree visual search of all limbs and trunks using both the naked eye and binoculars from ground level.

Once a hollow-bearing tree was identified it was recorded with a GPS device and the following information regarding the tree was noted:

- Tree tag or reference number.
- Tree species name.
- Diameter of the tree trunk at breast height (~1.4 m).
- Size category of each hollow (very small (<5 cm), small (2.5–5 cm), medium (5–10 cm), large (10–30 cm) and very-large (>30 cm).
- Fauna use (in hollow or displaying nesting behaviour near hollow).
- Evidence of fauna activity, i.e. direct observations of use, scratches, scat/whitewash nearby or within hollow, nests/ nesting material within hollow and evidence of chewing marks on the hollow rim or bark surrounding the hollow.
- Height for any large hollows (>30 cm) if less than 4 m from ground level.

It should be noted that hollow investigations completed at ground surveys are limited and can result in false positive identification of hollow openings and failure to detect hollows.

E.2 Hollow-bearing Tree Details

Findings from the hollow-bearing tree assessment conducted on the site are presented in **Table E.1** below and hollow-bearing tree locations are shown in **Figure 4.4** of this BCAR report.

Table E.1 Hollow-bearing Trees Observed

Tree No.	Species	DBH	Very Small 0-<5 cm	Medium 10-<20 cm	Large 20-<30 cm	Very Large >30 cm	Comments/ Fauna Use	Largest Hollow Class Present	X - Coordinate	Y - Coordinate
1	Dead Tree	90		1				Small (<10 cm)	365831	6326703
2	Dead Tree	40	1	2				Small (<10 cm)	365856	6326614
3	<i>Eucalyptus racemosa</i> (narrow-leaved scribbly gum)	50	2					Small (<10 cm)	365934	6326479
4	<i>Eucalyptus tereticornis</i> (forest red gum)	50	1					Small (<10 cm)	365889	6326294
5	Dead Tree	50	2					Small (<10 cm)	365805	6326707
6	<i>Eucalyptus haemastoma</i> (scribbly gum)	30/40	1					Small (<10 cm)	365691	6326746
7	<i>Angophora costata</i> (smooth-barked apple)	60			1			Medium (10 to <20 cm)	365709	6326643
8	<i>Angophora costata</i> (smooth-barked apple)	30		1				Small (<10 cm)	365712	6326613
9	<i>Angophora costata</i> (smooth-barked apple)	40		2				Small (<10 cm)	365756	6326558
10	Dead Tree	50			3			Medium (10 to <20 cm)	365747	6326503
11	<i>Melaleuca quinquenervia</i> (broad-leaved paperbark)	100			1			Medium (10 to <20 cm)	365806	6326527
12	<i>Melaleuca quinquenervia</i>	100			1			Medium (10 to <20 cm)	365801	6326426

Tree No.	Species	DBH	Very Small 0-<5 cm	Medium 10-<20 cm	Large 20-<30 cm	Very Large >30 cm	Comments/ Fauna Use	Largest Hollow Class Present	X - Coordinate	Y - Coordinate
	(broad-leaved paperbark)									
13	<i>Melaleuca quinquenervia</i> (broad-leaved paperbark)	105		1	1		Rainbow lorikeets observed nesting	Medium (10 to <20 cm)	365790	6326387
14	<i>Eucalyptus resinifera</i> (red mahogany)	60	1	1				Small (<10 cm)	365781	6326361
15	<i>Melaleuca quinquenervia</i> (broad-leaved paperbark)	80		1				Small (<10 cm)	365810	6326370
16	Dead Tree	60	1	2				Small (<10 cm)	365823	6326277
17	<i>Melaleuca quinquenervia</i> (broad-leaved paperbark)	60		1			Rainbow lorikeets observed nesting	Small (<10 cm)	365830	6326247
18	<i>Melaleuca quinquenervia</i> (broad-leaved paperbark)	50		1				Small (<10 cm)	365773	6326327
19	Dead tree	65	2	1				Small (<10 cm)	365767	6326345
20	<i>Melaleuca quinquenervia</i> (broad-leaved paperbark)	79	1	1			Stick nest present	Small (<10 cm)	365808	6326406
21	Dead tree	60		1				Small (<10 cm)	365750	6326614
22	<i>Eucalyptus haemastoma</i> (scribbly gum)	Not recorded		1			Common ringtail possum observed	Small (<10 cm)	365687	6326764

Tree No.	Species	DBH	Very Small 0-<5 cm	Medium 10-<20 cm	Large 20-<30 cm	Very Large >30 cm	Comments/ Fauna Use	Largest Hollow Class Present	X - Coordinate	Y - Coordinate
							during spotlighting			
23	Dead tree	30	5	2				Small (<10 cm)	365787	6326697
24	Dead tree	75			1	1		Very Large (>30 cm but less than 4 m high)	365839	6326732
25	<i>Angophora costata</i> (smooth-barked apple)	40		1			Common mya observed nesting	Small (<10 cm)	365865	6326535
26	<i>Eucalyptus racemosa</i> (narrow- leaved scribbly gum)	48	1					Small (<10 cm)	365895	6326529
27	<i>Eucalyptus racemosa</i> (narrow- leaved scribbly gum)	60		1			Hollow in arboreal termite nest <2 m from ground level	Small (<10 cm)	365870	6326479
28	<i>Angophora costata</i> (smooth-barked apple)	35		1				Small (<10 cm)	365896	6326281
29	<i>Melaleuca sieberi</i> (Sieber's paperbark)	10	1					Small (<10 cm)	365788	6326288
30	Dead tree	30	2					Small (<10 cm)	365823	6326277
31	Dead Tree	35	4					Small (<10 cm)	365886	6326274

**31 AND 41 KAMILAROO AVENUE,
LAKE MUNMORAH**

Hollow Bearing Tree Assessment

FINAL

May 2025

31 AND 41 KAMILAROO AVENUE, LAKE MUNMORAH

Hollow Bearing Tree Assessment

Prepared by

Umwelt (Australia) Pty Limited

on behalf of

Lakeside Leisure Village and Point Palliser Unit Trust

Project Director: Kate Connolly

Project Manager: Samantha Maher

Report No. 22152/R02/Appendix E

Date: May 2025



This report was prepared using
Umwelt's ISO 9001 certified
Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

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Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	Jacob Manners	22 May 2025	Jacob Manners	22 May 2025

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1.0 Hollow Bearing Tree Assessment

1.1 Hollow Bearing Tree Assessment Method

The site (31 and 41 Kamilaroo Avenue Lake Munmorah) was surveyed as part of a Biodiversity Certification Assessment Report (BCAR) prepared in accordance with the requirements of the Biodiversity Assessment Method (BAM) (DPIE 2020). A hollow bearing tree assessment was undertaken by Umwelt field ecologists as part of a habitat assessment. The site in its entirety was searched on foot to identify, assess and map any hollow bearing trees. All trees were inspected via a 360-degree visual search of all limbs and trunks using both the naked eye and binoculars from varying distances.

Once a hollow bearing tree was identified it was marked with a GPS and the following information regarding the tree was noted:

- Tree ID.
- Tree species.
- DBH (m) (Diameter of the tree trunk at breast height (~1.4 m)).
- Tree health (dead, poor, moderate, good).

And the following data regarding the hollows was recorded:

- Height of each hollow (m).
- Size category of each hollow (tiny (<5 cm), small (2.5–5 cm), medium (5–10 cm), large (10–30 cm) and extra-large (>30 cm).
- Occupancy of species (in hollow/ tree or nearby).
- Evidence of fauna activity, i.e. direct observations of use, scratches, scat nearby or within hollow, nests/ nesting material nearby or within hollow and chewing of the hollow rim.

It should be noted that hollow investigations based purely off of ground surveys are limited and can lead to potential errors in hollow counts as it is not possible to positively identify hollow openings.

1.2 Hollow Bearing Tree Assessment Findings

Findings from the hollow bearing tree assessment conducted at the site are presented below (**Table 1.1**).

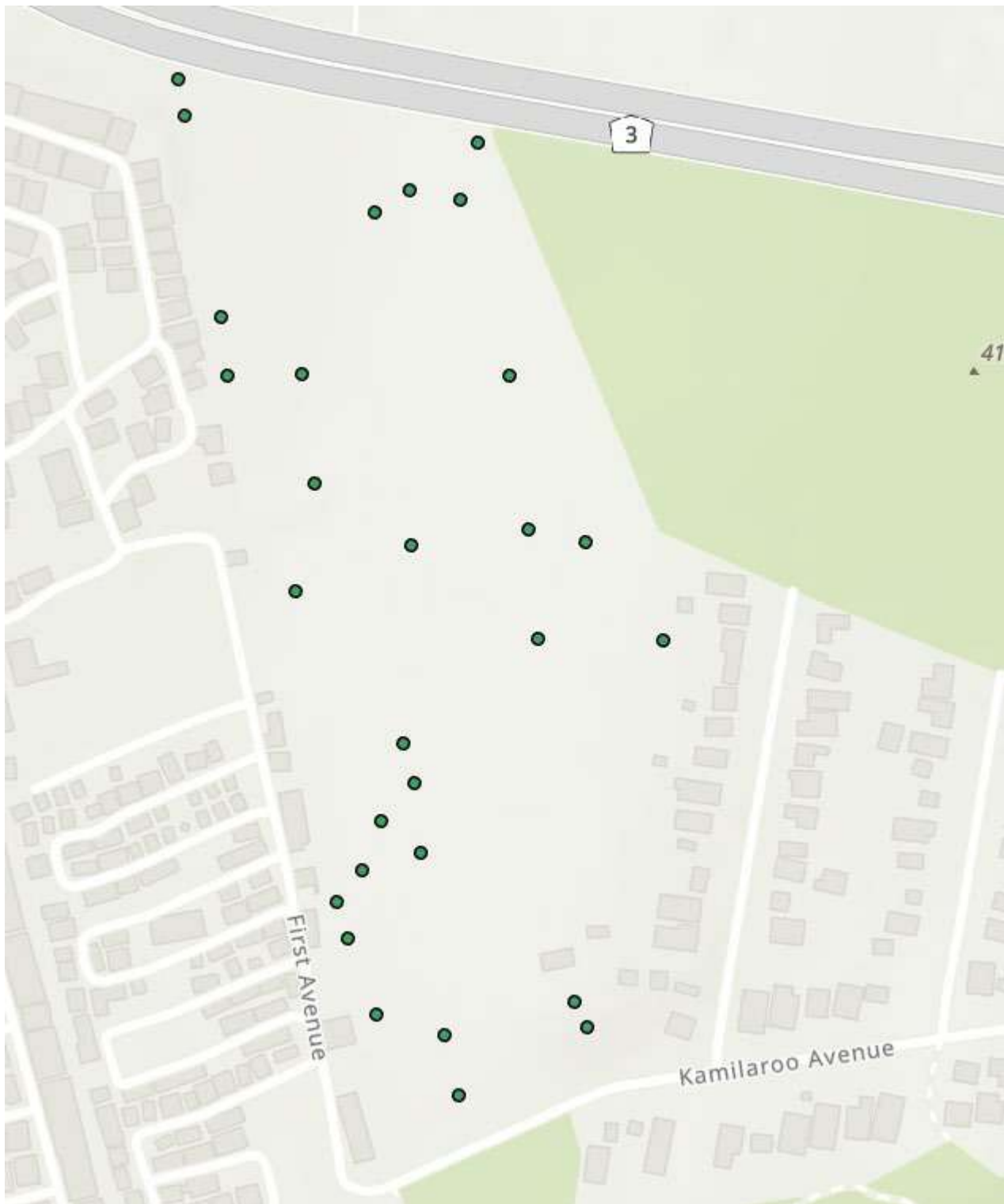
Table 1.1 Hollow Bearing Tree Details

Tree ID	Tree species	DBH	Tree condition	Tiny (<2.5 cm)	Small (2.5–5 cm)	Medium (5–10 cm)	Large (10–30 cm)	Extra large (>30 cm)	Heights (m)	Comments
HBTKS	<i>Eucalyptus haemastoma</i>	60	Moderate			1			<2	Kookaburra hollow in old termite nest
26						1				
HBTKS	<i>Melaleuca quinquenervia</i>	79	Good		1	1				Stick nest (magpie)
11	<i>Melaleuca quinquenervia</i>	100					1		15	In fork
HBTKS	<i>Melaleuca quinquenervia</i>	70	Good	1	1		1			
10	<i>Melaleuca quinquenervia</i>	100					1			
HBTKS		0				1				Ringtail in hollow in middle of tree, near broken/ cut branch
21						1				
HBT1	<i>Melaleuca quinquenervia</i>	60	Good			1				Nesting rainbow lorikeet
16					1					
HBT2	Dead tree	30	Dead		2					
29										
15	Dead tree	60		1		2			15	
HBT3	<i>Melaleuca sieberi</i>	10	Good		1					
28										
HBT4	<i>Melaleuca quinquenervia</i>	50	Good			1				
17										
HBT5	Dead tree	65	Dead		2	1				
18										
HBT5	<i>Melaleuca quinquenervia</i>	80	Good			1				
14	<i>Melaleuca quinquenervia</i>	80				1			12	
HBT9	Dead tree	30	Dead	5	2					

Tree ID	Tree species	DBH	Tree condition	Tiny (<2.5 cm)	Small (2.5–5 cm)	Medium (5–10 cm)	Large (10–30 cm)	Extra large (>30 cm)	Heights (m)	Comments
22										
HBT10	Dead tree	40		3	1	1				
4	Dead tree	50		2						
HBTXXX	Dead tree	35				2				
1	Dead tree	40		1		2			10	
HBTXXX	<i>Angophora costata</i>	40	Poor			1				Common myna nesting
24										
30										
HBTXXX	Dead tree	35	Dead	4					15	
3	<i>Eucalyptus tereticornis</i>	50		1						
HBTXXX	<i>Angophora costata</i>	0	Poor			2				
27	<i>Angophora costata</i>					1				
HBTSM01	<i>Eucalyptus longifolia</i>	85	Good	1						2x lorikeets occupying
13	<i>Eucalyptus resinifera</i>	60		1		1				
HBTSM02	<i>Melaleuca quinquenervia</i>	123			1	2				
12	<i>Melaleuca quinquenervia</i>	105				1	1			Nesting rainbow lorikeets
HBTSM03	Dead tree	53	Dead	2	3		2	1		One less than 20 cm
9	Dead tree	50					3		6	
HBTSM04	Dead tree	60	Dead			1				Hollow in termatia
20										
HBTSM05	Dead tree	75	Dead				1	1	2.5	
23										
HBTSM06	Dead tree	75	Dead	2	2	1				
0	Dead tree	90				1			5	
HBTSM07	<i>Eucalyptus racemosa</i>	48	Good		1					

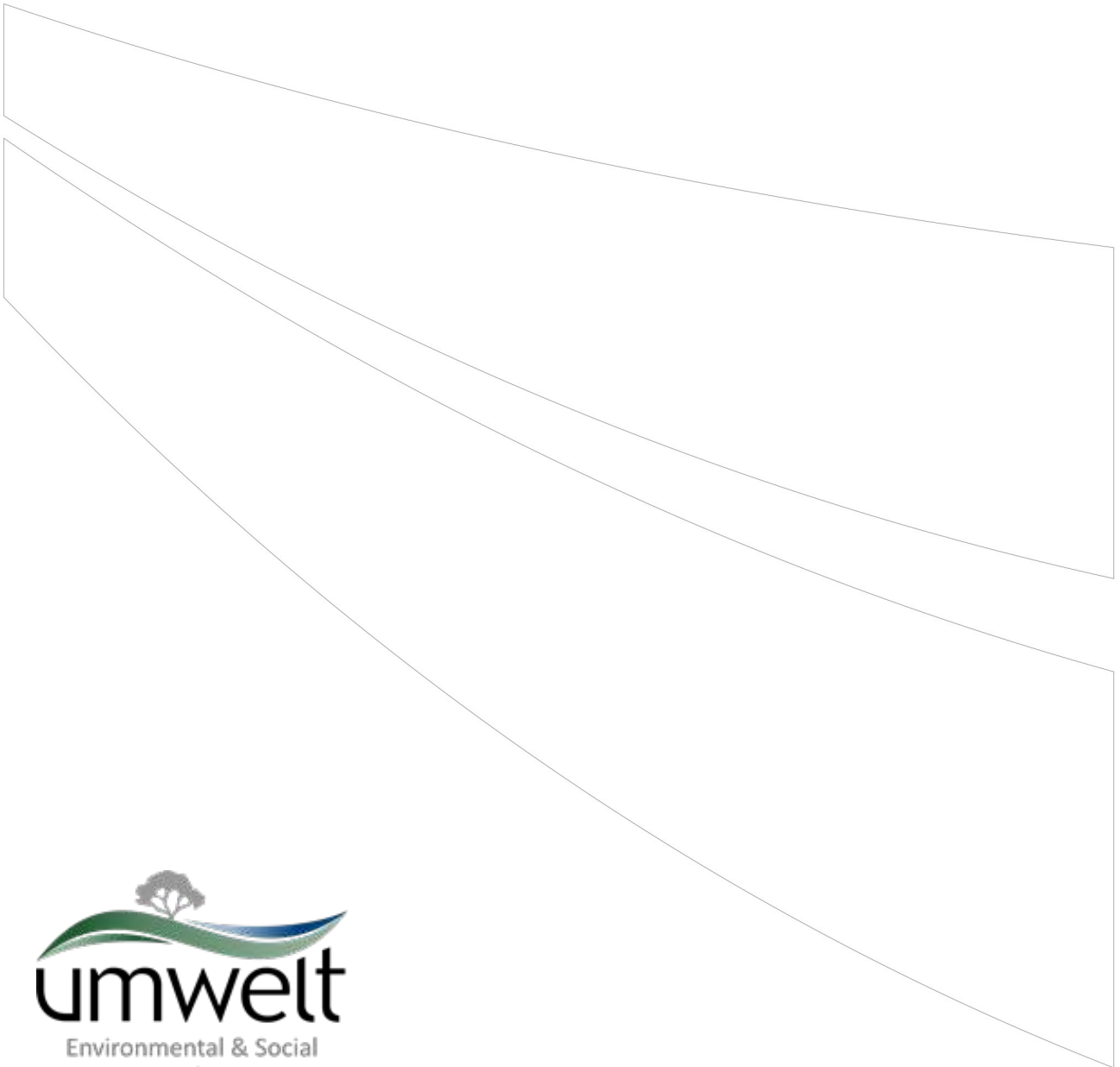
Tree ID	Tree species	DBH	Tree condition	Tiny (<2.5 cm)	Small (2.5–5 cm)	Medium (5–10 cm)	Large (10–30 cm)	Extra large (>30 cm)	Heights (m)	Comments
25										
HBTSM08	<i>Eucalyptus haemastoma</i>	0	Good			1				Lorikeets in tree
2	<i>Eucalyptus racemosa</i>	50		2					2	
EXTRAS										
5	<i>Eucalyptus haemastoma</i>	30/40							7	
6	<i>Angophora costata</i>	60							8	
7	<i>Angophora costata</i>	30						1	8	
8	<i>Angophora costata</i>	40					1		10	
19	Not a hollow- remove from figure		Moderate				2			Stick nest

Data in black (report figure data):



Red data (from fieldmaps):





Appendix F

Southern Myotis Acoustic Call Analysis Report



Microbat Call Identification Report

Prepared for ("Client"):	Umwelt Australia
Survey location/project name:	Kamilaroo Road, Lake Munmorah
Survey dates:	21 November - 6 December 2023
Client project reference:	22152
Job no.:	UMW-2407
Report date:	27 March 2024

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Methods

Data received

Balance! Environmental received 6834 full-spectrum ultrasonic acoustic files (.WAV format), recorded with two Anabat Swift detectors (Titley Scientific, Brisbane) between 21st November and 6th December 2023. The detectors were deployed facing dams on a property at Kamilaroo Road, Lake Munmorah NSW.

The brief for this analysis task was to determine if the Southern Myotis (*Myotis macropus*) was recorded during the deployment.

Bat-call analysis

Analyses were performed in *Anabat Insight* (Version 2.1.0; Titley Scientific, Brisbane), as follows:

1. The Search tool was used to scan all WAV files on a “per-pulse” basis and select those files containing at least four call pulses with characteristic frequency (Fc) in the range 35-50 kHz and slope of the characteristic section (Sc) >50 octaves per second (OPS).
2. Files that were selected by the Search filter were then reviewed manually to confirm the presence of *M. macropus* calls. This was achieved by comparing the visual properties of each call spectrogram, and the zero-crossing (ZC) call metrics derived from the calls, with those of reference calls from *M. macropus* and *Nyctophilus* species (G. Ford unpublished data) as well as the call descriptions provided in Pennay *et al.* (2004) and Reinhold *et al.* (2001).
3. Finally, a rapid manual scan was undertaken on a random sub-sample of files that failed the first Search filter to ascertain if any relevant calls had been missed by the Search.

Reporting standard

The format and content of this report follows Australasian Bat Society standards for the interpretation and reporting of bat call data (Reardon 2003), available on-line at <http://www.ausbats.org.au/>.

Species nomenclature follows Armstrong *et al.* (2020).

Results & Discussion

The initial Search process extracted 326 WAV files that potentially contained calls from *M. macropus*.

Manual review of those files found only five calls with the near-linear, frequency-modulated (FM) pulse properties of *M. macropus* and *Nyctophilus* species.

The pulse shapes (see Figures 1-5) and ZC metrics (see Table 1) of those five calls are more diagnostic of *Nyctophilus* species than of *M. macropus*, so it is considered highly likely (>~80% probability) that these five calls do not represent the target species.

Furthermore, given the stated deployment position (“facing dams”), if *M. macropus* were actively foraging over the water surface, a high volume of foraging calls should have been detected. The fact that <0.01% of the recorded calls represented “potential” target calls suggests that those calls were highly likely chance passings of *Nyctophilus* spp rather than *M. macropus* using the dams.

The five WAV files containing the potential target species calls are included in the compressed file folder accompanying this report (*UMW-2407_Kamilaroo Rd_potential-target-species-calls.zip*). The accompanying Excel file (*UMW-2407_Kamilaroo Rd_target-species-call-metrics.xlsx*) includes the complete set of ZC metrics derived from the five relevant files.

Table 1 *Nyctophilus* spp. vs. *Myotis macropus* diagnostic call metrics derived from five calls recorded at Kamilaroo Road, 21 November – 6 December 2023

Detector	FileName	N	TBC ms	S1 OPS
UMBAT18	514007 2023-11-26 22-15-11.wav	17	117.282	150.801
	514007 2023-11-28 00-24-51.wav	34	112.307	278.477
	514007 2023-12-04 21-23-57.wav	43	82.548	258.771
	514007 2023-12-05 02-15-28.wav	28	108.129	182.394
UMBAT17	514034 2023-11-25 19-38-15.wav	38	83.433	310.347
Reference *	<i>Myotis macropus</i>	-	<75	>400
	<i>Nyctophilus</i> species	-	>95	<300

* Metrics published in Pennay *et al.* (2004) and Reinhold *et al.* (2001).

References

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URL: <http://ausbats.org.au/species-list/4593775065>
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- Reardon, T. (2003). Standards in bat detector based surveys. *Australasian Bat Society Newsletter* **20**, 41-43.
- Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). *Key to the bat calls of south-east Queensland and north-east New South Wales*. Department of Natural Resources and Mines, Brisbane.

