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Biodiversity Development Assessment Report

Proposed Subdivision within Lot 1 DP875804 Heathcote Road and Lot 2 DP817692 Pleasure Point Road, Pleasure Point NSW 2172



Prepared for: Hodge Developments Pty Ltd

14 April 2025

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00	09/08/2024	Daniel Seraglio	Hodge Developments
01	05/09/2024	Daniel Seraglio	Hodge Developments
02	14/04/2025	Daniel Seraglio	Hodge Developments

EXECUTIVE SUMMARY

At the request of Hodge Developments, on behalf of Hodge Developments Pty Ltd (the Proponent), Anderson Environment & Planning (AEP) has undertaken the necessary investigations to inform the production of a Biodiversity Development Assessment Report (BDAR) for the proposed subdivision and associated development at Lot 1 DP875804 Heathcote Road and Lot 2 DP817692 Pleasure Point Road, Pleasure Point NSW 2172.

The proposed development is located within the Liverpool Local Government Area (LGA) and is zoned as R2: Low Density Residential, C3: Environmental Management and RE1: Public Recreation.

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

The Study Area covers approx. 39.44ha which includes all lands within Lot 1 DP875804 Heathcote Road and Lot 2 DP817692 Pleasure Point Road. Within the Study Area is the Subject Site (approx. 35.98) which includes the entire footprint of the proposed subdivision and associated infrastructure, encompassing the anticipated extent of the construction footprint. A Tree Removal Plan has been produced (ADW Johnson 2024, **Appendix A**) which identifies areas of retained vegetation within the Subject Site. As such, an impact area of 35.84ha has been defined, taking into account the retained areas of vegetation. Four different PCTs in varying conditions have been identified within the Subject Site resulting in the following impacts:

- PCT 4059 Good: *Sydney Hinterland Sandy Creekflat Shrub Forest* (0.14ha);
- PCT 4059 Degraded: *Sydney Hinterland Sandy Creekflat Shrub Forest* (0.15ha);
- PCT 4024 Degraded: *Cumberland Blue Box Riverflat Forest* (0.16);
- PCT 3619 Moderate: *Sydney Hinterland Grey Gum Transition Forest* (1.85ha);
- PCT 3619 Poor: *Sydney Hinterland Grey Gum Transition Forest* (1.16ha); and,
- PCT 3616 Moderate: *Sydney Hinterland Enriched Sandstone Bloodwood Forest* (0.63ha).

An area of planted native vegetation was also identified within the Subject Site. Approximately 0.04ha of this vegetation will require removal and as such, was assessed using the Planted Native Streamlined Assessment Module.

PCT 4024 is commensurate with the following state and federally listed threatened ecological communities (TECs):

- BC Act listed EEC: *River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*; and
- EPBC Act listed CEEC: *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria*.

Approximately 1.13ha (88%) of this TEC is proposed for retention in addition to 0.49ha (78%) good condition PCT 4059 surrounding the central hydroline. This vegetation, in addition to adjacent land and land along the foreshore of the Georges River (totalling 5.78ha) is proposed to be managed under a Vegetation Management Plan.

The proposal will impact approx. 4.13ha of native vegetation. As a result, it was determined that 86 ecosystem credits are incurred by the proposed native vegetation clearing.

One (1) threatened species was identified within the Subject Site. This species is listed below with the subsequent credit obligation:

- Southern Myotis (27 credits)

Works are also proposed to create a formalised channel through the foreshore. The proposed channel works will result in a positive impact to biodiversity values within the site, following management under

a VMP. As the channel works are situated within the foreshore, controlled activity approval will be required.

Assessments of the proposal under other relevant environmental policy instruments has occurred including:

- State Environmental Planning Policy (Resilience and Hazards) 2021;
- State Environmental Planning Policy (Biodiversity and Conservation) 2021;
- Water Management Act 2000;
- Fisheries Management Act 1994;
- Liverpool Local Environment Plan 2008; and,
- Liverpool Development Control Plan 2008.

Given an EPBC listed entity is present, within the Subject Site, referral to the Commonwealth Government is recommended.

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Study Certification and Licensing

This report was authored and certified by Joelan Sawyer (BAAS:23016) of Anderson Environment & Planning.

The below table acknowledges the Contributing Ecologists who undertook fieldwork, research or investigations, data analysis, and mapping that are relied on in preparing the report.

Staff	Title/Qualification	Tasks
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Ben Jones	Ecologist – Project Manager BSc (Zoo)	BAM Plots, Flora Surveys, Habitat Assessment, Gastropod Surveys, Contributing Author.
Joelan Sawyer	Senior Ecologist BSc (Bio) BAAS23016	Accredited person preparing and certifying the report. BAM Plots, Flora Surveys, Koala SATs, Nocturnal Surveys
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Ian Benson	Director & Principal Ecologist BEng (Civil) GradDipSc (Ecology) BAAS 18147	Report Approval

Research was conducted under the following licences:

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

Certification:

As the Certifying author, I, Joelan Sawyer (BAAS: 23016), make the following certification:

- This report has been written to comply with the requirements of the BAM 2020 and obligations outlined within the BAM Assessor Code of Conduct and includes, in the opinion of the writer, a true and accurate account of the species recorded, or considered likely to occur within the Survey Area, and inferences of such for biodiversity credit calculations;
- Anderson Environment and Planning have no actual, potential or perceived conflicts of interest with Hodge Developments Pty Ltd. Anderson Environment and Planning has received commercial payment for consulting services and assessment by Hodge Developments Pty Ltd for this project;
- BAM Assessment methodology, as well as Commonwealth, state and local government policies and guidelines formed the basis of project surveying methodology, unless specified departures from industry standard guidelines are justified for scientific and/or animal ethics reasons;
- All research workers have complied with relevant laws and codes relating to the conduct of flora and fauna research, including the *Animal Research Act 1995*, *Biodiversity Conservation Act 2016* and the Australian Code of Practice for the Care and Use of Animals for Scientific Purposes;
- This report has been written to comply with the requirements of the *Biodiversity Conservation Act 2016* and *Biodiversity and Conservation Regulation 2017* as outlined in the below Table.

<i>Biodiversity Conservation Act, 2016 (BC, Act) Section 6.15 Currency of biodiversity assessment report</i>	
(1) A biodiversity assessment report cannot be submitted in connection with a relevant application unless the accredited person certifies in the report that the report has been prepared on the basis of the requirements of (and information provided under) the biodiversity assessment method as at a specified date and that date is within 14 days of the date the report is so submitted.	I, Joelan Sawyer (BAAS:23016) declare that I prepared the BDAR for the relevant application on the basis of the requirements within BAM 2020 as at the specified date (below).
(2) A relevant application is an application for planning approval, for vegetation clearing approval, for biodiversity certification or in respect of a biodiversity stewardship agreement.	Not applicable to this application.
<i>Biodiversity and Conservation Regulation, 2017 (BC Regulations) Clause 6.8 Content of biodiversity development assessment reports (section 6.16)</i>	
A biodiversity development assessment report must include—	
1. the number and classes of biodiversity credits required to be retired in accordance with the like-for-like requirements of the offset rules, and	Addressed within Section 2.4 BDAR
2. the number and classes of biodiversity credits that could be retired in accordance with the variation rules (in any case in which the proponent of the development proposes to use the variation rules), and	Addressed within Section 2.4 of this BDAR
3. details of any proposal to fund a biodiversity conservation action in accordance with the offset rules, and	Not applicable to this application.
4. details of any ecological rehabilitation of a site impacted by mining under a mining lease that is proposed as a measure to offset or compensate for those impacts, and	Not applicable to this application
5. the date of the report and the requisite certification under section 6.15 of the Act, and	As below.
6. details of the accreditation of the person preparing the report and of the qualifications and experience of any other person commissioned to conduct research or investigations that are relied on in preparing the report, and	As above and Appendix H
7. any other information required by the biodiversity assessment method or ancillary rules to be included in the report.	Refer Appendices for contributing investigations, results and contributing reports prepared by other professional consultants

Principal Author and Certifier:

Joelan Sawyer



Senior Ecologist

Anderson Environment & Planning

BAAS no. 23016

Calculator Ref: 00047545/BAAS23016/24/00047546

Date: 14/04/2025

Glossary of Terms

Term	Meaning
APZ	Asset Protection Zone.
BAM	Biodiversity Assessment Method Order (2020) that determines: • Methodology applicable to quantifying biodiversity values inherent within a development site; • Avoid and mitigation efforts required to be employed as part of any development proposal; and, • Number and class of credits required to offset residual impacts of the proposal upon the biodiversity values therein.
BAM Calculator	The online tool used to interpret site survey data and regional location information to quantify ecosystem and species credits required / generated at a development / stewardship site.
BC Act	Biodiversity Conservation Act 2016 (NSW).
Biodiversity Credit Report	Specifies the number and type of biodiversity credits required to offset the impacts of a development.
Biodiversity credits	Ecosystem or Species Credits required to offset the loss of biodiversity values on a development site.
Biodiversity offsets	Specific measures that are put in place to compensate for impacts on biodiversity values.
Biodiversity values	The composition, structure, and function of ecosystems, and threatened species, populations and ecological communities, and their habitats.
BRW	Biodiversity Risk Weighting.
CEEC	Critically Endangered Ecological Community.
Council	City of Liverpool.
Cth DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water.
DAWE	Former Commonwealth Department of Agricultural, Water and Environment.
DoEE	Former Commonwealth Department of Energy and the Environment.
DPE	Former NSW Department of Planning and Environment.
DPI	Former NSW Department of Primary Industries.
DPIRD	NSW Department of Primary Industries and Regional Development.
Ecosystem credit	The class of biodiversity credits created or required for the impact on EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur within a vegetation type.
EEC	Endangered Ecological Community (under BC Act).
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999.
ERIAR	Ecological & Riparian Issues & Assessment Report

Term	Meaning
HBT	Hollow-bearing tree as defined in the BAM.
IBRA	Interim Biogeographic Regionalisation for Australia.
Important Wetland	An Important Wetland is a wetland listed under the Directory of Important Wetlands of Australia (DIWA, Environment Australia 2001) or an area included under the <i>State Environmental Planning Policy (Resilience and Hazards) 2021 – Chapter 2 Coastal Management</i> .
Local Wetland	Local Wetland is defined as an area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle (OEH 2017a).
NSW DCCEEW	State NSW Department of Climate Change, the Environment and Water.
OEH	Former NSW Office of Environment and Heritage.
PFC	Projected Foliage Cover.
Species credit	Class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area based on habitat surrogates.
SRMP	Stream & Riparian Management Plan (ADW Johnson 2024)
SWMP	Stormwater Management Plan (ADW Johnson 2024) and Addendum (ADW Johnson 2025).
Study Area	The Study Area includes the entirety of Lot 1 DP875804 Heathcote Road and Lot 2 DP817692 Pleasure Point Road, Pleasure Point NSW 2172
Subject Site	The Subject Site consists of the proposed development footprint within Lot 1 DP875804 Heathcote Road and Lot 2 DP817692 Pleasure Point Road, Pleasure Point NSW 2172
SVTM	NSW State Vegetation Type Map 2024.
TBDC	Threatened Biodiversity Data Collection.
TEC	Threatened Ecological Community.
TSPD	Threatened Species Profile Database.
VIS	Vegetation Integrity Score.
WCMP	Water Cycle Management Plan (ADW Johnson 2025)

1.0 Stage 1 – Biodiversity Assessment

1.1 Introduction

At the request of Hodge Developments (the Proponent), Anderson Environment & Planning (AEP) have undertaken the necessary investigations to inform the production of a Biodiversity Development Assessment Report (BDAR). The BDAR addresses the impacts associated with the proposed concept development application and staged subdivision at Lot 1 DP875804 Heathcote Road and Lot 2 DP817692 Pleasure Point Road, Pleasure Point NSW 2172 (the Study Area). The proposed development is located within the Liverpool City Local Government Area (LGA).

This BDAR adheres to the approach outlined in the Biodiversity Assessment Methodology (DPIE 2020a) (the BAM) and the BAM Calculator User Guide (DPIE 2020b).

1.1.1 Biodiversity Offset Scheme Threshold Trigger

This BDAR has been triggered as required by Clause 7.1 Biodiversity Conservation Regulation 2017:

- (1)(a) the clearing of native vegetation of an area declared by clause 7.2 as exceeding the threshold.

A minimum lot size of 400m² applies to the Study Area therefore, the minimum threshold for the clearing of native vegetation is 0.25ha. The proposed subdivision will result in an impact to >1ha of native vegetation and as such the BAM and Biodiversity Offsets Scheme (BOS) applies.

Therefore, this BDAR has been produced to facilitate an assessment under the Biodiversity Assessment Method Order 2020 (BAM Order). The proposed development is seeking to clear approximately 0.04ha of planted native vegetation. An assessment under the Planted Native Vegetation Module of the BAM 2020 has been undertaken for this area.

1.1.2 Assessment Scope

The BDAR presented herewith aims to quantify impacts of the proposal upon biodiversity values based on the methods described within the BAM Order, including threatened entities listed under the BC Act.

This report includes:

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

1.1.3 The Proposal

The proposed development includes the subdivision of Lot 1 DP875804 Heathcote Road and Lot 2 DP817692 Pleasure Point Road, Pleasure Point NSW and includes the integration of:

- Residential lots;
- Road network and car parking;
- Bus route;
- Cycle routes;
- Pedestrian links;
- Bioretention basins;
- Natural recreational open spaces; and,

- Bushfire Asset Protection Zone (APZ) Buffers.

Site details are outlined in **Table 1**. The development footprint is shown in **Figure 1** and **Appendix A**.

1.1.4 Site Particulars

Table 1: Site Particulars

Detail	Comments
Client	Hodge Developments Pty Ltd
Address	Heathcote Road and Pleasure Point Road, Pleasure Point NSW 2172
Title(s)	Lot 1 DP875804 and Lot 2 DP817692
LGA	Liverpool City Council
Zoning	R2: Low Density Residential, C3: Environmental Management and RE1: Public Recreation.
Study Area	The Study Area includes the entirety of Lot 1 DP875804 and Lot 2 DP817692, Heathcote Road, Pleasure Point NSW 2172 – totalling approximately 39.44ha.
Subject Site	The Subject Site consists of areas that will be cleared or impacted by the development, totalling approximately 35.98ha (refer Figure 1) This includes: • 4.09ha of remnant vegetation; • 0.04ha of planted native vegetation; and, • 31.85ha of cleared areas, exotic vegetation and infrastructure.
Current Land Use	The Study Area is a parcel of land comprising: residential infrastructure; machinery and construction material storage; areas of remnant vegetation; and, large areas of cleared and planted exotic vegetation. A small area of planted native vegetation is present adjacent to the residential property at the north-east of the Study Area. The Study Area lies adjacent to the Georges River at its northern boundary and contains mapped hydrolines running north, through the centre of the site. The north of the site contains remnant vegetation contiguous with off-site vegetation to the north-west and east of the site.
Surrounding Land Use	The surrounding land includes the residential areas of Voyager Point and Pleasure Point to the east and west with East Hills located to the north, opposite the Georges River. The landscape to the north of the site is largely dominated by extensive urban development. A patch of retained bushland lies adjacent to the south-west of the site, with extensive bushland to the south, separated from the site by Heathcote Road. Further bushland lies to the north-west of the site, surrounding Voyager Point Wetland Reserve. The riparian corridor of the Georges River provides connectivity between this bushland, the site and downstream habitats including Pleasure Point Reserve.

1.1.5 Geology and Soils

Reference to the 1:100,000 Sheet Soil Landscapes (eSPADE) of the Study Area indicates that the site is located within the Soil Landscapes;

- GyMEA Soil Landscape; and,
- Lucas Heights Soil Landscape.

The GyMEA Soil Landscape encompasses the north-east portion of the Study Area and is characterised as follows:

- Landscape – undulating to rolling rises and low hills on Hawkesbury Sandstone. Local relief 20–80 m, slopes 10–25%. Rock outcrop <25%. Broad convex crests, moderately inclined side

slopes with wide benches, localised rock outcrop on low broken scarps. Extensively cleared open forest (dry sclerophyll forest) and eucalypt woodland.

- Soils – shallow to moderately deep (30–100 cm) Yellow Earths (Gn2.24) and Earthy Sands (Uc5.11, Uc5.2) on crests and insides of benches; shallow (<20 cm) Siliceous Sands (Uc1.21) on leading edges of benches; localised gleyed podzolic soils (Dg4.21) and Yellow Podzolic Soils (Dy4.11, Dy5.11, Dy5.41) on shale lenses; shallow to moderately deep (<100 cm) Siliceous Sands (Uc1.2) and Leached Sands (Uc2.21) along drainage lines.
- Limitations – steep slopes, water erosion hazard, rock outcrop, localised rockfall hazard, localised non-cohesive soils, shallow highly permeable soil, very low soil fertility.

The Lucas Heights Soil Landscape encompasses the majority of the Study Area and is characterised as follows:

- Landscape – gently undulating crests and ridges on plateau surfaces of the Mittagong Formation (alternating bands of shale and fine-grained sandstones). Local relief to 30 m, slopes <10%. Rock outcrop is absent. Low open-forest and woodland (dry sclerophyll).
- Soils – moderately deep (50–150 cm), hardsetting Yellow Podzolic Soils and Yellow Soloths (Dy2.41).
- Limitations – localised water erosion hazard, localised shallow soils, stony soils with low soil fertility and low available water capacity.

1.1.6 Information Sources

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

- Field surveys conducted within the site by AEP (March-December 2024);
- Aerial Photograph Interpretation (API) of the site and surrounding locality (Nearmap 2024, Google 2024, and SIX Maps);
- Survey guidelines (DEC 2004, NSW DCCEEW 2024c, DPIE 2020, DPIE 2020a);
- NSW *State Vegetation Type Map* (DPE 2024);
- NSW DCCEEW BAM – Important Areas Map to determine whether the site is mapped as *Swift Parrot*, *Regent Honeyeater* or *Migratory Shorebird and Plains-wanderer Important Areas*;
- Collective knowledge gained from previous ecological survey and assessment in the Liverpool City LGA; and,
- PlantNET NSW (<http://plantnet.rbgsyd.nsw.gov.au/>).

In addition, database searches were carried out, namely:

- Review of flora and fauna records held by the NSW DCCEEW Atlas of NSW Wildlife within a 10km search area of the site (April 2025); and,
- Review of flora and fauna records held by the Cth DCCEEW Protected Matters Search within a 5km radius of the site (April 2025).



Legend

Subject Site Study Area Cadastre

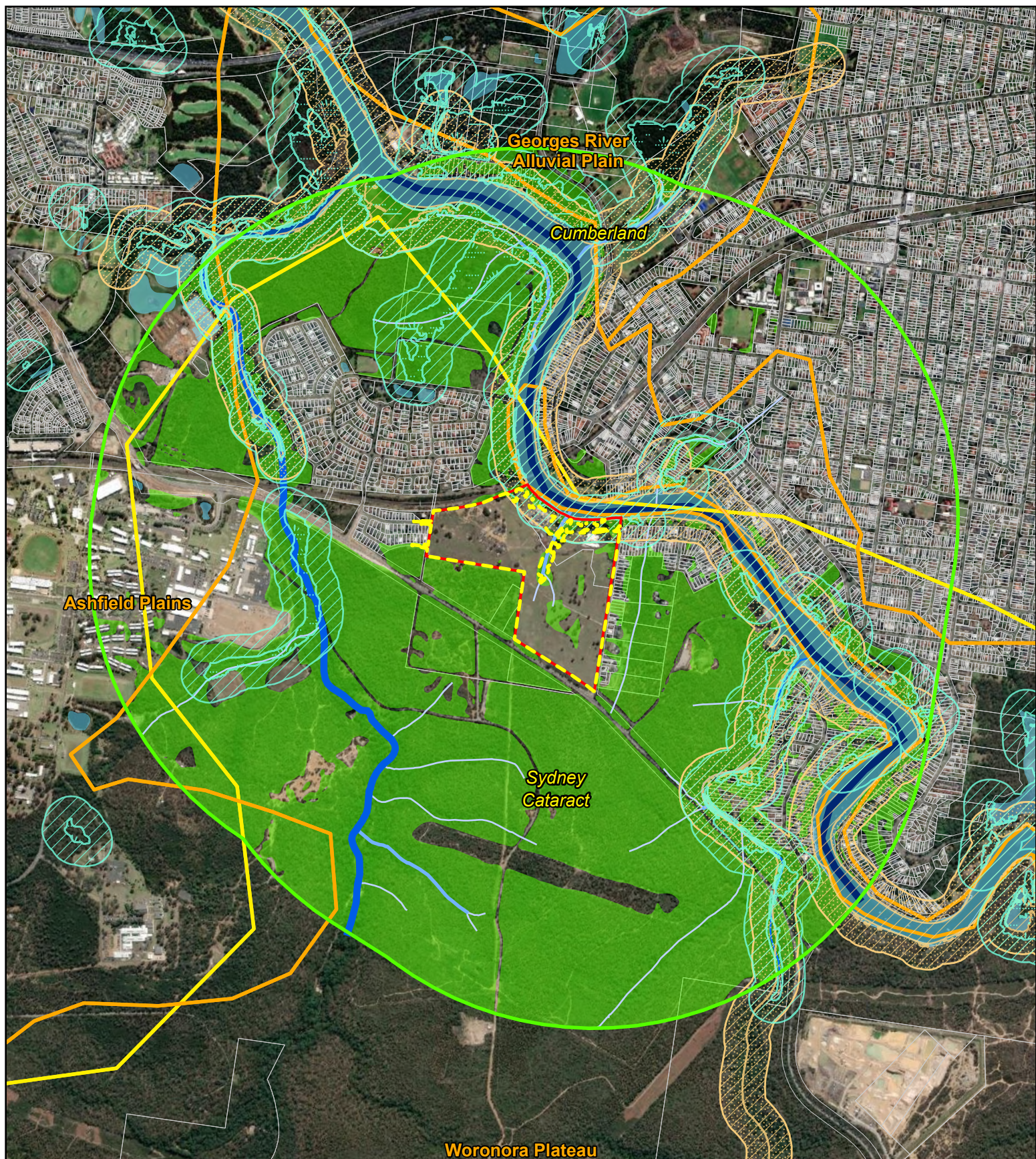
Figure 1 - Site Map

Address: Heathcote Road, Pleasure Point
Client: Hodge Developments Pty Ltd
AEP Ref: 3539 | Date: 10 April 2025

Imagery: Nearmap
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.



Legend

- Subject Site
- Study Area
- Cadastre
- Hydroarea

- 1500m Assessment Buffer
- Coastal Wetlands
- Coastal Wetland Proximity

- Littoral Rainforest
- Littoral Rainforest Proximity
- Coastal Use Area
- Coastal Environment

- Native Vegetation Extent
- IBRA Subregions
- NSW (Mitchell) Landscapes

- First Order Stream
- Second Order Stream
- Third Order Stream
- Fourth Order Stream
- Fifth Order Stream
- Seventh Order Stream

Figure 2 - Site Location



1.2 Landscape Features

1.2.1 Regional Landscapes

The Study Area was identified as occurring within the following landscape areas:

- IBRA Bioregion – Sydney Basin
- IBRA Subregion – Sydney Cataract
- NSW Landscape – Woronora Plateau.

Delineation of NSW Landscape areas are shown in **Figure 2**.

1.2.2 Identified Landscape Features

The BAM Calculator identifies nine (9) landscape features that require assessment for their relevance to the Subject Site. These features are outlined in (**Table 2**).

Table 2: Landscape Feature Assessment

Landscape Feature	Assessment
Rivers and Streams	Within the Study Area, there are two (2) mapped first order hydrolines which converge to form one (1) second order hydroline flowing north towards the Georges River. The Georges River flows west-east along the northern boundary of the Study Area. These hydrolines have been assessed within the Stream Riparian Management Plan (SRMP) (ADW Johnson 2024) which concluded that only one (1) second order stream is present within the site.
Wetlands	The Study Area contains mapped Coastal Wetlands (SEPP Resilience and Hazards 2021) along its boundary with the Georges River. Land along the Georges River is also mapped as Coastal Use Area and Coastal Environment Area. Key Fish Habitat is located adjacent to the site, within the Georges River. These features are shown within Figure 2.
Native Vegetation Extent	Approx. 6.12ha of native vegetation occurs within the Study Area, of which 4.13ha is impacted by the proposal. Some vegetation within the Subject Site is proposed to be retained, as detailed within the Tree Removal Plan (ADW Johnson 2024) (Refer Appendix A). Native vegetation within the Study Area was identified as being commensurate with Plant Community Types (PCTs): • PCT 4059: <i>Sydney Hinterland Sandy Creekflat Shrub Forest</i>; • PCT 4028: <i>Estuarine Swamp Oak Twig-rush Forest</i> • PCT 4024: <i>Cumberland Blue Box Riverflat Forest</i>; • PCT 3619: <i>Sydney Hinterland Grey Gum Transition Forest</i>; and, • PCT 3616: <i>Sydney Hinterland Enriched Sandstone Bloodwood Forest</i>. All of the identified PCTs, excepting PCT 4028 are located within the Subject Site and will be impacted by the proposals. PCT 4028 is located outside of the Subject Site and will not be impacted. Of the impacted vegetation, PCT 4024 has associated TECs (Refer Section 1.4.3.3).
Connectivity Features	Vegetation within the Study Area is generally scattered throughout the site and contiguous connectivity to offsite bushland is limited to vegetation within the north of the site, along the Georges River. This vegetation is contiguous with bushland to the north-west and east of the site, providing connectivity to the Voyager Point Wetland Reserve in the northwest and Pleasure Point Reserve to the east. A patch of retained bushland lies adjacent to the south-west of the site, with further extensive bushland to the south, separated from the site by Heathcote Road. Limited vegetation at the eastern, southern and western site boundaries and the scattered nature of vegetation throughout the site limits ecological connectivity with

Landscape Feature	Assessment
	the wider landscape. Furthermore, the site is encircled by a tall mesh fence (approx. 1.8m high) on all boundaries, except along the Georges River. The Georges River runs along the northern boundary of the Study Area, providing hydrological connectivity to the south-east and north-west.
Karst, Caves, Crevices, Cliffs, Rock, and other Geological Features of Significance	There are no identified karst, caves, crevices, cliffs, rock, and other geological features of significance within the Subject Site or within 100m. Some small sandstone rock outcrops are present within the site however, these are unlikely to provide habitat for threatened fauna.
Areas of Geological Significance and Soil Hazard Features	No areas of geological significance were identified within the site. The site is mapped as likely to contain Acid Sulphate Soils.
Features identified by the Secretary's Environmental Assessment Requirements (SEARs)	No SEARs apply to this proposal.
Areas of Outstanding Biodiversity Value (AOBV) under the BC Act:	No areas of AOBV are present on the Subject Site or adjacent lands.

1.3 Site Context Components

1.3.1 Method

The Subject Site layout allowed for the landscape values to be determined based upon a site-based method, rather than that of a linear method.

1.3.2 Landscape Native Vegetation Cover

The Assessment Area for this component consists of a 1500m buffer around the Subject Site, which covers approx. 1154.19ha. Within this area, approx. 597ha comprises native vegetation as per Section 4.3.2 of the BAM. This equates to approx. 52% native vegetation cover and was entered as such within the BAM Calculator. This information is used as a filter by the BAM-C to predict threatened species likely to occur or use habitat on the subject land (see BAM Subsection 5.2).

1.4 Native Vegetation

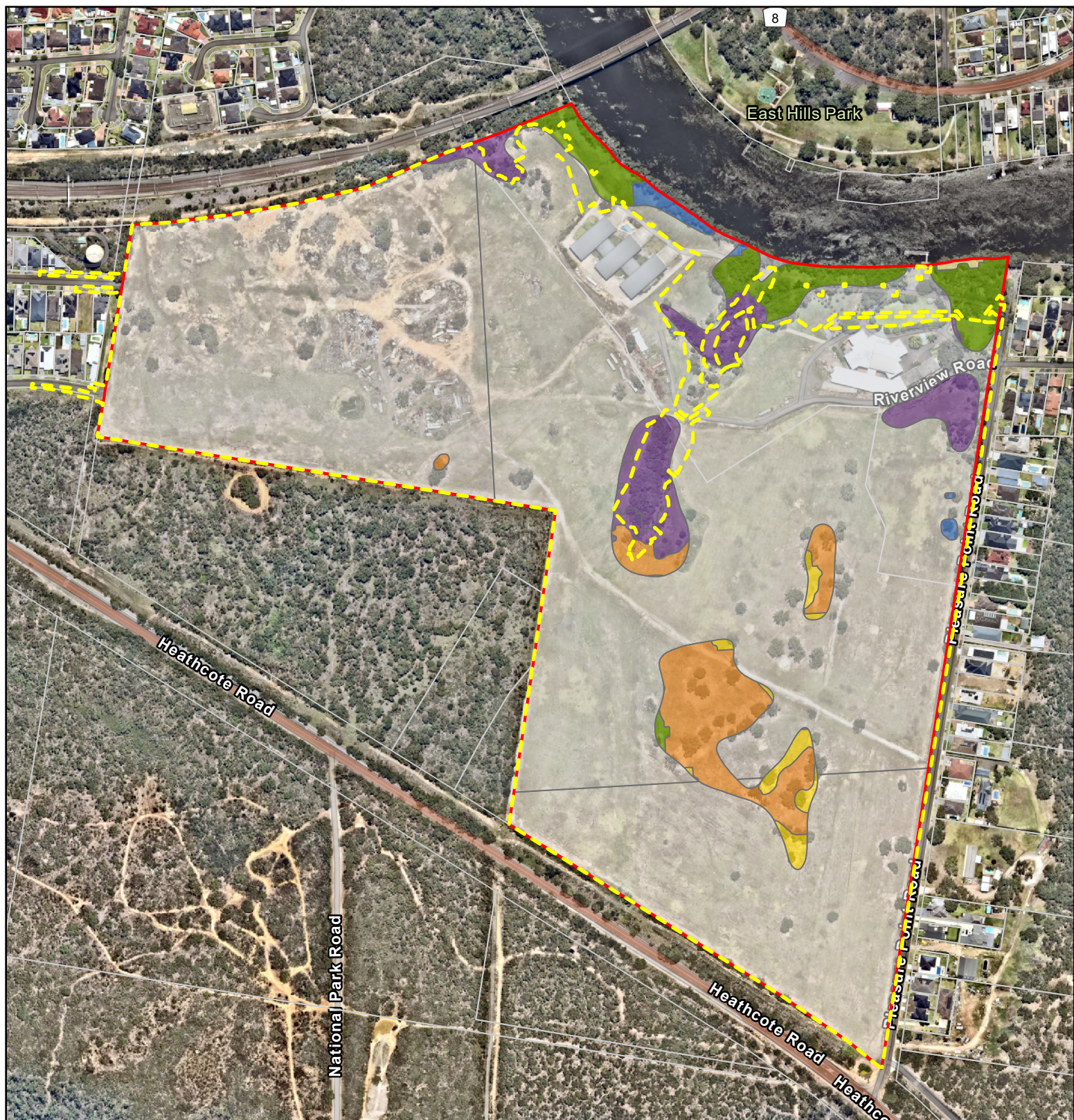
1.4.1 State Vegetation Mapping

NSW State Vegetation Type Map (SVTM, DPE 2024) shows the vegetation communities mapped within the Study Area and their extent. Details are provided in **Table 3** and **Figure 3**.

State vegetation mapping served as a basis for preliminary site assessment. Ground-truthing of vegetation by AEP was the prime source of data to inform Plant Community Type (PCT) determination in the present assessment.

Table 3: State Vegetation Type Mapping Results

PCT ID	Vegetation Community	Area (ha)
0	Not classified	34.51
3448	<i>Castlereagh Ironbark Forest</i>	0.286
3616	<i>Sydney Hinterland Grey Gum Transition Forest</i>	0.029
3619	<i>Sydney Hinterland Enriched Sandstone Bloodwood Forest</i>	1.578
3629	<i>Castlereagh Scribbly Gum Woodland</i>	0.799
4024	<i>Cumberland Blue Box Riverflat Forest</i>	1.288
4028	<i>Estuarine Swamp Oak Twig-rush Forest</i>	0.131
4059	<i>Sydney Hinterland Sandy Creekflat Shrub Forest</i>	0.721
4091	<i>Grey Mangrove-River Mangrove Forest</i>	0.028
Total		39.44



Legend

Subject Site

Study Area

Cadastre

State Vegetation Type Mapping (2024)

PCT 0 - Not classified

PCT 3448 - Castlereagh Ironbark Forest

PCT 3616 - Sydney Hinterland Grey Gum Transition Forest

PCT 3619 - Sydney Hinterland Enriched Sandstone Bloodwood Forest

PCT 3629 - Castlereagh Scribbly Gum Woodland

PCT 4024 - Cumberland Blue Box Riverflat Forest

PCT 4028 - Estuarine Swamp Oak Twig-rush Forest

PCT 4059 - Sydney Hinterland Sandy Creekflat Shrub Forest

PCT 4091 - Grey Mangrove-River Mangrove Forest

Figure 3 - SVTM

Address: Heathcote Road, Pleasure Point
Client: Hodge Developments Pty Ltd
AEP Ref: 3539 | Date: 10 April 2025

Imagery: Nearmap
Spatial Reference: GDA2020 MGA Zone 56

0 100 200
m
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.

1.4.2 Plot Based Floristic Surveys

Flora surveys were undertaken by AEP in March, July, August, September, October and December 2024 to produce a flora species list for the Subject Site and Study Area, to search specifically for threatened flora and fauna species known to occur within the wider area, and to gather data necessary to both derive vegetation community type(s) and to meet relevant survey guidelines. Works included:

- Ground-truthing of vegetation mapping to identify all vegetation communities present onsite as well as segregate vegetation zones according to condition and current management practices;
- Systematic coverage of the site using the Random Meander Technique (Cropper 1993);
- A total of nine (9) BAM plots were undertaken by AEP throughout the Study Area. An RDP was undertaken within the planted native vegetation area to clarify whether a PCT was present. Plots were located to capture the floristic structure and composition of the respective zones. Field sheets are provided in **Appendix D**. The location of BAM Plots is depicted in **Figure 7** and a summary of the flora encountered on site is provided in **Appendix B**; and,
- Targeted threatened species surveys were carried out for candidate species.

1.4.3 Plant Community Types (PCTs)

The Study Area comprises predominantly cleared land dominated by exotic species, with the majority of the site subject to regular mowing. Large remnant trees are scattered throughout the Study Area, with vegetation densest at the centre of the site associated with the central hydroline. Northern portions of the Study Area contain planted native vegetation around existing dwellings and riparian vegetation along the Georges River.

Native vegetation within the Study Area includes:

- PCT 4059: *Sydney Hinterland Sandy Creekflat Shrub Forest*;
- PCT 4028: *Estuarine Swamp Oak Twig-rush Forest*;
- PCT 4024: *Cumberland Blue Box Riverflat Forest*;
- PCT 3619: *Sydney Hinterland Grey Gum Transition Forest*;
- PCT 3616: *Sydney Hinterland Enriched Sandstone Bloodwood Forest*; and,
- Planted Native.

PCT 4059: *Sydney Hinterland Sandy Creekflat Shrub Forest*

PCT 4059 exists along the central hydroline within the Site and generally comprises a eucalypt dominated canopy with a mesic understorey that has higher floristic diversity compared to other areas of the site. A regenerating section to the south-east lacks a developed canopy layer and contains thick ferny re-growth. This PCT has therefore been assessed as occurring in two conditions within the site (Good and Degraded).