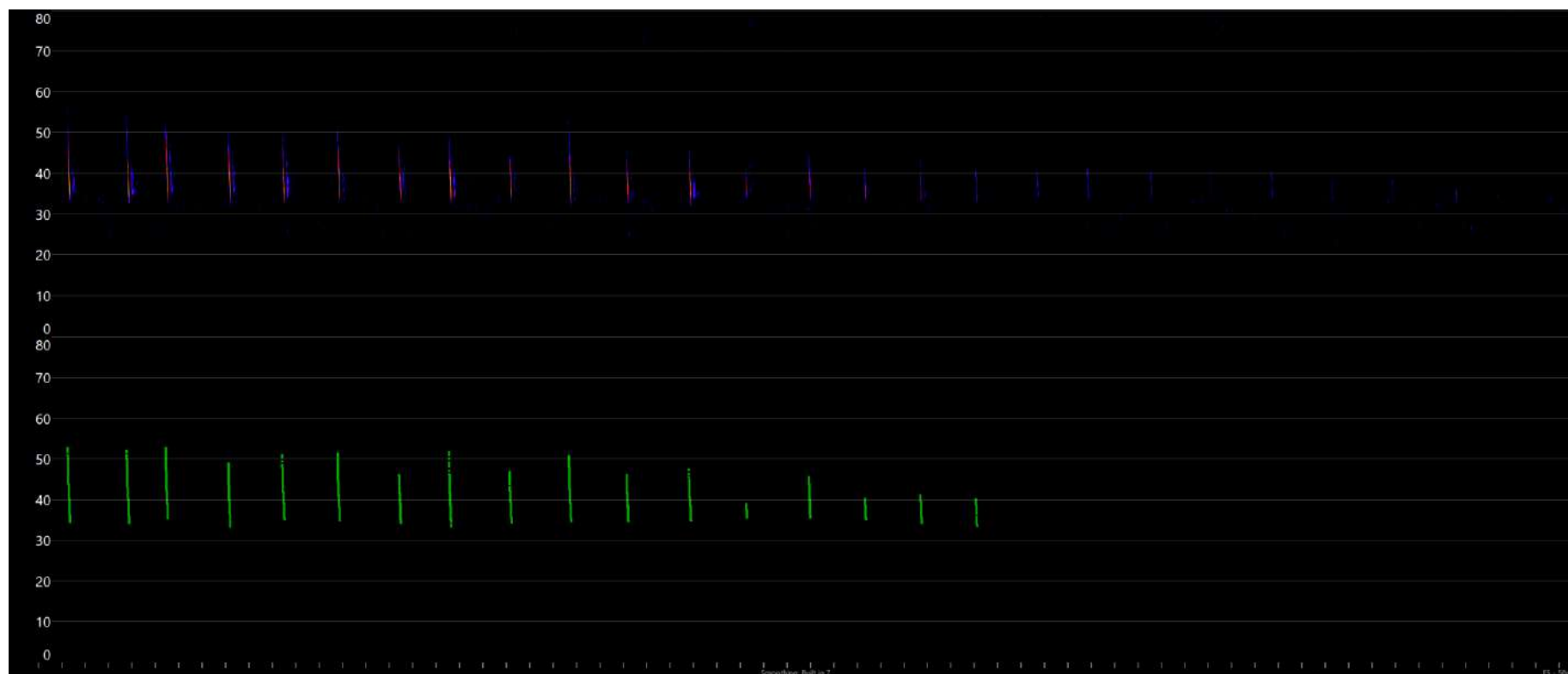


Figure 1 Screenshot of probable *Nyctophilus* sp. call in file 514007 2023-11-26 22-15-11.wav
Full-spectrum (top) and zero-crossing (bottom) spectrograms. Time-scale (x-axis) = 50ms per tick-mark. True-time display (time between pulses not compressed)

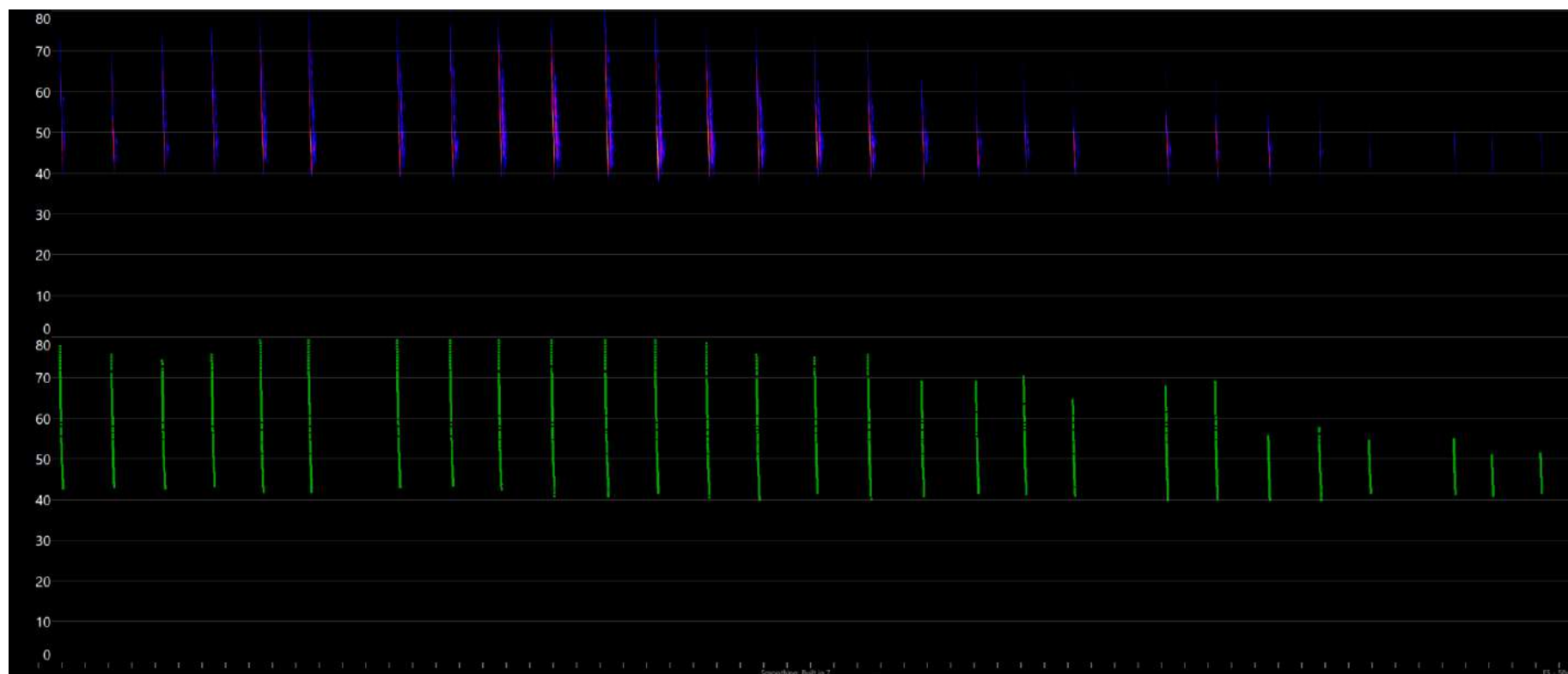


Figure 2 Screenshot of probable *Nyctophilus* sp. call in file 514007 2023-11-28 00-24-51.wav

Full-spectrum (top) and zero-crossing (bottom) spectrograms. Time-scale (x-axis) = 50ms per tick-mark. True-time display (time between pulses not compressed)

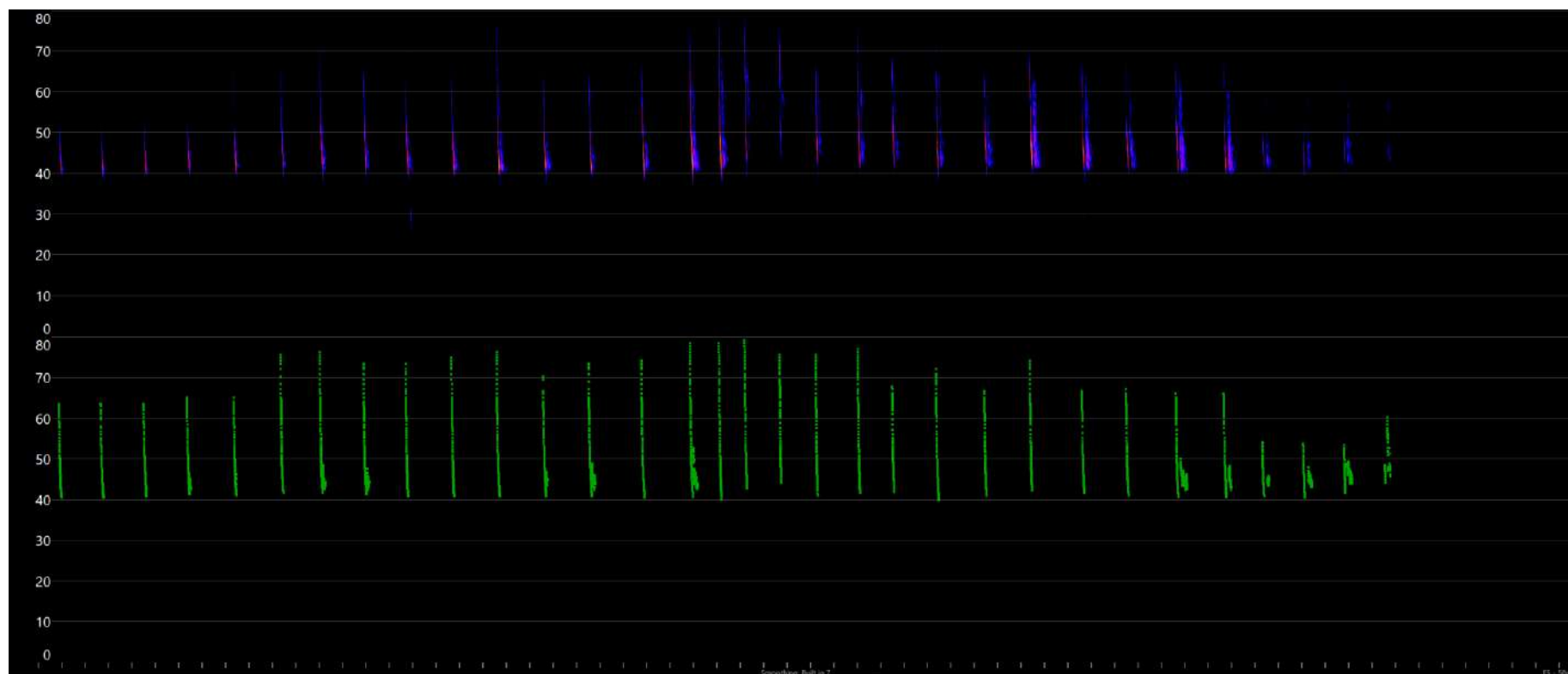


Figure 3 Screenshot of probable *Nyctophilus* sp. call in file 514007 2023-12-04 21-23-57.wav

Full-spectrum (top) and zero-crossing (bottom) spectrograms. Time-scale (x-axis) = 50ms per tick-mark. True-time display (time between pulses not compressed)

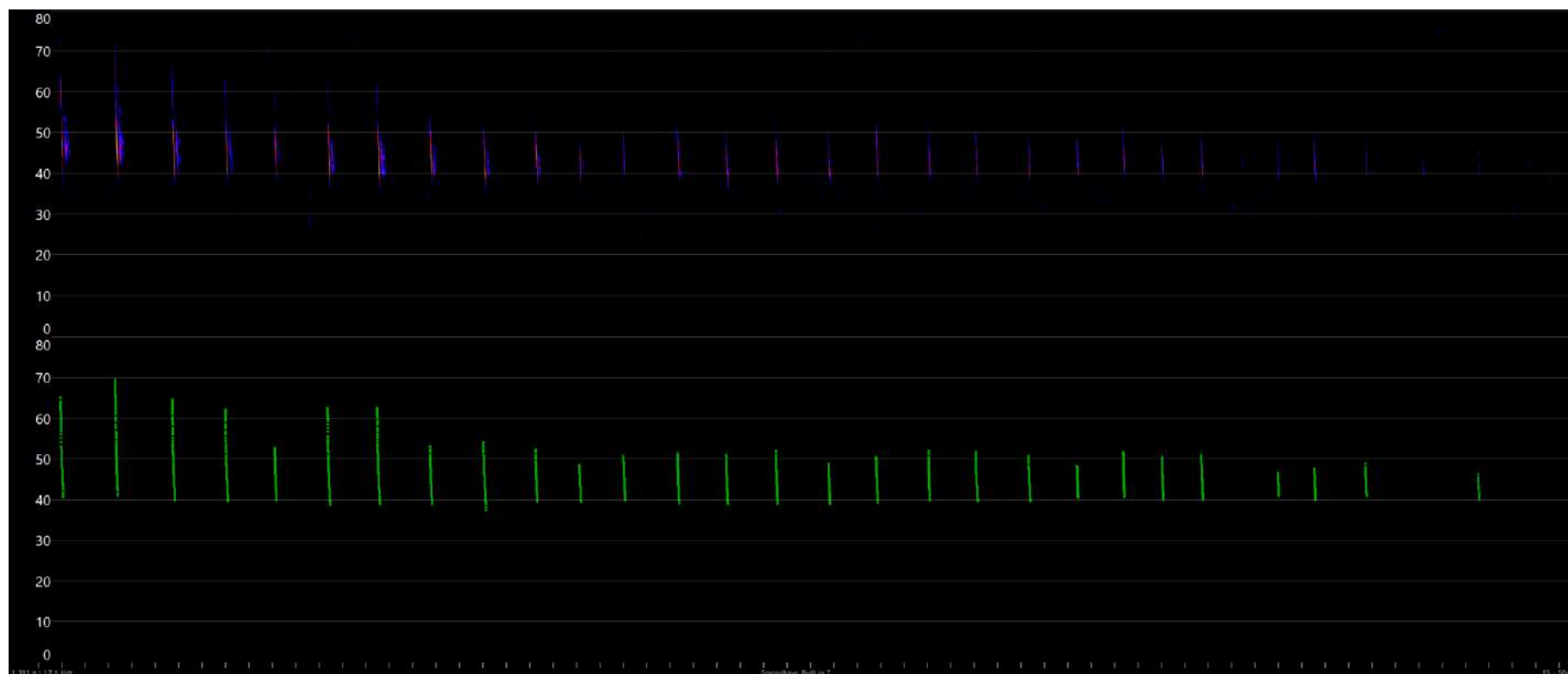


Figure 4 Screenshot of probable *Nyctophilus* sp. call in file 514007 2023-12-05 02-15-28.wav

Full-spectrum (top) and zero-crossing (bottom) spectrograms. Time-scale (x-axis) = 50ms per tick-mark. True-time display (time between pulses not compressed)

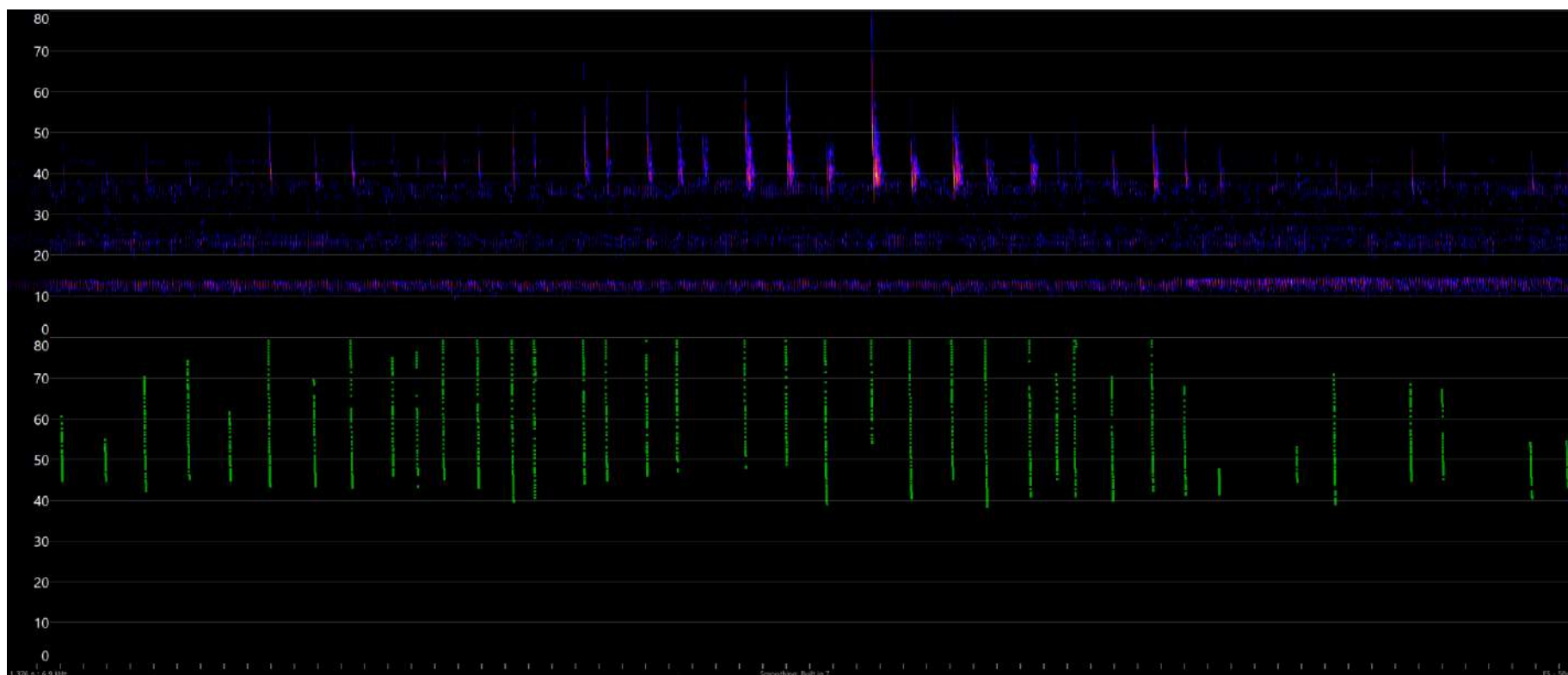


Figure 5 Screenshot of probable *Nyctophilus* sp. call in file 514034 2023-11-25 19-38-15.wav.

Full-spectrum (top) and zero-crossing (bottom) spectrograms. Time-scale (x-axis) = 50ms per tick-mark. True-time display (time between pulses not compressed)

Appendix G

Biodiversity Credit Reports



Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00046906/BAAS17099/24/00046907	Kamilaroo Avenue Lake Munmorah Biocertification	05/08/2025
Assessor Name	Report Created	BAM Data version *
	11/11/2025	Current classification (live - default) (82)
Assessor Number	BAM Case Status	Date Finalised
BAAS24034	Finalised	11/11/2025
Assessment Revision	BOS entry trigger	Assessment Type
4		Biocertification

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAI	Ecosystem credits

BAM Credit Summary Report

Coastal Creekflat Layered Grass-Sedge Swamp Forest												
3	4020_VZ3_Paddock_Trees	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	40.4	40.4	0.76	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		15
											Subtotal	15
Hunter Coast Lowland Scribbly Gum Forest												
1	3583_VZ1_Paddock_Trees	Not a TEC	12.2	12.2	0.45	PCT Cleared - 64%	High Sensitivity to Gain			1.75		0
2	3583_VZ2_Exotic_Grassland	Not a TEC	1.5	1.5	7.9	PCT Cleared - 64%	High Sensitivity to Gain			1.75		0
											Subtotal	0
											Total	15

Species credits for threatened species

BAM Credit Summary Report

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAI	Species credits
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BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00046906/BAAS17099/24/00046907	Kamilaroo Avenue Lake Munmorah Biocertification	05/08/2025
Assessor Name	Assessor Number	BAM Data version *
	BAAS24034	Current classification (live - default) (82)
Proponent Names	Report Created	BAM Case Status
	11/11/2025	Finalised
Assessment Revision	BOS entry trigger	Assessment Type
4		Biocertification
Date Finalised	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
11/11/2025		

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Nil		

Additional Information for Approval

Assessment Id	Proposal Name
00046906/BAAS17099/24/00046907	Kamilaroo Avenue Lake Munmorah Biocertification



BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3583-Hunter Coast Lowland Scribbly Gum Forest	Not a TEC	8.3	0	0	0
4020-Coastal Creekflat Layered Grass-Sedge Swamp Forest	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.8	15	0	15

3583-Hunter Coast Lowland Scribbly Gum Forest	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region

BAM Biodiversity Credit Report (Like for like)

	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 3583, 3592, 3594	Sydney Coastal Dry Sclerophyll Forests >=50% and <70%	3583_VZ1_Pad dock_Trees	Yes	0	Wyong, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 3583, 3592, 3594	Sydney Coastal Dry Sclerophyll Forests >=50% and <70%	3583_VZ2_Exotic_Grassland	No	0	Wyong, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
4020-Coastal Creekflat Layered Grass-Sedge Swamp Forest	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region



BAM Biodiversity Credit Report (Like for like)

	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 3272, 3906, 3983, 3985, 3986, 3988, 3989, 3990, 3995, 3997, 3998, 4000, 4001, 4004, 4006, 4009, 4013, 4019, 4020, 4021, 4044, 4047, 4057	-	4020_VZ3_Pad dock_Trees	Yes	15	Wyong, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

Appendix H

31 & 41 Kamilaroo Road Rezoning – Drainage Line Assessment

Our Ref: 22152_R03_Watercourse_Assessment_250312

12 March 2025

Chris Speek
Development Manager
Mavid Group

E| ChrisSpeek@mavidgroup.com.au

Dear Chris

RE: 31 & 41 Kamilaroo Road Rezoning – Drainage Line Assessment

1.0 Background Information

Land within 31 & 41 Kamilaroo Road is proposed to be rezoned for residential development. Central Coast Council have identified that a first order hydroline is mapped within the western part of the site, which requires a 10 m wide setback from the top of each bank. The NSW Department of Planning and Environment Controlled Activities – Guidelines for Riparian Corridors on Waterfront Land identify that *‘where a watercourse does not exhibit the features of a defined channel with bed and banks, the department may determine that the watercourse is not waterfront land for the purposes of the WM Act’*.

A site inspection was completed by an ecologist on 6 March 2025 with the aim of documenting and describing the geomorphic characteristics of the first order hydroline mapped within the site. A site map showing the drainage features of the site is provided as **Figure 1.1**, in **Attachment 1**. Photographs taken at the photo points mapped in **Figure 1.1** are included in **Attachment 2**. The site investigations identified that the mapped hydroline consists of a series of shallow constructed drainage channels which lack native riparian vegetation and also lack a well-defined natural channel with bed and banks. Further details of the site observations are as follows.

2.0 Watercourse Characteristics

There is a mapped farm dam to the north which is a source of water flowing to the general area of the mapped hydroline (photo point 1 north). In historical imagery from 1965, the area around the farm dam is cleared of trees, and it is evident that the dam is constructed rather than a natural billabong. The mapped hydroline is also fed from the manufactured home estate to the west by runoff from hardstand areas, conveyed by an offsite open concrete drain (photo point 1 south) which is mapped in **Figure 1.1**.

Umwelt (Australia)
Pty Limited

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www.umwelt.com.au

The northern part of the mapped hydroline is misaligned with any drainage features, particularly the existing constructed drainage channels present by up to approximately 15 metres at its northern extent, however crossing and generally aligning with the constructed drainage channel approximately 60 metres further to the south.

The location where the hydroline is mapped as flowing south and offsite, does not align to an actual flow path. The actual flow path partially flows back through a man-made open drain within the manufactured home estate to the west (photo point 5) and also continues flowing further south through poorly defined drainage channels, parallel with the western site boundary (photo points 6 to 10).

At the southern boundary of the site there is no constructed drainage channel and water here flows to a flat grassy area (photo point 10), which eventually drains to Kamilaroo Road and associated Council drainage infrastructure in the road reserve. If the watercourse was natural, it is expected that these downstream sections would be better defined than the upstream parts, which was not evident during the site inspection.

3.0 Conclusion

It is evident that the drainage channels within site are all poorly defined drainage channels, constructed and from time to time modified to divert overland flow from an existing development to the west and water from a farm dam. The man-made drainage channels present show signs of mechanical excavation and do not contain any natural riparian bed or bank structure or natural riparian vegetation. The flows within these drainage channels are also not permanent, and only present after periods of rainfall.

Therefore, subject to further determination from NSW DCCEW Water Operations / Licensing and Approvals, it is considered that the hydroline mapped within the site is unlikely to constitute Waterfront Land for the purposes of the Water Management Act.

We trust this information meets with your current requirements. Please do not hesitate to contact the undersigned on 1300 793 267 should you require clarification or further information.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Jacob Manners', enclosed within a hand-drawn oval.

Jacob Manners
Principal Ecologist

E | jmanners@umwelt.com.au
M | 0477 990 810

ATTACHMENT 1 – FIGURE 1.1



- Legend**
- Study Area (Rezoning Area)
 - Pacific Highway
 - Road
 - Watercourse
 - Waterbody
 - > Approximate Location of Man-made Drain
 - Photo Point Location

FIGURE 1.1

Site Drainage Characteristics and
Photo Point Locations

ATTACHMENT 2 – SITE PHOTOGRAPHS

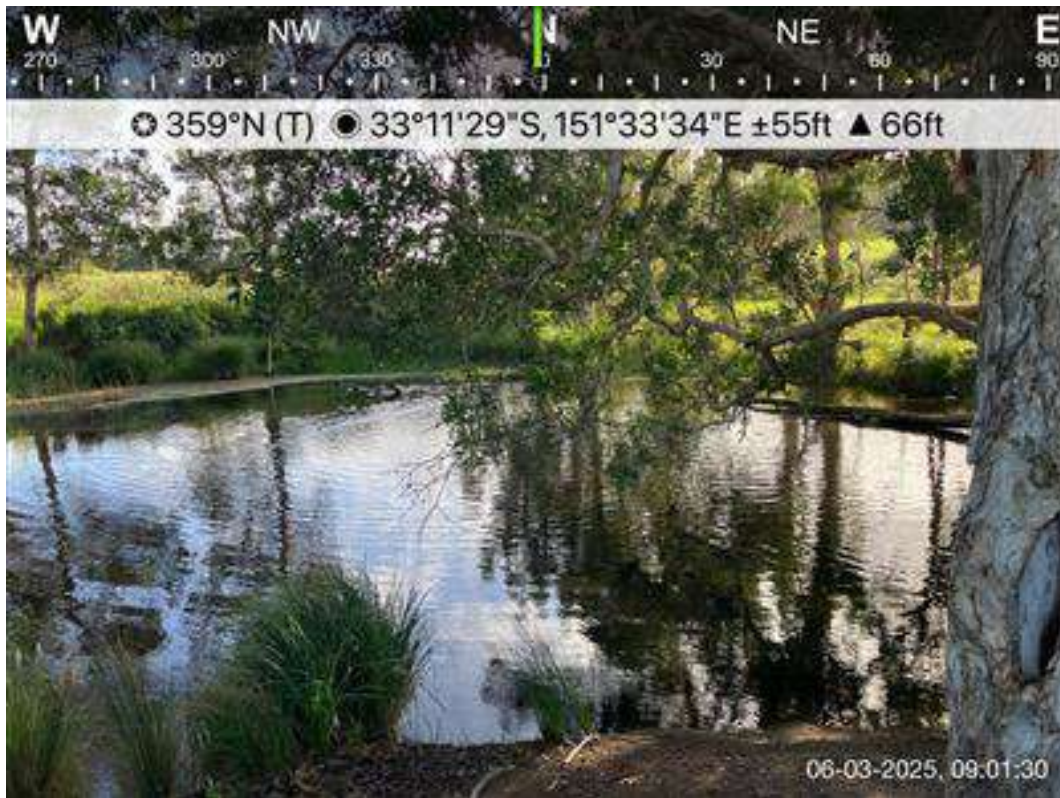


Photo Point 1 –View of main farm dam, to the north of the mapped hydroline



Photo Point 1 – View looking south in the general direction of the man-made drainage channels down slope of the main farm dam. Note other drainage flow source from the gated area in the right hand side of the image. The hydroline is mapped approximately 15 m further to the east here.