PCT 4028: *Estuarine Swamp Oak Twig-rush Forest*

A small area of PCT 4028 is present adjacent to the Georges River in the north-west of the Study Area and comprises a narrow band of vegetation dominated by *Casuarina glauca*. This PCT lies wholly outside of the Subject Site and the PCT has therefore been assigned through visual interpretation and consideration of the SVTM. This PCT is associated with State and Federally listed TECs:

- BC Act listed Endangered: *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*
- EPBC Act listed Endangered: *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community*

This PCT lies wholly outside of the Subject Site, therefore no description is provided for this vegetation zone or further assessment made, regarding the categorisation of this PCT.

PCT 4024: Cumberland Blue Box Riverflat Forest

PCT 4024 is dominated by Eucalypts and *Casuarina glauca* and is situated in the north of the Study Area along the Georges River extending slightly south along the central hydroline. The majority of this PCT has been underscrubbed and is turfed with *Cynodon dactylon*. This PCT is associated with State and Federally listed TECs:

- BC Act listed Endangered: *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*
- EPBC Act listed Critically Endangered: *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria*

PCT 3619: Sydney Hinterland Grey Gum Transition Forest

PCT 3619 is the most abundant community within the site, occurring as both scattered trees and larger patches, all of which are heavily underscrubbed and dominated by *Eucalyptus sclerophylla* and *Corymbia gummifera*.

PCT 3616: Sydney Hinterland Enriched Sandstone Bloodwood Forest

PCT 3616 exists in two patches, at the north-east and north-west of the site at a slightly lower elevation than PCT 3619. The canopy is dominated by Eucalypts with the understorey containing *Acacia binervia*, *Allocasuarina littoralis* and *Angophora bakeri*. The ground layer was grassy with a high cover of *Imperata cylindrica* and various native forbs and subshrubs throughout. This vegetation zone is disturbed through recent slashing and has been assessed as moderate condition.

Planted Native

Planted native vegetation is present at the north-east of the site, comprising a ring of planted *Waterhousea floribunda* surrounding a mown lawn.

Remainder

The remainder of the vegetation within the site comprises cleared areas dominated by non-native grassland and planted exotic trees and shrubs. These areas are discussed in **Section 1.4.4**, below.

Ground-truthed PCT mapping for the Study Area is shown in **Figure 4**. BAM plot photographs are included in **Table 9** and additional site photographs are provided in **Appendix G**.

1.4.3.1 PCT Selection Justification

The BAM's assessment module requires the identification of all PCTs (or the most likely PCTs) and all TECs, on the Subject Land (i.e. the Subject Site). The identification must be in accordance with the NSW PCT classification as described in the BioNet Vegetation Classification system. The identification of TECs must be consistent with the NSW Threatened Species Scientific Committee Final Determination for the TEC.

Diagnostic species recorded on site during field work support the determination of PCTs, in addition to analysis of the floristic composition and landscape position of the BAM plots in the community against the BioNet Vegetation Classification. The diagnostic species composition and PCT determination summary is shown in **Table 4**, below. A detailed PCT determination is provided in **Tables 5 to 8**.

Table 4: Species Data Summary for Potential PCT Determination

BAM Plot	Plots 3 & 9
Dominant Species	<i>Eucalyptus resinifera</i>
Diagnostic Species Present	Upper Stratum: <i>Eucalyptus punctata</i> , <i>Corymbia gummifera</i> , <i>Melaleuca linariifolia</i> , <i>Eucalyptus sclerophylla</i> , <i>Eucalyptus piperita</i> , <i>Eucalyptus resinifera</i>
	Mid Stratum: <i>Angophora bakeri</i> , <i>Leptospermum polygalifolium</i> , <i>Allocasuarina littoralis</i> , <i>Persoonia linearis</i> , <i>Ceratopetalum gummiferum</i> , <i>Acacia terminalis</i>
	Ground Stratum: <i>Themeda triandra</i> , <i>Pteridium esculentum</i> , <i>Imperata cylindrica</i> , <i>Lobelia purpurascens</i> , <i>Entolasia stricta</i> , <i>Microlaena stipoides</i> , <i>Entolasia marginata</i> , <i>Smilax glyciophylla</i> , <i>Lomandra longifolia</i>

Assessed PCTs	4010, 4086, 4059
PCT Determination	4059
BAM Plot	Plot 8
Dominant Species	<i>Eucalyptus baueriana</i>
Diagnostic Species Present	Upper Stratum: <i>Angophora bakeri</i> , <i>Angophora floribunda</i> , <i>Casuarina glauca</i> , <i>Eucalyptus crebra</i> , <i>Eucalyptus baueriana</i> , <i>Eucalyptus moluccana</i>
	Mid Stratum: <i>Acacia decurrens</i> , <i>Polyscias sambucifolia</i>
	Ground Stratum: <i>Cynodon dactylon</i> , <i>Cyperus gracilis</i> , <i>Entolasia marginata</i> , <i>Entolasia stricta</i> , <i>Microlaena stipoides</i>
Assessed PCTs	4025, 4023, 3321, 4024
PCT Determination	4024
BAM Plot	Plots 1 and 4
Dominant Species	<i>Eucalyptus sclerophylla</i> , <i>Corymbia gummifera</i>
Diagnostic Species Present	Upper Stratum: <i>Eucalyptus sclerophylla</i> , <i>Corymbia gummifera</i>
	Mid Stratum: <i>Acacia brownii</i> , <i>Acacia falcata</i> , <i>Acacia terminalis</i> , <i>Acacia ulicifolia</i> , <i>Banksia spinulosa</i> , <i>Bossiaea ensata</i> , <i>Dillwynia phyllicoides</i> , <i>Hovea lanceolata</i> , <i>Melaleuca nodosa</i> , <i>Micrantheum ericoides</i> , <i>Monotoca scoparia</i> , <i>Ozothamnus diosmifolius</i> , <i>Phyllanthus hirtellus</i> , <i>Pimelea linifolia</i>
	Ground Stratum: <i>Aristida vagans</i> , <i>Cymbopogon refractus</i> , <i>Cynodon dactylon</i> , <i>Echinopogon ovatus</i> , <i>Entolasia marginata</i> , <i>Entolasia stricta</i> , <i>Eragrostis brownii</i> , <i>Imperata cylindrica</i> , <i>Lomandra cylindrica</i> , <i>Lomandra filiformis</i> subsp. <i>coriacea</i> , <i>Lomandra glauca</i> , <i>Lomandra obliqua</i> , <i>Microlaena stipoides</i> , <i>Paspalum distichum</i> , <i>Rytidosperma caespitosum</i> , <i>Themeda triandra</i> , <i>Billardiera scandens</i> , <i>Grona varians</i> , <i>Hardenbergia violacea</i> , <i>Xanthorrhoea media</i>
Assessed PCTs	3448, 3616, 3619, 3629
PCT Determination	3619
BAM Plot	Plots 2 & 7
Dominant Species	<i>Eucalyptus punctata</i> , <i>Eucalyptus crebra</i> , <i>Angophora bakeri</i>
Diagnostic Species Present	Upper Stratum: <i>Acacia binervia</i> , <i>Allocasuarina littoralis</i> , <i>Angophora bakeri</i> , <i>Eucalyptus crebra</i> , <i>Eucalyptus punctata</i> , <i>Eucalyptus sclerophylla</i> , <i>Glochidion ferdinandi</i> , <i>Melia azedarach</i>
	Mid Stratum: <i>Acacia falcata</i> , <i>Acacia terminalis</i> , <i>Dillwynia retorta</i> , <i>Grevillea speciosa</i> , <i>Kunzea ambigua</i> , <i>Leptospermum trinervium</i> , <i>Micrantheum ericoides</i> , <i>Monotoca scoparia</i> , <i>Ozothamnus diosmifolius</i> , <i>Philothea myoporoides</i> , <i>Phyllanthus hirtellus</i> , <i>Pimelea linifolia</i> , <i>Polyscias sambucifolia</i> , <i>Styphelia laeta</i>
	Ground Stratum: <i>Cynodon dactylon</i> , <i>Entolasia marginata</i> , <i>Entolasia stricta</i> , <i>Imperata cylindrica</i> , <i>Lepidosperma laterale</i> , <i>Lomandra cylindrica</i> , <i>Lomandra longifolia</i> , <i>Lomandra obliqua</i> , <i>Microlaena stipoides</i> , <i>Themeda triandra</i> , <i>Centella asiatica</i> , <i>Dianella caerulea</i> , <i>Dianella revoluta</i> , <i>Gonocarpus tetragynus</i> , <i>Gonocarpus teucroides</i> , <i>Goodenia hederacea</i> , <i>Hovea linearis</i> , <i>Opercularia</i> spp., <i>Pomax umbellata</i> , <i>Tricoryne simplex</i> , <i>Asplenium flabellifolium</i> , <i>Cheilanthes sieberi</i>
Assessed PCTs	3448, 3616, 3619, 3629
PCT Determination	3616

The detailed assessment of potential PCTs and subsequent PCT determination is shown in **Tables 5 to 8**, below. Following determination of the PCTs within the Study Area, vegetation zones (refer **Table 9**, below) were identified based on the assessed condition of PCTs within the site. The PCT condition has been determined through assessment of the Vegetation Integrity Score as detailed in **Section 1.4.6** and **Table 12**.

Table 5: PCT Determination for PCT 4059 - Sydney Hinterland Sandy Creekflat Shrub Forest

Plots 3 & 9				
Potential PCTs		4086	4059	4010
PCT Name		Sydney Coastal Sandstone Riparian Scrub	Sydney Hinterland Sandy Creekflat Shrub Forest	Sydney Hinterland Creekflat Paperbark Scrub
SVTM		No	Yes – Within Subject Site	No
IBRA Region		Sydney Basin	Sydney Basin	Sydney Basin
IBRA Subregion		Cumberland; Pittwater; Sydney Cataract ; Wollemi	Cumberland; Sydney Cataract ; Yengo	Burrangorang; Sydney Cataract ; Wollemi
LGA		Blue Mountains; Campbelltown; Hawkesbury; Ku-Ring-Gai; Liverpool ; Penrith; Sutherland Shire; Wingecarribee; Wollondilly; Wollongong	Liverpool ; Sutherland Shire; The Hills Shire	Blue Mountains; Liverpool ; Wingecarribee
Present Diagnostic Species within Study Area	Tree	<i>Eucalyptus punctata</i> , <i>Acacia decurrens</i> , <i>Corymbia gummifera</i> , <i>Glochidion ferdinandi</i> , <i>Notelaea longifolia</i> , <i>Allocasuarina littoralis</i> , <i>Angophora costata</i> , <i>Ceratopetalum gummiferum</i> , <i>Eucalyptus piperita</i>	<i>Eucalyptus resinifera</i> , <i>Acacia parramattensis</i> , <i>Allocasuarina littoralis</i> , <i>Angophora floribunda</i> , <i>Angophora costata</i> , <i>Eucalyptus piperita</i> , <i>Eucalyptus punctata</i> , <i>Eucalyptus sclerophylla</i> , <i>Eucalyptus tereticornis</i> , <i>Notelaea longifolia</i> , <i>Angophora bakeri</i> , <i>Banksia integrifolia</i> , <i>Clerodendrum tomentosum</i> , <i>Eucalyptus amplifolia</i> , <i>Eucalyptus botryoides</i> <--> <i>saligna</i> , <i>Eucalyptus globoidea</i> , <i>Eucalyptus haemastoma</i> , <i>Eucalyptus pilularis</i> , <i>Tristaniopsis laurina</i>	<i>Acacia decurrens</i> , <i>Ceratopetalum gummiferum</i> , <i>Eucalyptus piperita</i> , <i>Eucalyptus punctata</i> , <i>Eucalyptus sclerophylla</i>
	Shrub	<i>Dodonaea triquetra</i> , <i>Monotoca scoparia</i> , <i>Leptospermum polygalifolium</i> , <i>Acacia terminalis</i> , <i>Acacia longifolia</i> , <i>Philotheca myoporoides</i> , <i>Kunzea ambigua</i> , <i>Leptospermum trinervium</i> , <i>Grevillea sericea</i> , <i>Hakea sericea</i> , <i>Acacia ulicifolia</i> , <i>Banksia spinulosa</i> , <i>Leptospermum squarrosum</i> , <i>Persoonia linearis</i> , <i>Phyllanthus hirtellus</i> , <i>Pimelea linifolia</i> , <i>Bossiaea heterophylla</i> , <i>Melaleuca linariifolia</i> , <i>Xylomelum pyrifolium</i>	<i>Melaleuca linariifolia</i> , <i>Dodonaea triquetra</i> , <i>Leptospermum polygalifolium</i> , <i>Acacia longifolia</i> , <i>Banksia spinulosa</i> , <i>Persoonia linearis</i> , <i>Polyscias sambucifolia</i> , <i>Hakea sericea</i> , <i>Kunzea ambigua</i> , <i>Leptospermum trinervium</i> , <i>Phyllanthus hirtellus</i> , <i>Pimelea linifolia</i>	<i>Melaleuca linariifolia</i> , <i>Dodonaea triquetra</i> , <i>Leptospermum polygalifolium</i> , <i>Leptospermum trinervium</i> , <i>Persoonia linearis</i> , <i>Pimelea linifolia</i> , <i>Polyscias sambucifolia</i>
	Grass	<i>Lepidosperma laterale</i> , <i>Entolasia stricta</i> , <i>Lomandra longifolia</i> , <i>Entolasia marginata</i> , <i>Microlaena stipoides</i> , <i>Lomandra filiformis</i> , <i>Cynodon dactylon</i> , <i>Echinopogon ovatus</i> , <i>Eragrostis brownii</i> , <i>Imperata cylindrica</i> , <i>Juncus usitatus</i> , <i>Themeda triandra</i>	<i>Imperata cylindrica</i> , <i>Microlaena stipoides</i> , <i>Lomandra longifolia</i> , <i>Entolasia marginata</i> , <i>Entolasia stricta</i> , <i>Lepidosperma laterale</i> , <i>Themeda triandra</i> , <i>Echinopogon ovatus</i>	<i>Lomandra longifolia</i> , <i>Entolasia stricta</i> , <i>Imperata cylindrica</i> , <i>Entolasia marginata</i> , <i>Microlaena stipoides</i> , <i>Echinopogon ovatus</i> , <i>Themeda triandra</i>
	Forb	<i>Gonocarpus teucrioides</i> , <i>Xanthosia pilosa</i> , <i>Dianella caerulea</i> , <i>Commelina cyanea</i> , <i>Dichondra repens</i> , <i>Gonocarpus tetragynus</i>	<i>Lobelia purpurascens</i> , <i>Dianella caerulea</i> , <i>Centella asiatica</i> , <i>Dichondra repens</i> , <i>Gonocarpus teucrioides</i> , <i>Commelina cyanea</i> , <i>Gonocarpus tetragynus</i> , <i>Pomax umbellata</i>	<i>Lobelia purpurascens</i> , <i>Dianella caerulea</i> , <i>Gonocarpus teucrioides</i> , <i>Oxalis perennans</i>
PCT Description		A very tall to extremely tall shrubland or open shrubland found on rocky creek lines or shallow alluvial soils at the base of deep sandstone gully systems incised into the coastal and hinterland plateaus of the Sydney Basin. The small tree and shrub layer has highly variable foliage cover as it is interspersed by rock pools, rock pavements and open sandy banks. It is a zone of occasional flooding and plants must survive fast-moving waters. The tallest strata almost always includes <i>Tristaniopsis laurina</i> and very frequently <i>Allocasuarina littoralis</i>, <i>Ceratopetalum apetalum</i> and <i>Leptospermum morrisonii</i>. Other common shrub species include <i>Lomatia myricoides</i>, <i>Tristania neriifolia</i> and <i>Acacia obtusifolia</i>. Small moisture-loving ferns, sedges and rushes, including <i>Lomandra fluvialis</i>, may form dense clumps on or near stream banks. Typically, this PCT forms a narrow band on either side of the stream channel and as a result has a naturally constrained extent. It is common in the mid to low elevations of the Woronora Plateau south of Sydney and is likely to be more extensive in the lower Blue Mountains and northern Sydney, where more survey sites are desirable to confirm extent. This PCT occurs at between 40-270 metres asl across moderate to high rainfall zones (840-1270 mm mean annual rainfall).	A moist shrubby sclerophyll open forest restricted to areas of damp sandy creek line colluvium/alluvium subject to intermittent waterlogging on sandstone plateaus and creek flats draining to larger rivers on northern and southern rims of the Cumberland Plain between Maroota and Heathcote. This PCT occurs at elevations of 10-200 metres asl in areas receiving 850-1100 mm mean annual rainfall. A tall to very tall tree canopy commonly includes <i>Eucalyptus resinifera</i>, occasionally with <i>Angophora floribunda</i>, along with trees more typical of adjacent drier habitats such as <i>Angophora costata</i> or <i>Eucalyptus sclerophylla</i>. A sub-canopy of scattered to dense <i>Melaleuca linariifolia</i> is almost always present, with occasional <i>Allocasuarina littoralis</i>. A mid-dense to sparse shrub stratum very frequently includes <i>Dodonaea triquetra</i>, commonly with scattered <i>Leptospermum polygalifolium</i>, and occasionally with tall <i>Acacia</i> species (<i>Acacia floribunda</i>, <i>Acacia parramattensis</i>, <i>Acacia longifolia</i>) or <i>Bursaria spinosa</i>. A mid-dense to dense ground layer is typically dominated by grasses and ferns. Grasses almost always include <i>Microlaena stipoides</i> and <i>Imperata cylindrica</i>, commonly with <i>Poa affinis</i>, <i>Entolasia marginata</i>, <i>Echinopogon caespitosus</i> and <i>Oplismenus aemulus</i>. Ferns almost always include <i>Pteridium esculentum</i>, commonly with <i>Adiantum aethiopicum</i> and occasionally <i>Calochlaena dubia</i> or <i>Hypolepis muelleri</i>. Graminoids and forbs very frequently include <i>Lobelia purpurascens</i>, <i>Lomandra longifolia</i>, <i>Schoenus melanostachys</i> and <i>Dianella caerulea</i>, commonly with <i>Centella asiatica</i>, <i>Billardiera scandens</i>, <i>Lepidosperma laterale</i> and <i>Glycine microphylla</i>. This community may be subject to disturbance by weed invasion and altered hydrology where it occurs near roads and drainage structures.	This placeholder PCT is defined from six plots on sandy alluvial soils along creeks exiting low elevation sandstone plateaus in the Sydney hinterland. Caution is required in the evaluation and assignment of new plots to this PCT. On present knowledge it may be described as a low to mid-high <i>Melaleuca</i> open forest and is restricted to several creeks in the northern Holsworthy area near the Georges River and an outlying location in a gully head near Blaxland in the Lower Blue Mountains. The mid-dense to dense tree canopy consists of <i>Melaleuca linariifolia</i> with occasional eucalypt emergents including very tall <i>Eucalyptus botryoides</i> - <i>saligna</i> hybrid, <i>Eucalyptus piperita</i> or <i>Eucalyptus sclerophylla</i>. The mid-dense shrub layer that include species tolerant of periodically damp soils that include <i>Callistemon citrinus</i>, <i>Leptospermum polygalifolium</i> and <i>Leptospermum juniperinum</i> as well as a suite of <i>Acacia</i> species. The ground layer is dense and consists of sedges and ferns and a sparse cover of grasses. Species include <i>Gahnia sieberiana</i>, <i>Machaerina rubiginosa</i>, <i>Eleocharis sphacelata</i>, <i>Calochlaena dubia</i>, <i>Pteridium esculentum</i>, <i>Adiantum aethiopicum</i> and <i>Entolasia stricta</i>. This community is recorded at below 200 metres asl, with most plots located below 50 metres asl. It is weakly related to other PCTs in the forested wetland class. It is likely that the current samples underestimate the extent of the PCT across low-lying sandy alluviums across the Sydney hinterland.

Plots 3 & 9			
Potential PCTs	4086	4059	4010
Other Diagnostic Features	Not Specified	Not Specified	Not Specified
Vegetation Formation	Forested Wetlands	Forested Wetlands	Forested Wetlands
Vegetation Class	Eastern Riverine Forests	Coastal Floodplain Wetlands	Coastal Swamp Forests
Geographical Restrictions	Common in the mid to low elevations of the Woronora Plateau. More extensive in the lower Blue Mountains and northern Sydney.	Occurs on northern and southern rims of the Cumberland Plain between Maroota and Heathcote.	Sydney hinterland; northern Holsworthy area near the Georges River and an outlying location in a gully head near Blaxland in the Lower Blue Mountains.
Landscape Position	Not Specified	Not Specified	Not Specified
Elevation	26m to 399m	0m to 175m	12m to 514m
Lithology	Not Specified	Not Specified	Not Specified
Rainfall (Median)	963mm	962mm	920mm
PCT Determination	PCT 4086 has poor floristic overlap with assessed vegetation except for <i>Allocasuarina littoralis</i> which was observed in the assessed vegetation but not in the tallest strata which contained taller Eucalyptus species. This PCT is found in deep gullies sandy gullies which does match the landform of this vegetation zone. Therefore, PCT 4086 was not chosen as best match for the assessed vegetation.	This PCT has a strong floristic overlap with the assessed vegetation, the PCT is characterised as having a moist shrubby understorey with a canopy frequently containing <i>Eucalyptus resinifera</i> with <i>Angophora costata</i> and <i>Eucalyptus sclerophylla</i> , a sub canopy of <i>Melaleuca linearifolia</i> and occasional <i>Allocasuarina littoralis</i> , this description matches with the assessed vegetation except for <i>Angophora costata</i> which was absent. The PCT is known to be restricted to sandy alluvial or colluvial creeklines that flow into larger river near the edges of the Cumberland Plain, in this case the Georges River. This description perfectly matches the lithology and landscape position of the vegetation zone. Therefore, PCT 4059 was selected as best match PCT for the assessed vegetation.	PCT 4010 has poor floristic overlap with the assessed vegetation. Despite having a number of upper stratum species in common, the assessed vegetation comprises a full eucalypt canopy in contrast to PCT 4010 which contains occasional emergent eucalypts. There is a moderate lithology and landscape position match, being on sandy creekline alluvium in the Sydney Hinterland. This PCT was not chosen as best match for the assessed vegetation.
Result	PCT 4059		
Estimated Cleared Value of PCT (%)	92.31		
Associated TECs	None		

Table 6: PCT Determination for PCT 4024: Cumberland Blue Box Riverflat Forest

Plot 8						
Potential PCTs		3321	4023	4024	4025	
PCT Name		Cumberland Shale-Sandstone Ironbark Forest	Coastal Valleys Riparian Forest	Cumberland Blue Box Riverflat Forest	Cumberland Red Gum Riverflat Forest	
SVTM		No	No	Yes – Within Subject Site	No	
IBRA Region		Sydney Basin	Sydney Basin	Sydney Basin	Sydney Basin	
IBRA Subregion		Burragorang; Cumberland; Sydney Cataract ; Wollemi; Yengo	Cumberland; Hunter	Cumberland; Sydney Cataract	Burragorang; Cumberland; Yengo	
LGA		Blue Mountains; Campbelltown; Central Coast; Hawkesbury; Hornsby; Liverpool ; Penrith; Sutherland Shire; The Hills Shire; Wingecarribee; Wollondilly	Blacktown; Camden; Cessnock; Liverpool ; Penrith; Singleton; The Hills Shire	Camden; Canterbury-Bankstown; Hawkesbury; Liverpool ; Sutherland Shire	Blacktown; Camden; Campbelltown; Fairfield; Hawkesbury; Liverpool ; City of Parramatta; Penrith; Ryde; The Hills Shire; Wollondilly	
Present Diagnostic Species within Study Area		Tree	<i>Eucalyptus sclerophylla</i> , <i>Melia azedarach</i> , <i>Eucalyptus baueriana</i> , <i>Eucalyptus piperita</i> , <i>Eucalyptus punctata</i> , <i>Eucalyptus crebra</i> , <i>Allocasuarina littoralis</i> , <i>Eucalyptus globoidea</i> , <i>Acacia decurrens</i> , <i>Notelaea longifolia</i> , <i>Angophora bakeri</i> , <i>Corymbia gummifera</i> , <i>Angophora floribunda</i> , <i>Acacia binervia</i> , <i>Eucalyptus resinifera</i> , <i>Angophora costata</i> , <i>Glochidion ferdinandi</i> , <i>Eucalyptus moluccana</i>	<i>Casuarina glauca</i> , <i>Eucalyptus moluccana</i> , <i>Acacia decurrens</i> , <i>Angophora floribunda</i> , <i>Eucalyptus crebra</i>	<i>Acacia decurrens</i> , <i>Angophora floribunda</i> , <i>Eucalyptus baueriana</i> , <i>Casuarina glauca</i> , <i>Eucalyptus crebra</i> , <i>Eucalyptus moluccana</i> , <i>Notelaea longifolia</i> , <i>Allocasuarina littoralis</i>	<i>Acacia decurrens</i> , <i>Angophora floribunda</i> , <i>Eucalyptus moluccana</i> , <i>Eucalyptus crebra</i> , <i>Casuarina glauca</i> , <i>Notelaea longifolia</i> , <i>Eucalyptus baueriana</i> , <i>Allocasuarina littoralis</i> , <i>Eucalyptus punctata</i> , <i>Melia azedarach</i> , <i>Eucalyptus globoidea</i> , <i>Eucalyptus sclerophylla</i> , <i>Angophora bakeri</i> , <i>Eucalyptus piperita</i>
		Shrub	<i>Persoonia linearis</i> , <i>Ozothamnus diosmifolius</i> , <i>Phyllanthus hirtellus</i> , <i>Kunzea ambigua</i> , <i>Lissanthe strigosa</i> , <i>Pimelea linifolia</i> , <i>Dodonaea triquetra</i> , <i>Acacia ulicifolia</i> , <i>Acacia longifolia</i> , <i>Leptospermum trinervium</i> , <i>Acacia falcata</i> , <i>Acacia terminalis</i> , <i>Polyscias sambucifolia</i> , <i>Leptospermum polygalifolium</i> , <i>Hakea sericea</i> , <i>Dillwynia retorta</i> , <i>Lomatia silaifolia</i> , <i>Melaleuca nodosa</i> , <i>Acacia brownii</i> , <i>Melaleuca linariifolia</i> , <i>Banksia spinulosa</i> , <i>Micrantheum ericoides</i> , <i>Monotoca scoparia</i> , <i>Styphelia laeta</i> , <i>Xylomelum pyriforme</i>	<i>Melaleuca linariifolia</i> , <i>Ozothamnus diosmifolius</i> , <i>Phyllanthus hirtellus</i>	<i>Melaleuca linariifolia</i> , <i>Ozothamnus diosmifolius</i> , <i>Phyllanthus hirtellus</i>	<i>Ozothamnus diosmifolius</i> , <i>Kunzea ambigua</i> , <i>Melaleuca linariifolia</i> , <i>Polyscias sambucifolia</i> , <i>Lissanthe strigosa</i> , <i>Melaleuca nodosa</i> , <i>Leptospermum polygalifolium</i> , <i>Persoonia linearis</i> , <i>Acacia falcata</i> , <i>Hakea sericea</i> , <i>Leptospermum trinervium</i>
		Grass	<i>Microlaena stipoides</i> , <i>Entolasia stricta</i> , <i>Aristida vagans</i> , <i>Lepidosperma laterale</i> , <i>Themeda triandra</i> , <i>Lomandra filiformis</i> , <i>Lomandra longifolia</i> , <i>Entolasia marginata</i> , <i>Cymbopogon refractus</i> , <i>Eragrostis brownii</i> , <i>Echinopogon ovatus</i> , <i>Imperata cylindrica</i> , <i>Lomandra obliqua</i> , <i>Lomandra cylindrica</i> , <i>Lomandra glauca</i> , <i>Lomandra gracilis</i> , <i>Cyperus gracilis</i> , <i>Rytidosperma caespitosum</i> , <i>Cynodon dactylon</i> , <i>Juncus usitatus</i>	<i>Microlaena stipoides</i> , <i>Echinopogon ovatus</i> , <i>Cynodon dactylon</i> , <i>Entolasia marginata</i> , <i>Juncus usitatus</i> , <i>Aristida vagans</i> , <i>Eragrostis brownii</i> , <i>Lomandra longifolia</i> , <i>Themeda triandra</i> , <i>Cyperus gracilis</i> , <i>Entolasia stricta</i> , <i>Lomandra filiformis</i> , <i>Cymbopogon refractus</i> , <i>Paspalum distichum</i>	<i>Entolasia marginata</i> , <i>Microlaena stipoides</i> , <i>Cynodon dactylon</i> , <i>Echinopogon ovatus</i> , <i>Lomandra longifolia</i> , <i>Entolasia stricta</i> , <i>Cymbopogon refractus</i> , <i>Juncus usitatus</i> , <i>Lepidosperma laterale</i> , <i>Aristida vagans</i> , <i>Imperata cylindrica</i> , <i>Themeda triandra</i>	<i>Microlaena stipoides</i> , <i>Entolasia marginata</i> , <i>Echinopogon ovatus</i> , <i>Themeda triandra</i> , <i>Lomandra longifolia</i> , <i>Cynodon dactylon</i> , <i>Cyperus gracilis</i> , <i>Lomandra filiformis</i> , <i>Juncus usitatus</i> , <i>Aristida vagans</i> , <i>Entolasia stricta</i> , <i>Eragrostis brownii</i> , <i>Cymbopogon refractus</i> , <i>Imperata cylindrica</i> , <i>Lepidosperma laterale</i> , <i>Rytidosperma caespitosum</i> , <i>Lomandra cylindrica</i> , <i>Lomandra gracilis</i>
		Forb	<i>Lobelia purpurascens</i> , <i>Pomax umbellata</i> , <i>Dichondra repens</i> , <i>Dianella revoluta</i> , <i>Dianella caerulea</i> , <i>Goodenia hederacea</i> , <i>Gonocarpus tetragynus</i> , <i>Oxalis perennans</i> , <i>Centella asiatica</i> , <i>Commelina cyanea</i> , <i>Gonocarpus teucrioides</i> , <i>Hovea linearis</i> , <i>Trachymene incisa subsp. incisa</i> , <i>Xanthosia pilosa</i> , <i>Einadia trigonos</i> , <i>Tricoryne simplex</i>	<i>Dichondra repens</i> , <i>Lobelia purpurascens</i> , <i>Oxalis perennans</i> , <i>Centella asiatica</i> , <i>Commelina cyanea</i> , <i>Einadia trigonos</i> , <i>Trachymene incisa subsp. incisa</i>	<i>Lobelia purpurascens</i> , <i>Dichondra repens</i> , <i>Commelina cyanea</i> , <i>Centella asiatica</i> , <i>Dianella caerulea</i> , <i>Dianella revoluta</i> , <i>Gonocarpus tetragynus</i> , <i>Gonocarpus teucrioides</i> , <i>Oxalis perennans</i>	<i>Dichondra repens</i> , <i>Lobelia purpurascens</i> , <i>Oxalis perennans</i> , <i>Commelina cyanea</i> , <i>Centella asiatica</i> , <i>Einadia trigonos</i> , <i>Dianella caerulea</i> , <i>Goodenia hederacea</i> , <i>Pomax umbellata</i> , <i>Gonocarpus tetragynus</i> , <i>Tricoryne simplex</i>
PCT Description		A tall sclerophyll open forest with a mid-stratum of dry and soft-leaved shrubs or small trees and a ground cover of grasses and graminoids found on the fringes of the Cumberland Plain in the Sydney Basin. It is one of a suite of forests that are associated with the subtle	A tall Casuarina open forest with a dense grassy ground layer that is found adjacent to streams or on river flats, primarily in the South Creek catchment of the Cumberland Plain to the west of Sydney and from Ellalong to north of Rothbury in the central Hunter valley. The canopy is one of the distinguishing features of this PCT, very frequently including a high cover of	A tall sclerophyll open forest with soft-leaved shrubs, small trees and Melaleucas with a grassy ground cover situated on the alluvial flats below 30 metres asl alongside the Georges River near Voyagers Point with smaller occurrences at Cobbitty and Richmond on the Hawkesbury-Nepean river systems.	A tall to extremely tall sclerophyll open forest with a mid-stratum of soft-leaved shrubs and small trees and dense, grassy ground layer situated on the alluvial flats alongside streams that drain the Cumberland Plain or more rarely the broad alluvial flats of the	