Photo Point 2 – View looking south in the general location of the mapped hydroline. A shallow machine excavated drainage channel is present, which is vegetated with exotic grasses.



Photo Point 3 looking south in the general location of the mapped hydroline where there are two shallow man-made drainage channels.



Photo Point 4 view south along the mapped hydroline showing poorly defined shallow drainage channels.



Photo Point 5 view of the offsite man-made drainage channel to the west that intersects the manufactured home estate and flows further west. The hydroline mapping does not follow this alignment, despite it being the only flow path to the south through the manufactured home estate.

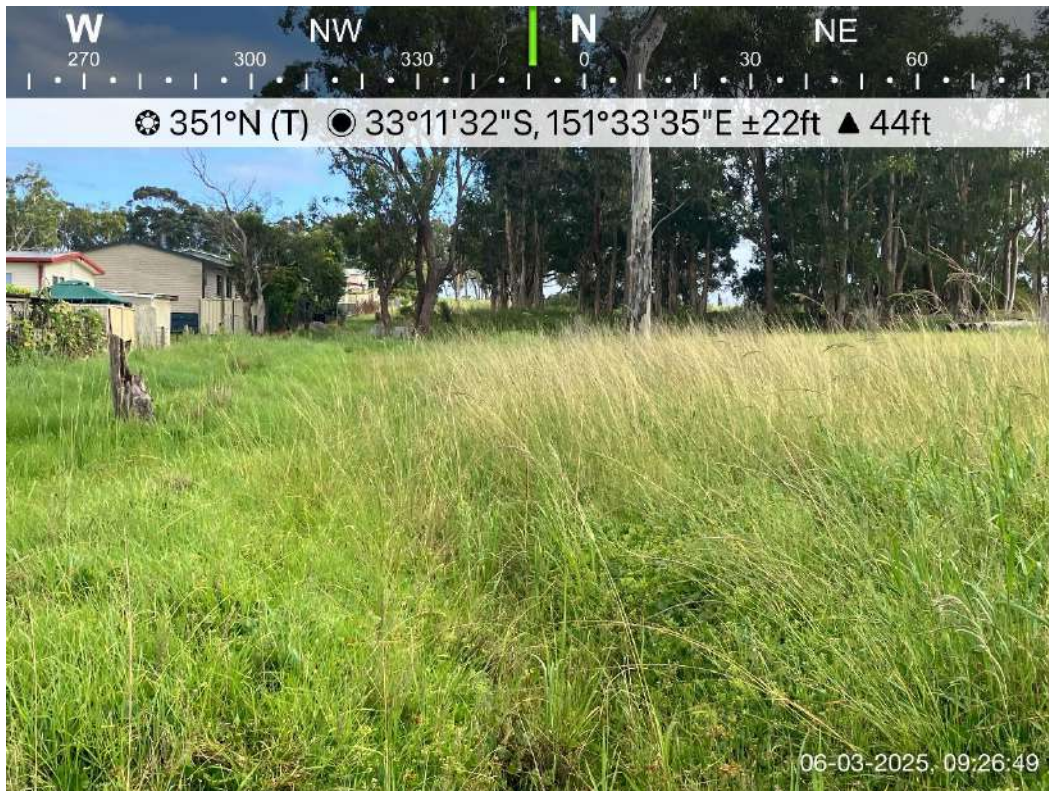


Photo Point 5 view north along the mapped hydro line showing poorly defined shallow man-made drainage channel.



Photo Point 6 view south along poorly defined shallow man-made drainage channel (no hydroline mapped here).



Photo Point 7 view south at a man-made drainage (no hydroline mapped here).



Photo Point 8 view south along poorly defined shallow man-made drainage channel (no hydroline mapped here).



Photo Point 9 view south along poorly defined man-made drainage channel (no hydroline mapped here).



Photo Point 10 view north at the southern extent of the man-made drainage channel (no hydroline mapped here).



Photo Point 10 view south of the man-made drainage channel where the water flows to a grassy paddock area (no hydroline mapped here). The water eventually flows to Kamilaroo Road and a drainage point which is piped under the road.

Appendix I

DCCEEW – Water (LA) Response: Kamilaroo Rd Watercourse Assessment

Contact: Department of Climate Change, Energy, the Environment and Water
Phone: 1300 081 047
Email: waterlicensing.servicedesk@dpie.nsw.gov.au

Our ref: V15/2812-11#66

20 June 2025

The General Manager
Central Coast Council
PO Box 20
WYONG NSW 2259

Attention: Kathryn Heintz
Emailed: Kathryn.Heintz@centralcoast.nsw.gov.au

Dear Sir/Madam

Re: V15/2812-11#66 - Planning Proposal
Description: 31 & 41 Kamilaroo Road, Lake Munmorah Watercourse Assessment

Thank you for your referral of the abovementioned proposal to the Department of Climate Change, Energy, the Environment and Water—Water (Licencing and Approvals). The proposal has been considered and the following comments are provided for your consideration.

- The Departments Water Group agrees that the mapped watercourse within the subject site is not well defined with typical features such as a channel, bed or banks, vegetation changes due to prolonged wetness or fluvial bedforms. As such, the subject watercourse is not considered to be a “river” under the Water Management Act, 2000.
- It appears that the flow path below the dam diverts into the established subdivision on the west and is incorporated in road drainage network.
- The design for this site must still consider flow to and from the adjacent sites to maintain flow connectivity and maintain water quality into Lake Munmorah.
- Should a new flow path need to be established on the subject site in the form of an open channel, then it is recommended that the Departments riparian corridor guideline criteria be applied to the flow path.
- The Departments Guidelines for Controlled Activities can be found:
<https://water.dpie.nsw.gov.au/our-work/licensing-and-approvals/controlled-activity-approvals#guidelines-for-controlled-activity-approvals>

If you have any questions regarding this correspondence, please use Water Assist to obtain further information or make an enquiry: <https://water.dpie.nsw.gov.au/water-assist>

Yours Sincerely

JBraden

**For
Manager
Licensing and Approvals
Department of Climate Change, Energy,
the Environment and Water**

Appendix J

Arborist Impact Assessment





AEP

BIODIVERSITY | BUSHFIRE | ARBORICULTURE

NEWCASTLE SYDNEY CENTRAL COAST

Arborist Impact Assessment

Proposed Development

Lot 416 & 417 DP 755266

31 & 41 Kamilaroo Rd, Lake Munmorah, NSW



Prepared for: **Point Palliser Unit Trust and
Lakeside Leisure Village
C/- Mavid Development Pty Ltd**

July 2025

AEP Ref: 2629

Revision: 00

Newcastle | Sydney | Central Coast

10 Darvall St Carrington | 275 Stanmore Rd Petersham | U3/5 Pioneer Ave Tuggerah
P 0420 624 707 E info@andersonep.com.au ABN 57 659 651 537

Document Control

Document Name	Arborist Impact Assessment for Proposed development at 31 & 41 Kamilaroo Rd, Lake Munmorah, NSW
Project Number	2629
Client Name	Point Palliser Unit Trust and Lakeside Leisure Village C/- Mavid Development Pty Ltd
AEP Project Team	Joe Young Warwick Muir Natalie Black

Revision

Revision	Date	Author	Reviewed	Approved
00	08/07/2025	Joe Young	Warwick Muir	Warwick Muir

Distribution

Revision	Date	Name	Organisation
00	08/07/2025	Chris Speak	Mavid Development Pty Ltd

Disclaimer

Direct observations are relevant only to the trees identified within this report. This report utilises a rapid assessment of tree health and condition to inform retention value. This assessment of tree health and condition is based on non-destructive visual observations from ground level. Thus, it is not possible to identify all structural faults at high levels in the tree, internal structural faults or within the root system. Observations about Tree Health, Structure, and other characteristics have been made at the time of assessment and these characteristics may change over time due to natural growth of the tree as a living organism or due to unforeseen events. As such the observations that are supplied within are relevant for a period of 12 months from the time of assessment, after which re-assessment may be required for the trees assessed within this report. The recommendations and methodologies for Tree Protection within this report are relevant only to the Trees assessed within this report. The author is not responsible for tree damage related to failure to apply these recommendations or methodologies for Tree Protection in full within this report or for tree damage relating to works conducted by an unaffiliated person. No responsibility for damage to persons or property is accepted for damage by trees referred to within this report.

Executive Summary

At the request of Mavid Development Pty Ltd on behalf of Point Palliser Unit Trust and Lakeside Leisure Village (the clients), Anderson Environment & Planning (AEP) have prepared an Arborist Impact Assessment to address the potential arboricultural impacts from the proposed rezoning and future property development (the Proposal) at 31 & 41 Kamilaroo Rd, Lake Munmorah, NSW (the Subject Site).

The arborist site survey was undertaken on 03 July 2025. Tree Assessment was undertaken using the following methodologies (**Section 4**);

- A visual tree assessment as described by Mattheck and Breloer (1994);
- Characteristic features for each tree were recorded;
- Structural Root Zone (SRZ) and Tree Protection Zone (TPZ) using methods of calculation as outlined in AS 4970 – 2009; and
- Landscape Significance Rating (LSR) and Retention Values as outlined by Morton (2006).

A total of 22 trees identified within the site and surrounds were assessed. The condition of the assessed trees includes one (1) in poor or dead condition, nine (9) in fair condition and 12 in good condition (**Section 5.1**).

The following landscape significance ratings (LSRs) have been applied to the assessed trees (**Section 5.2**);

- One (1) 'High', due to the trees position in the landscape, canopy size and good health and as representatives of the original vegetation of the area;
- 14 'Moderate' due to their position in the landscape, canopy size and good health and as representatives of the original vegetation of the area; and
- Seven (7) 'Low' due to small canopy size low visual amenity, health or structure characteristics.

With consideration of the estimated life expectancy for each tree, Retention Values were assigned to each tree within the site. This identified the following;

- Two (2) 'High';
- 18 'Moderate'; and
- Two (2) 'Low' Retention Value Trees.

Following the assessment conducted above it has been determined that a 5m buffer from the site boundary in the vicinity of these trees will be sufficient to limit impacts to the assessed offsite trees, provided this buffer is identified as a 'no-go' zone for all potential construction related activities and fenced during any potential works. (**Figures 3 & 4**)

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Appendices

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1.0 Introduction

1.1 Background

At the request of Mavid Development Pty Ltd, Anderson Environment & Planning (AEP) have prepared an Arborist Impact Assessment and Tree Protection Plan to address the potential arboricultural impacts from the proposed rezoning and subsequent development (the Proposal) at 31 & 41 Kamilaroo Rd, Lake Munmorah, NSW (the Subject Site).

1.2 Objectives

Further to the above the following objectives for this report have been assigned:

- Tree identification plan and schedule identifying tree species, size, canopy spread and other dimensions;
- Assessment of trees bordering the north west corner and the eastern boundary of the Subject Site, including, but not limited to, the health and vigour of the trees, structural integrity, life expectancy, retention value and landscape significance;
- Determine tree protection buffers to protect trees during development construction;
- Likely impact development will have on assessed trees, including TPZ and SRZ encroachments; and
- Tree protection plan and methodologies for trees to be retained.

2.0 Site Description and Locality

Table 1 provide the site details for the Subject Site.

Table 1 – Site Particulars

Detail	Comments
Client	Point Palliser Unit Trust and Lakeside Leisure Village C/- Mavid Development Pty Ltd
Address	31 & 41 Kamilaroo Rd, Lake Munmorah, NSW.
Title(s)	Lot 416 & 417 DP 755266
Subject Site	The Subject Site consists of two lots located side by side, the northern half of the eastern boundary adjoins native bushland and the southern half is developed residential housing. The western boundary adjoins developed residential land with the Pacific Hwy to the north.
LGA	Central Coast Council
Zoning	Under the <i>Central Coast Council Local Environmental Plan 2022</i> (the LEP), the Subject Site is zoned RU6 – Transition.
Current Land Use	The site is currently a cleared vacant lot that is mostly grass typical of farm land with remnant scattered vegetation throughout. The site contains a small farm dam adjacent to the western boundary.
Surrounding Land Use	The land adjoins established residential and vegetated public reserve to the east, an established manufactured home estate to the west and vegetated public reserve and Lake Munmorah waterbody to the south.

Detail	Comments
Soil	The Subject site is within the Doyalson Soil Landscape, described as Brown loose loamy sand. Brown loose sand to loamy sand with coarse-grained texture and single-grained structure with sandy fabric within the topsoil. (eSpade, 2025).

3.0 Proposed Development

It is proposed to rezone the land. Proposed future use following rezoning will likely entail development of the land for housing, requiring civil excavation works including but not limited to, cut and fill to level the site, boxing out of roads and footpath areas, trenching for power, water, sewer and associated infrastructure.

Figure 1 depicts the extent of the Subject Site overlain on an aerial photograph of the locality.

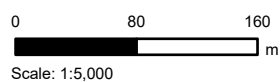


- Study Area
- Cadastre

Figure 1 - Site Location

Address: 31 - 41 Kamilaroo Rd Lake Munmorah
 Client: Mavid Development
 AEP Ref: 2629 | Date: July 2025

Imagery: Nearmap (16/04/2022)
 Spatial Reference: GDA2020 MGA Zone 56



Disclaimer: While reasonable care has been taken to ensure the information on this map is accurate and up-to-date, errors or omissions may still occur. Please verify the accuracy of all information before use. Note that boundaries are not survey accurate and do not scale off this plan.

4.0 Methodology

The arborist site survey was undertaken on 03 July 2025. Each tree observed within the Subject Site was assigned a unique tree number (Trees were not tagged as they lay outside of the subject site). Tree species were identified based on guidance from regional identification guides (Fairley and Moore 1989, Robinson 2003), and descriptions and records provided by the Royal Botanic Gardens (Plantnet 2022).

4.1 Visual Tree Assessment

A visual tree assessment to evaluate the health and condition of these trees in relation to the impacts of the proposed development was undertaken from ground level following the methodology described by Mattheck and Breloer (1994). Tree height was estimated following the guidance outlined in the Private Native Forestry Code of Practice (DECC 2007) and confirmed with a laser range finder. The Diameter at Standard Height (DSH) and Diameter Above Buttress (DAB) was determined using a DBH tape and methods of calculation for the Structural Root Zone (SRZ) and Tree Protection Zone (TPZ) applied as outlined in Australian Standard 4970-2025 *Protection of trees on development Sites* (AS 4970 – 2025) (Standards Australia 2025). Tree Total Canopy Area was estimated from the formula $\pi \times (\text{average canopy spread})^2$. Tree data and photos were recorded with a mobile phone.

4.2 Tree Location Mapping and Data

Tree locations were recorded using ESRI Field Maps in conjunction with a handheld GPS device. These coordinates were projected into GIS mapping software to visualise tree positions spatially. As handheld GPS units can be subject to minor positional inaccuracies, the plotted locations may not reflect absolute location.

4.3 Tree Retention Value

To determine tree Retention Value a Landscape Significance Rating (LSR) was assigned to each tree. The LSR value provides consideration of the tree's amenity, environmental and heritage values (refer **Appendix B**). Trees are then assigned one of the following LSR categories:

- Significant (1);
- Very High (2);
- High (3);
- Moderate (4);
- Low (5);
- Very Low (6); and
- Insignificant (7).

Once the landscape significance value has been determined the following assessment matrix that utilises estimated life expectancy and landscape significance (**Table 2**) was applied to each tree.

Table 2 – Tree Retention Status Matrix Assessment matrix adopted from Morton (2006)

Landscape significance rating							
Estimated Life Expectancy	1	2	3	4	5	6	7
Greater than 40 Years	High						
15 to 40 Years			Moderate				
5 to 15 Years				Low			
Less than 5 Years					Very low		
Dead or Hazardous							

4.4 Limitations

This report utilises a rapid assessment of tree health and condition to inform retention value. Should a detailed assessment of tree structural health and condition be required a tree risk assessment report should be commissioned.

This assessment of tree health and condition is based on non-destructive visual observations from ground level. Thus, it is not possible to identify all structural faults at high levels in the tree, internal structural faults or within the root system. Should a detailed assessment for structural faults be required a tree risk assessment report should be commissioned.

Weather conditions such as extreme wind, storm activity, lightning as well as other events or disturbances independent of the proposed activities are unpredictable. Unforeseeable damage to trees may occur as a result of unpredictable or unplanned weather events or disturbances.

Tree identifications are based on identifying features (fruit, inflorescence, etc.) found during July and made at ground level from within the Subject Site.

The total canopy area for each tree utilised within this report is an estimation based on field observation of canopy spread and the true amount of canopy area may differ.

Trees identified within by this plan are located to GPS accuracy and there may be some minor discrepancy in the true location.

5.0 Tree Assessment Results

A total of 22 trees were assessed. Trees were assessed in the north western corner and the north eastern boundary where the site is adjacent to RE1 zoned land that contains native vegetation. Observations were made for each assessed tree to determine tree protection zones and provide a buffer for the interface between trees and the site (**Appendix A**). Tree locations are shown in **Figure 2**.

5.1 Summary of Tree Condition and Characteristics

All 22 trees assessed are located outside of the Subject Site.

5.1.1 North West Corner

Seven (7) trees in the north-west corner were assessed. These trees were selected as the expected notional root zones (NRZ) are likely to extend into the subject land, and their NRZs would also provide a buffer for surrounding trees.

Trees 1, 2, and 3 are situated close to the boundary and are highly visible from the Pacific Highway. The buffer provided by these trees will help protect those behind them. Due to their health and condition, it is recommended that no intrusion occurs into the projected notional root zones.

Trees 4, 5, 6, and 7 are pruned regularly to maintain safe clearance between the tree canopy and the overhead power lines. A significant portion of their notional root zones—up to 40%—is covered by a public footpath constructed of concrete. Therefore, no further disturbance should occur within the projected notional root zones due to the already reduced absorption area.

5.1.2 North East Boundary

Fifteen (15) trees along the north-east boundary were assessed. These trees were selected as their expected NRZs are likely to extend into the subject land, NRZs would also provide indicators to form a buffer for surrounding trees. A large portion of the trees along this boundary have a DSH of less than 200 mm and therefore a small projected NRZ.

Trees along this boundary are in varying health and structural condition. As edge trees, they form the interface between grazing land and an area of native bushland. The NRZ of these trees was used to determine an appropriate buffer for them and the remainder of the trees along the boundary.

Tree 8 in the north-east corner has a minor encroachment of less than 10%. The projected buffer protects the remainder of the NRZ of this tree where it extends into the subject land.

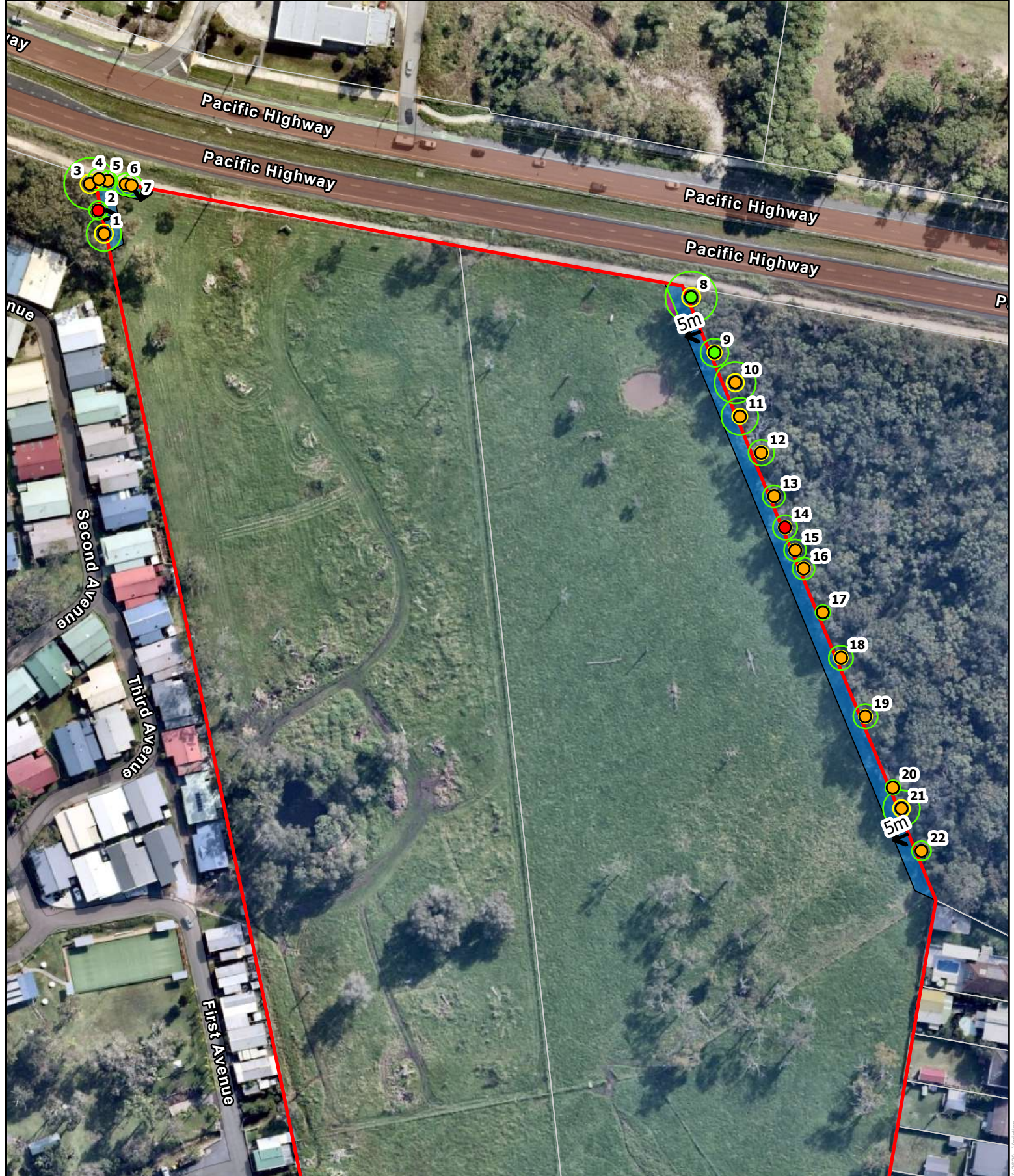
5.2 Summary of Landscape Significance and Retention Value

The following landscape significance ratings (LSRs) have been applied to the assessed trees:

- One (1) 'High', due to the tree's position in the landscape, canopy size and good health and as representatives of the original vegetation of the area;
- 14 'Moderate' due to their position in the landscape, canopy size, good health and as representatives of the original vegetation of the area; and
- Seven (7) 'Low' due to small canopy size low visual amenity, health or structure characteristics.

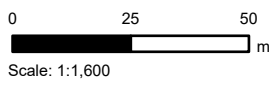
With consideration of the estimated life expectancy for each tree, Retention Values were assigned to each tree within the site. This identified the following;

- Two (2) 'High';
- 18 'Moderate'; and
- Two (2) 'Low' Retention Value Trees.



- | | | |
|--|---|--|
| Study Area | Tree Retention Value | TPZ |
| Cadastre | ● High | SRZ |
| | ● Low | Tree Protection Buffer |
| | ● Moderate | |

Figure 2 - Tree Assessment



Address: 31 - 41 Kamilaroo Rd Lake Munmorah
 Client: Mavid Development
 AEP Ref: 2629 | Date: July 2025

Imagery: Nearmap (16/04/2022)
 Spatial Reference: GDA2020 MGA Zone 56

Disclaimer: While reasonable care has been taken to ensure the information on this map is accurate and up-to-date, errors or omissions may still occur. Please verify the accuracy of all information before use. Note that boundaries are not survey accurate and do not scale off this plan.

6.0 Tree Impact Assessment

The NRZ and SRZ are indicative areas critical for maintaining a tree's viability and stability respectively, holding the majority of the roots necessary for each function. Any ground works within these zones is likely to impact the viability or stability of the tree by injuring the root system.

Trees were assessed to determine the extent of tree protection required to retain trees during development construction and provide a buffer for these trees. Trees that line the boundary of the site that have the potential for their nominal tree protection zones to be encroached during development were assessed to provide an overall tree protection area for all trees in the survey area.

6.1 Proposal Impacts

Assuming that a 5m tree protection buffer is established for the site, and any potential footprint is located to the edge of this buffer, the following potential impacts have been identified;

- Tree 8 has potential encroachment into the indicative NRZ; however, the tree is in good health and the proposed buffer will provide adequate retention of roots and soil volume for this tree to maintain health and stability should disturbance occur. The TPZ of this tree can be feasibly offset into unimpacted areas and this tree should be largely unaffected if the buffer is implemented.
- The proposed buffer extends past the NRZ of the remaining trees and should be unaffected as adequate soil volume, soil moisture and solute movements should be sufficient to maintain the health and stability of these trees if the buffer is implemented.

Trees located behind the assessed trees are a sufficient distance away from the subject site to be retained without specific tree protection fencing.

All future proposed construction and development plans following rezoning must consider the buffer as identified within this report as a "no-go" zone for any proposal footprint to avoid impacts to these offsite trees. This includes but is not limited to avoiding the following works within this buffer;

- Engineering cut and fill footprints to level the site;
- Roads and footpath areas, including boxing out, batters and paved areas; and
- Trenching for power, water, sewer and associated infrastructure.

Once any future construction or development plans are prepared, the proposal footprints should be reviewed by an AQF5 Arborist to ensure any potential impacts are mitigated for the trees assessed within this report.

Figures 3 & 4 delineate the buffers required to mitigate impacts to the assessed trees.