Plot 8				
Potential PCTs	3321	4023	4024	4025
	intergrade between clay-rich shale soil and the coarse sandy substrates of the sandstone plateau. The canopy almost always includes ironbark eucalypts (<i>Eucalyptus crebra</i>, <i>Eucalyptus fibrosa</i>) and commonly <i>Eucalyptus punctata</i> and stringybark eucalypts (<i>Eucalyptus globoidea</i> or <i>Eucalyptus eugenioides</i>). A sparse small tree layer almost always includes one or more <i>Acacia</i> species, of which <i>Acacia parramattensis</i> and <i>Acacia decurrens</i> are the most frequent and abundant, commonly with <i>Allocasuarina littoralis</i> or <i>Allocasuarina torulosa</i>. The shrub layer includes a mix of species that typically occur on sandstone soils and shale substrates. The sandstone shrubs very frequently include <i>Persoonia linearis</i> and shale species commonly include <i>Bursaria spinosa</i> and <i>Leucopogon juniperinus</i>. The mid-dense ground layer typically consists of graminoids, forbs and hardy ferns, and very frequently includes <i>Microlaena stipoides</i>, <i>Lobelia purpurascens</i>, <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>, <i>Entolasia stricta</i>, <i>Aristida vagans</i>, <i>Lepidosperma laterale</i>, <i>Themeda triandra</i> and <i>Lomandra multiflora</i> subsp. <i>multiflora</i>. This PCT occurs in a warm, moist climate on the western edge of the Woronora Plateau, on the rim of the Nepean and Georges rivers, along the edge of the Lapstone Monocline and in Hawkesbury and The Hills local government areas. It is floristically related to PCT 3448 which differs in that <i>Eucalyptus fibrosa</i> and melaleucas (<i>Melaleuca decora</i> or <i>Melaleuca nodosa</i>) are almost always present, and it is primarily found on Tertiary alluvium or shale-gravel soils. There is much gradation between these PCTs, especially in the northern Holsworthy. On soil where shale has a lesser influence on the vegetation composition, this PCT grades into either PCT 3616 or 3619, in which ironbarks, <i>Bursaria spinosa</i> and soft ground covers such as <i>Lobelia purpurascens</i>, <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> and <i>Dichondra repens</i> are less frequent than in this PCT. Trees, shrubs and hardier groundcovers that are more frequent in PCT 3616 include <i>Eucalyptus punctata</i>, <i>Corymbia gummifera</i>, <i>Leptospermum trinervium</i> and <i>Acacia linifolia</i>, <i>Lomandra obliqua</i> and <i>Cyathochaeta diandra</i>. <i>Corymbia gummifera</i> is very frequent in PCT 3619 which also includes sandstone heath species and hardier groundcovers such as <i>Banksia spinulosa</i>, <i>Persoonia levis</i>, <i>Lambertia formosa</i>, <i>Lomandra obliqua</i> and <i>Cyathochaeta diandra</i>. With a greater shale influence, this PCT grades into PCT 3320 which includes <i>Eucalyptus tereticornis</i> and <i>Eucalyptus moluccana</i> in its canopy.	relatively young <i>Casuarina glauca</i> amongst a mix of old and young eucalypts, commonly red gums (<i>Eucalyptus amplifolia</i> and <i>Eucalyptus tereticornis</i>) or occasionally <i>Eucalyptus moluccana</i>. The only common species in the sparse shrub layer is <i>Bursaria spinosa</i>. There is a dense ground cover, typical of river flat forests, that is typically comprised of grasses, forbs, twiners and ferns. A high cover of <i>Microlaena stipoides</i> is almost always present, with more scattered <i>Brunoniella australis</i> and <i>Dichondra repens</i> being very frequent. Common ground covers include <i>Solanum prinophyllum</i>, <i>Glycine tabacina</i>, <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>, <i>Oplismenus aemulus</i> and <i>Lobelia purpurascens</i>. It is possible that this PCT represents a successional state in a community that is re-establishing following clearing. In addition, the dominance of the salt tolerant <i>Casuarina glauca</i> may indicate saline conditions. This PCT typically occurs at elevations below 70 metres asl in a hot, dry climate. On broader floodplains of the Cumberland Plain, it grades into PCT 4025, which rarely includes <i>Casuarina glauca</i> however nevertheless has considerable floristic overlap with this PCT. Near the edge of the floodplain, it adjoins the grassy forests of either the Cumberland Plain (PCT 3320) or the Hunter valley (PCT 3315). Again, <i>Casuarina glauca</i> is rare in these PCTs.	The canopy very frequently includes <i>Eucalyptus baueriana</i> and <i>Angophora floribunda</i>, commonly associated with <i>Eucalyptus tereticornis</i>. The open to mid-dense mid-stratum is layered and almost always includes acacias and very frequently melaleucas, the most frequent of which are <i>Acacia decurrens</i>, <i>Melaleuca nodosa</i>, <i>Melaleuca decora</i> and <i>Melaleuca styphelioides</i>. Scattered individuals of <i>Casuarina glauca</i>, <i>Exocarpos cupressiformis</i>, <i>Bursaria spinosa</i> and <i>Ozothamnus diosmifolius</i> commonly complete the mid-stratum. The ground layer is typically characterised by a dense cover of grasses, soft-leaved forbs and ferns that almost always includes <i>Microlaena stipoides</i> and <i>Entolasia marginata</i>. Common ground covers include <i>Cynodon dactylon</i>, <i>Echinopogon ovatus</i>, <i>Lobelia purpurascens</i>, <i>Pteridium esculentum</i>, <i>Dichondra repens</i>, <i>Einadia hastata</i>, <i>Glycine clandestina</i>, <i>Lomandra longifolia</i> and <i>Echinopogon caespitosus</i>. This PCT typically occurs at elevations of below 30 metres asl in a warm, moist climate, often in small, disturbed patches situated in an urban matrix. It has floristic overlap with PCT 4025 however <i>Eucalyptus baueriana</i> and species such as <i>Casuarina glauca</i> and <i>Cynodon dactylon</i> are rare in that PCT.	Hawkesbury and Nepean river systems to the west of Sydney. The canopy almost always includes red gums (<i>Eucalyptus tereticornis</i>, <i>Eucalyptus amplifolia</i>), occasionally associated with an apple (<i>Angophora floribunda</i>, <i>Angophora subvelutina</i>), which may be locally prominent. A sparse mid-stratum almost always includes <i>Bursaria spinosa</i> and one or more <i>Acacia</i> species, of which <i>Acacia parramattensis</i> is the most frequent and abundant. The ground layer is typically characterised by a dense cover of grasses along with soft-leaved forbs and ferns. A high cover of <i>Microlaena stipoides</i> is almost always present with more scattered <i>Dichondra repens</i>, <i>Oplismenus aemulus</i> and <i>Solanum prinophyllum</i> being very frequent. The largest remaining areas are situated along the smaller streams and, while widespread, this PCT primarily occurs in small, often disturbed patches and is threatened by ongoing weed invasion following flood events. It typically occurs in a warm, moist climate at low elevation with a mean of 60 metres asl, however may occur up to 320 metres in southern parts of the Cumberland Plain. Where saline soils occur on the floodplain, this PCT grades into PCT 4023 which includes <i>Casuarina glauca</i> in its canopy. Where the floodplain narrows in valleys with sandstone escarpments upslope, it grades into PCT 4058 which includes a wider range of shrubs and scramblers including <i>Sigesbeckia orientalis</i> subsp. <i>orientalis</i>, <i>Breynia oblongifolia</i> and <i>Rubus parvifolius</i>. As elevation or distance from the margin of the floodplain increases, this PCT grades into grassy woodlands of the Cumberland Plain (PCT 3320) in which <i>Eucalyptus moluccana</i> is common.

Plot 8				
Potential PCTs	3321	4023	4024	4025
Other Diagnostic Features	Not Specified	Not Specified	Not Specified	Not Specified
Vegetation Formation	Grassy Woodlands	Forested Wetlands	Forested Wetlands	Forested Wetlands
Vegetation Class	Coastal Valley Grassy Woodlands	Coastal Floodplain Wetlands	Coastal Floodplain Wetlands	Coastal Floodplain Wetlands
Geographical Restrictions	Occurs on the fringes of the Cumberland Plain in the Sydney Basin	Occurs in the South Creek catchment of the Cumberland Plain to the west of Sydney and from Ellalong to north of Rothbury in the central Hunter valley	Occurs alongside the Georges River near Voyagers Point with smaller occurrences at Cobbitty and Richmond on the Hawkesbury-Nepean river systems	Occurs alongside streams that drain the Cumberland Plain or more rarely the Hawkesbury and Nepean river systems to the west of Sydney
Landscape Position	Not Specified	Not Specified	Not Specified	Not Specified
Elevation	10m to 516m	20m to 114m	1m to 59m	3m to 328m
Lithology	Not Specified	Not Specified	Not Specified	Not Specified
Rainfall (Median)	884mm	807mm	890mm	836mm
PCT Determination	This PCT has some floristic similarities to the assessed vegetation including canopy species presence such as <i>Eucalyptus moluccana</i> , <i>Eucalyptus tereticornis</i> , <i>Eucalyptus crebra</i> , <i>Eucalyptus baueriana</i> and <i>Angophora floribunda</i> . However, the lithology and landscape position are poor matches, this vegetation zone occurs on quaternary alluvial flats and not on transitional soils that occur on the intergrade between shale and sandstone lithologies. Therefore PCT 3312 was not chosen as best match for the assessed vegetation.	This PCT has a strong floristic overlap with the assessed vegetation except that this PCT is defined by high cover of <i>Casuarina glauca</i> which only occurs sparsely in this vegetation zone except at the banks of the Georges River. The landscape position and lithology are a match. However, this PCT is not known to occur within the Sydney Cataract IBRA Subregion and was therefore not chosen as best match for the assessed vegetation.	This PCT has a strong overlap of canopy species with assessed vegetation, including <i>Eucalypts baueriana</i> , <i>Angophora floribunda</i> , <i>Casuarina glauca</i> , <i>Eucalyptus crebra</i> <i>Eucalyptus tereticornis</i> and <i>Acacia decurrens</i> . This PCT is defined as being dominated by <i>Eucalyptus baueriana</i> as was the assessed vegetation. The lithology and landscape position overlap is strong being situated on the alluvial flats of the Georges River. For these reasons, PCT 4024 was chosen as best match PCT for the assessed vegetation.	This PCT has strong floristic overlap with the assessed vegetation aside from <i>Casuarina glauca</i> which is not known to occur within this PCT, the lithology and landscape position are also a match. However, this PCT is not known to occur within the Sydney Cataract IBRA Subregion and was therefore not chosen as best match for the assessed vegetation.
Result	PCT 4024			
Estimated Cleared Value of PCT (%)	98.88			
Associated TECs	BC Act-listed EEC: <i>River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i> EPBC Act-listed CEEC: <i>River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria</i>			

Table 7: PCT Determination for PCT 3619: Sydney Hinterland Grey Gum Transition Forest

		Plots 1 & 4			
Potential PCTs		3448	3616	3619	3629
PCT Name		Castlereagh Ironbark Forest	Sydney Hinterland Grey Gum Transition Forest	Sydney Hinterland Enriched Sandstone Bloodwood Forest	Castlereagh Scribbly Gum Woodland
SVTM		Yes – Within Subject Site	Yes – Within Subject Site	Yes – Within Subject Site	Yes – Within Subject Site
IBRA Region		Sydney Basin	Sydney Basin	Sydney Basin	Sydney Basin
IBRA Subregion		Cumberland; Sydney Cataract ; Wollemi; Yengo	Burraborang; Cumberland; Sydney Cataract ; Wollemi; Yengo	Burraborang; Cumberland; Sydney Cataract ; Wollemi; Yengo; Pittwater	Cumberland; Sydney Cataract ; Wollemi
LGA		Blacktown; Blue Mountains; Campbelltown; Canterbury-Bankstown; Cumberland; Hawkesbury; Hornsby; Liverpool ; City of Parramatta; Penrith; Sutherland Shire; Wollondilly	Blue Mountains; Campbelltown; Hawkesbury; Hornsby; Liverpool ; Penrith; Sutherland Shire; The Hills Shire; Wingecarribee; Wollondilly	Blue Mountains; Campbelltown; Canterbury-Bankstown; Hornsby; Liverpool ; City of Parramatta; Penrith; Sutherland Shire; The Hills Shire; Wingecarribee; Wollondilly; Ryde	Blacktown; Cumberland; Hawkesbury; Liverpool ; Penrith; Wollondilly
Present Diagnostic Species within Study Area	Tree	<i>Allocasuarina littoralis</i> , <i>Eucalyptus crebra</i> , <i>Acacia decurrens</i> , <i>Eucalyptus globoidea</i> , <i>Eucalyptus moluccana</i> , <i>Eucalyptus punctata</i> , <i>Notelaea longifolia</i> , <i>Angophora bakeri</i> , <i>Eucalyptus sclerophylla</i> , <i>Angophora floribunda</i> , <i>Corymbia gummifera</i> , <i>Eucalyptus resinifera</i> , <i>Melia azedarach</i> , <i>Acacia binervia</i> , <i>Angophora costata</i> , <i>Casuarina glauca</i>	<i>Eucalyptus punctata</i> , <i>Corymbia gummifera</i> , <i>Allocasuarina littoralis</i> , <i>Angophora bakeri</i> , <i>Angophora costata</i> , <i>Eucalyptus sclerophylla</i> , <i>Eucalyptus crebra</i> , <i>Eucalyptus globoidea</i> , <i>Eucalyptus resinifera</i> , <i>Notelaea longifolia</i> , <i>Acacia decurrens</i> , <i>Eucalyptus piperita</i> , <i>Angophora floribunda</i> , <i>Ceratopetalum gummiferum</i> , <i>Acacia binervia</i> , <i>Glochidion ferdinandi</i> , <i>Melia azedarach</i>	<i>Corymbia gummifera</i> , <i>Eucalyptus punctata</i> , <i>Allocasuarina littoralis</i> , <i>Angophora costata</i> , <i>Eucalyptus sclerophylla</i> , <i>Eucalyptus globoidea</i> , <i>Angophora bakeri</i> , <i>Eucalyptus piperita</i> , <i>Eucalyptus resinifera</i> , <i>Notelaea longifolia</i> , <i>Ceratopetalum gummiferum</i> , <i>Acacia decurrens</i> , <i>Angophora floribunda</i> , <i>Eucalyptus crebra</i>	<i>Eucalyptus sclerophylla</i> , <i>Angophora bakeri</i> , <i>Allocasuarina littoralis</i> , <i>Corymbia gummifera</i> , <i>Eucalyptus globoidea</i> , <i>Angophora floribunda</i> , <i>Casuarina glauca</i>
	Shrub	<i>Lissanthe strigosa</i> , <i>Acacia falcata</i> , <i>Melaleuca nodosa</i> , <i>Ozothamnus diosmifolius</i> , <i>Phyllanthus hirtellus</i> , <i>Pimelea linifolia</i> , <i>Persoonia linearis</i> , <i>Kunzea ambigua</i> , <i>Hakea sericea</i> , <i>Acacia ulicifolia</i> , <i>Leptospermum trinervium</i> , <i>Polyscias sambucifolia</i> , <i>Dodonaea triquetra</i> , <i>Acacia brownii</i> , <i>Dillwynia retorta</i> , <i>Acacia longifolia</i> , <i>Melaleuca linariifolia</i> , <i>Styphelia laeta</i> , <i>Acacia myrtifolia</i> , <i>Acacia terminalis</i> , <i>Monotoca scoparia</i> , <i>Banksia spinulosa</i> , <i>Dillwynia phyllicoides</i> , <i>Grevillea sericea</i>	<i>Phyllanthus hirtellus</i> , <i>Persoonia linearis</i> , <i>Leptospermum trinervium</i> , <i>Pimelea linifolia</i> , <i>Lissanthe strigosa</i> , <i>Acacia ulicifolia</i> , <i>Banksia spinulosa</i> , <i>Kunzea ambigua</i> , <i>Acacia terminalis</i> , <i>Hakea sericea</i> , <i>Lomatia silaifolia</i> , <i>Monotoca scoparia</i> , <i>Dillwynia retorta</i> , <i>Ozothamnus diosmifolius</i> , <i>Dodonaea triquetra</i> , <i>Acacia myrtifolia</i> , <i>Xylomelum pyriforme</i> , <i>Acacia longifolia</i> , <i>Acacia brownii</i> , <i>Acacia falcata</i> , <i>Leptospermum polygalifolium</i> , <i>Grevillea sericea</i> , <i>Styphelia laeta</i> , <i>Melaleuca nodosa</i> , <i>Polyscias sambucifolia</i> , <i>Bossiaea heterophylla</i> , <i>Micrantheum ericoides</i> , <i>Acacia hispidula</i> , <i>Dillwynia floribunda</i> , <i>Dillwynia phyllicoides</i> , <i>Bossiaea ensata</i> , <i>Hovea lanceolata</i> , <i>Melaleuca linariifolia</i> , <i>Philotheca myoporoides</i> , <i>Ricinocarpus pinifolius</i>	<i>Banksia spinulosa</i> , <i>Phyllanthus hirtellus</i> , <i>Leptospermum trinervium</i> , <i>Acacia ulicifolia</i> , <i>Pimelea linifolia</i> , <i>Lomatia silaifolia</i> , <i>Hakea sericea</i> , <i>Lissanthe strigosa</i> , <i>Persoonia linearis</i> , <i>Monotoca scoparia</i> , <i>Acacia myrtifolia</i> , <i>Acacia terminalis</i> , <i>Dillwynia retorta</i> , <i>Grevillea sericea</i> , <i>Bossiaea heterophylla</i> , <i>Xylomelum pyriforme</i> , <i>Micrantheum ericoides</i> , <i>Kunzea ambigua</i> , <i>Dodonaea triquetra</i> , <i>Leptospermum polygalifolium</i> , <i>Acacia longifolia</i> , <i>Dillwynia phyllicoides</i> , <i>Acacia brownii</i> , <i>Ozothamnus diosmifolius</i> , <i>Acacia hispidula</i> , <i>Bossiaea ensata</i> , <i>Dillwynia floribunda</i> , <i>Melaleuca nodosa</i> , <i>Styphelia laeta</i> , <i>Acacia falcata</i> , <i>Polyscias sambucifolia</i> , <i>Ricinocarpus pinifolius</i>	<i>Pimelea linifolia</i> , <i>Hakea sericea</i> , <i>Melaleuca nodosa</i> , <i>Banksia spinulosa</i> , <i>Leptospermum trinervium</i> , <i>Acacia brownii</i> , <i>Lissanthe strigosa</i> , <i>Leptospermum polygalifolium</i> , <i>Phyllanthus hirtellus</i> , <i>Acacia falcata</i> , <i>Ozothamnus diosmifolius</i> , <i>Persoonia linearis</i> , <i>Grevillea sericea</i> , <i>Dillwynia floribunda</i> , <i>Kunzea ambigua</i> , <i>Acacia longifolia</i> , <i>Acacia ulicifolia</i> , <i>Bossiaea heterophylla</i> , <i>Styphelia laeta</i> , <i>Acacia myrtifolia</i> , <i>Leptospermum squarrosum</i> , <i>Micrantheum ericoides</i> , <i>Monotoca scoparia</i> , <i>Ricinocarpus pinifolius</i>
	Grass	<i>Entolasia stricta</i> , <i>Aristida vagans</i> , <i>Microlaena stipoides</i> , <i>Lepidosperma laterale</i> , <i>Themeda triandra</i> , <i>Lomandra filiformis</i> , <i>Eragrostis brownii</i> , <i>Echinopogon ovatus</i> , <i>Lomandra longifolia</i> , <i>Cymbopogon refractus</i> , <i>Entolasia marginata</i> , <i>Lomandra gracilis</i> , <i>Juncus usitatus</i> , <i>Imperata cylindrica</i> , <i>Lomandra cylindrica</i> , <i>Lomandra obliqua</i> , <i>Cynodon dactylon</i> , <i>Lomandra glauca</i> , <i>Rytidosperma caespitosum</i> , <i>Cyperus gracilis</i>	<i>Entolasia stricta</i> , <i>Lomandra obliqua</i> , <i>Themeda triandra</i> , <i>Lepidosperma laterale</i> , <i>Aristida vagans</i> , <i>Lomandra filiformis</i> , <i>Microlaena stipoides</i> , <i>Eragrostis brownii</i> , <i>Lomandra cylindrica</i> , <i>Lomandra longifolia</i> , <i>Imperata cylindrica</i> , <i>Cymbopogon refractus</i> , <i>Entolasia marginata</i> , <i>Echinopogon ovatus</i> , <i>Lomandra glauca</i> , <i>Lomandra gracilis</i> , <i>Cynodon dactylon</i> , <i>Juncus usitatus</i>	<i>Lomandra obliqua</i> , <i>Entolasia stricta</i> , <i>Lepidosperma laterale</i> , <i>Lomandra filiformis</i> , <i>Microlaena stipoides</i> , <i>Themeda triandra</i> , <i>Lomandra cylindrica</i> , <i>Aristida vagans</i> , <i>Lomandra longifolia</i> , <i>Eragrostis brownii</i> , <i>Lomandra gracilis</i> , <i>Imperata cylindrica</i> , <i>Lomandra glauca</i> , <i>Entolasia marginata</i> , <i>Cymbopogon refractus</i> , <i>Echinopogon ovatus</i>	<i>Lepidosperma laterale</i> , <i>Lomandra filiformis</i> , <i>Lomandra cylindrica</i> , <i>Lomandra glauca</i> , <i>Echinopogon ovatus</i> , <i>Imperata cylindrica</i> , <i>Lomandra longifolia</i> , <i>Cymbopogon refractus</i> , <i>Cynodon dactylon</i> , <i>Entolasia marginata</i> , <i>Juncus usitatus</i> , <i>Lomandra gracilis</i> , <i>Lomandra obliqua</i> , <i>Entolasia stricta</i> , <i>Themeda triandra</i> , <i>Eragrostis brownii</i> , <i>Microlaena stipoides</i> , <i>Aristida vagans</i>
	Forb	<i>Dianella revoluta</i> , <i>Lobelia purpurascens</i> , <i>Goodenia hederacea</i> , <i>Pomax umbellata</i> , <i>Dichondra repens</i> , <i>Gonocarpus tetragynus</i> , <i>Oxalis perennans</i> , <i>Centella asiatica</i> , <i>Commelina cyanea</i> , <i>Dianella caerulea</i> , <i>Gonocarpus teucrioides</i> , <i>Einadia trigonos</i> , <i>Hovea linearis</i> , <i>Trachymene incisa</i> subsp. <i>incisa</i>	<i>Pomax umbellata</i> , <i>Dianella revoluta</i> , <i>Goodenia hederacea</i> , <i>Gonocarpus tetragynus</i> , <i>Lobelia purpurascens</i> , <i>Hovea linearis</i> , <i>Dianella caerulea</i> , <i>Xanthosia pilosa</i> , <i>Gonocarpus teucrioides</i> , <i>Trachymene incisa</i> subsp. <i>incisa</i> , <i>Dichondra repens</i> , <i>Tricoryne simplex</i> , <i>Actinotus helianthi</i> , <i>Centella asiatica</i> , <i>Lobelia andrewsii</i> , <i>Oxalis perennans</i>	<i>Dianella revoluta</i> , <i>Goodenia hederacea</i> , <i>Hovea linearis</i> , <i>Pomax umbellata</i> , <i>Gonocarpus tetragynus</i> , <i>Dianella caerulea</i> , <i>Xanthosia pilosa</i> , <i>Gonocarpus teucrioides</i> , <i>Actinotus helianthi</i> , <i>Lobelia purpurascens</i> , <i>Tricoryne simplex</i> , <i>Lobelia andrewsii</i> , <i>Trachymene incisa</i> subsp. <i>incisa</i> , <i>Dichondra repens</i>	<i>Dianella revoluta</i> , <i>Gonocarpus tetragynus</i> , <i>Pomax umbellata</i> , <i>Goodenia hederacea</i> , <i>Lobelia purpurascens</i> , <i>Hovea linearis</i> , <i>Trachymene incisa</i> subsp. <i>incisa</i> , <i>Oxalis perennans</i> , <i>Dianella caerulea</i> , <i>Gonocarpus teucrioides</i> , <i>Tricoryne simplex</i>
PCT Description		A tall sclerophyll open forest with a dense mid-stratum of Melaleucas and a patchy ground layer of grasses and graminoids or a dense thicket of Melaleucas with emergent eucalypts that is found on the Cumberland Plain to the west of Sydney. It is one of a suite of	A tall to very tall shrubby sclerophyll woodland or open forest with a grassy ground cover found on enriched Hawkesbury or Mittagong sandstone ridges, thin shale caps or lenses on crests or slopes on the margins of the Cumberland Plain, western Sydney. It	A tall, rarely very tall, shrubby sclerophyll open forest or woodland, found on exposed, slightly enriched Hawkesbury or Mittagong sandstone ridges on the margins of the Cumberland plain, western and south-western Sydney. It describes the assemblage found	A mid-high to tall sclerophyll woodland with a mid-stratum of Melaleuca trees and dry shrubs found on consolidated Tertiary sand deposits in western Sydney. It is one of several dry sclerophyll forest and woodland PCTs associated with spatially disjunct

	forests that are associated with the subtle intergrade between clay-rich shale soil and the sandier substrates. The canopy almost always includes ironbark eucalypts (primarily <i>Eucalyptus fibrosa</i>), occasionally accompanied by stringybark eucalypts (<i>Eucalyptus sparsifolia</i>, <i>Eucalyptus oblonga</i> or <i>Eucalyptus globoidea</i>). The dense shrub to small tree layer almost always includes melaleucas and acacias of which <i>Melaleuca decora</i> and <i>Acacia falcata</i> are the most frequent. The smaller shrubs <i>Bursaria spinosa</i> and <i>Daviesia ulicifolia</i> are both common. The ground layer is a sparse cover of graminoids, forbs, twiners and a hardy fern. <i>Entolasia stricta</i> is almost always present while <i>Aristida vagans</i>, <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>, <i>Microlaena stipoides</i>, <i>Dianella revoluta</i>, <i>Lomandra multiflora</i> subsp. <i>multiflora</i>, <i>Lepidosperma laterale</i> and <i>Opercularia diphylla</i> are very frequent. The ground layer may be depauperate in locations where the dense mid-stratum excludes light and suppresses plant growth. This PCT is associated with moderately fertile soils derived from Tertiary alluvial deposits, shale and ironstone gravels and residual soils derived from shale or from sandstone with enrichment from nearby shales. It is extensive around Castlereagh, Holsworthy and the catchment of the Cooks River where Melaleuca thickets are prevalent, possibly the result of human-induced changes to the original forest structure. There are smaller occurrences at Kemps Creek and near the shale sandstone interface in Wollondilly Shire. This PCT has been extensively cleared and often occurs in small, fragmented patches. It typically occurs in a moist, warm climate at elevations below 150 metres asl, though it may reach 400 metres asl in the southernmost part of its range. The occurrences at higher elevation on the southern and western edge of the Cumberland Plain represent an extended interpretation of this PCT compared to previous studies. This PCT has considerable floristic and habitat overlap with PCT 3321, with much gradation between these PCTs in the northern Holsworthy area. PCT 3321 differs in that <i>Eucalyptus punctata</i> and <i>Persoonia linearis</i> are more frequent, Melaleucas are rare and it is found on thin shales near the sandstone interface. At the sandier end of the shale-sandstone interface, this PCT grades into PCTs 3616 and 3619. Trees and shrubs that are more frequent in PCT 3616 include <i>Eucalyptus punctata</i>, <i>Persoonia linearis</i>, <i>Leptospermum trinervium</i>, <i>Lissanthe strigosa</i> and <i>Acacia linifolia</i>. <i>Corymbia gummifera</i> is very frequent in PCT 3619 which also includes sandstone heath	describes the assemblage found on intermediate shale and sandstone influenced soils amongst the suite of PCTs found near or within the broad interface between sandstone and shale substrates on the lower elevation sandstone plateaus of the Sydney hinterland. The tree canopy very frequently includes a high cover of <i>Eucalyptus punctata</i> commonly in association with <i>Corymbia gummifera</i> and one or more species of stringybarks, of which <i>Eucalyptus oblonga</i> and <i>Eucalyptus sparsifolia</i> are most frequent. These may be occasionally accompanied or replaced by one of or more species of ironbark or mahogany of which <i>Eucalyptus crebra</i> and <i>Eucalyptus resinifera</i> are most frequent. Rarely, a high cover of <i>Eucalyptus sclerophylla</i>, <i>Angophora costata</i> and <i>Eucalyptus pilularis</i> occur at some locations. A sparse cover of smaller trees commonly includes <i>Allocasuarina littoralis</i> and occasionally <i>Angophora bakeri</i>. The shrub layer is sparse, rarely mid-dense, low in height, and is characterised by sclerophyll shrubs. <i>Persoonia linearis</i> is very frequently recorded, commonly with <i>Leptospermum trinervium</i>, <i>Lissanthe strigosa</i> and <i>Acacia linifolia</i>. The ground layer is sparse and patchy, occasionally mid-dense, and characterised by grasses, graminoids and small forbs. A combination of grass species is common and may include one or more of <i>Themeda triandra</i>, <i>Aristida vagans</i>, <i>Microlaena stipoides</i>, <i>Panicum simile</i> and <i>Austrostipa pubescens</i>. Small shrubs such as <i>Phyllanthus hirtellus</i> are very frequent, as are small forbs and graminoids including <i>Pomax umbellata</i>, <i>Dianella caerulea</i>, <i>Lomandra obliqua</i>, <i>Lomandra multiflora</i> subsp. <i>multiflora</i> and <i>Lepidosperma laterale</i>. This PCT is found at elevations of between 10-500 metres asl and in moderate rainfall zones of 800-1080 mm per annum. The highest elevations are at Yerrinbool on the southern margins of the Cumberland Plain, however it is most common below 300 metres in the lower Blue Mountains east to Glenorie and Castle Hill, north-west of Sydney and Menai to Picton in the south-west. There is high environmental and spatial overlap with two additional PCTs in the shale-sandstone interface zone each representing stronger (PCT 3321) or weaker (PCT 3619) shale influence in the soil. In the former, the tree canopy very frequently includes a high cover of <i>Eucalyptus crebra</i> or <i>Eucalyptus fibrosa</i>, sandstone shrubs are infrequent and replaced by <i>Bursaria spinosa</i> or <i>Leucopogon juniperinum</i> and the ground layer has a higher cover of soft grasses including <i>Microlaena stipoides</i>. Conversely the former includes a similar tree canopy, although <i>Eucalyptus punctata</i> is both less frequent and abundant, and a mid-stratum	on the highest sandstone-influenced soils amongst the suite of PCTs found near or within the broad interface between sandstone and shale substrates on the lower elevation sandstone plateaus of the Sydney hinterland. The tree canopy very frequently includes a higher cover of <i>Corymbia gummifera</i> together with one or more species of stringybark eucalypts, of which <i>Eucalyptus oblonga</i> and <i>Eucalyptus globoidea</i> are most frequent. These may be occasionally accompanied or replaced by <i>Eucalyptus punctata</i>, <i>Angophora costata</i> or species of scribbly gum or mahogany eucalypts, of which <i>Eucalyptus sclerophylla</i> and <i>Eucalyptus resinifera</i> are most frequent respectively. A mid-dense shrub layer very frequently includes <i>Leptospermum trinervium</i>, <i>Banksia spinulosa</i>, <i>Acacia linifolia</i> and <i>Persoonia levis</i>. Other common shrubs include <i>Isopogon anemonifolius</i> and <i>Lambertia formosa</i>. The ground layer is a mid-dense cover characterised by the very frequent occurrence of grasses <i>Entolasia stricta</i> and <i>Austrostipa pubescens</i> and graminoids <i>Cyathochaeta diandra</i>, <i>Lomandra obliqua</i> and <i>Lomandra multiflora</i> subsp. <i>multiflora</i>. This PCT is common on the margins of shale-enriched soils that are often cleared of native vegetation cover. It grades into PCT 3616 with increasing shale influence and where species that prefer richer soils, including grasses <i>Themeda triandra</i> and <i>Aristida vagans</i>, and eucalypts such as <i>Eucalyptus punctata</i> are both more frequent and abundant, while the frequency, cover and diversity of heath shrubs including <i>Banksia spinulosa</i>, <i>Persoonia levis</i> and <i>Lambertia formosa</i>, declines. This PCT occurs within a broad elevation range of 80-580 metres asl mainly with a mean annual rainfall of 810-1050 mm, rarely higher. It has an extensive distribution from western Menai and Panania in the Georges River catchment, south-west along the margins of Campbelltown and Wedderburn into the upper Nepean catchment, onto the Burragorang Plateau and into the lower Blue Mountains and Hawkesbury River catchment. A disjunct northern outlier occurs in northern Baulkham Hills local government area.	older sand deposits found on gently undulating terrain in coastal and hinterland valleys of the Sydney Basin. The tree canopy very frequently includes <i>Eucalyptus sclerophylla</i> with <i>Eucalyptus parramattensis</i> and/or <i>Angophora bakeri</i>, the former species with a higher foliage cover than the latter two. The mid-stratum commonly includes a sparse cover of taller <i>Melaleuca decora</i>, which also may be recorded in the tree canopy. <i>Melaleuca nodosa</i>, <i>Banksia spinulosa</i>, <i>Hakea sericea</i>, <i>Hakea dactyloides</i>, <i>Leptospermum trinervium</i> and <i>Acacia brownii</i> are all very frequent or common in the lower mid-dense to dense shrub stratum. The ground layer usually includes a diverse mix of grasses, graminoids and small shrubs. <i>Entolasia stricta</i> and <i>Pimelea linifolia</i> are almost always present while <i>Themeda triandra</i>, <i>Dianella revoluta</i>, <i>Cyathochaeta diandra</i> and <i>Xanthorrhoea minor</i> are all very frequent. This PCT is strongly associated with old stream deposits at Castlereagh, Holsworthy and Voyager Point, as well as thin sand mantles in Rookwood Cemetery and Villawood. More extensive areas may have been present at these localities, although urban development has long since removed the native vegetation cover. The largest areas cover low-lying gentle topography at elevations of 0-60 metres asl, with 800-900 mm mean annual rainfall. On these main tertiary deposits clay-rich laterised sediments are often exposed, where the assemblage grades into PCT 3448. Elsewhere the PCT is found at a number of disjunct locations on higher elevations of around 200 metres asl, on in situ sands and lateritic gravels on sandstone ridges. These stands are unusual as they occur among the shale-sandstone transition zone on the margins of the Cumberland Plain. Here, species common to this PCT, including <i>Eucalyptus parramattensis</i>, <i>Melaleuca</i> spp. and <i>Themeda triandra</i>, are occasionally present in small areas, before grading into the enriched sandstone transition forest PCTs 3616 and 3619.
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Plots 1 & 4				
Potential PCTs	3448	3616	3619	3629
	species such as <i>Banksia spinulosa</i> , <i>Persoonia levis</i> and <i>Lambertia formosa</i> and only occasional soft grasses such as <i>Microlaena stipoides</i> and <i>Aristida vagans</i> which are very frequent in this PCT. With a greater shale influence, this PCT grades into PCT 3320 which includes <i>Eucalyptus tereticornis</i> and <i>Eucalyptus moluccana</i> in its canopy and a more diverse suite of soft-leaved grasses and forbs.	which has a higher and more diverse cover of sandstone heath species such as <i>Banksia spinulosa</i> , <i>Persoonia levis</i> and <i>Lambertia formosa</i> and only occasional soft grasses including <i>Themeda triandra</i> and <i>Aristida vagans</i> .		
Other Diagnostic Features	Not Specified	Not Specified	Not Specified	Not Specified
Vegetation Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Dry Sclerophyll Forests (Shrubby sub-formation)	Dry Sclerophyll Forests (Shrubby sub-formation)	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation Class	Cumberland Dry Sclerophyll Forests	Sydney Hinterland Dry Sclerophyll Forests	Sydney Hinterland Dry Sclerophyll Forests	Sydney Sand Flats Dry Sclerophyll Forests
Geographical Restrictions	Occurs on the Cumberland Plain to the west of Sydney	Margins of the Cumberland Plain, western Sydney	Occurs on the margins of the Cumberland plain, western and south-western Sydney	Occurs within coastal and hinterland valleys of the Sydney Basin.
Landscape Position	Not Specified	Not Specified	Not Specified	Not Specified
Elevation	1m to 391m	12m to 497m	3m to 579m	1m to 290m
Lithology	Not Specified	Not Specified	Not Specified	Not Specified
Rainfall (Median)	868mm	868mm	868mm	868mm
PCT Determination	Floristic overlap with this PCT is poor, PCT 3448 is characterised as being dominated by <i>Eucalyptus fibrosa</i> accompanied by various stringybark species, none of which were observed in this zone. PCT 3448 and the assessed vegetation both occur on transitional soils at the broad interface between Hawkesbury sandstone and Wianamatta shale. Despite this, PCT 3448 was not chosen as best fit for the assessed vegetation.	This PCT is characterised by a canopy dominated by <i>Eucalyptus punctata</i> which is not commensurate with the assessed vegetation however, there are other floristic similarities. There is strong overlap of landscape position and lithology being on ridgetops with soils influenced by Hawkesbury Sandstone and Wianamatta Shale geologies. Despite this, PCT 3616 is not considered best match for the assessed vegetation.	Despite this vegetation zone being heavily underscrubbed, the floristic overlap is strong. This PCT is characterised as being dominated by <i>Corymbia gummifera</i> , which is commensurate with the assessed vegetation. The zone also contains abundant <i>Eucalyptus sclerophylla</i> . Other diagnostic canopy species were observed but not recorded, some were observed off site, species such as <i>Eucalyptus agglomerata</i> , <i>Eucalyptus Punctata</i> , <i>Eucalyptus robusta</i> , <i>Angophora costata</i> and <i>Angophora bakeri</i> . This PCT is known to occur on ridgetops near the broad interface between Hawkesbury Sandstone and Wianamatta Shale geologies which perfectly matches the landscape position and lithology of the assessed vegetation. therefore, PCT 3619 was chosen as best match PCT.	The floristic overlap with this PCT is poor. PCT 3629 is characterized as being dominated by <i>Eucalyptus sclerophylla</i> and <i>Eucalyptus parramattensis</i> , of which only <i>Eucalyptus sclerophylla</i> was observed in abundance while <i>Eucalyptus parramattensis</i> was entirely absent. Although both PCT 3448 and the assessed vegetation occur on transitional soils at the broad interface between Hawkesbury sandstone and Wianamatta shale, PCT 3448 was not selected as the best match for the assessed vegetation.
Result	PCT 3619			
Estimated Cleared Value of PCT (%)	25.41			
Associated TECs	None			