Study Area

Cadastre

Tree Retention Value

● Low

● Moderate

TPZ

SRZ

Tree Protection Buffer

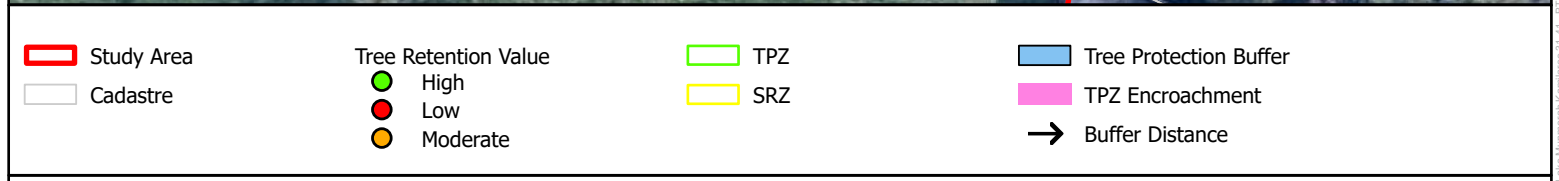
→ Buffer Distance

Figure 3 - Tree Assessment (West)

0 4.5 9 m

Scale: 1:270





7.0 Recommendations

7.1 Tree Retention and Protection

- A 5m tree protection buffer from the site boundary should be established in the vicinity of the assessed trees as delineated in **Figures 3 & 4**. This buffer should be identified within any future construction or development plans (following re-zoning) as a 'no-go' zone for all potential construction related activities.
- Once any future construction or development plans are prepared, the proposal footprints should be reviewed by an AQF5 Arborist to ensure any potential impacts are mitigated for the trees assessed within this report and that Tree Retention is feasible.
- Tree protection fencing will be required along the proposed buffer to protect the trees and ensure that ground conditions remain favourable for tree health and stability during any construction activity.
- Tree protection fencing should be in place before any construction occurs and should remain in place for the duration of the project. Tree protection fencing should be inspected by the project arborist prior to construction and no work should occur within the TPZ without supervision from the project arborist.

7.2 Project Arborist

- At the commencement of development a Project Arborist shall be appointed, holding a minimum of AQF level 5 in Arboriculture and with experience on site clearance work of trees.
- The Project Arborist (PA) shall communicate with the project manager and site supervisor prior to commencement of construction.
- The PA shall identify the trees to be retained and set out on ground the positions of tree protection fence panels to be installed.
- Prior to commencement of earthworks, the PA shall inspect the fences and ensure the trees are adequately protected, then issue an email stating compliance with tree protection fence placements has occurred.
- Trees should be inspected at the final stage of earthworks. The inspection will identify any changes in tree health due to impacts from the development or environmental factors. A compliance certificate should be issued.

7.3 Tree Protection Measures

- Tree Protection Measures should be consistent with the Australian Standards for the Protection of Trees on Development sites AS: 4970:2025 to meet compliance.
- All tree maintenance and pruning works should be carried out by a qualified tree worker in accordance with AS4373 –2007 Pruning of Amenity Trees.
- A continuous TPZ fence should be installed for retained trees. The TPZ shall be delineated by a 1.8m interlocking chain wire fence located around trees designated to be retained within close proximity to the works, in accordance with AS 4687. **Appendix D** details tree protection fencing that should be implemented.
- TPZ fencing must be installed before the commencement of any Works. The fencing should not be removed or altered until after the completion of works.

- All Contractors working in close proximity to the TPZ of trees to be retained should be briefed as to the requirements of the TPZ.
- The TPZ fencing and zone should be certified by the project arborist before construction commences.
- Tree health and condition should be monitored by the project arborist at regular stages during construction, at practical completion of construction, and after completion.
- The following activities should be avoided within the TPZ of trees to be retained where practicable:
 - Machine excavation of soil including trenching;
 - Operation of heavy equipment;
 - Stockpiling of soils;
 - Storage of heavy or other equipment;
 - Parking of vehicles;
 - Wash down and cleaning of equipment;
 - Excavation for silt fencing;
 - Dumping of waste;
 - Change of soil level or gradient; and
 - Covering with concrete, impermeable, or compacted surfaces.
- Where works are required that encroach into TPZ of trees to be retained, additional protection measures, which include trunk and low branch guards, and ground protection measures should be implemented following guidance in Australian standard *AS 4970 – 2025 Protection of trees on development Sites* (**Appendix D**). These works should only be conducted under supervision of the Project Arborist. The use of “soft” construction methods including manual and vacuum removal of soils is recommended for works conducted within the TPZ of trees to be retained.

8.0 Conclusion

The recommendations for tree retention and removal have been made with consideration of minimising arboricultural impacts.

Future use of the site may include the development of infrastructure close to the site's boundaries that host trees to be retained. The provision of a buffer is essential to protect the trees and will ensure that ground conditions remain favourable for tree health and stability.

The implementation of a detailed Tree Protection Plan and Tree Protection measures will be an essential part of the Construction Environment Management Plan to avoid further loss of trees in close proximity to the construction footprint.

We trust this meets your requirements. Should you require further details or clarification, please do not hesitate to contact the undersigned or Natalie Black, Senior Environmental Manager (0431 249 360).

Yours faithfully,



Warwick Muir

Ecologist / Arborist

BSc AQF5

0448 689 698

9.0 References

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Appendix A – Tree Schedule

Appendix A – Assessed Tree Schedule

Tree ID	Scientific Name	Common Name	DBH (m)	DAB (m)	Canopy Spread (m)				Canopy Spread Average (m)	Estimated Total Canopy Area (m ²)	Height (m)	Age Class	Health	Structure	Landscape significance rating	Estimated life expectancy	Retention Value	NRZ (m)	SRZ (m)	Encroachment Percentage
					N	E	S	W												
1	<i>Eucalyptus haemastoma</i>	Broad-leaved Scribbly Gum	0.47	0.80	5	4	3	3	3.75	44	14	Mature	Fair	Fair	Moderate	15-40	Moderate	5.6	3.0	0.0
2	<i>Corymbia gummifera</i>	Red Bloodwood	0.25	0.34	3	1	1	1	1.5	7	14	Mature	Fair	Fair	Low	15-40	Low	3.0	2.1	0.0
3	<i>Eucalyptus haemastoma</i>	Broad-leaved Scribbly Gum	0.70	0.85	2	5	4.5	3.5	3.75	44	16	Over-Mature	Fair	Fair	Moderate	15-40	Moderate	8.4	3.1	0.0
4	<i>Corymbia gummifera</i>	Red Bloodwood	0.30	0.38	3	3	2	1.5	2.38	18	10	Mature	Good	Fair	Moderate	15-40	Moderate	3.6	2.2	0.0
5	<i>Corymbia gummifera</i>	Red Bloodwood	0.26	0.32	2.5	1	4	2	2.38	18	10	Mature	Good	Fair	Moderate	40+	Moderate	3.1	2.1	0.0
6	<i>Corymbia gummifera</i>	Red Bloodwood	0.30	0.35	2.5	1	4	2	2.38	18	10	Mature	0	Fair	Moderate	40+	Moderate	3.6	2.1	0.0
7	<i>Corymbia gummifera</i>	Red Bloodwood	0.30	0.32	2.5	1	4	2	2.38	18	10	Mature	0	Fair	Moderate	40+	Moderate	3.6	2.1	0.0
8	<i>Eucalyptus haemastoma</i>	Broad-leaved Scribbly Gum	0.70	0.80	4	5	4.5	2	3.88	47	12	Mature	Good	Good	High	40+	High	8.4	3.0	7.4%
9	<i>Angophora costata</i>	Smooth-barked Apple	0.38	0.45	3	3	3	3	3	28	16	Mature	Good	Good	Moderate	40+	High	4.6	2.4	0.0
10	<i>Eucalyptus haemastoma</i>	Broad-leaved Scribbly Gum	0.56	0.70	4	4	2	2	3	28	15	Mature	Good	Good	Moderate	40+	Moderate	6.7	2.9	0.0
11	<i>Eucalyptus haemastoma</i>	Broad-leaved Scribbly Gum	0.50	0.50	3	3	3	4	3.25	33	15	Mature	Good	Good	Moderate	40+	Moderate	6.0	2.5	0.0
12	<i>Angophora costata</i>	Smooth-barked Apple	0.35	0.40	1	4	4	3	3	28	14	Mature	Fair	Fair	Moderate	15-40	Moderate	4.2	2.3	0.0
13	<i>Angophora costata</i>	Smooth-barked Apple	0.30	0.35	2.5	2.5	2.5	2.5	2.5	20	14	Mature	Good	Good	Moderate	40+	Moderate	3.6	2.1	0.0
14	<i>Angophora costata</i>	Smooth-barked Apple	0.33	0.36	0	2	3	2	1.75	10	8	Mature	Fair	Poor	Low	15-40	Low	4.0	2.2	0.0
15	<i>Eucalyptus haemastoma</i>	Broad-leaved Scribbly Gum	0.30	0.34	1	1	4	3	2.25	16	8	Mature	Good	Good	Moderate	40+	Moderate	3.6	2.1	0.0

Tree ID	Scientific Name	Common Name	DBH (m)	DAB (m)	Canopy Spread (m)				Canopy Spread Average	Estimated Total Canopy Area	Height (m)	Age Class	Health	Structure	Landscape significance rating	Estimated life expectancy	Retention Value	NRZ (m)	SRZ (m)	Encroachment Percentage
					N	E	S	W	(m)	(m ²)										
16	<i>Corymbia gummifera</i>	Red Bloodwood	0.30	0.36	1	1	2	2	1.5	7	8	Mature	Good	Good	Low	40+	Moderate	3.6	2.2	0.0
17	<i>Corymbia gummifera</i>	Red Bloodwood	0.20	0.24	0	0	2	2	1	3	7	Semi-Mature	Good	Good	Low	40+	Moderate	2.4	1.8	0.0
18	<i>Eucalyptus haemastoma</i>	Broad-leaved Scribbly Gum	0.33	0.40	1	1.5	2.5	3	2	13	10	Mature	Good	Good	Moderate	40+	Moderate	4.0	2.3	0.0
19	<i>Angophora costata</i>	Smooth-barked Apple	0.33	0.38	3	1	1	3	2	13	14	Mature	Good	Good	Low	40+	Moderate	4.0	2.2	0.0
20	<i>Corymbia gummifera</i>	Red Bloodwood	0.20	0.23	1	0	2	2.5	1.38	6	6	Semi-Mature	Good	Good	Low	40+	Moderate	2.4	1.8	0.0
21	<i>Eucalyptus capitellata</i>	Brown Stringybark	0.50	0.65	3	2	4	4.5	3.38	36	8	Mature	Fair	Fair	Moderate	15-40	Moderate	6.0	2.8	0.0
22	<i>Eucalyptus capitellata</i>	Brown Stringybark	0.26	0.30	1.5	1.5	1.5	1.5	1.5	7	7	Mature	Good	Good	Low	40+	Moderate	3.1	2.0	0.0

Appendix B – Glossary

GLOSSARY AND DEFINITIONS

Age Classes:

- Juvenile refers to an immature tree;
- Semi-mature refers to a tree between immaturity and full size;
- Mature refers to a full-sized tree with some capacity for further growth; and
- Over-mature refers to a tree already in decline.

Diameter at standard height (DSH): Tree stem diameter at 1.4 metres above ground level.

Diameter at buttress (DAB): Tree stem diameter as measured above the root buttress at ground level.

Notional root zone (NRZ): Zone enclosed by a radius of 12 times the DSH.

Tree Protection Zone (TPZ):

A specified zone of the area necessary to protect tree viability, encompassing the area necessary to protect both the crown and roots.

Structural Root Zone (SRZ):

An indicative measure of the spread of the primary woody and structural roots necessary for tree stability, as calculated by the formula $SRZ = (DAB \times 50)^{0.42} \times 0.64$

Visual Tree Assessment (VTA):

Visual inspection of tree only.

Co-dominant leaders

A tree where two or more stems are of similar diameter.

Included Bark Junctions

A junction where the angle of the union creates an area of ingrown bark. This can create a structural weakness, and is often found on co-dominant stems.

Crown

The portion of the tree consisting of branches and leaves and any part of the trunk from which branches arise.

Stem

The position of the tree consisting of branches and leaves and any part of the trunk from which branches arise. An organ which supports branches, leaves, flowers and fruits.

Epicormic Growth

Refers to shoots produced by dormant buds within the bark or stem of a tree as a result of stress, incorrect pruning or increased light.

Health Condition

Exceptional

- Visually complete crown with dense foliage throughout that indicates strong health and vigour.
- Leaf size and colour that is true to type for the species and free from pest (insect) and disease (pathogen) damage.

- Expected levels of primary growth or seasonal extension and internodal growth evident for the species.
- No evidence of colonising saprophytes and no deadwood evident.

Good

- Visually complete crown, varying in foliage density throughout.
- Leaf size and colour that is true to type for the species with none or minor levels of pest (insect) and/or disease (pathogen) damage evident.
- Expected levels of primary growth or seasonal extension and internodal growth evident for the species.
- No evidence of colonising saprophytes and low levels of deadwood present and approximately 10mm or less in size.

Fair

- Sparse crown, varying in foliage density throughout.
- Reduced leaf size and atypical in colour for the species.
- Low to medium levels of pest (insect) and/or disease (pathogen) damage.
- Reduced, seasonal extension and internodal growth.
- Deadwood easily visible and less than approximately 30mm in size.
- Epicormic growth may be evident.

Poor

- Obvious signs of crown decline, exhibiting significant reduction in live crown volume and foliage density with reduced leaf size and atypical in colour for the species.
- Evidence of defoliation and/or dieback of branch tips.
- Medium to high levels of pest (insect) and disease (pathogen) damage.
- Presence of exudates (kino and resins) from wounds (open and/or weeping).
- Significant reduction in seasonal extension and internodal growth, with significant levels of epicormic growth evident.
- Deadwood easily visible, approximately 30mm to 100mm in size.

Dead

- No evidence of live foliage observed throughout the crown.
- Obvious signs of cracking and shrinking wood.
- Visible evidence of delaminating bark to stems and branches.

Structure Condition**Very Good**

- Strong branch unions at attachment points with no acute angles (compression and tension forks) and good branch taper at unions.
- No visibly, defective tree parts or structural defects.

- No wounds to stems and branches, no crossing and rubbing of branches and no wounds to exposed roots.
- No fungal fruiting bodies present to stems, branches and roots indicating, a presence of fungal pathogens.

Good to Fair

- Developing inclusions at unions of leading, codominant stems and branches.
- Evidence of defective tree parts (low levels) including branch and stem inclusions and crossing and rubbing of branches.
- Evidence of mechanical damage to periderm of stems, branches and roots, exposing vascular tissues.
- Exposed wounds for surface, colonising pathogens and entry points for developing decay.
- Presence of fungal fruiting bodies.
- Some evidence of cavities or hollows. (Fair only)
- No evidence of soil upheaval surrounding base of tree.

Poor

- Obvious signs and evidence of included bark to basal unions of codominant, leading stems and branches.
- Advanced, structural defects evident with failure of tree parts determined within 5 years from time of inspection and assessment.
- Evidence of decay from open wounds with presence of exudates (kino and resins) and exposed and degraded woody tissues.
- Presence of fungal fruiting bodies.
- Presence of cavities and hollows.
- Evidence of mechanical damage with advanced degradation of exposed roots.

a) Hazardous Tree

b) Immediate Removal

- Advanced, structural defects evident. Open cracks to codominant stem and branch unions evident.
- Previous branch and stem failures evident. Failure of remaining tree parts determined within 3 months 6 months, from time of inspection and assessment. Arboricultural works to be scheduled immediately to mitigate associated hazard and risk.
- Severed roots and soil upheaval evident indicating failure of root zone.
- Tree failure imminent within 12 months from time of inspection and assessment

Landscape Significance

Assesses a tree within the landscape and rates according to criteria taken from Morton (2006):

1. Significant

- The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance; or

- The subject tree forms part of the curtilage of a Heritage Item (building / structure /artifact as defined under the LEP) and has a known or documented association with that item; or
- The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event; or
- The subject tree is scheduled as a Threatened Species or is a key indicator species of an Endangered Ecological Community as defined under the or Biodiversity Conservation Act 2016 (NSW) or The Environmental Protection and Biodiversity Conservation Act 1999 (Federal); or
- The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species; or
- The subject tree is a Remnant Tree, being a tree in existence prior to development of the area; or
- The subject tree has a very large live crown size exceeding 300m² with normal to dense foliage cover, is located in a visually prominent in the landscape, exhibits very good form and habit typical of the species and makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity; or
- The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.

2. Very high

- The tree has a strong historical association with a heritage item (building/structure/artifact/garden etc) within or adjacent the property and/or
- Exemplifies a particular era or style of landscape design associated with the original development of the site; or
- The subject tree is listed on Council's Significant Tree Register; or
- The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link/ Wildlife Corridor or has known wildlife habitat value;
- The subject tree has a very large live crown size exceeding 200m²; a crown density exceeding 70% Crown Cover (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area.

3. High

- The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence; or
- The tree is a locally-indigenous species and representative of the original vegetation of the area; or
- The subject tree has a large live crown size exceeding 100m²; and
- The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (eg crown distortion/suppression) with a crown density of at least 70% Crown Cover (normal); and The subject tree is visible from the

street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area.

4. Moderate

- The subject tree has a medium live crown size exceeding 40m²; and
- The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% Crown Cover (thinning to normal); and
- The tree makes a fair contribution to the visual character and amenity of the area; and
- The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms.
- The tree has no known or suspected historical association

5. Low

- The subject tree has a small live crown size of less than 40m² and can be replaced within the short term with new tree planting; or
- The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% Crown Cover (sparse); and
- The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area.

6. Very low

- The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or a nuisance species.
- The subject tree is scheduled as exempt (not protected) under the provisions of the local Council's Tree Preservation Order due to its species, nuisance or position relative to buildings or other structures.

7. Insignificant

- The tree is a declared Noxious Weed under the Biosecurity Act (NSW) 2015 or identified as a priority weed within the local region.

Appendix C – Site Photographs



Plate 1 Above: Site photo showing the fence line in the top half of the north eastern part of the site.

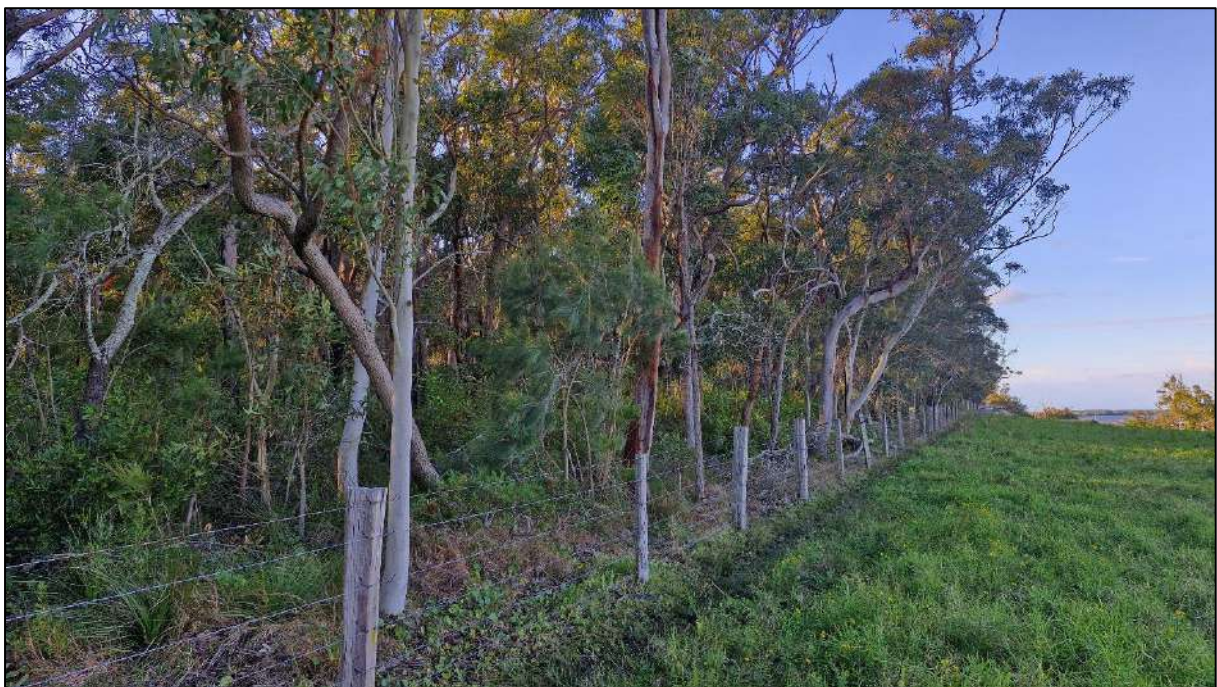


Plate 2 Above: Site photo of the eastern boundary showing the setback of the trees from the fence line and general diameter of trees in the area.

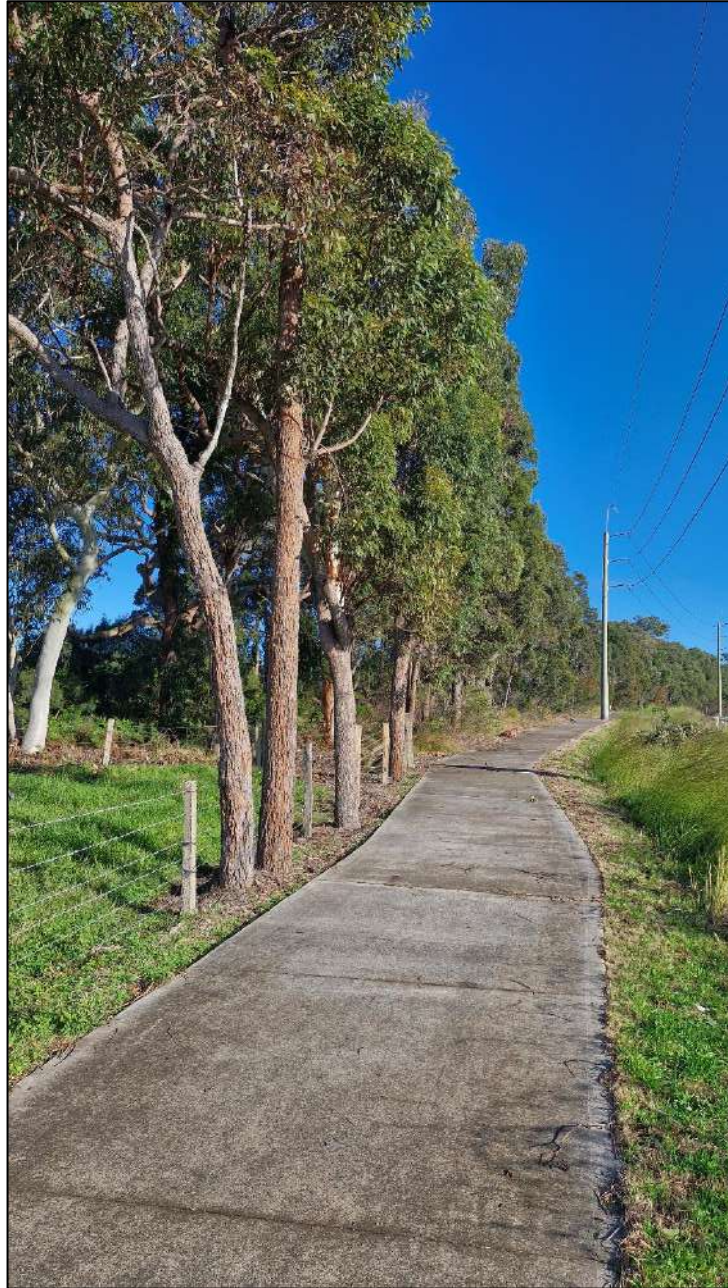


Plate 3 Above: Trees 4, 5, 6, and 7 showing powerlines and public path covering up to 40%+ of the root systems.



Plate 4 Above: Tree 3 – *Eucalyptus haemastoma* with a large arboreal termite nest and large trunk diameter.



Plate 5 Above: Tree 15 – *Eucalyptus haemastoma* showing limbs overhanging the fence line.



Plate 6 & 7: General site photos showing grass ground cover and scattered trees in various condition across the site.