Table 8: PCT Determination for PCT 3616: Sydney Hinterland Enriched Sandstone Bloodwood Forest

Plots 2 & 7				
Potential PCTs	3448	3616	3619	3629
PCT Name	Castlereagh Ironbark Forest	Sydney Hinterland Grey Gum Transition Forest	Sydney Hinterland Enriched Sandstone Bloodwood Forest	Castlereagh Scribbly Gum Woodland
SVTM	Yes – Within Subject Site	Yes – Within Subject Site	Yes – Within Subject Site	Yes – Within Subject Site
IBRA Region	Sydney Basin	Sydney Basin	Sydney Basin	Sydney Basin
IBRA Subregion	Cumberland; Sydney Cataract ; Wollemi; Yengo	Burratorang; Cumberland; Sydney Cataract ; Wollemi; Yengo	Burratorang; Cumberland; Sydney Cataract ; Wollemi; Yengo; Pittwater	Cumberland; Sydney Cataract ; Wollemi
LGA	Blacktown; Blue Mountains; Campbelltown; Canterbury-Bankstown; Cumberland; Hawkesbury; Hornsby; Liverpool ; City of Parramatta; Penrith; Sutherland Shire; Wollondilly	Blue Mountains; Campbelltown; Hawkesbury; Hornsby; Liverpool ; Penrith; Sutherland Shire; The Hills Shire; Wingecarribee; Wollondilly	Blue Mountains; Campbelltown; Canterbury-Bankstown; Hornsby; Liverpool ; City of Parramatta; Penrith; Sutherland Shire; The Hills Shire; Wingecarribee; Wollondilly; Ryde	Blacktown; Cumberland; Hawkesbury; Liverpool ; Penrith; Wollondilly
Present Diagnostic Species within Study Area	Tree	<i>Eucalyptus punctata</i> , <i>Corymbia gummifera</i> , <i>Allocasuarina littoralis</i> , <i>Angophora bakeri</i> , <i>Angophora costata</i> , <i>Eucalyptus sclerophylla</i> , <i>Eucalyptus crebra</i> , <i>Eucalyptus globoides</i> , <i>Eucalyptus resinifera</i> , <i>Notelaea longifolia</i> , <i>Acacia decurrens</i> , <i>Eucalyptus piperita</i> , <i>Angophora floribunda</i> , <i>Ceratopetalum gummiferum</i> , <i>Acacia binervia</i> , <i>Glochidion ferdinandi</i> , <i>Melia azedarach</i>	<i>Corymbia gummifera</i> , <i>Eucalyptus punctata</i> , <i>Allocasuarina littoralis</i> , <i>Angophora costata</i> , <i>Eucalyptus sclerophylla</i> , <i>Eucalyptus globoides</i> , <i>Angophora bakeri</i> , <i>Eucalyptus piperita</i> , <i>Eucalyptus resinifera</i> , <i>Notelaea longifolia</i> , <i>Ceratopetalum gummiferum</i> , <i>Acacia decurrens</i> , <i>Angophora floribunda</i> , <i>Eucalyptus crebra</i>	<i>Eucalyptus sclerophylla</i> , <i>Angophora bakeri</i> , <i>Allocasuarina littoralis</i> , <i>Corymbia gummifera</i> , <i>Eucalyptus globoides</i> , <i>Angophora floribunda</i> , <i>Casuarina glauca</i>
	Shrub	<i>Phyllanthus hirtellus</i> , <i>Persoonia linearis</i> , <i>Leptospermum trinervium</i> , <i>Pimelea linifolia</i> , <i>Lissanthe strigosa</i> , <i>Acacia ulicifolia</i> , <i>Banksia spinulosa</i> , <i>Kunzea ambigua</i> , <i>Acacia terminalis</i> , <i>Hakea sericea</i> , <i>Lomatia silaifolia</i> , <i>Monotoca scoparia</i> , <i>Dillwynia retorta</i> , <i>Ozothamnus diosmifolius</i> , <i>Dodonaea triquetra</i> , <i>Acacia myrtifolia</i> , <i>Xylomelum pyriforme</i> , <i>Acacia longifolia</i> , <i>Acacia brownii</i> , <i>Acacia falcata</i> , <i>Leptospermum polygalifolium</i> , <i>Grevillea sericea</i> , <i>Styphelia laeta</i> , <i>Melaleuca nodosa</i> , <i>Polyscias sambucifolia</i> , <i>Bossiaea heterophylla</i> , <i>Micrantheum ericoides</i> , <i>Acacia hispidula</i> , <i>Dillwynia floribunda</i> , <i>Dillwynia phyllicoides</i> , <i>Bossiaea ensata</i> , <i>Hovea lanceolata</i> , <i>Melaleuca linariifolia</i> , <i>Philotheca myoporoides</i> , <i>Ricinocarpus pinifolius</i>	<i>Banksia spinulosa</i> , <i>Phyllanthus hirtellus</i> , <i>Leptospermum trinervium</i> , <i>Acacia ulicifolia</i> , <i>Pimelea linifolia</i> , <i>Lomatia silaifolia</i> , <i>Hakea sericea</i> , <i>Lissanthe strigosa</i> , <i>Persoonia linearis</i> , <i>Monotoca scoparia</i> , <i>Acacia myrtifolia</i> , <i>Acacia terminalis</i> , <i>Dillwynia retorta</i> , <i>Grevillea sericea</i> , <i>Bossiaea heterophylla</i> , <i>Xylomelum pyriforme</i> , <i>Micrantheum ericoides</i> , <i>Kunzea ambigua</i> , <i>Dodonaea triquetra</i> , <i>Leptospermum polygalifolium</i> , <i>Acacia longifolia</i> , <i>Dillwynia phyllicoides</i> , <i>Acacia brownii</i> , <i>Ozothamnus diosmifolius</i> , <i>Acacia hispidula</i> , <i>Bossiaea ensata</i> , <i>Dillwynia floribunda</i> , <i>Melaleuca nodosa</i> , <i>Styphelia laeta</i> , <i>Acacia falcata</i> , <i>Polyscias sambucifolia</i> , <i>Ricinocarpus pinifolius</i>	<i>Pimelea linifolia</i> , <i>Hakea sericea</i> , <i>Melaleuca nodosa</i> , <i>Banksia spinulosa</i> , <i>Leptospermum trinervium</i> , <i>Acacia brownii</i> , <i>Lissanthe strigosa</i> , <i>Leptospermum polygalifolium</i> , <i>Phyllanthus hirtellus</i> , <i>Acacia falcata</i> , <i>Ozothamnus diosmifolius</i> , <i>Persoonia linearis</i> , <i>Grevillea sericea</i> , <i>Dillwynia floribunda</i> , <i>Kunzea ambigua</i> , <i>Acacia longifolia</i> , <i>Acacia ulicifolia</i> , <i>Bossiaea heterophylla</i> , <i>Styphelia laeta</i> , <i>Acacia myrtifolia</i> , <i>Leptospermum squarrosum</i> , <i>Micrantheum ericoides</i> , <i>Monotoca scoparia</i> , <i>Ricinocarpus pinifolius</i>
	Grass	<i>Entolasia stricta</i> , <i>Lomandra obliqua</i> , <i>Themeda triandra</i> , <i>Lepidosperma laterale</i> , <i>Aristida vagans</i> , <i>Lomandra filiformis</i> , <i>Microlaena stipoides</i> , <i>Eragrostis brownii</i> , <i>Lomandra cylindrica</i> , <i>Lomandra longifolia</i> , <i>Imperata cylindrica</i> , <i>Cymbopogon refractus</i> , <i>Entolasia marginata</i> , <i>Echinopogon ovatus</i> , <i>Lomandra glauca</i> , <i>Lomandra gracilis</i> , <i>Cynodon dactylon</i> , <i>Juncus usitatus</i>	<i>Lomandra obliqua</i> , <i>Entolasia stricta</i> , <i>Lepidosperma laterale</i> , <i>Lomandra filiformis</i> , <i>Microlaena stipoides</i> , <i>Themeda triandra</i> , <i>Lomandra cylindrica</i> , <i>Aristida vagans</i> , <i>Lomandra longifolia</i> , <i>Eragrostis brownii</i> , <i>Lomandra gracilis</i> , <i>Imperata cylindrica</i> , <i>Lomandra glauca</i> , <i>Entolasia marginata</i> , <i>Cymbopogon refractus</i> , <i>Echinopogon ovatus</i>	<i>Lepidosperma laterale</i> , <i>Lomandra filiformis</i> , <i>Lomandra cylindrica</i> , <i>Lomandra glauca</i> , <i>Echinopogon ovatus</i> , <i>Imperata cylindrica</i> , <i>Lomandra longifolia</i> , <i>Cymbopogon refractus</i> , <i>Cynodon dactylon</i> , <i>Entolasia marginata</i> , <i>Juncus usitatus</i> , <i>Lomandra gracilis</i> , <i>Lomandra obliqua</i> , <i>Entolasia stricta</i> , <i>Themeda triandra</i> , <i>Eragrostis brownii</i> , <i>Microlaena stipoides</i> , <i>Aristida vagans</i>
	Forb	<i>Dianella revoluta</i> , <i>Lobelia purpurascens</i> , <i>Goodenia hederacea</i> , <i>Pomax umbellata</i> , <i>Dichondra repens</i> , <i>Gonocarpus tetragynus</i> , <i>Oxalis perennans</i> , <i>Centella asiatica</i> , <i>Commelina cyanea</i> , <i>Dianella caerulea</i> , <i>Gonocarpus teucrioides</i> , <i>Einadia trigonos</i> , <i>Hovea linearis</i> , <i>Trachymene incisa</i> subsp. <i>incisa</i>	<i>Pomax umbellata</i> , <i>Dianella revoluta</i> , <i>Goodenia hederacea</i> , <i>Gonocarpus tetragynus</i> , <i>Lobelia purpurascens</i> , <i>Hovea linearis</i> , <i>Dianella caerulea</i> , <i>Xanthosia pilosa</i> , <i>Gonocarpus teucrioides</i> , <i>Trachymene incisa</i> subsp. <i>incisa</i> , <i>Dichondra repens</i> , <i>Tricoryne simplex</i> , <i>Actinotus helianthi</i> , <i>Centella asiatica</i> , <i>Lobelia andrewsii</i> , <i>Oxalis perennans</i>	<i>Dianella revoluta</i> , <i>Gonocarpus tetragynus</i> , <i>Pomax umbellata</i> , <i>Goodenia hederacea</i> , <i>Lobelia purpurascens</i> , <i>Hovea linearis</i> , <i>Trachymene incisa</i> subsp. <i>incisa</i> , <i>Oxalis perennans</i> , <i>Dianella caerulea</i> , <i>Gonocarpus teucrioides</i> , <i>Tricoryne simplex</i>
PCT Description	A tall sclerophyll open forest with a dense mid-stratum of Melaleucas and a patchy ground layer of grasses and graminoids or a dense thicket of Melaleucas with emergent eucalypts that is found on the Cumberland Plain to the west of Sydney. It is one of a suite of	A tall to very tall shrubby sclerophyll woodland or open forest with a grassy ground cover found on enriched Hawkesbury or Mittagong sandstone ridges, thin shale caps or lenses on crests or slopes on the margins of the Cumberland Plain, western Sydney. It	A tall, rarely very tall, shrubby sclerophyll open forest or woodland, found on exposed, slightly enriched Hawkesbury or Mittagong sandstone ridges on the margins of the Cumberland plain, western and south-western Sydney. It describes the assemblage found	A mid-high to tall sclerophyll woodland with a mid-stratum of Melaleuca trees and dry shrubs found on consolidated Tertiary sand deposits in western Sydney. It is one of several dry sclerophyll forest and woodland PCTs associated with spatially disjunct