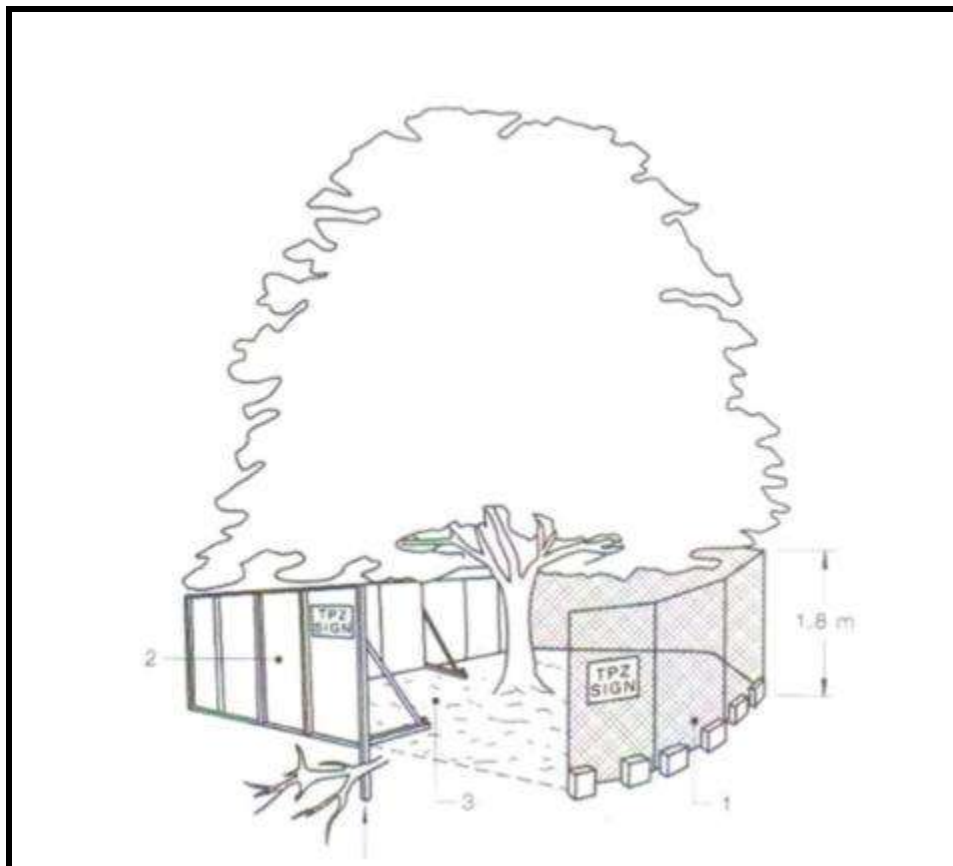
Appendix D –Tree Protection Fencing and Ground Protection

Example of tree protection fencing:

Fence off all trees noted for retention with 1.8m steel mesh fencing at the perimeter of the designated protection zone. Attach signs relating to the importance of tree protection and penalties for breaching tree protection orders to the fencing. If the area is large, install multiple signs.

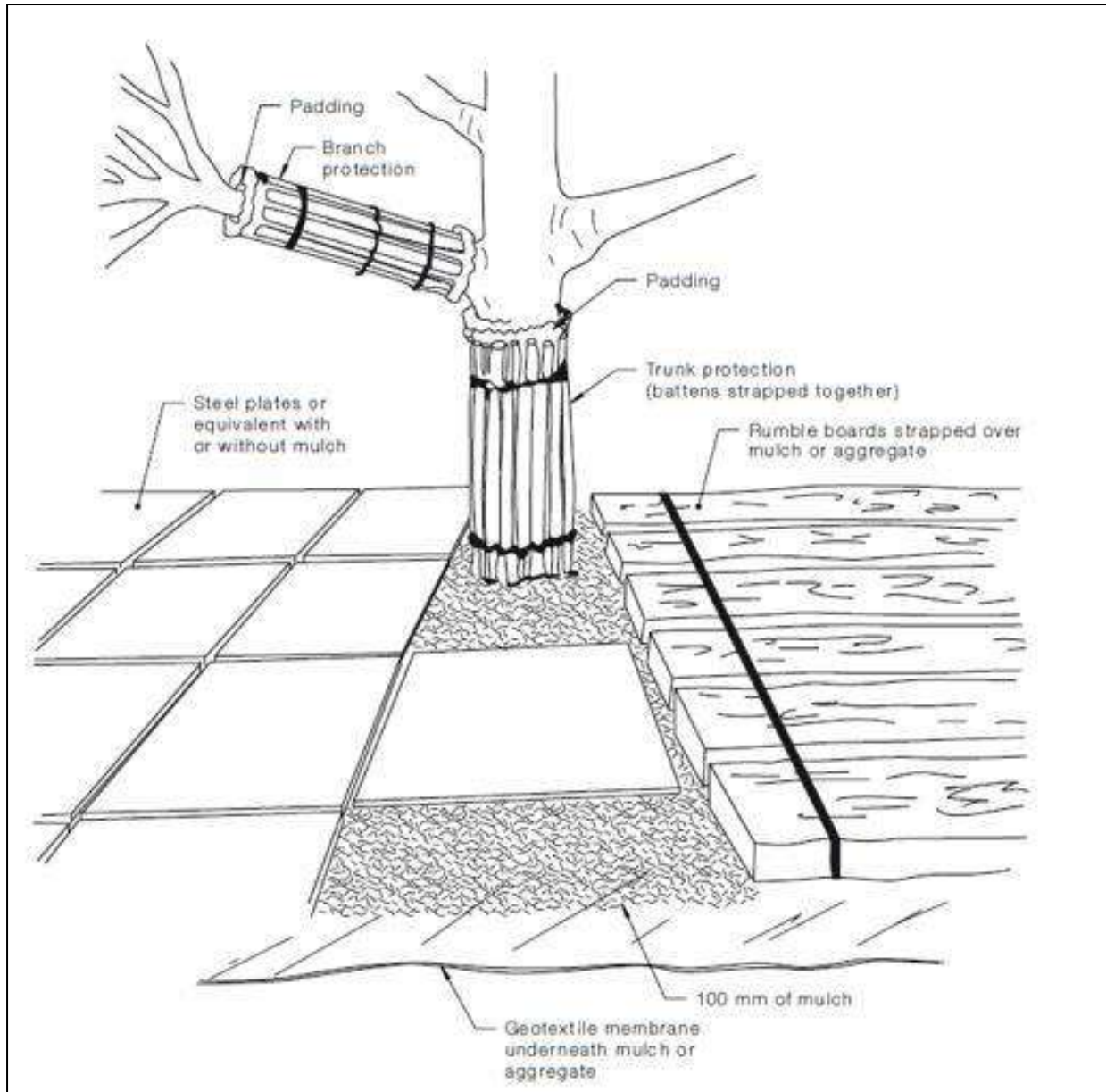
Signs should state that this is a restricted area, no entry unless in the company of the arborist. Authorised access to the protected zone could be through a locked gate or via ladders

Mulching and semi-regular watering for established protection zones.



Ground Protection

If temporary access for machinery is required within the TPZ ground protection measures will be required. The purpose is to prevent root damage and soil compaction within the TPZ. Measures may include a permeable membrane such as geotextile beneath a layer a mulch or crushed rock below rumble boards as per the below diagram.



Notes:

For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to the trees, not nailed or screwed.

Rumble boards should be of suitable thickness to prevent compaction and root damage

Appendix K

Response to Conservation Programs, Heritage & Regulation Group Review Comments

Summary of Conservation Programs, Heritage & Regulation Group (CPHR) Review Comments and Additional Information Provided.

CPHR have undertaken an assessment of the draft Biodiversity Certification Assessment Report (BCAR) (Umwelt, 2025) on behalf of Central Coast Council to support the rezoning and biodiversity certification of land at 31 and 41 Kamilaroo Road, Lake Munmorah (the site). Umwelt's response to the additional information requested is included in **Table K.1**.

Table K.1 Response to CPHR Request for Further Information, Dated 29 May 2025

CPHR Comment	Umwelt Response
The future Planning Proposal and BCAR should address how the proposed rezoning includes provisions which facilitate the protection and conservation of HEV. The following is recommended to achieve this: A fenced 35 m wide C2 Environmental Conservation Zone along the northern boundary of the site, to restore habitat for Swift Parrot and Squirrel Glider.	Umwelt considers this a planning matter and therefore, recommends that this request is forwarded to the planning consultants (SLR).
- The Executive Summary of the BCAR should be updated to include recordings of grey-headed flying-foxes foraging on site. - All dual credit species recorded on site must be offset in accordance with the BAM as ecosystem credits.	- The Executive Summary of the BCAR has been updated to include the observation of the grey-headed flying-fox and the potential for foraging habitat on site. - The BCAR has already offset all three dual credit species as ecosystem credits, in accordance with the BAM.
- Further information is required regarding the proposed purpose and use of large dam on the western side of the boundary - The Future Development Masterplan displayed in Figure 1.3, must include all buffers required in accordance with the WM Act and BAM 2020. Photo 4.7 must be updated to accurately reflect the location.	- The dam on the western boundary is incorporated within the design plan and is likely to undergo replanting/landscaping. The hydrology is to remain relatively the same. - A site inspection was completed by Umwelt on 6 March 2025. The site inspection was used to inform the Drainage Line Assessment which was presented to NSW DCCEEW - Water (Licencing and Approvals). The outcome of this assessment concluded that the mapped first-order water course does not meet the definition under the <i>Water Management Act, 2000</i>. NSW DCCEEW - Water (Licencing and Approvals) agreed with the assessment. No additional management buffers are required in accordance with the WM Act and BAM 2020. Photo 4.7 has now been updated to accurately reflect the location.
Update the BCAR to outline all the management and mitigation measures required to be included within the BMP.	The only species mapped over the site which aligns with the Council's Species Management Plan is <i>Myotis macropus</i>. Management and mitigation measures have been adopted in Section 7.1.1.

Appendix L

Independent Review of Kamilaroo Road Lake Munmorah BCAR



Dr Matthew Hingee
Senior Strategic Environment Planner
Strategic Planning Projects
Central Coast Council
Matthew.Hingee@centralcoast.nsw.gov.au

16 May 2025

**INDEPENDENT REVIEW OF KAMILAROO ROAD LAKE MUNMORAH BIODIVERSITY
CERTIFICATION ASSESSMENT REPORT**

Dear Matthew

Please find attached an independent review of the Kamilaroo Road Lake Munmorah BCAR.

This review was prepared by Evelyn Craigie B.Sc. who is also an accredited BAM Assessor (BAAS18088) and Garon Staines B.App.Sc. Both consultants are experienced ecologists.

There are no potential or actual pecuniary interests to declare in regard to this application.

If you require any additional information, please contact me.

Yours sincerely

Garon Staines B.App.Sc.
Director and Principal Ecologist
Future Ecology

1. Introduction

Future Ecology Pty Ltd has undertaken a review of the following Biodiversity Certification Assessment Report (BCAR) on behalf of Central Coast Council:

Kamilaroo Road Lake Munmorah: Biodiversity Certification Assessment Report (Umwelt Australia Pty Limited, April 2025)

The review assesses the adequacy of the BCAR with respect to the requirements of the Biodiversity Assessment Method (BAM) and Council comments provided to the proponent.

It is noted that spatial files, JPEGs of figures and access to the BAM Calculator was not provided to Future Ecology and therefore, the review does not include analysis of these items.

2. Review Summary

A detailed review is provided in Section 3. The majority of the requirements of the BAM and Council's previous comments are adequately addressed; however, further information is required as follows:

- Provision of a 10m riparian buffer around the 1st order stream mapped in the west of the property:
 - a Drainage Line Assessment has been presented to NSW DCCEE Water Operations/Licensing and Approvals; however, the results of this assessment have not been provided and are not considered in the BCAR
- Integration of the vegetation and dam into a north-south corridor along the western boundary to reconnect Swift Parrot habitat with EEC:
 - A north-south corridor along the western boundary is not proposed, however, adequate justification is provided. It is considered a corridor in this area would have limited value for biodiversity as it would be very narrow. Notwithstanding this, if a riparian buffer is required, the potential for revegetation in the area should be explored further.
- Location Map:
 - Strahler stream order and riparian buffers to be included
 - Connectivity to be included
- Avoid and minimise impacts:
 - Assessment of impact minimisation should incorporate discussion of the riparian buffer, once this is confirmed
- Assessment of indirect impacts:



- Assessment of indirect impacts is to be provided and include discussion of whether the buffer area/avoidance provided for the Swift Parrot habitat is sufficient to avoid indirect impacts to trees within the Swift Parrot habitat e.g. root damage, soil compaction, changed hydrology, fertilisers. The buffer should include, at a minimum, the tree protection zone as per AS 4970-2009 Protection of trees on development sites. Advice from a qualified Arborist should be sought to confirm this.



3. BCAR Review

Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
Administration		Was the report prepared by an accredited assessor?	✓	-
		Is the finalised biodiversity credit report from the BAM Calculator (BAM-C) attached and submitted with the report?	✓	-
		Has the report been finalised and certified as BAM compliant within 14 days of the submission date?	✓	The submission date was not provided to Future Ecology. The biodiversity reports are finalised and dated as follows: - BAM Credit Summary Report: 08/04/2025 - BAM Biodiversity Credit Report: 28/10/2024
		Is the proposal considered a controlled action under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and require approval from the Commonwealth Government?	✓	Not a controlled action Information provided in Section 4.3.2
Previous Council Comments		Previous comments from Council that were yet to be addressed were: - 10m riparian buffer around 1st order stream mapped in the west of the property: liaise with Office of Water to determine whether a 10m riparian buffer is required. If required, locate all buildings and infrastructure outside the 10m buffer.	X	Unresolved: a Drainage Line Assessment has been presented to NSW DCCEW Water Operations/Licensing and Approvals; however, the results of this assessment have not been provided.



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		- Additional survey for threatened frogs post flooding rain	✓	Resolved: additional surveys undertaken in accordance with survey requirements.
		- Additional Owl survey in accordance with an Owl survey plan provided to Council	✓	Resolved: additional surveys undertaken in accordance with survey requirements.
		- Survey Eastern Cave Bat in accordance with BAM survey guidelines	✓	Resolved: additional surveys undertaken in accordance with survey requirements.
		- Consider integrating vegetation and dam into a north-south corridor along the western boundary to reconnect Swift Parrot habitat with EEC	X	Unresolved: pending confirmation of whether a 10m riparian buffer is required. A north-south corridor along the western boundary is not proposed, however, adequate justification is provided. It is considered a corridor in this area would have limited value for biodiversity as it would be very narrow. Notwithstanding this, if a riparian buffer is required, the potential for revegetation in the area should be explored further.
Introduction	Chapters 2	Introduction to the biodiversity assessment including: - Brief description of the proposal	✓	Provided Section 1.1.1



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
	and 3	Identification of subject land ¹ boundary, including: - operational footprint (if BDAR) - construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure (if BDAR)	N/A	N/A (not a BDAR)
		Land proposed for biodiversity certification (if BCAR)	✓	Provided Section 1.1.3 and 1.4
		General description of the subject land	✓	Provided Section 1.1.2
		Sources of information used in the assessment, including reports and spatial data	✓	Provided Section 1.5
		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)	✓	Masterplan provided Figure 1.3
		Identification of site context components and landscape features, including: - general description of subject land topographic and hydrological setting, geology and soils	✓	Provided Section 3.2
Landscape context	Sections 3.1 and 3.2, Appendix E	- percent native vegetation cover in the assessment area (as described in BAM Section 3.2)	Confirmation requires GIS files which were not provided to Future Ecology	Provided Section 3.3
		- IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	✓	Provided Section 3.2.1
		- rivers and streams classified according to stream	✓	Provided Section 3.2.2



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		order (as described in BAM Subsection 3.1.3(3.) and Appendix E)		
		- wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(3.))	✓	Provided Section 3.2.1
		- connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	✓	Provided Section 3.2.3
		- karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(12.))	✓	Provided Section 3.2.4
		- NSW (Mitchell) landscape on which the subject land occurs	✓	Provided Section 3.2.6
		Site Map - Boundary of subject land - Cadastre of subject land - Landscape features identified in BAM Subsection 3.1.3	✓	Provided Figure 1.1
		Location Map - Digital aerial photography at 1:1,000 scale or finer - Boundary of subject land - Assessment area, (i.e. the subject land and either 1500 m buffer area or 500 m buffer for linear development - Landscape features identified in BAM Subsection	X	Provided Figure 1.2 Strahler stream order and riparian buffers to be included Connectivity to be included



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		3.1.3 - Additional detail (e.g. local government area boundaries) relevant at this scale		
		Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location map include: - IBRA bioregions and subregions - rivers, streams and estuaries - wetlands and important wetlands - connectivity of different areas of habitat - karst, caves, crevices, cliffs, rocks and other geological features of significance and if required, soil hazard features - areas of outstanding biodiversity value occurring on the subject land and assessment area - any additional landscape features identified in any SEARs for the proposal - NSW (Mitchell) landscape on which the subject land occurs	X	Location Map Strahler stream order and riparian buffers to be included Connectivity to be included
		All report maps as separate jpeg files Individual digital shape files of: - subject land boundary - assessment area (i.e. subject land and 1500 m buffer area) boundary - cadastral boundary of subject land - areas of native vegetation cover - landscape features	N/A	N/A (not provided to Future Ecology)
		- Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between	✓	Provided section 4.1 and Figure 4.1



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		mapped vegetation extent and aerial imagery (as described in BAM Section 4.1(1–3.) and Subsection 4.1.1)		
Native vegetation	Chapter 4, Appendix A and Appendix H	Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2)	N/A	N/A (All vegetation included)
		Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area (described in BAM Section 4.1(3.) and Subsection 4.1.1)	✓	Provided Section 4.1
		Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2	✓	Provided Section 2
		Where relevant, describe the use of more appropriate local data, provide reasons that support the use of more appropriate local data and include the written confirmation from the decision-maker that they support the use of more appropriate local data (as described in BAM Subsection 1.4.2 and Appendix A)	✓	N/A (not applied)
		For each PCT within the subject land, describe: - vegetation class - extent (ha) within subject land - evidence used to identify a PCT including any analyses undertaken, references/sources, existing vegetation maps (BAM Section 4.2(1–	✓	Provided Table 4.1 and 4.2 TECs information provided Table 4.3



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		3.)) - plant species relied upon for identification of the PCT and relative abundance of each species - if relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2(1–2.)) - estimate of percent cleared value of PCT (BAM Subsection 4.2.1(5.))		
		Describe the vegetation integrity assessment of the subject land, including: - identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1) - assessment of patch size (as described in BAM Subsection 4.3.2) - survey effort (i.e. number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1–2.) - use of relevant benchmark data from BioNet	✓	Provided Table 4.5
		Vegetation Classification (as described in BAM Subsection 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	N/A	N/A Standard benchmarks applied



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		- 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 - provide written confirmation from the decision-maker that they support the use of local benchmark data		
		Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of cleared areas (as described in BAM Section 4.1(1–3.)) and all parts of the subject land that do not contain native vegetation (BAM Subsection 4.1.2)	✓	Provided Figure 4.2
		Map of PCTs within the subject land (as described in BAM Section 4.2(1.))	✓	As above
		Map of vegetation zones within the subject land (as described in BAM Subsection 4.3.1)	✓	As above
		Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCTs boundaries	✓	Provided Figure 2.1
		Map of TEC distribution on the subject land and table of TEC listing, status and area (ha)	✓	Provided Table 4.3 and Figure 4.3
		Map of patch size locations for each native vegetation zone and table of patch size areas (as described in BAM Subsection 4.3.2)	✓	Provided Table 4.5



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		Table of current vegetation integrity scores for each vegetation zone within the site and including: - composition condition score - structure condition score - function condition score - presence of hollow bearing trees	✓	Provided Table 4.6 (unable to check if scores match those in the BAM calculator)
		All report maps as separate jpeg files Plot field data (MS Excel format) Plot field data sheets Digital shape files of: - PCT boundaries within subject land - TEC boundaries within subject land - vegetation zone boundaries within subject land - floristic vegetation survey and vegetation integrity plot locations	N/A	N/A (not provided to Future Ecology)
		Identify ecosystem credit species likely to occur on the subject land, including: - list of ecosystem credit species derived from the BAM-C (as described in BAM Subsection 5.1.1 and Section 5.2(1.)) - justification and supporting evidence for exclusion of any ecosystem credit species based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2) - justification for addition of any ecosystem credit species to the list	✓	Provided Table 5.1 All species retained for further assessment Note: Future Ecology is unable to cross-check with BAM calculator
Threatened species	Chapter 5	Identify species credit species likely to occur on the subject land, including:	✓	Provided Table 5.2



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		- list of species credit species derived from the BAM-C (as described in BAM Subsection 5.1.1) - justification and supporting evidence for exclusions based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2) - justification and supporting evidence for exclusions based on degraded habitat constraints and/or microhabitats on which the species depends (as described in BAM Subsection 5.2.2) - justification for addition of any species credit species to the list		All flora species retained. Justification provided for excluded fauna in Table 5.3 Note: Future Ecology is unable to cross-check with BAM calculator
		From the list of candidate species credit species, identify: - species assumed present within the subject land (if relevant) (as described in BAM Subsection 5.2.4(2.a.)) - species present within the subject land on the basis of being identified on an important habitat map for a species (as described in BAM Subsection 5.2.4(2.d.)) - species for which targeted surveys are to be completed to determine species presence (Subsection 5.2.4(2.b.)) - species for which an expert report is to be used to determine species presence (Subsection 5.2.4(2.c.))	✓	Provided Table 5.3



Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		Present the outcomes of species credit species assessments from: - threatened species survey (as described in BAM Section 5.2.4) - expert reports (if relevant) including justification for presence of the species and information used to make this determination (as described in BAM Section 5.2.4 and 5.3, Box 3)	✓	Provided Section 5.2.2
		Where survey has been undertaken include detailed information on: - survey method and effort, (as described in BAM Section 5.3) - justification of survey method and effort (e.g. citation of peer-reviewed literature) if approach differs from the Department's taxa-specific survey guides or where no relevant guideline has been published - timing of survey in relation to requirements in the TBDC or the Department's taxa-specific survey guides. Where survey was undertaken outside these guides include justification for the timing of surveys - survey personnel and relevant experience - describe any limitations to surveys and how these were addressed/overcome	✓	Provided Section 2 and Section 5.3 Flora surveys undertaken within TBDC recommendations, survey guidelines and reference populations where relevant. Fauna surveys undertaken within TBDC recommendations, survey guidelines and Council comments where relevant.



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		Where an expert report has been used in place of survey (as described in BAM Section 5.3, Box 3), include: - justification of the use of an expert report - identify the expert, provide evidence of their expert credentials and Departmental approval of expert status - all requirements of Box 3 have been addressed in the expert report	N/A	N/A (expert reports not obtained, all required surveys undertaken)
		Where use of local data is proposed (BAM Subsection 1.4.2): - identify relevant species - identify data to be amended - identify source of information for local data, e.g. published literature, additional survey data, etc. - justify use of local data in preference to VIS Classification or TBDC data - provide written confirmation from the decision-maker that they support the use of local data	N/A	N/A (standard data applied)
		Species polygon completed for species credit species present within the subject land (assumed present or determined on the basis of survey, expert report or important habitat map) ensuring that: - the unit of measure for each species is documented for species assessed by area: - the polygon includes the extent of suitable habitat for the target species within the subject	N/A	N/A (species credit species not recorded)



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		land (as described in BAM Subsection 5.2.5) - a description of, and evidence-based justification for, the habitat constraints, features or microhabitats used to map the species polygon including reference to information in the TBDC for that species and any buffers applied - for species assessed by counts of individuals: - the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(3.)) - the method used to derive this number (i.e. threatened species survey or expert report) and evidence-based justification for the approach taken - the polygon includes all individuals located on the subject land with a buffer of 30 m around the individuals or groups of individuals on the subject land - Identify the biodiversity risk weighting for each species credit species identified as present within the subject land (as described in BAM Section 5.4)		
		Table showing ecosystem credit species in accordance with BAM Section 5.1.1, and identifying: - the ecosystem credit species removed from the	✓	Provided Table 5.2



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		list		
		- the sensitivity to gain class of each species		
		Table detailing species credit species in accordance with BAM section 5.2 and identifying: - the species credit species removed from the list of species because the species is considered vagrant, out of geographic range or the habitat or micro habitat features are not present - the candidate species credit species not recorded on the subject land as determined by targeted survey, expert report or important habitat map	✓	Provided Table 5.3
		Table detailing species credit species recorded or assumed as present within the subject land, habitat constraints or microhabitats associated with the species, counts of individuals (flora)/extent of suitable habitat (flora and fauna) (as described in BAM Subsection 5.2.6) and biodiversity risk weighting (BAM Section 5.4)	N/A	N/A (species credit species not recorded)
		Map indicating the GPS coordinates of all individuals of each species recorded within the subject land and the species polygon for each species (as described in BAM Subsection 5.2.5)	N/A	N/A (species credit species not recorded)
		- Digital shape files of suitable habitat identified for survey for each candidate species credit species - Survey locations including GPS coordinates of any plots, transects, grids - Digital shape files of each species polygon	N/A	N/A (not provided to Future Ecology)



INDEPENDENT REVIEW OF KAMILAROO ROAD, LAKE MUNMORAH - BIODIVERSITY CERTIFICATION ASSESSMENT REPORT

Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		including GPS coordinates of located individuals - Species polygon map in jpeg format - Expert reports and any supporting data used to support conclusions of the expert report - Field data sheets detailing survey information including prevailing conditions, date, time, equipment used, etc.		
		Identify potential prescribed biodiversity impacts on threatened entities, including: - karst, caves, crevices, cliffs, rocks and other geological features of significance (as described in BAM Subsection 6.1.1) - occurrences of human-made structures and non-native vegetation (as described in BAM Subsection 6.1.2) - corridors or other areas of connectivity linking habitat for threatened entities (as described in BAM Subsection 6.1.3) - water bodies or any hydrological processes that sustain threatened entities (as described in BAM Subsection 6.1.4) - protected animals that may use the proposed wind farm development site as a flyway or migration route (as described in BAM Subsection 6.1.5)	✓	Provided Table 6.1



INDEPENDENT REVIEW OF KAMILAROO ROAD, LAKE MUNMORAH - BIODIVERSITY CERTIFICATION ASSESSMENT REPORT

Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		- where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community (as described in BAM Subsection 6.1.6)		
Prescribed impacts	Chapter 6	Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts - Describe the importance of habitat features to the species including, where relevant, impacts on life-cycle or movement patterns (e.g. Subsection 6.1.3) - Map showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.) - Maps of habitual flight paths for nomadic and migratory species likely to fly over the site and maps of likely habitat for threatened aerial species resident on the site (for wind farm developments only) - Digital shape files of prescribed impact feature locations - Prescribed impact features map in jpeg format	N/A	N/A (per Table 6.1 and Section 7.2, no species identified as dependent on or potentially use habitat features associated with prescribed impacts)
		Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts)	✓	Provided Section 7



Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		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 - routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route - 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		
Avoid and minimise impacts	Chapter 7	Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2) - Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Section 7.2.1(3.)) - Table of measures to be implemented to avoid and minimise the impacts of the proposal,	X	Provided Section 7 Assessment of impact minimisation should incorporate discussion of the riparian buffer, once this is confirmed.



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		including action, outcome, timing and responsibility - Map of alternative footprints considered to avoid or minimise impacts on biodiversity values; and of the final proposal footprint, including construction and operation - Maps demonstrating indirect impact zones where applicable		
		Digital shape files of: - alternative and final proposal footprint - direct and indirect impact zones - Maps in jpeg format	N/A	N/A (not provided to Future Ecology)
Assessment of Impacts	Chapter 8, Sections 8.1 and 8.2	Determine the impacts on native vegetation and threatened species habitat, including a description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Section 8.1)	✓	Provided Section 8
		Assessment of indirect impacts on vegetation and threatened species and their habitat including (as described in BAM Section 8.2): - description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal - documenting the consequences to vegetation and threatened species and their habitat including evidence-based justifications	X	Provided Table 8.2 Assessment of indirect impacts to Swift Parrot habitat is not provided. Assessment of indirect impacts is to be provided and include discussion of whether the buffer area/avoidance provided for the Swift Parrot habitat is sufficient to avoid indirect impacts to trees



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		- reporting any limitations or assumptions, etc. made during the assessment - identification of the threatened entities and their habitat likely to be affected		within the Swift Parrot habitat e.g. root damage, soil compaction, changed hydrology, fertilisers. The buffer should include, at a minimum, the tree protection zone as per AS 4970-2009 Protection of trees on development sites. Advice from a qualified Arborist should be sought to confirm the above.
		Assessment of prescribed biodiversity impacts (as described in BAM Section 8.3) including: - assessment of the nature, extent and duration of impacts on the habitat of threatened species or ecological communities associated with: - karst, caves, crevices, cliffs, rocks and other features of geological significance - human-made structures - non-native vegetation - connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range - movement of threatened species that maintains their life cycle - water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities - assessment of the impacts of vehicle strikes on	✓	Provided Section 8.3



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		threatened species of animals or on animals that are part of a TEC		
		Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	✓	Provided Table 10.2 Note: Future Ecology is unable to cross-check with BAM calculator
Mitigation and Management of Impacts	Chapter 8, Sections 8.4 and 8.5	Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Sections 8.4 and 8.5 including: - 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	✓	Provided Table 8.4 and 8.5
		Identification of measures for mitigating impacts related to: - displacement of resident fauna (as described in BAM Subsection 8.4.1(2.)) - indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.)) - mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2)	✓	Provided Table 8.4 and 8.5
		Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	N/A	Provided Section 8.5



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
				Uncertain impacts are not expected
		Table of measures to be implemented to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	✓	Provided Table 8.4 and 8.5
		Identification and assessment of impacts on TECs and threatened species that are at risk of a serious and irreversible impacts (SAIL, in accordance with BAM Section 9.1) including: - addressing all criteria in Subsection 9.1.1 for each TEC listed as at risk of an SAIL present on the subject land - addressing all criteria in Subsection 9.1.2 for each threatened species at risk of an SAIL present on the subject land - documenting assumptions made and/or limitations to information - documenting all sources of data, information, references used or consulted - clearly justifying why any criteria could not be addressed	X	Provided for Swift Parrot Section 9 Requires consideration of indirect impacts (see above)
Impact Summary	Chapter 9	- Identification of impacts requiring offset in accordance with BAM Section 9.2 - Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.) - Identification of areas not requiring assessment in accordance with BAM Section 9.3	✓	Provided Section 10



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		- Map showing the extent of TECs at risk of an SAIL within the subject land - Map showing location of threatened species at risk of an SAIL within the subject land	N/A	N/A (specific figure not provided, however, area of Swift Parrot Important Habitat Map shown in Figure 4.4)
		Map showing location of: - impacts requiring offset - impacts not requiring offset - areas not requiring assessment	✓	Provided Figure 10.1
		Digital shape files of: - extent of TECs at risk of an SAIL within the subject land - location of threatened species at risk of an SAIL 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	N/A	N/A (not provided to Future Ecology)
Impact Summary	Chapter 10	Ecosystem credits and species credits that measure the impact of the development on biodiversity values, including: - future vegetation integrity score for each vegetation zone within the subject land (Equation 25 and Equation 26 in BAM Appendix H)	✓	Provided Section 10 Note: Future Ecology is unable to cross-check with BAM calculator



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Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		- change in vegetation integrity score (BAM Subsection 8.1.1) - number of required ecosystem credits for the direct impacts of the proposal on each vegetation zone within the subject land (BAM Subsection 9) - number of required species credits for each candidate threatened species that is directly impacted on by the proposal (BAM Subsection 10.1.3)		
		- Table of PCTs requiring offset and the number of ecosystem credits required - Table of threatened species requiring offset and the number of species credits required	✓	Ecosystem: provided Table 10.2 Species: N/A (species credits not required)
		Submitted proposal in the BAM Calculator	N/A	N/A (not provided to Future Ecology)
Biodiversity credit report	Chapter 10	Description of credit classes for ecosystem credits and species credits at the development or clearing site or land to be biodiversity certified (BAM Section 10.2)	✓	Provided Section 11
		Table of credit class and matching credit profile	✓	Provided Table 11.1
		BAM credit report in pdf format	✓	Provided Appendix G



INDEPENDENT REVIEW OF KAMILAROO ROAD, LAKE MUNMORAH - BIODIVERSITY CERTIFICATION ASSESSMENT REPORT

Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
Biodiversity certification offsets and strategy (biodiversity certification only)	Chapter 12 and Appendix J	Land-based conservation measures including (strategic biodiversity certification only): - identification of parcels subject to land-based conservation measures - identification of land-based conservation measures proposed for each parcel - supporting information to demonstrate suitability of land-based conservation measures (Appendix J) - credit score of land-based conservation measures (Appendix J)	N/A	N/A (credits to be purchased and retired)
		Biodiversity certification strategy including: - land proposed for biodiversity certification - land proposed for biodiversity conservation - proposed conservation measures - legal mechanisms for securing delivery of proposed conservation measures - parties to the biodiversity certification and responsibilities, noting where biodiversity certification agreements are proposed - timing for delivery of conservation measures - funding sources for delivery of conservation measures - framework for monitoring, reporting or auditing implementation of conservation measures	✓	Provided Section 12
		- Maps of parcels of land proposed for land-based conservation measures - Maps as per Appendix M as required in relation to any land-based conservation measures	N/A	N/A (credits to be purchased and retired)



INDEPENDENT REVIEW OF KAMILAROO ROAD, LAKE MUNMORAH - BIODIVERSITY CERTIFICATION ASSESSMENT REPORT

Report section	BAM ref.	Information requirements	Adequate / Correct	Comments
		- Tables as per Appendix M as required in relation to any land-based conservation measures - Table of credit scores for land-based conservation measures, including scores produced by BAM and weighting adjusted scores as per Appendix J		
		- Digital shape files of parcels of land proposed for land-based conservation measures - Maps in jpeg format	N/A	N/A (not provided to Future Ecology)



Appendix M

Response to Independent Review



Summary of Independent Review Comments and Additional Information Provided

Central Coast Council (CCC) have requested an independent review of the draft Biodiversity Certification Assessment Report (BCAR) (Umwelt, 2025) to support rezoning and biodiversity certification of land at 31 and 41 Kamilaroo Road, Lake Munmorah (the site). The independent review was undertaken by Evelyn Cragie and Garon Staines (Future Ecology) on behalf of Matthew Hingee (Central Coast Council) (dated 16 May 2025). Umwelt's response to the additional information requested is included in **Table M.1**.

Table M.1 Response to CPHR Request for Further Information, Dated 29 May 2025

Information Requirements	Additional Clarification of Requirements	Umwelt Response
10 m riparian buffer around 1st order stream mapped in the west of the property: liaise with Office of Water to determine whether a 10 m riparian buffer is required. If required, locate all buildings and infrastructure outside the 10 m buffer.	A Drainage Line Assessment has been presented to NSW DCCEEW Water Operations/Licensing and Approvals; however, the results of this assessment have not been provided.	Umwelt has since been provided with the results of the Drainage Line Assessment and the mapped water course does not meet the definitions at described in the <i>Water Management Act, 2000</i> and therefore, no additional constraints are required to be implemented.
Consider integrating vegetation and dam into a north-south corridor along the western boundary to reconnect Swift Parrot habitat with EEC.	Pending confirmation of whether a 10 m riparian buffer is required. A north-south corridor along the western boundary is not proposed, however, adequate justification is provided. It is considered a corridor in this area would have limited value for biodiversity as it would be very narrow. Notwithstanding this, if a riparian buffer is required, the potential for revegetation in the area should be explored further.	As noted above there is no requirement for a 10 m riparian buffer. A north to south corridor along the western boundary is not proposed as it would have limited value for biodiversity.
Location Map.	Strahler stream order and riparian buffers to be included Connectivity to be included.	Figure 1.1 and Figure 1.2 have now been updated to include the Strahler stream order, riparian buffers and connectivity.
Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2).	Assessment of impact minimisation should incorporate discussion of the riparian buffer, once this is confirmed.	Umwelt has since been provided with the results of the Drainage Line Assessment and the mapped water course does not meet the definitions at described in the <i>Water Management Act, 2000</i> and therefore, no additional constraints are required to be implemented.
Assessment of indirect impacts on vegetation and threatened species and their habitat (as described in BAM Section 8.2).	Assessment of indirect impacts to Swift Parrot habitat is not provided. Assessment of indirect impacts is to be provided and include discussion of whether the buffer area/avoidance provided for the Swift Parrot habitat is sufficient to avoid indirect impacts to trees within the Swift Parrot	An arborist was engaged to assess the swift parrot important habitat mapping within and adjacent to the site. The report (Appendix J) recommends a 5 m tree protection zone which has since been implemented in the updated

Information Requirements	Additional Clarification of Requirements	Umwelt Response
	habitat e.g. root damage, soil compaction, changed hydrology, fertilisers. The buffer should include, at a minimum, the tree protection zone as per AS 4970-2025 Protection of trees on development sites. Advice from a qualified Arborist should be sought to confirm the above.	concept design and therefore indirect impacts have been avoided.
Identification and assessment of impacts on TECs and threatened species that are at risk of a serious and irreversible impacts (SAII, in accordance with BAM Section 9.1).	Requires consideration of indirect impacts (see above).	See above.

Appendix N

Response to Central Coast Council and Conservation Programs, Heritage & Regulation Group Comments

Summary of Central Coast Council (CCC) and CPHR (Conservation Programs, Heritage & Regulation Group) comments and additional information provided.

CCC and CPHR have undertaken an assessment of the draft Biodiversity Certification Assessment Report (BCAR) (Umwelt, 2025) to support the rezoning and biodiversity certification of land at 31 and 41 Kamilaroo Road, Lake Munmorah (the site). Umwelt's response to the additional information requested is included in **Table N.1**.

Table N.1 Response to CCC and CPHR Comments, Dated, 13 August 2025

CCC/CPHR Comment	Umwelt Response
A fenced 35 m wide C2 Environmental Conservation Zone along the northern boundary of the site, to restore habitat for swift parrot and squirrel glider. - In the masterplan a 20 m corridor is identified to be restored along the northern boundary. None of the figures in the BCAR show this area. The figures are to show and identify this area as 'Conservation land'. - The 20 m area is not identified to be zoned C2, the BCAR and concept plan are to provide this.	Council have advised that a 20 m corridor is sufficient and will be rezoned to C2. It should also be noted that a landscaped buffer along the southern edge of the C2 area is included in the development masterplan as well as an existing path and road reserve to the along the northern boundary. A combination of these two areas and the C2 area will inadvertently and unofficially increase the width of the 20 m C2 area. The BCAR has been updated to ensure this rezoning is addressed and clear in figures.
Update the BCAR to outline all the management and mitigation measures required to be included within the BMP. - Section 12.7 of the BCAR states that a BMP is proposed to be prepared for the certified lands. A figure is required which shows the area proposed to be subject to the BMP, this should include the 20 m wide corridor and 5 m wide TPZ area along the eastern boundary with Lot 7324. - Identify which Lot the 'Conservation land' will be incorporated into and how the BMP area will be funded and managed i.e. under a community association?	- A new figure (Figure 12.1) has been added to the BCAR. The figure identifies the areas subject to the Biodiversity Management Plan, the Conservation Land and the Tree Protection Zone. - The Biodiversity Management Plan (Appendix O) is to be implemented along a corridor of the northern boundary within both Lot 416 & 417 (DP 755266), running parallel to the boundary line from the northwest corner to the northeast corner, as well as a section along the northeastern boundary of Lot 417 and a section along the southern boundary (Figure 12.1). The Conservation Land will be included in each relevant lot of which they are immediately attached to. As the west and east are two separate owners and operators, each will own and manage their own lands. Both sites will be part of a landlease community and funded and managed under the lease scheme.
Components of the biocertificaiton assessment area are not properly mapped, and there appears to be conflicts.	- The Asset Protection Zones has been updated to ensure no clearing of native vegetation will be required within the swift parrot important habitat map or within the Tree Protection Zones. - The terminology throughout the report has not been updated entirely as the report in its current state utilises the terminology as described throughout the Biodiversity Assessment Method (2020) and the Biodiversity Certification Assessment Report template. More clarification has been provided to show consistency with the

CCC/CPHR Comment	Umwelt Response
• The swift parrot important habitat map is identified to be avoided (and not certified); however, areas are subject to the proposed bushfire APZ. The BCAR is to integrate with the bushfire threat assessment (AEP, 28/03/2025). The APZ is to be included in the development clearing footprint (certified lands) and any required native vegetation removal from this area is to be quantified and assessed. • Avoided land is not properly identified. Avoided land must comprise those areas not subject to any proposed development (including APZs). The proposed 5 m TPZ along the eastern boundary with Lot 7324 is a minimisation measure, as APZ management appears proposed in this area. • Revise figures to identify proposed certified and avoided land. Map and use terminology consistent with biodiversity certification agreements. • As the impact area will differ, assessment will be required including calculation of the applicable biodiversity credits. Impacts that do not require offset should be limited to the avoided land.	terminology used within biodiversity certification agreements. • Impact area calculations have been updated throughout the BCAR and within the BAM-C. There is no swift parrot offset liability as all swift parrot important habitat mapping has been avoided.

Appendix O

Biodiversity Management Plan – 31 & 41 Kamilaroo Avenue, Lake Munmorah, NSW (AEP, September 2025)



AEP

BIODIVERSITY | BUSHFIRE | ARBORICULTURE
NEWCASTLE SYDNEY CENTRAL COAST

Biodiversity Management Plan Outline – Retained Land 31 & 41 Kamilaroo Avenue, Lake Munmorah, NSW

Prepared For: Point Palliser Pty Ltd

Prepared By: Anderson Environment and Planning

Date: October 2025

AEP Reference: 2629

Revision: 00



Document Control

Document Name	Biodiversity Management Plan Outline – Retained Land 31 & 41 Kamilaroo Avenue, Lake Munmorah, NSW
Project Number	2629
Client Name	Point Palliser Pty Ltd
AEP Project Team	Chris Wark Alana Guest

Revision

Revision	Date	Authors	Reviewed	Approved
00	21/10/2025	Alana Guest	Chris Wark	Chris Wark

Distribution

Revision	Date	Name	Organisation
00	21/10/2025	Chris Speak	Landstone Property Group

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Introduction

Anderson Environment & Planning (AEP) provide this document to inform the production of a Biodiversity Management Plan (BMP) for the retained land located within Lots 416 & 417 DP755266 known as 31 and 41 Kamilaroo Avenue, Lake Munmorah, NSW following approval.

1.1 Biodiversity Management Plan Objectives

The aim of the future BMP would be to schedule bushland restoration measures necessary to enhance the vegetation present onsite. The successive stages of regeneration are applicable to ensure that the targets and objectives are achieved over the 5-year duration of the BMP and to minimise maintenance over time.

The future BMP would incorporate best practices in bushland restoration, management of invasive species and revegetation in order to achieve the following objectives within 5 years, and would aim to:

- Regenerate physical and biological functions and landscape connectivity, specifically with regards to the fauna movement corridor;
- Enable reconstructive and facilitated regeneration where appropriate, and in accordance with the compliance requirements of the Asset Protection Zones (APZs) as per Planning for Bush Fire Protection 2019 (PBP, 2019);
- Ensure the site is maintained until vegetation targets are achieved; and
- Ensure connectivity and habitat enhancement to promote fauna diversity.

1.2 Document Referencing

The future BMP should reference the following documents:

- Anderson Environment & Planning (2025). Field Survey Summary;
- Anderson Environment & Planning (20205). Arborist Impact Assessment;
- Anderson Environment & Planning (2025). Bushfire Threat Assessment; and
- Relevant Council, State and Federal legislation and policies.

For the purposes of referencing, this document should be cited as:

- Anderson Environment & Planning (2025). Biodiversity Management Outline Plan – Retained Land – 31 & 41 Kamilaroo Avenue, Lake Munmorah, NSW.

1.3 About the Plan

The future BMP would be a comprehensive report developed to provide management for flora and fauna over the Subject Site for 5 years. To allow for a concise and easily referable Plan, the BMP would be divided into sections, which function cohesively together and as separate Plans:

- Section 1 – Introduction – provide information on objectives and referencing material;
- Section 2 – Site Context and Existing Condition – provide detailed information on the BMP lands and ground-truthed condition;
- Section 3 – Flora and Fauna Management – outline the approach to revegetate the BMP Lands, including methodology and targets over the 5 years to achieve a Naturally Regenerating Site;
- Section 4 – Site Preparation – outline the procedure to prepare the BMP lands for management and the processes to protect the BMP lands from surrounding development.

- Section 5 – Implementation of the BMP – this section would outline when and how the BMP is to be implemented. Including Project Management – this section of the Plan would address qualifications, monitoring and reporting procedures required.
- Section 6 – Project Management – this section of the Plan should address qualifications, monitoring and reporting procedures.

The following sections and information should be used as a guide to develop the future Biodiversity Management Plan (BMP) for the site.

2.0 Site Context and Existing Condition

2.1 Local context

The BMP Lands consists of land within Lots 416 & 417 DP755266, known as 31 & 41 Kamilaroo Avenue, Lake Munmorah, NSW 2259, within the Central Coast Council Local Government Area (LGA). The site is currently zoned RU6 - Transition.

The BMP will retain native flora consisting of remnant native vegetation which provides both habitat and landscape connectivity for native fauna species in the area. **Figure 1** shows the site location.

2.2 Vegetation Descriptions

State Vegetation Type Mapping (SVTM) (2024) identifies one (1) plant community type on site. This is PCT 2583 Hunter Coast Lowland Scribbly Gum Forest, which is present only as small patches to the northwestern corner and along the northeastern boundary of the Study Area. The remainder of the site consists of Kikuyu dominated grassland paddock which has not been classified into a PCT. Further ecological surveys to determine plant community types would be required to determine appropriate revegetation of the 20m northern fauna corridor though it is considered likely that PCT 2583 would be appropriate.

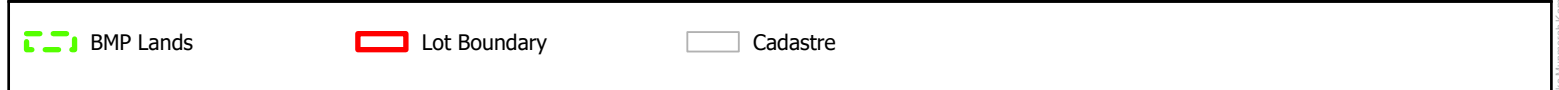


Figure 1 - Site Location

Address: 31 & 41 Kamilaroo Avenue, Lake Munmorah
 Client: Point Palliser Pty Ltd
 AEP Ref: 2629 | Date: October 2025

Imagery: NearMap, December 2024
 Spatial Reference: GDA2020 MGA Zone 56

Scale: 1:5,000

Disclaimer: While reasonable care has been taken to ensure the information on this map is accurate and up-to-date, errors or omissions may still occur. Please verify the accuracy of all information before use. Note that boundaries are not survey accurate and do not scale off this plan.

3.0 Flora and Fauna Management

Regeneration of the BMP lands is to be undertaken over a period of 5 years. Management of the site is to be undertaken to ensure compliance with the *Biosecurity Act 2015*.

Given that the BMP lands contains both native regenerating areas and asset protection zones (APZs) a mixed approach to management will be required to ensure that the different management zones meet their required objectives.

To achieve this, an Integrated Regeneration Approach is recommended, with key elements and targets identified for each vegetation community within each Management Zone.

After the 5-year duration of the BMP, ongoing management may be required into the future in order to maintain native canopy cover and connectivity through maintenance of established native trees where necessary, as well as maintenance of groundcover to assist in fauna movement.

3.1 Integrated Regeneration Approach for BMP Lands

Regeneration of the BMP lands should be undertaken by utilising where possible the principles of the *Society for Ecological Restoration Australasia* (2021) *National standards for the practice of ecological restoration in Australia Edition 2.2* and an ecological regeneration approach that would be suitable for the BMP lands. This approach utilises four integrated restoration techniques to achieve the goal of a Natural Regenerating ecosystem and include:

- Reconstruction Approach;
- Facilitated Regeneration Approach;
- Combined regeneration/reintroduction; and
- Natural Regeneration.

National Guidelines assigned to BMP Land areas are based on their history of disturbance and current state and are created in such a way so that they are progressive. As mentioned above, Natural Regeneration would only be an aim for certain Management Zones, with others being kept to APZ standards.

Adaptive management should be included in the BMP for additional active restoration or stabilisation via supplementary planting due to the potential for unforeseen factors to arise such as new weed incursion, erosion, vandalism or introduction of pathogens that may impact one or more strata of vegetation.

3.1.1 Reconstruction Approach

This approach is to be used across the site where the vegetation condition is poor, and lacks potential to regenerate within the period of the BMP, generally due to a range of causes of degradation that have led to partial or total damage to biotic and abiotic factors. The Reconstruction Approach includes:

- Rubbish removal;
- Primary weeding;
- Planting of tree, shrub and ground species in appropriate areas;
- Installation of guards around tree and shrub species;
- Watering;
- Secondary weeding;
- Mulching in areas without jute matting;
- Maintenance of tree guards; and

- Replacement of dead plants.

This approach should be used in the northernmost section of the site in the form of native planting, in order to establish a fauna corridor across the northern boundary of the site. The remaining zones will require weed management strategies to reduce weed incursion.

3.2 Management Zones

The BMP lands have been segregated into four (4) Management Zones (MZs) based on vegetation conditions and specific measures necessary to achieve the objectives of this BMP.

The location of each Management Zone is presented in **Figure 3**.

- Management Zone 1 (MZ1): Biodiversity Zone
- Management Zone 2 (MZ2): Management of the established Tree Protection Zones (TPZ)
- Management Zone 3 (MZ3): Asset Protection Zone (APZ)

3.2.1 MZ1: Biodiversity Zone

MZ1 would run along the northern boundary. This zone includes areas of Swift Parrot Important Habitat which are to be restored and maintained in line with this management zones works. Planting of native tree species will occur in this area to assist in the establishment of a biodiversity corridor along the northern boundary, in addition to mowing, weed management and monitoring. As such, the Reconstruction approach has been allocated MZ1.

Works within MZ1 should include:

- Establish a monitoring point(s); and
- Primary, Secondary and Maintenance weeding.

Weed Control

- This area should be traversed regularly, targeting all weeds present to prevent the incursion and establishment of invasive species;
- Herbicide may be used at the discretion of the bush regeneration contractor if deemed necessary and posing low risk to regenerating native vegetation from off-target spray;
- Scattered clumps of exotic grasses should be deseeded and the clump crowned using a gyprock saw. All propagules should be bagged and taken offsite; and

Revegetation

- Planting should be in alignment with the Plant Community Types (PCT) present within neighbouring property.

3.2.2 MZ2: Management Swift Parrot Habitat

MZ2 runs along the northeast boundary. This Zone is to provide protection for retained trees within this area to provide management for Swift Parrot Habitat, noting that there are some TPZs in the south that would also be managed under this management zone. Works to be undertaken within MZ2 would be restricted to maintenance weeding, mowing and monitoring, as well as maintenance of existing trees where required, with revegetation only occurring as planting of trees to replace existing trees that require removal, and landscape planting. As such, the Facilitated Regeneration Approach has been allocated to MZ2.

It is noted that for access purposes, temporary protective fencing will be required around this zone to offer tree protection during construction works.

Works within MZ2 should include:

- No monitoring point would be expected in this area, instead examination of trees within this zone should occur, with commentary on condition included in the reporting; and
- Primary, Secondary and Maintenance weeding.

Weed Control

- Mowing of grassy areas;
- This area will be traversed regularly, targeting all weeds present to prevent the incursion and establishment of invasive species;
- Scattered clumps of exotic grasses should be deseeded and the clump crowned using a gyprock saw. All propagules should be bagged and taken offsite;
- Herbicide may be used at the discretion of the bush regeneration contractor if deemed necessary and posing low risk to regenerating native vegetation from off-target spray; and
- All leaf litter and woody debris can be removed from these areas.

3.2.3 MZ3: Asset Protection Zone (APZ)

MZ3 is located to the south of MZ1 and east of MZ2 forming a continuous area between retained vegetation and dwellings. There is also a patch along the southern boundary but this area is most likely to be developed. Works to be undertaken within MZ3 would be restricted to maintenance weeding, mowing and monitoring, as well as maintenance of existing trees where required, with revegetation only occurring as planting of trees to replace existing trees that require removal and landscape planning in line with Appendix 4 of PBP 2019. Works within this area are to align with APZ management requirements as outlined within the Planning for Bushfire Protection (2019). As such, the Facilitated Regeneration Approach has been allocated to MZ3.

Works within MZ3 will include:

- No monitoring point would be expected to be established in this zone but instead a visual inspection of the management zone to ensure it is meeting APZ standards would occur; and
- Primary, Secondary and Maintenance weeding.

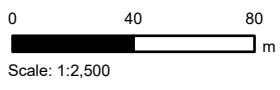
Weed Control

- Regular mowing of grassed areas will be required to comply with APZ requirements;
- This area will be traversed regularly, targeting all weeds present to prevent the incursion and establishment of invasive species;
- Herbicide may be used at the discretion of the bush regeneration contractor if deemed necessary and posing low risk to regenerating native vegetation from off-target spray;
- Scattered clumps of exotic grasses should be deseeded and the clump crowned using a gyprock saw. All propagules should be bagged and taken offsite; and
- All leaf litter and woody debris is to be regularly removed from these areas.



- | | |
|--|---|
|  Subject Site | Management Zone |
|  Cadastre |  MZ1: Biodiversity Corridor |
| |  MZ2: Swift Parrot Protection Zone |
| |  MZ3: Asset Protection Zone |

Figure 2 - Managment Zones



3.3 Existing Tree Management – Arborist Assessment

The recommendations of the arborist report relating to the retention of trees are to be followed.

3.3.1 Reuse of Biomass

Reuse of logs, branches or other woody material removed from the development site which could otherwise be repurposed to benefit the BMP Lands can be placed in the northern biodiversity corridor, noting that the aim would be to establish a complex ground habitat and not to dump unwanted mulch or woody debris.

4.0 Site Preparation

Prior to the commencement of regeneration, the BMP Lands will need to be prepared. The following works have been recommended to assist future BMP creation for site preparation.

4.1 Site Induction

Induction for all personnel entering/working onsite should highlight the sensitive nature of the conservation land and discuss the importance of avoiding all impact to this land including all the following activities:

- Clearing of vegetation;
- Storage of vehicles or machinery;
- Stockpiling, materials storage;
- Unauthorised access; and
- Dumping of rubbish or building waste.

4.2 Fencing

Permanent fencing requirements should be determined in coordination with Council. It is recommended that the future BMP include a provision for the erection of temporary fencing to be installed around retained vegetation within the BMP Lands and proposed development to protect it from indirect impacts during clearing and construction.

4.3 Weed / Pathogens / Disease Control

Diseases and pathogens which could affect the BMP Lands include the root-rot fungus (*Phytophthora cinnamomi*) and Myrtle rust (*Puccinia psidii*), potentially affecting the Eucalyptus species present onsite as well as Amphibian Chytrid fungus disease, Chytridiomycosis, caused by Chytrid fungus (*Batrachochytrium dendrobatidis*).

To minimise the potential for any such introductions, it is recommended that appropriate hygiene controls be employed and hygiene stations supplied. The following should be included within any future BMP as a minimum standard:

Plant, Machinery, Tools and Boots Hygiene

- All plant/machinery is to be washed down upon entry to site and prior to exiting site;
- The location of a wash down area is to be clearly identified within the site;
- Following initial removal of rubbish from BMP land, no plant/machinery should enter the BMP lands, other than for mowing purposes.
- All tools being utilised on site should be sterilised and washed free of soil before use and at the end of each day;
- Boots should be clean and free of soil and seeds before entry to site and before exiting site;
- Boots should be sterilised in a similar manner to tools after soil and seed removal; and
- Sterilisation of tools and boots shall be undertaken using 60% alcohol, methylated spirits or Phytoclean™ applied via spray bottle or brush dipped in the mixture.

Phytophthora cinnamomi

- Minimisation of work during excessively wet or muddy conditions;
- All personnel to be inducted on Phytophthora identification and management; and
- All plants and soils used/brought into site must be disease-free.

Amphibian Chytrid fungus

- Minimisation of work during excessively wet or muddy conditions;
- All personnel to be inducted on Chytrid management measures for the site; and
- Handling of frogs only when necessary, using fresh disposable gloves to handle individual frogs.

Myrtle Rust

- All personnel to be inducted into the identification and management of Myrtle rust; and
- Should any areas on site be identified as areas contaminated by the above, additional exclusion measures including, work program directions, soil storage and waste disposal programs must be implemented.

4.4 Erosion and Sedimentation Control

An Erosion and Sedimentation Control Plan (ESCP) should be prepared for future residential development and may form part of the CEMP. Erosion and Sediment control measures should be implemented in accordance with specifications set out in the latest edition of the Landcom publication “Soils and Constructions – Volume 1 (The Blue Book)”.

The BMP lands are relatively flat with low potential for erosion to occur as a result of weed control activities, however the future BMP should include a provision to allow for soil stabilisation should large areas of soil be exposed. The requirement to implement temporary erosion and sedimentation control as part of weed control activities should be at the discretion of the Bush Regeneration Contractor.

4.5 Rubbish Removal

Rubbish and waste are to be removed from BMP lands. The need to remove such material should be assessed on a case-by-case basis as in some instances the material is inert, such as concrete, rocks and timber posts, etc. Such material may inadvertently provide geomorphic stability and suitable shelter and habitat for native fauna.

4.6 Monitoring and Reporting

The BMP should ensure that upon completion of site preparation, production of a Baseline Report outlining compliance with the above, as well as baseline data, be provided to Central Coast Council. The BMP should also set out a monitoring and reporting schedule.

5.0 Implementation of the BMP

The following sections outline the requirements for reporting and are provided as a guide for the future BMP to use to ensure that aims and outcomes are achieved and that Central Coast Council is kept informed.

5.1 Baseline Data and Report

Baseline monitoring and data collection would commence once site preparation had occurred, noting that MZ1 will be starting likely from a blank state, with the Project Ecologist and Bush regeneration Contractor (BRC) determining when to take baseline data. The final location of the monitoring point for MZ1 would be determined during collection of baseline data collection.

The monitoring point should consist of a 10m x 10m quadrat marked with two 1.8m star pickets located at the northeast and southwest corner of the plot. The location of the northeast corner should also be marked with a GPS waypoint to facilitate identification in the field and will be used as photo monitoring point.

The baseline data will cover:

- A meandering transects through each management Zone assessing the:
 - Record location of transect with GPS;
 - Vegetation condition;
 - Preparing a species list;
 - Noting key coverage of native and weeds; and
 - Incidental fauna.
- The transects must be able to be replicated for 5 years to reduce impacts to the community;
- Establish 10mx10m plot(s) in MZ1 using stakes to mark out plot corners:
 - Orient plots north south where possible;
 - Survey using meander method recording all flora species within the quadrat;
 - Record coverage of all recorded species (including weeds) in each distinct layer present within the quadrat. Treat each vegetation layer (if present); and
 - Incidental fauna.
- Photo monitoring is to be taken in all aspects (N, E, S, W) from the centre marker of the plot (4 photos);
- Yellow safety caps to be placed on star pickets;
- Photos taken at a consistent height using the established reference point;
- Record photo point location(s) with GPS and show location on Monitoring Locations Map;
- Photos and commentary on trees within MZ2 along with photos and commentary on APZ compliance within MZ 3; and
- Overall health of the vegetation within BMP Lands.

5.2 Weed Management

Weeds have significant impact on structural integrity of the vegetation present. Flora surveys would be required to determine to required onsite management of weeds via the identification of weed species present.

5.2.1 Priority Weeds for Onsite Management

Exotic species identified as Priority Weeds should be the focus of weed management activities, based on legal requirement to control the species listed as Priority Weeds under the *Biosecurity Act 2015*, as well as other species occurring in high density onsite that have the potential to further colonise the BMP Lands and undermine regeneration efforts.

The *Biosecurity Act 2015* outlines several 'duties'; the general biosecurity duty, and additional duties under mandatory measures, regional measures, prohibited matter or biosecurity zone. Specific action for these measures may be required.

5.3 Pest Species

The future BMP should include provision for adaptive management if monitoring within management zones indicates pest species pose notable impediments to achieving the aims of the BMP (i.e., through excessive browsing and spreading seed etc.).

6.0 Project Management

The future BMP should outline the required project management for the site and should include direction for the engagement of a suitably qualified Bush Regeneration Contractor (BRC) to undertake weed control and planting works outlined in this BMP.

Bush Regenerator(s) or company(s) shall have;

- Australian Association of Bush Regenerators (AABR) Accreditation. The Bush Regenerators shall hold a current AQF3 qualification;
- Site Supervisor must have demonstrated minimum of 3 years' experience in the bush regeneration or related field and must have experience at a supervisory level in providing training, supervision and technical advice to staff, clients, volunteers and members of the public; and
- The Site Supervisor must hold a current AQF 3 qualification or higher and must have completed the Bush Regeneration Level IV Certificate or have a diploma or degree in a field related to natural resource management.

6.1 Monitoring and Reporting

The BMP is to outline who is responsible for the establishment of monitoring points and collection and reporting of data. It is to outline the reporting requirements (recommended yearly monitoring and reporting for the 5 year BMP)

6.1.1 Bush Regeneration Contractor Summary of Work

The BMP is to outline the requirement for BRC works summaries, including the detail and frequency.

6.1.2 Monitoring and Reporting by Project Ecologist

The BMP is to outline monitoring and reporting timelines and requirements. It is recommended that monitoring and reporting include the same metrics as the baseline data but should also include commentary on information such as:

- Effectiveness of weed control methods;
- General health of the vegetation including signs of dieback, vandalism etc;
- Survival rate of plantings; and
- State of fencing and erosion and sedimentation measures.

6.1.3 Reporting

The BMP is to outline reporting requirements for each year and to detail the requirement of a final report certifying completion of the BMP at the end of the implementation period. It is also to include an item to ensure that any reasonable additional actions be completed to the satisfaction of the Central Coast Council Ecologist prior to lodgement of the final report to ensure compliance with the aims and objectives of the BMP.

6.2 Interventions

The BMP should include a section to ensure that if adverse circumstances occur that Central Coast Council is informed and adaptive management actions undertake

7.0 References

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Appendix P

Bushfire Threat Assessment 31 & 41 Kamilaroo Rd, Lake Munmorah, NSW (AEP, September 2025)



AEP

BIODIVERSITY | BUSHFIRE | ARBORICULTURE

NEWCASTLE SYDNEY

Bushfire Threat Assessment

Planning Proposal – Rezoning of Lots 416 & 417 DP755266
at 31 & 41 Kamilaroo Rd, Lake Munmorah, NSW



Prepared for: Point Palliser Pty Ltd

21 October 2025

AEP Ref: 2629

Revision: 05

Document Control

Document Name	Bushfire Threat Assessment – Planning Proposal – Rezoning of Lots 416 & 417 DP755266 at 31 & 41 Kamilaroo Rd, Lake Munmorah, NSW
Project Number	2629
Client Name	Chris Smith Interface Planning
AEP Project Team	Simon Purcell Alissa Rogers Naomi Stackhouse Alana Guest Maria Jedensjo Chris Wark

Revision

Revision	Date	Author	Reviewed	Approved
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05	16/09/2025	Minor modifications – Chris Wark		
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Distribution

Revision	Date	Name	Organisation
01	03/06/2022	Chris Smith	Interface Planning
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Appendix

Appendix A – Extract from the BFRMP

1.0 Introduction

Anderson Environment & Planning was commissioned by Chris Speek of Landstone, on behalf of Point Palliser Unit Trust and Lakeside Leisure Village (the client), to undertake a Bushfire Threat Assessment (BTA) for a Planning Proposal to rezone Lots 416 & 417 DP755266 at 31 & 41 Kamilaroo Avenue, Lake Munmorah, NSW, 2259 from RU6 – Transition to RE2 – Private Recreation, and for proposed changes to the minimum lot size for the development of proposal.

The Planning Proposal will be assessed as per Division 3.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). As a result, Section 3.18 requires concurrence from the Rural Fire Service (RFS) to enable the planning proposal to proceed on Bushfire Prone Land. This report addresses the required heads of consideration relevant to obtaining concurrence from the RFS.

This report is specifically intended to assess the bushfire protection measures required by “Planning for Bushfire Protection 2019” (PBP) and the construction requirements for proposed development in accordance with the provisions of the Building Code of Australia – Volume 1 and 2, Edition 2022 and Australian Standard 3959-2018 (AS 3959) – “Construction of buildings in bushfire-prone areas”, to provide direction for future development planning within the site.

For the purposes of referencing, this document should be referred to as:

Anderson Environment & Planning (2025). *Bushfire Threat Assessment – Planning Proposal – Rezoning of Lots 416 & 417 DP755266 at 31 & 41 Kamilaroo Avenue, Lake Munmorah, NSW, 2259*. Unpublished report for SLR Consulting Australia Pty Ltd.
Revision 6, October 2025.

2.0 Site Particulars

Table 1 shows the site location, precinct location and size, as well as the size of the affected lots within each precinct. **Figure 1** depicts the extent of the Subject Site overlain on an aerial photograph of the locality.

Table 1 – Site Particulars

Item	Comments
Client	Point Palliser Unit Trust and Lakeside Leisure Village
Address	31 & 41 Kamilaroo Avenue, Lake Munmorah, NSW, 2259.
Title(s)	Lots 416 & 417 DP 755266
Subject Site	Consists of all land within Lots 416 & 417 DP 755266, which total approximately 9.5ha (Figure 1).
LGA	Central Coast Council
Zoning	The land is zoned RU6 – Transition
Current Land Use	The site is currently a cleared vacant block with remnant scattered vegetation throughout. The site contains a small farm dam adjacent to the western boundary, forming the head of a 1 st order watercourse. The land adjoins established residential and vegetated public reserve to the east, an established manufactured home estate to the west and vegetated public reserve and Lake Munmorah waterbody to the south.
Surrounding Land Use	• North: SP1 – Infrastructure and B2 – Local Centre (Fuel Facility and Shopping Centre across Pacific Highway); • North West: R1 – General Residential and SP2 – Infrastructure; • West: RE2 – Private Recreation; • South: RE1 – Public Recreation; • South East: R2 – Low Density Residential and C3 – Environmental Management; and • North East: RE1 – Public Recreation.

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



0 250
metres

Note:
1. Boundaries are not survey accurate
2. Do not scale off this plan



AEP

Figure 1 - Site Location

Date: Dec 2024

Location: 13 & 41 Kamilaroo Rd, Lake Munmorah NSW

Client: Point Palliser Unit Trust and Lakeside Leisure Village

AEP Ref:2629

3.0 Proposed Development

The intent of the Planning Proposal is to rezone the subject land from RU6 – Transition to RE2 – Private Recreation pursuant to *Central Coast Local Environmental Plan 2022*. The Planning Proposal also seeks changes to the minimum lot size provisions to excise the existing dwelling at 31 Kamilaroo Avenue to facilitate previously agreed commercial terms.

The purpose of the rezoning is to facilitate the subsequent development of the land for residential purposes. RE2 zoning allows for the existing manufactured home estate located at 51 Kamilaroo Avenue to expand to 41 Kamilaroo Avenue, as well as for a separate manufactured home estate at 31 Kamilaroo Ave to be developed, subject to Council approval.

Figure 2 depicts the masterplan of the proposed development.

Figure 2 – Proposed Development

4.0 Bushfire Hazard Assessment

4.1 Bushfire Prone Land Mapping

Examination of the NSW Planning Portal, Bushfire Prone Land (BPL) mapping (2025) confirms that following Bushfire Prone Land mapping:

- Vegetation Category 1;
- Vegetation Category 3; and
- Vegetation Buffer.

This designation has triggered the need for the assessment herewith. **Figure 3** depicts the Bushfire Prone Land Mapping.

Appendix 1 of the PBP provides the steps required to determine the level of bushfire hazard that applies to the site. Factors influencing the hazard level include:

- The formation of vegetation surrounding the site (as defined by Keith 2004);
- The distance between vegetation and the site (or proposed buildings therein);
- The effective slope for each patch of vegetation; and
- The Fire Danger Index (FDI) of the council area within which the development occurs.
- These factors together provide an indication of the level of threat posed to the development from any vegetation retained within the site and surrounding vegetation in the event of a bushfire, and the required mitigation measures to be taken in the form of Asset Protection Zones (APZs) and building construction standards.

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

Bushfire Prone Land Map (2024)

Vegetation Buffer

Vegetation Category 1

Vegetation Category 3



0 250

meters

Note:
1. Boundaries are not survey accurate
2. Do not scale off this plan



AEP

Figure 3 - Bushfire Prone Land Mapping

Date: Sept 2025

Location: 13 & 41 Kamilaroo Rd, Lake Munmorah NSW

Client: Point Palliser Unit Trust and Lakeside Leisure Village AEP Ref:2629

4.2 PBP Performance Criteria Assessment

Chapter 4 of PBP 2019 refers to Strategic Planning. Under EP&A Act s4.14, the consent authority must be satisfied that the development on bushfire prone land conforms to PBP. If not, it must consult with the Commissioner of the NSW RFS. This applies to any development other than subdivision of land that could lawfully be used for residential purposes or development for a SFPP.

Strategic Planning (Chapter 4 in PBP 2019) will be considered in accordance with the acceptable solutions and performance criteria specified in Section 4.2 and Table 4.2.1 (refer to **Table 2**).

Table 2 – Bushfire Issues and Strategic Assessment

Issue	Criteria and Risk Items	Consideration	Assessment
Bush fire landscape assessment	A Bush fire landscape assessment considers the likelihood of a bush fire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.	The bush fire hazard in the surrounding area, including: • Vegetation • Topography • Weather	The site and surrounds occur within the Greater Hunter and Central Coast region, with existing vegetation subsequently classified with a Fire Danger Index (FDI) of 100 as per Appendix 1 Section A1.6 of the PBP. AEP understands that hazard vegetation along the North eastern boundary of the Subject Site will be retained as RE1 – Public Recreation land and the vegetation will be retained to preserve local biodiversity. The retention of this land will mean that this vegetation will form hazard vegetation and has been assessed as hazard vegetation for the purpose of this planning proposal. A 20m vegetated buffer is proposed along the northern boundary, adjacent to the Pacific Highway as is considered to be remnant vegetation. The simplified approach provides acceptable method for accessing remnant vegetation as the size would be less than 1ha. This remnant is considered a low risk and has been assessed as such. Vegetation to the North West is considered remnant vegetation and the simplified approach is considered an acceptable assessment for this vegetation. The vegetation is upslope and a potential fire run perpendicular to the slope does not exceed 50m. This remnant is considered a low risk and has been assessed as such. The remaining scattered canopy vegetation within the Subject Site will be cleared for future developments. Significant trees that could potentially be retained pose no risk as hazard vegetation due to their sparse distribution. The vegetation to the south, across Kamilaroo Avenue, zoned RE1 – Public Recreation, outside of the Subject Site will be retained as a lakefront reserve and will remain as hazard vegetation. It is noted that the large parcel at southern end of site is proposed to be retained in the ownership of the current vendor, however, this area is considered managed and has not been assessed as a hazard for the current proposal.

Issue	Criteria and Risk Items	Consideration	Assessment
			The residential developments to the west / south west and east / south east are not considered to contain hazardous vegetation. The Fuel Facilities and Shopping Centre across Pacific Highway on the North Boundary of the site, zoned SP1 – Infrastructure and B2 – Local Centre, are also not assessed as containing hazardous vegetation. The vegetation to the north east across the pacific highway has been classed as hazard vegetation, but it is unlikely that this area will have an impact on the proposal due to the approx. 50m separation by the highway. Therefore, off-site vegetation will be considered within this bushfire assessment. All vegetation within 140m of the Subject Site including the 20m vegetated buffer within the Subject Site has been subjected to this assessment: • North West / North – Remnant Vegetation; • West – Existing residential no Hazard Vegetation; • South West / South / South East – Hazard Vegetation classed as Forest Vegetation; • South East / East – Existing residential no Hazard Vegetation; • East / North East – Hazard Vegetation classed as Forest Vegetation; • North East – Hazard Vegetation classed as Woodland Vegetation to the north of the Pacific Highway; and • North West – Existing commercial and residential development no Hazard Vegetation. Refer to Plate 1 – 10 for photo reference Figure 4 provides an indication of the vegetation surrounding the site that constitutes the future hazard post development for the proposal.

Issue	Criteria and Risk Items	Consideration	Assessment
			Furthermore, consultation of the Bushfire Risk Management Plan 2020-2025 (BFRMP) produced by the Central Coast Bush Fire Management Committee (CCBFMC, 2020) Indicates that the site surrounds are mapped as the following: • North of the site is mapped as Economic – Commercial (ID1202); • South-East of the site is mapped as Human Settlement – Residential (ID592); • West of the site is mapped as Human settlement – Special Fire Protection (ID916); and • South of the site is mapped as Environment – Endangered (ID466). No Fire Exclusion Zone (FEZ); Asset Protection Zone (APZ); Land Management Zone (LMZ); or Strategic Fire Advantage Zones (SFAZ) are mapped adjacent to the site. It is noted that two small parcels of SFAZ are located to the east and north of the Subject Site, however, these are located outside of the 140m assessment buffer and unlikely to have any major bearing on management of hazard vegetation associated with the Subject Site. A map showing the location of these zones was extracted from the BFRMP and is included in Appendix A of this report.
		The potential fire behaviour that might be generated based on the above.	Canopy fire may occur in land to the north, northeast, and south.
		Any history of bush fire in the area.	A wildfire occurred in 2013/2014 in the category 1 mapped vegetation on Lots to the north of the planning proposal area. It came as close as 170m. Another fire occurred in the west in 1994/95. Both of these fires occurred in the context of larger parcels of forest vegetation.
		Potential fire runs into the site and the intensity of such fire runs.	Canopy fire may occur in land to the north, northeast, and south though the fire run in each of these instances is limited by close proximity to residential dwellings and the lake. The greatest potential

Issue	Criteria and Risk Items	Consideration	Assessment
			to impact the development lies to the west noting that this is the longest potential fire run away from residential properties.
		The difficulty in accessing and suppressing a fire, the continuity of bush fire hazards or the fragmentation of landscape fuels and the complexity of the associated terrain.	The Proposal has ample space to provide the required APZs, suitable access and egress points, defensible space, hydrants and, given the location to local fire station (<1.6km approximately 4 minutes – NSW RFS – Lake Munmorah), this is not considered an issue.
Land use assessment	The land use assessment will identify the most appropriate locations within the masterplan area or site layout for the proposed land uses.	The risk profile of different areas of the development layout based on the above landscape study;	<u>Slope Analysis</u> From the plan presented in Figure 4, it is apparent that the site falls predominantly downslope to the south towards the lake. Examination of slope class to relevant hazard areas reveals: • North – Flat / Upslope; • North west – Flat / Upslope; • South – 0-5 Degrees Downslope; and • East – Flat / Upslope. <u>Asset Protection Zones</u> Based on the information presented previously, the following derivation of required Asset Protection Zones (APZ's) was concluded. Examination of slope class to relevant hazard areas reveals: <u>Fire Danger Index Rating = 100</u> <u>North</u> • Predominant Vegetation – Remnant Vegetation; • Effective Slope – Flat / Upslope; • Require minimum APZ – 11m if built to BAL 29 ≤29kW/m², 1090K; OR • Require minimum APZ 38m if built to SFPP ≤10kW/m², 1200K. <u>North West</u> • Predominant Vegetation – Remnant Vegetation;

Issue	Criteria and Risk Items	Consideration	Assessment
			- Effective Slope – Flat / Upslope; - Require minimum APZ – 11m if built to BAL 29 $\leq 29\text{kW/m}^2$, 1090K; OR - Require minimum APZ 38m if built to SFPP $\leq 10\text{kW/m}^2$, 1200K. South - Predominant Vegetation – Forest; - Effective Slope – 0-5 degrees downslope; - Require minimum APZ – 29m if built to BAL 29 $\leq 29\text{kW/m}^2$, 1090K; OR - Require minimum APZ 79m if built to SFPP $\leq 10\text{kW/m}^2$, 1200K. East - Predominant Vegetation – Forest; - Effective Slope – Flat / Upslope; - Require minimum APZ – 24m if built to BAL 29 $\leq 29\text{kW/m}^2$, 1090K; OR - Require minimum APZ 67m if built to SFPP $\leq 10\text{kW/m}^2$, 1200K. APZ requirements as per Table A1.12.1; A1.12.2 with BAL requirements based on A1.12.5 of the PBP 2019. As per Section A4.1.2 of PBP2019, the APZ may be composed of an Inner Protection Area (IPA) and an Outer Protection Area (OPA) with management summarised as follows: - IPA: up to 15% canopy cover; 2-5m minimum canopy separation; no shrubs at the base of trees; shrub cover under 10%; grasses kept to no more than 100mm in height;

Issue	Criteria and Risk Items	Consideration	Assessment
			- OPA: up to 30% canopy cover; 2-5m minimum canopy separation; shrub cover under 20%; grasses kept to no more than 100mm in height; and - The OPA can be located within 10 metres from the outer edge of the APZ related to forest hazard only. Figure 5 shows the required residential APZs and BALs. Figure 6 shows the options for both residential APZs and SFPP APZs
		The proposed land use zones and permitted uses.	Given the above assessment the proposed Residential zone is deemed suitable within the Subject Site.
		The most appropriate siting of different land uses based on risk profiles within the site (i.e., not locating development on ridge tops).	Given the above assessment the proposal to rezone to enable a residential housing estate and Manufactured Housing Estate is deemed appropriate.
		The impact of the siting of these uses on APZ provision.	APZs have been considered as part of the concept plan to ensure that these can be accommodated as part of any future development.
Access and egress	A study of the existing and proposed road networks both within and external to the masterplan area or site layout.	The capacity for the proposed road network to deal with evacuating residents and responding emergency services, based on the existing and proposed community profile.	Future development would be serviced via the existing accessway along Kamilaroo Avenue. The proposed rezoning allows for residential development in accordance with the proposed density provisions and permitted uses. A traffic study would be required to ensure adequacy of roads. Emergency response times would be expected to be prompt as NSW RFS Lake Munmorah is located approximately 1.6km / 4 minutes from the site.
		The location of key access routes and direction of travel.	As discussed above.
		The potential for development to be isolated in the event of a bush fire.	It is unlikely that in the event of a fire the Subject Site would become isolated due to the location within an urban landscape and the accessibility of access to the site and defensible space provided between the site and future dwellings.

Issue	Criteria and Risk Items	Consideration	Assessment
Emergency services	An assessment of the future impact of new development on emergency services.	Consideration of the increase in demand for emergency services responding to a bush fire emergency including the need for new stations/brigades.	Given the proximity to the adjoining urban developments and the local fire station it has been determined that the planning proposal to rezone the land would not significantly increase the demand on fire vehicles nor emergency timeframes.
		Impact on the ability of emergency services to carry out fire suppression in a bush fire emergency.	There is ample land for offsite vegetation to be accessed via suitable access and egress points and defendable space around any future development, therefore it has been determined that this would be able to provide suitable access to undertake suppression activities if required.
Infrastructure	An assessment of the issues associated with infrastructure and utilities.	The ability of the reticulated water system to deal with a major bush fire event in terms of pressures, flows, and spacing of hydrants.	It is expected that future development would be serviced by a reticulated water supply system extended from existing and proposed residential areas. The reticulated water supply and street hydrant access will need to be delivered in accordance with AS 2419.1–2021.
		Life safety issues associated with fire and proximity to high voltage power lines, natural gas supply lines etc.	The installation of all services will be undertaken to ensure they comply with requirements within the PBP 2019.
Adjoining land	The impact of new development on adjoining landowners and their ability to undertake bush fire management.	Consideration of the implications of a change in land use on adjoining land including increased pressure on BPMs through the implementation of Bush Fire Management Plans.	The planning proposal is likely to reduce the risk of Bush Fire to the adjoining land, given the area proposed for residential zoned land will be managed and future vegetation removal undertaken, reducing the risk of bushfire fires into the adjoining residential areas.



Plate 1: Forest Hazard vegetation across Kamilaroo Avenue opposite the site, looking directly south from the southern boundary

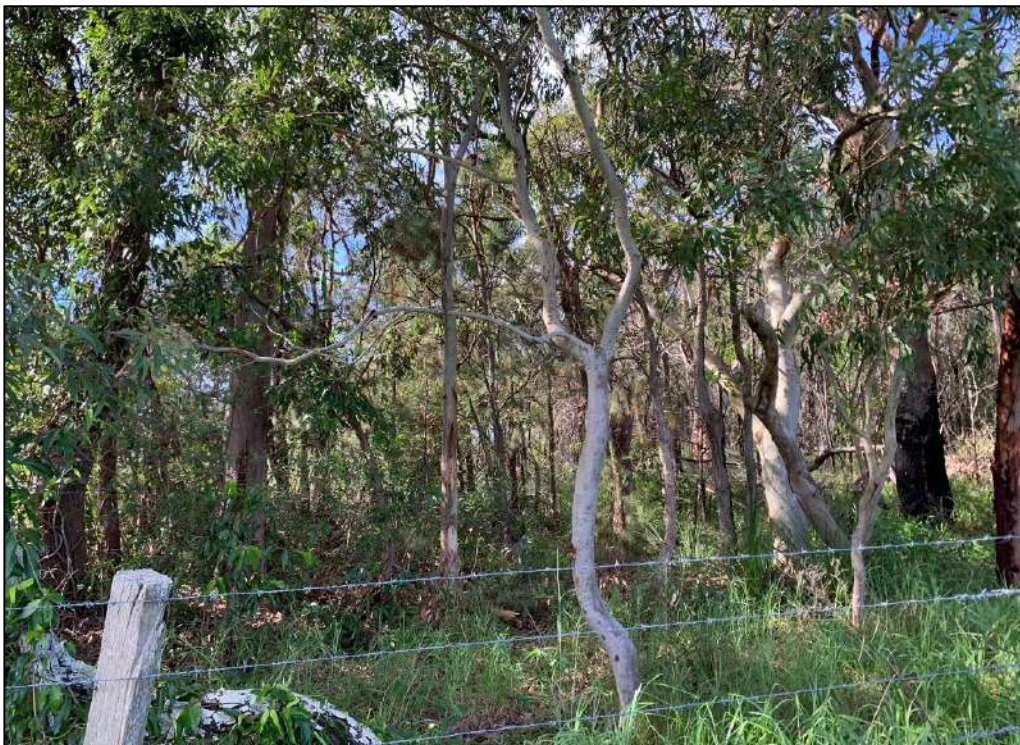


Plate 2: Forest Hazard vegetation looking directly East from the Eastern boundary



Plate 3: Residential development to the west of the site. Looking directly west from the centre of the lot.



Plate 4: Commercial development across the Pacific Highway. Looking north from the northern boundary.



Plate 5: Looking north from the northeast corner of the site. Pacific Highway and adjoining hazard vegetation on the Northeast boundary of the site.



Plate 6: Looking directly south across the Subject Site from the northeast corner. Grassy disturbed paddock with scarce canopy trees pictured.



Plate 7: Looking West from the north-western corner of site. Strip of hazard vegetation zoned as R1 – Residential, adjacent to residential blocks and Pacific highway to the north.



Plate 8: Looking North towards current residential block (31) from the southeast corner of site.



Plate 9: Looking directly east from within the Subject site towards current Residential development.



Plate 10: South-eastern corner of the site looking to the West towards Residential development, with Southern hazard vegetation in view.

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
- 100m Slope Assessment
- 140m Vegetation Assessment
- 20m Vegetated Buffer
- 2m Contour

Hazard Vegetation

- Forest
- Remnant Vegetation
- Woodland
- Unmanaged Grassland
- Non-hazard / Infrastructure



Note:
1. Boundaries are not survey accurate
2. Do not scale off this plan



AEP

Figure 4 - Slope and Hazard Assessment

Date: Sept 2025

Location: 13 & 41 Kamilaroo Rd, Lake Munmorah NSW

Client: Point Palliser Unit Trust and Lakeside Leisure Village AEP Ref:2629

4.3 Construction Standards – AS 3959:2018

The identification of proximate hazards post development has resulted in the need for APZs, and hence consideration of related construction standards. As part of the planning proposal phase of the project, these APZ's are assumed based on residential development consistent with the R1 zoning land use table and proposed density provisions. Where MHE development is provided with an APZ in accordance with Table A1.12.2 then residential BAL requirements can be applied, where this is not the case then APZs in line with A1.12.1 shall apply.

The Australian Standard 3959:2018 "Construction of buildings in bushfire prone areas", details six (6) levels of construction standard that are required for buildings, depending upon the expected impact of a bushfire from adjacent areas. These Bushfire Attack Levels (BAL) are measured from the edge of the hazard and incorporate vegetation type and slopes (**Section 4**) to determine the relevant distance for each BAL rating (and associated construction standard).

The relationship between the expected impact of a bushfire and the BAL rating is provided in **Table 4** below. Residential BALs and APZs are shown in **Figure 5**.

Table 3 – BAL Construction Standard

Bushfire Attack Level	Maximum radiant heat impact (kW/m ²)	Level of construction standard under AS 3959:2018
Low		No special construction requirements
12.5	≤12.5	BAL – 12.5
19	12.6 to 19.0	BAL – 19
29	19.1 to 29	BAL - 29
40	29 to 40	BAL – 40
Flame Zone	≥40	BAL – FZ (Not deemed to satisfy provisions)

As manufactured home estate are also proposed within this planning proposal, as per section 6.3.2 of the PBP 2019, due to the nature of manufactured home estates, there is no mechanism within the development consent process to ensure that the dwellings will be constructed to the standards applied within AS 3959 or NASH Standard. Therefore, the acceptable solution for manufactured housing is the provision of an APZ which achieves 10kW/m² commensurate with SFPP development in line with Table A1.12.1 of the PBP.

Where evidence can be provided which confirms that dwellings within the manufactured home estate will be constructed to the appropriate construction standards under AS 3959 or NASH Standard, an APZ can be provided which meets 29kW/m² in line with Tables A1.12.2 - A1.12.3 of the PBP 2019.

The required setbacks (in metres) for different levels of BAL construction standards, measured from hazard vegetation, applicable to the proposed development are:

North – Flat / Upslope – Remnant Vegetation (BAL 29 ≤29kW/m², 1090K)

- <8 – BAL - FZ
- 8-<11 – BAL - 40
- 11-<16 – BAL – 29
- 16-<23 – BAL – 19
- 23-<100 – BAL – 12.5

North SFPP – Flat / Upslope – Remnant Vegetation (BAL 12.5 SFPP $\leq 10\text{kW/m}^2$, 1200K)

- Require minimum APZ 38m – BAL 12.5

North West - Flat / Upslope – Remnant Vegetation (BAL 29 $\leq 29\text{kW/m}^2$, 1090K)

- <8 – BAL - FZ
- 8-<11 – BAL - 40
- 11-<16 – BAL – 29
- 16-<23 – BAL – 19
- 23-<100 – BAL – 12.5

North West - Flat / Upslope – Forest (BAL 12.5 SFPP $\leq 10\text{kW/m}^2$, 1200K)

- Require minimum APZ 38m – BAL 12.5

South – 0-5 degrees downslope – Forest (BAL 29 $\leq 29\text{kW/m}^2$, 1090K)

- <22 – BAL - FZ
- 22-<29 – BAL - 40
- 29-<40 – BAL – 29
- 40-<54 – BAL – 19
- 54-<100 – BAL – 12.5

South SFPP – 0-5 degrees downslope – Forest (BAL 12.5 SFPP $\leq 10\text{kW/m}^2$, 1200K)

- Require minimum APZ 79m – BAL 12.5

East - Flat / Upslope – Forest (BAL 29 $\leq 29\text{kW/m}^2$, 1090K)

- <18 – BAL - FZ
- 18-<24 – BAL - 40
- 24-<33 – BAL – 29
- 33-<45 – BAL – 19
- 45-<100 – BAL – 12.5

East - Flat / Upslope – Forest (BAL 12.5 SFPP $\leq 10\text{kW/m}^2$, 1200K)

- Require minimum APZ 67m – BAL 12.5

A minimum setback aligning with **BAL 29 is required.**

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

Bushfire Attack Level (BAL)

BAL 29

BAL 19

BAL 12.5

 Asset Protection Zone (APZ)



0 125
meters

Note:
1. Boundaries are not survey accurate.
2. Do not scale off this plan.



AEP

Figure 5 - Residential BALs and APZ

Date: Oct 2025

Location: 13 & 41 Kamilaroo Rd, Lake Munmorah NSW

Client: Point Palliser Unit Trust and Lakeside Leisure Village AEP Ref:2629

4.4 Special Fire Protection Purpose Developments (Planning for Bushfire Protection 2019)

The Planning Proposal for rezoning at 31 & 41 Kamilaroo Avenue, Lake Munmorah is later earmarked for extension of an existing Manufactured Home Estate (MHE) and a new Manufactured home estate. *Planning for Bush Fire Protection 2019* provides an assessment and review process for SFPP developments to minimise the risk of bush fires to life and property, at areas occupied by at-risk members of the community.

Section 6.8.1 and Table 6.8a within the PBP (2019) outlines the performance criteria and acceptable solutions for APZs and construction for SFPP development. **Table 4** outlines these components and assessment as relates to the new MHE development.

SFPP APZ for dwellings that are not constructed to meet the residential BAL requirements are shown in **Figure 6**, however it is proposed within this development that all dwellings will be built to required residential BALs. Any dwellings that are not shown as having a BAL requirement are still to be built to BAL – 12.5 standards as a minimum.

Table 4 – Performance criteria for APZs for SFPP Development

PBP 2019 Considerations	Acceptable Solutions	AEP Assessment
Radiant heat levels of greater than 10kW/ m ² (calculated at 1200K) will not be experienced on any part of the building.	The building is provided with an APZ in accordance with Table A1.12.1 in Appendix 1.	Based on surrounding hazard vegetation, classed as “Forest” and “remnant Vegetation”, the development is provided with an APZ in accordance with table A1.12.1 in the PBP 2019, which details minimum distances for APZ for SFPP developments (refer Figure 6). Where higher construction levels (BAL – 29) are proposed then A1.12.2 residential APZs have been used.
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	APZs are located on lands with a slope less than 18 degrees	No slopes greater than 18 degrees are located within the property.
APZs are managed and maintained to prevent the spread of fire to the building.	The APZ is managed in accordance with the requirements of Appendix 4 of this document, and is wholly within the boundaries of the development site.	APZs are to be managed in accordance with the requirements outlined in Appendix 4 of the PBP 2019, and are located wholly within the boundaries of the development site (refer Figure 6).
The APZ is provided in perpetuity	APZ are wholly within the boundaries of the development site; and other structures located within the APZ need to be located further than 6m from the refuge building.	APZ are wholly within the boundaries of the development site; and other structures located within the APZ are to be located further than 6m from the designated refuge building.
Landscaping		
Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	Landscaping is in accordance with Appendix 4; and fencing is constructed in accordance with section 7.6.	All landscaping is to comply with Appendix 4 of the PBP. Fencing is to comply with section 7.6 of PBP.

PBP 2019 Considerations	Acceptable Solutions	AEP Assessment
Construction Standards / SFPP Variations		
The proposed building can withstand bush fire attack in the form of wind, embers, radiant heat and flame contact.	A construction level of BAL-12.5 under AS 3959 or NASH Standard and section 7.5 of PBP is applied.	The MHE is proposing to use residential BALs and APZs. The dwellings located in BAL 19 and 29 would meet the required construction standards. Those in BAL 12.5 or lower are to be built to BAL 12.5 standards as a minimum.
Manufactured home estates: APZs achieve radiant heat levels that are commensurate with the construction standard for the proposed dwellings.	an APZ in accordance with Table A1.12.1 in Appendix 1 of this document is provided to all new dwellings; or an APZ in accordance with Table A1.12.2 or A1.12.3 in Appendix 1 of this document is provided where it is demonstrated that all new dwellings will be constructed in accordance with BAL-29.	Final determination on construction standards will be confirmed at the development application stage, however radiant heat levels will be suitable for MHE development standards.
Access		
Firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.	SFPP access roads are two-wheel drive, all-weather roads; access is provided to all structures; traffic management devices are constructed to not prohibit access by emergency services vehicles; access roads must provide suitable turning areas in accordance with Appendix 3; and one way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.	Future development would be serviced via the existing accessway along Kamilaroo Avenue. It is considered that the proposed access and egress arrangements are appropriate and no issues have been identified with evacuation, safe haven zones, or firefighting logistics. Sufficient space is located with the development footprint to accommodate the requirements of an SFPP development including access to all structures and relevant road requirements as per the PBP2019. Construction plans will ensure all traffic management devices within the proposal do not prohibit emergency services vehicle access. All accesses provided within the site will be designed to comply with Appendix 3 of the PBP 2019.

PBP 2019 Considerations	Acceptable Solutions	AEP Assessment
		The proposed rezoning allows for residential development in accordance with the proposed density provisions and permitted uses. Emergency response times would be expected to be prompt as NSW RFS Lake Munmorah is located approximately 1.6km / 4 minutes from the site.
The capacity of access roads is adequate for firefighting vehicles.	The capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating.	The capacity of the roads is to be designed to ensure the surface can carry fully loaded firefighting vehicles
There is appropriate access to water supply.	Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression	Hydrant design will be constructed to ensure all are located outside of carparking areas and carriageways. This is to ensure access at all times.
	Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005	Hydrants are to be provided in accordance with the relevant clauses of AS 2419.1:2021
	There is suitable access for a Category 1 fire appliances to within 4m of the static water supply where no reticulated supply is available	N/A – reticulated water is to be supplied to the development.
Perimeter Roads		
Perimeter access roads are designed to allow safe access and egress for firefighting vehicles while occupants are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	There are two-way sealed roads	All perimeter roads within development are to be designed to ensure there is an 8m wide, two-way sealed road servicing the MHE, hydrants are to be clear of all parking areas and the internal roads have multiple linkages to ensure access and exist from various areas within the development. All road designs are to incorporate complying curves, edges, grades, falls and vertical clearance (4m) to
	Minimum 8m carriageway width kerb to kerb	

PBP 2019 Considerations	Acceptable Solutions	AEP Assessment	
	Parking is provided outside of the carriageway width	ensure firefighting vehicles can manoeuvre the site in the event of a fire.	
	Hydrants are to be located clear of parking areas	Widths and other requirements associated with these roads are able to be accommodated within future DA plans.	
	There are through roads, and these are linked to the internal road system at an interval of no greater than 500m;		
	Curves of roads have a minimum inner radius of 6m;		
	The maximum grade road is 15 degrees and average grade of not more than 10 degrees;		
	The road crossfall does not exceed 3 degrees; and		
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.		
Non-perimeter Roads			
Access roads are designed to allow safe access and egress for Firefighting vehicles while residents are evacuating.	Minimum 5.5m carriageway width kerb to kerb	All internal roads are to comply with the minimum 5.5m carriageway with parking provided on the outside and, as stated above, all hydrants are to be located clear of parking areas.	
	Parking is provided outside of the carriageway width		
	Hydrants are located clear of parking areas	The concept plan shows no unlinked roads within the development that are longer than 500m.	
	Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m		Curves, grades, falls and vertical height for all access roads are to comply with the PBP 2019 minimum requirements.
	Curves of roads have a minimum inner radius of 6m		

PBP 2019 Considerations	Acceptable Solutions	AEP Assessment
	The maximum grade road is 15 degrees and average grade of not more than 10 degrees	
	The road crossfall does not exceed 3 degrees	
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided	
Water Supplies		
An adequate water supply for firefighting purposes is installed and maintained.	Reticulated water is to be provided to the development, where available; or	Reticulated water is to be provided to service the development.
	A 20,000 litres minimum static water supply for firefighting purposes is provided for each occupied building where no reticulated water is available.	N/A
Water supplies are located at regular intervals; and the water supply is accessible and reliable for firefighting operations.	Fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2021;	Hydrant spacing and designed is to be designed and delivered to comply with the relevant clauses of AS 2419.1-2021
	Hydrants are not located within any road carriageway; and	As previously stated, hydrants' locations are to be outside of carparking areas.
	Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	N/A
Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005.	Will comply
The integrity of the water supply is maintained.	All above-ground water service pipes external to the building are metal, including and up to any taps.	The design is to ensure all external pipes are made of metal, including taps.

PBP 2019 Considerations	Acceptable Solutions	AEP Assessment
Electricity Supplies		
Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	Where practicable, electrical transmission lines are underground	Power supply is proposed to be underground
	Where overhead, electrical transmission lines are proposed as follows: • lines are installed with short pole spacing of 30m, unless crossing gullies, gorges or riparian areas; and • no part of a tree is closer to a power line than the distance set out in ISSC3 Guideline for Managing Vegetation Near Power Lines.	N/A
Gas Supplies		
Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	No LPG will be provided on site for filling of gas bottles and for filling of cars. If any gas is to be provided on site it will be in the form of swap and go and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used;	No LPG will be provided on site.
	All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side	N/A
	Connections to and from gas cylinders are metal	N/A
	If gas cylinders need to be kept close to the building, safety valves are directed away from the building and at least 2m away from any combustible material, so they do not act as a catalyst to combustion	N/A
	Polymer-sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used; and	N/A

PBP 2019 Considerations	Acceptable Solutions	AEP Assessment
	Above-ground gas service pipes external to the building are metal, including and up to any outlets	N/A
Emergency Management		
Bush Fire Emergency Management and Evacuation Plan is prepared.	Bush Fire Emergency Management and Evacuation Plan is prepared consistent with the: • The NSW RFS document: A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan; • NSW RFS Schools Program Guide; • Australian Standard AS 3745:2010 Planning for emergencies in facilities; and Australian Standard AS 4083:2010 Planning for emergencies – Health care facilities (where applicable).	Development of a Bush Fire Emergency Management and Evacuation Plan shall be a condition of consent and in line with the documents listed to the left.
	The Bush Fire Emergency Management and Evacuation Plan should include planning for the early relocation of occupants.	Development of a Bush Fire Emergency Management and Evacuation Plan shall be a condition of consent and is to include early relocation of occupants. On days of catastrophic conditions the manager, or their representative, is to ensure that the Hazards near me app is monitored and evacuation measures are ready to be enacted.
Appropriate and adequate management arrangements are established for consultation and implementation of the Bush Fire Emergency Management and Evacuation Plan.	An Emergency Planning Committee is established to consult with residents (and their families in the case of aged care accommodation and schools) and staff in developing and implementing an Emergency Procedures Manual;	THE BFEMP is to be developed with input from residents and reviewed with input from residents. Plans are to be provided to residents detailing all on-site and off-site arrangements and emergency evacuation drills are to be enacted annually.
	Detailed plans of all emergency assembly areas including on-site and off-site arrangements as stated in AS 3745:2010 are clearly displayed, and an annually emergency evacuation is conducted.	

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

Assesment Protection Zone (APZ)



Special Fire Protection Purpose



Residential Development



0 125
meters

Note:
1. Boundaries are not survey accurate
2. Do not scale off this plan



AEP

Figure 6 - Asset Protection Zones

Date: Oct 2025

Location: 13 & 41 Kamilaroo Rd, Lake Munmorah NSW

Client: Point Palliser Unit Trust and Lakeside Leisure Village AEP Ref:2629

5.0 Other Considerations

The following analysis applies to the site in reference to environmental features present.

- **Riparian Corridors** – One farm dam considered a first order waterway is present in the North-east of the site. Managed drainage line also presents, running south, adjacent to the Western boundary of the site.
- **SEPP (Resilience and Hazard) 2021 – Chapter 2 Coastal Management** – The Subject Site is mapped as a Coastal Environmental Area.
- **SEPP (Biodiversity and Conservation) 2021 – Chapter 4 Koala Habitat Protection 2021** – Koala Habitat Protection applies and further ecological considerations would be need to address this SEPP.
- **Areas of geological interest** – none present.
- **Environmental protection zones or steep lands (>18°)** – none present.
- **Land slip or flood prone areas** – The area is not considered flood prone according to the Probable Maximum Flood information.
- **National Parks estate or various other reserves** – The nearest national park, Lake Munmorah Reserve, is not affected by the proposed development.
- **Threatened species matters** – Further ecological assessment would be required to determine if threatened species matters occur within the site.
- **Aboriginal Heritage** – none known to be present.

6.0 Conclusion

Investigations undertaken for this Bushfire Threat Assessment report have revealed that the Planning Proposal will be affected by Forest vegetation to the east and south of the subject site. Further to this, the site will be affected by remnant vegetation to the northwest. Remnant vegetation will affect the development within the Subject Site due to a 20m vegetated buffer and swift parrot retained habitat along the northern boundary that will be implemented a part of this proposal.

Required APZs and associated BAL construction standards have been derived and applied to the site and may change as a result of tree removal or retention as part of the planning proposal and future Development Applications. Existing and future hazards associated with the bushland surrounding the Subject Site will result in the required APZs occurring within the Subject Site. As such, the position of future building envelopes will need to take this into consideration. **Figure 5** and **Figure 6** a concept plan for development overlain on the proposed masterplan. **Figure 5** APZs can be applied for residential properties and MHE dwellings meeting the required residential BAL construction standards and **Figure 6** shows the required APZs for both residential and SFPP APZs. The current APZs are based on swift parrot important mapped areas being retained, the 20m biodiversity corridor and allow for preservation of certain trees identified by Central Coast Council.

The proposed rezoning allows development of the land for residential purposes in accordance with the proposed density provisions and permitted uses. A reticulated water supply system from established residential areas is expected to service the site, and street hydrant access will need to be delivered in accordance with AS2419.1 – 2021.

Following rezoning, a new MHE development is proposed. The current concept for the new development in the east has been assessed as part of this report and while it is subject to change it is considered that there is enough space within the proposed area that all required Bushfire Protection Measures can be provided.

It is considered that the proposed protection measures, principally APZs, suitable access and egress points, defensible space and relevant construction standards, would comply with the relevant requirements of PBP 2019 and AS-3959. When applied at development application stage and subject to proposed works, these measures should provide adequate protection to life and property within the proposed development in the event of a bushfire occurring in the immediate locality.

As such, it is considered that the Planning Proposal is able to meet the required objectives and principles of Chapter 4 – Strategic Planning and the concept is capable of meeting the requirements of Chapter 6 – Special fire Protection Purpose Developments of PBP 2019. However, it can never be guaranteed that the site and residents and property therein will not at some stage be affected by a bushfire event.

7.0 References

Central Coast Bush Fire Management Committee (2020). *Bush Fire Risk Management Plan 2020-2025*. CCBFMC. Charmhaven, NSW.

NSW Government (1979). *Environment and Planning & Assessment Act 1979*. NSW Government, Sydney.

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Standards Australia (2018) AS-3959 *Construction of Buildings in Bushfire-Prone Areas*. Standards Australia, Sydney.

Appendix A – Extract from the BFRMP

Central Coast BFRMP 2020-2025



03/06/2022, 06:36:31

BushfireManagementZones

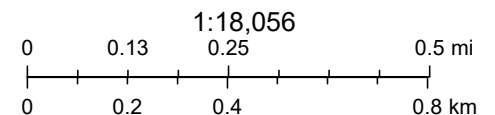
Environment

Strategic Fire Advantage Zone

Economic

Asset Areas - TYPE 2021

Human Settlement



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community,
Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap
contributors, and the GIS User Community



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