	forests that are associated with the subtle intergrade between clay-rich shale soil and the sandier substrates. The canopy almost always includes ironbark eucalypts (primarily <i>Eucalyptus fibrosa</i>), occasionally accompanied by stringybark eucalypts (<i>Eucalyptus sparsifolia</i>, <i>Eucalyptus oblonga</i> or <i>Eucalyptus globoidea</i>). The dense shrub to small tree layer almost always includes melaleucas and acacias of which <i>Melaleuca decora</i> and <i>Acacia falcata</i> are the most frequent. The smaller shrubs <i>Bursaria spinosa</i> and <i>Daviesia ulicifolia</i> are both common. The ground layer is a sparse cover of graminoids, forbs, twiners and a hardy fern. <i>Entolasia stricta</i> is almost always present while <i>Aristida vagans</i>, <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>, <i>Microlaena stipoides</i>, <i>Dianella revoluta</i>, <i>Lomandra multiflora</i> subsp. <i>multiflora</i>, <i>Lepidosperma laterale</i> and <i>Opercularia diphylla</i> are very frequent. The ground layer may be depauperate in locations where the dense mid-stratum excludes light and suppresses plant growth. This PCT is associated with moderately fertile soils derived from Tertiary alluvial deposits, shale and ironstone gravels and residual soils derived from shale or from sandstone with enrichment from nearby shales. It is extensive around Castlereagh, Holsworthy and the catchment of the Cooks River where Melaleuca thickets are prevalent, possibly the result of human-induced changes to the original forest structure. There are smaller occurrences at Kemps Creek and near the shale sandstone interface in Wollondilly Shire. This PCT has been extensively cleared and often occurs in small, fragmented patches. It typically occurs in a moist, warm climate at elevations below 150 metres asl, though it may reach 400 metres asl in the southernmost part of its range. The occurrences at higher elevation on the southern and western edge of the Cumberland Plain represent an extended interpretation of this PCT compared to previous studies. This PCT has considerable floristic and habitat overlap with PCT 3321, with much gradation between these PCTs in the northern Holsworthy area. PCT 3321 differs in that <i>Eucalyptus punctata</i> and <i>Persoonia linearis</i> are more frequent, Melaleucas are rare and it is found on thin shales near the sandstone interface. At the sandier end of the shale-sandstone interface, this PCT grades into PCTs 3616 and 3619. Trees and shrubs that are more frequent in PCT 3616 include <i>Eucalyptus punctata</i>, <i>Persoonia linearis</i>, <i>Leptospermum trinervium</i>, <i>Lissanthe strigosa</i> and <i>Acacia linifolia</i>. <i>Corymbia gummifera</i> is very frequent in PCT 3619 which also includes sandstone heath	describes the assemblage found on intermediate shale and sandstone influenced soils amongst the suite of PCTs found near or within the broad interface between sandstone and shale substrates on the lower elevation sandstone plateaus of the Sydney hinterland. The tree canopy very frequently includes a high cover of <i>Eucalyptus punctata</i> commonly in association with <i>Corymbia gummifera</i> and one or more species of stringybarks, of which <i>Eucalyptus oblonga</i> and <i>Eucalyptus sparsifolia</i> are most frequent. These may be occasionally accompanied or replaced by one of or more species of ironbark or mahogany of which <i>Eucalyptus crebra</i> and <i>Eucalyptus resinifera</i> are most frequent. Rarely, a high cover of <i>Eucalyptus sclerophylla</i>, <i>Angophora costata</i> and <i>Eucalyptus pilularis</i> occur at some locations. A sparse cover of smaller trees commonly includes <i>Allocasuarina littoralis</i> and occasionally <i>Angophora bakeri</i>. The shrub layer is sparse, rarely mid-dense, low in height, and is characterised by sclerophyll shrubs. <i>Persoonia linearis</i> is very frequently recorded, commonly with <i>Leptospermum trinervium</i>, <i>Lissanthe strigosa</i> and <i>Acacia linifolia</i>. The ground layer is sparse and patchy, occasionally mid-dense, and characterised by grasses, graminoids and small forbs. A combination of grass species is common and may include one or more of <i>Themeda triandra</i>, <i>Aristida vagans</i>, <i>Microlaena stipoides</i>, <i>Panicum simile</i> and <i>Austrostipa pubescens</i>. Small shrubs such as <i>Phyllanthus hirtellus</i> are very frequent, as are small forbs and graminoids including <i>Pomax umbellata</i>, <i>Dianella caerulea</i>, <i>Lomandra obliqua</i>, <i>Lomandra multiflora</i> subsp. <i>multiflora</i> and <i>Lepidosperma laterale</i>. This PCT is found at elevations of between 10-500 metres asl and in moderate rainfall zones of 800-1080 mm per annum. The highest elevations are at Yerrinbool on the southern margins of the Cumberland Plain, however it is most common below 300 metres in the lower Blue Mountains east to Glenorie and Castle Hill, north-west of Sydney and Menai to Picton in the south-west. There is high environmental and spatial overlap with two additional PCTs in the shale-sandstone interface zone each representing stronger (PCT 3321) or weaker (PCT 3619) shale influence in the soil. In the former, the tree canopy very frequently includes a high cover of <i>Eucalyptus crebra</i> or <i>Eucalyptus fibrosa</i>, sandstone shrubs are infrequent and replaced by <i>Bursaria spinosa</i> or <i>Leucopogon juniperinum</i> and the ground layer has a higher cover of soft grasses including <i>Microlaena stipoides</i>. Conversely the former includes a similar tree canopy, although <i>Eucalyptus punctata</i> is both less frequent and abundant, and a mid-stratum	on the highest sandstone-influenced soils amongst the suite of PCTs found near or within the broad interface between sandstone and shale substrates on the lower elevation sandstone plateaus of the Sydney hinterland. The tree canopy very frequently includes a higher cover of <i>Corymbia gummifera</i> together with one or more species of stringybark eucalypts, of which <i>Eucalyptus oblonga</i> and <i>Eucalyptus globoidea</i> are most frequent. These may be occasionally accompanied or replaced by <i>Eucalyptus punctata</i>, <i>Angophora costata</i> or species of scribbly gum or mahogany eucalypts, of which <i>Eucalyptus sclerophylla</i> and <i>Eucalyptus resinifera</i> are most frequent respectively. A mid-dense shrub layer very frequently includes <i>Leptospermum trinervium</i>, <i>Banksia spinulosa</i>, <i>Acacia linifolia</i> and <i>Persoonia levis</i>. Other common shrubs include <i>Isopogon anemonifolius</i> and <i>Lambertia formosa</i>. The ground layer is a mid-dense cover characterised by the very frequent occurrence of grasses <i>Entolasia stricta</i> and <i>Austrostipa pubescens</i> and graminoids <i>Cyathochaeta diandra</i>, <i>Lomandra obliqua</i> and <i>Lomandra multiflora</i> subsp. <i>multiflora</i>. This PCT is common on the margins of shale-enriched soils that are often cleared of native vegetation cover. It grades into PCT 3616 with increasing shale influence and where species that prefer richer soils, including grasses <i>Themeda triandra</i> and <i>Aristida vagans</i>, and eucalypts such as <i>Eucalyptus punctata</i> are both more frequent and abundant, while the frequency, cover and diversity of heath shrubs including <i>Banksia spinulosa</i>, <i>Persoonia levis</i> and <i>Lambertia formosa</i>, declines. This PCT occurs within a broad elevation range of 80-580 metres asl mainly with a mean annual rainfall of 810-1050 mm, rarely higher. It has an extensive distribution from western Menai and Panania in the Georges River catchment, south-west along the margins of Campbelltown and Wedderburn into the upper Nepean catchment, onto the Burragorang Plateau and into the lower Blue Mountains and Hawkesbury River catchment. A disjunct northern outlier occurs in northern Baulkham Hills local government area.	older sand deposits found on gently undulating terrain in coastal and hinterland valleys of the Sydney Basin. The tree canopy very frequently includes <i>Eucalyptus sclerophylla</i> with <i>Eucalyptus parramattensis</i> and/or <i>Angophora bakeri</i>, the former species with a higher foliage cover than the latter two. The mid-stratum commonly includes a sparse cover of taller <i>Melaleuca decora</i>, which also may be recorded in the tree canopy. <i>Melaleuca nodosa</i>, <i>Banksia spinulosa</i>, <i>Hakea sericea</i>, <i>Hakea dactyloides</i>, <i>Leptospermum trinervium</i> and <i>Acacia brownii</i> are all very frequent or common in the lower mid-dense to dense shrub stratum. The ground layer usually includes a diverse mix of grasses, graminoids and small shrubs. <i>Entolasia stricta</i> and <i>Pimelea linifolia</i> are almost always present while <i>Themeda triandra</i>, <i>Dianella revoluta</i>, <i>Cyathochaeta diandra</i> and <i>Xanthorrhoea minor</i> are all very frequent. This PCT is strongly associated with old stream deposits at Castlereagh, Holsworthy and Voyager Point, as well as thin sand mantles in Rookwood Cemetery and Villawood. More extensive areas may have been present at these localities, although urban development has long since removed the native vegetation cover. The largest areas cover low-lying gentle topography at elevations of 0-60 metres asl, with 800-900 mm mean annual rainfall. On these main tertiary deposits clay-rich laterised sediments are often exposed, where the assemblage grades into PCT 3448. Elsewhere the PCT is found at a number of disjunct locations on higher elevations of around 200 metres asl, on in situ sands and lateritic gravels on sandstone ridges. These stands are unusual as they occur among the shale-sandstone transition zone on the margins of the Cumberland Plain. Here, species common to this PCT, including <i>Eucalyptus parramattensis</i>, <i>Melaleuca</i> spp. and <i>Themeda triandra</i>, are occasionally present in small areas, before grading into the enriched sandstone transition forest PCTs 3616 and 3619.
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Plots 2 & 7				
Potential PCTs	3448	3616	3619	3629
	species such as <i>Banksia spinulosa</i> , <i>Persoonia levis</i> and <i>Lambertia formosa</i> and only occasional soft grasses such as <i>Microlaena stipoides</i> and <i>Aristida vagans</i> which are very frequent in this PCT. With a greater shale influence, this PCT grades into PCT 3320 which includes <i>Eucalyptus tereticornis</i> and <i>Eucalyptus moluccana</i> in its canopy and a more diverse suite of soft-leaved grasses and forbs.	which has a higher and more diverse cover of sandstone heath species such as <i>Banksia spinulosa</i> , <i>Persoonia levis</i> and <i>Lambertia formosa</i> and only occasional soft grasses including <i>Themeda triandra</i> and <i>Aristida vagans</i> .		
Other Diagnostic Features	Not Specified	Not Specified	Not Specified	Not Specified
Vegetation Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Dry Sclerophyll Forests (Shrubby sub-formation)	Dry Sclerophyll Forests (Shrubby sub-formation)	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation Class	Cumberland Dry Sclerophyll Forests	Sydney Hinterland Dry Sclerophyll Forests	Sydney Hinterland Dry Sclerophyll Forests	Sydney Sand Flats Dry Sclerophyll Forests
Geographical Restrictions	Occurs on the Cumberland Plain to the west of Sydney	Margins of the Cumberland Plain, western Sydney	Occurs on the margins of the Cumberland plain, western and south-western Sydney	Occurs within coastal and hinterland valleys of the Sydney Basin.
Landscape Position	Not Specified	Not Specified	Not Specified	Not Specified
Elevation	1m to 391m	12m to 497m	3m to 579m	1m to 290m
Lithology	Not Specified	Not Specified	Not Specified	Not Specified
Rainfall (Median)	868mm	868mm	868mm	868mm
PCT Determination	Floristic overlap with this PCT is poor, PCT 3448 is characterised as being dominated by <i>Eucalyptus fibrosa</i> accompanied by various stringybark species, none of which were observed in this zone. PCT 3448 and the assessed vegetation both occur on transitional soils at the broad interface between Hawkesbury sandstone and Wianamatta shale. Despite this, PCT 3448 was not chosen as best fit for the assessed vegetation.	PCT 3616 has strong floristic overlap with the assessed vegetation despite heavy underscrubbing. PCT 3616 is characterised as being dominated by <i>Eucalyptus punctata</i> and <i>Eucalyptus crebra</i> , which is commensurate with the assessed vegetation. The lithology overlap is strong, occurring on transitional soils at the broad interface between Hawkesbury sandstone and Wianamatta shale. For these reasons PCT 3616 was chosen as best match for the assessed vegetation.	PCT 3619 has poor floristic overlap with the assessed vegetation despite heavy underscrubbing. PCT 3619 is characterised as being dominated by <i>Corymbia gummifera</i> with various stringybarks which is not commensurate with the assessed vegetation which was dominated by <i>Eucalyptus punctata</i> and <i>Eucalyptus crebra</i> . The lithology overlap is strong, occurring on transitional soils at the broad interface between Hawkesbury sandstone and Wianamatta shale. Despite this, PCT 3619 was not chosen as best fit PCT for the assessed vegetation.	The floristic overlap with this PCT is poor. PCT 3629 is characterized as being dominated by <i>Eucalyptus sclerophylla</i> and <i>Eucalyptus parramattensis</i> , of which only <i>Eucalyptus sclerophylla</i> was observed in abundance while <i>Eucalyptus parramattensis</i> was entirely absent. Although both PCT 3448 and the assessed vegetation occur on transitional soils at the broad interface between Hawkesbury sandstone and Wianamatta shale, PCT 3448 was not selected as the best match for the assessed vegetation.
Result	PCT 3616			
Estimated Cleared Value of PCT (%)	61.88			
Associated TECs	None			

Table 9: Vegetation Zones

PCT 4059 Good Condition (Plot 3)	
Description of Vegetation Zone	This zone comprises riparian forest along a first-order stream within the central portion of the Study Area. The vegetation is mesic, containing <i>Melaleuca linariifolia</i> and Eucalyptus species including <i>Eucalyptus resinifera</i> and <i>Eucalyptus piperita</i>. The mesic ground layer was rich with native shrubs, forbs, grasses and sedges with weed incursion including <i>Lantana camara</i>, <i>Ageratina adenophora</i> and <i>Cinnamomum camphora</i>.
Area (ha)	0.63
  Plate 1: BAM Plot 3 (Start) Plate 2: BAM Plot 3 (End)	
PCT 4059 Degraded Condition (Plot 9)	
Description of Vegetation Zone	This zone has been heavily cleared and disturbed, consisting of a few scattered eucalypts and shrubs including <i>Eucalyptus sclerophylla</i>, <i>Acacia melanoxylon</i> and <i>Casuarina glauca</i>. The ground layer is dominated by <i>Pteridium esculentum</i> and other native forbs with significant weed incursion from <i>Eragrostis curvula</i>, <i>Megathyrsus maximus</i> and <i>Anredera cordifolia</i>.
Area (ha)	0.18
  Plate 3: BAM Plot 9 (Start) Plate 4: BAM Plot 9 (End)	

PCT 4024 Degraded Condition (Plot 8)	
Description of Vegetation Zone	This vegetation zone was predominantly canopy only with only a scarce amount of native understorey adjoining the Georges River and unnamed tributary. The majority of the vegetation zone is turfed with <i>Cynodon dactylon</i> . The canopy contains <i>Eucalyptus baueriana</i> , <i>Eucalyptus punctata</i> , <i>Eucalyptus tereticornis</i> , <i>Eucalyptus crebra</i> , <i>Eucalyptus moluccana</i> and <i>Casuarina glauca</i> .
Area (ha)	1.29
 	
Plate 5: BAM Plot 8 (Start) Plate 6: BAM Plot 8 (End)	
PCT 3619 Moderate Condition (Plot 1)	
Description of Vegetation Zone	This vegetation zone has been heavily underscrubbed, the only remaining canopy consists of <i>Eucalyptus sclerophylla</i> and <i>Corymbia gummifera</i> with one <i>Eucalyptus oblonga</i> observed but not recorded. The shrub layer is entirely absent and the ground layer is partially bare, with an assortment of native forbs and subshrubs. This zone is located in the south eastern corner of the site on the highest aspect of the site.
Area (ha)	1.85
 	
Plate 7: BAM Plot 1 (Start) Plate 8: BAM Plot 1 (End)	

PCT 3619 Poor Condition (Plot 4)	
Description of Vegetation Zone	This vegetation zone has the same structure and species composition as PCT 3619 'Good' except that the understorey exists in a more degraded state with less diversity of native subshrubs and forbs. This vegetation zone exists predominantly in the western corner of the site.
Area (ha)	1.16
	
Plate 9: BAM Plot 4 (Start)	Plate 10: BAM Plot 4 (End)
PCT 3616 Moderate Condition (Plots 2 & 7)	
Description of Vegetation Zone	This vegetation zone exists just downslope of PCT 3619 and contained minor sandstone outcropping. The canopy is dominated by <i>Eucalyptus punctata</i> and <i>Eucalyptus crebra</i> with <i>Eucalyptus sclerophylla</i> . The understorey included <i>Acacia binervia</i> , <i>Allocasuarina littoralis</i> and <i>Angophora bakeri</i> and grassed areas that are regularly slashed.
Area (ha)	0.75
	
Plate 11: BAM Plot 2 (Start)	Plate 12: BAM Plot 2 (End)



Plate 13: BAM Plot 7 (Start)



Plate 14: BAM Plot 7 (End)

Planted Native	
Description of Vegetation Zone	This vegetation zone comprised a ring of planted <i>Waterhousea floribunda</i> surrounding a mown lawn.
Area (ha)	0.06
	
Plate 15: Planted Native	

Figure 4 depicts ground-truthed vegetation within the site.

1.4.3.2 Planted Native Vegetation

A small area of vegetation present within the north-eastern section of the Subject Site was classified as 'planted native vegetation' and BAM 2020 Appendix D has therefore been applied (**Table 10**). This vegetation type is not required to be further assessed using the BAM, and was thus excluded from any credit or offset calculations.

This assessment module has been used to assess the planted native vegetation within the Subject Site, in line with the decision-making framework in **Table 10**.

Table 10: Decision-Making Key (Appendix D BAM, 2020)

Item	Standard for Assessment	Options	AEP Assessment
1	Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?	Yes - The planted native vegetation must be allocated to the best-fit PCT and the BAM must be applied. No - Go to 2.	The planted vegetation comprises a ring of <i>Waterhousea floribunda</i> within a mulched planting bed, surrounding an exotic managed lawn. This vegetation is surrounded by exotic landscaping. The natural distribution of <i>Waterhousea floribunda</i> is within riverine rainforest, north from the Hunter Valley. As this species does not naturally occur within the Sydney Basin Bioregion, and does not form a vegetation mosaic, it cannot readily be assigned to a Plant Community Type (PCT) within the Subject Site. NO
2	Is the planted native vegetation: a. planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and b. the primary objective was to replace or regenerate a plant community type or a threatened plant species population or its habitat	Yes - The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM. No - Go to 3.	The <i>W. floribunda</i> were planted for ornamental landscaping and not for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.). NO
3	Is the planted/translocated native vegetation individuals of a threatened species or other native species planted/translocated for the purpose of providing threatened species habitat under one of the following:		Refer Below
3a	A species recovery project	Yes - The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM. No - Go to 4.	The planted vegetation within the Subject Site have not been planted / Translocated for the purpose of a species recovery project. NO
3b	Saving our Species project		The planted vegetation within the Subject Site were not been planted / Translocated for the purpose of Saving our Species project. NO
3c	Other types of government funded restoration project.		The planted vegetation within the Subject Site have not been planted / Translocated for the purpose of other types of government funded restoration project.

Item	Standard for Assessment	Options	AEP Assessment
			NO
3d	Condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat		The planted vegetation within the Subject Site have not been planted / Translocated for the purpose of Condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat. NO
3e	Legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (e.g. Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act)		The planted vegetation within the Subject Site have not been planted / translocated for the purpose of legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (e.g. Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act). NO
3f	Ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan.		The planted vegetation within the Subject Site were not planted / translocated for the purpose of ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan. NO
3g	Approved vegetation management plan (e.g. as required as part of a Controlled Activity Approval for works on waterfront land under the NSW Water Management Act 2000).		The planted vegetation within the Subject Site were not been planted / translocated for the purpose of an approved vegetation management plan (e.g. as required as part of a Controlled Activity Approval for works on waterfront land under the NSW Water Management Act 2000). NO
4	Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation?	Yes - Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied). No - Go to 5.	The planted vegetation within the Subject Site was not planted / translocated for the purpose of a voluntarily revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation. NO
5	Is the native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as: windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes,	Yes - Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied). No - Go to 6.	The planted vegetation was planted for an aesthetic purpose, evidenced by its situation within a mulched planting bed and setting within a defined geometric pattern, i.e. an oval ring (see also, Plate 16). YES

Item	Standard for Assessment	Options	AEP Assessment
	macadamia plantations or teatree farms?		
Evidence demonstrating the application of the decision-making key to the areas of planted native vegetation must be provided in the BDAR or BCAR.			Refer Above.

Item 5 within **Table 10**, above requires evidence-based justification to support the assessment that the planted vegetation was installed for a functional (aesthetic) purpose. **Plate 16** depicts historical aerial imagery (2016) showing the oval lawn around which the planted vegetation has since been installed. Given the date within which the planting occurred (i.e. post 2016), and the inference that the planting was installed after the lawn it can be reasonably justified that the planting was undertaken for a functional (aesthetic) purpose.



Plate 16: Historical imagery (2016) showing the location of the planted native vegetation (circled in red)

It has been concluded that the assessment of the planted vegetation must be assessed in accordance with Appendix D.2 of the BAM 2020. Appendix D.2 requires the assessor to assess the planted native vegetation for the suitability for use by threatened species, recording results. This vegetation has been subject to assessment for the presence of fauna species as part of the survey effort and assessment, for the site as a whole.

1.4.3.3 Associated TECs

PCT 4024 is associated with the following state and federally listed threatened ecological communities:

- BC Act listed EEC: *River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*; and
- EPBC Act listed CEEC: *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria*.

The Subject PCT (i.e. the assessed vegetation comprising PC 4024, within the Subject Site) has been assessed against the relevant determination and listing criteria for the associated TEC and is discussed in further detail below.

BC Act-listed TEC

The BC Act listed Critically Endangered Ecological Community: *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* is estimated to represent less than 30% of its original extent. The community has been extensively cleared and modified with large former areas of this community now occupied by exotic pastures grazed by cattle, market gardens and other cropping enterprises.

Characteristic canopy species are present within the Subject PCT, including *E. baueriana*, *E. moluccana*, *Casuarina glauca* and *Angophora floribunda* in addition to a number of associated ground

cover species. Whilst the Subject PCT has been subject to disturbance through historic land clearance and landscaping practices such as regular slashing, it has been assessed as commensurate with this community. A further detailed assessment against relevant criteria is provided in **Appendix F**.

EPBC Act-listed TEC

The federally listed *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria* broadly encompasses the same community as the aforementioned BC Act-listed TEC. A key difference in the federal listing is that the vegetation must meet specific conditions to qualify. This means that some degraded patches, which may align with the state-listed TEC may not qualify for federal protection.

An assessment against the relevant characteristics and condition thresholds is detailed in **Appendix F**. It concludes that the Subject PCT meets the relevant patch size and condition thresholds to qualify as Condition Class C2 – large or contiguous patch in moderate condition and therefore commensurate with the EPBC Act listed TEC.

Herewith, vegetation associated with the state and federal listing is referred to as River-flat Eucalypt Forest (REF).

1.4.4 Cleared / Exotic and Infrastructure

The majority of the Study Area (approx. 33.32ha) is a mixture of cleared areas, exotic vegetation, roads, and other infrastructure (including residential buildings and ancillary features which do not comprise vegetation). This primarily occurs in the form of large managed fields that have been highly modified from the original vegetation through historical and ongoing management practices. These areas include a high cover of *Eragrostis curvula*, *Sporobolus africanus*, *Paspalum dilatatum*, *Hyparrhenia hirta* and other pasture weeds.

BAM plots 5 and 6 were undertaken within this zone and it was determined that these areas do not constitute a defined native vegetation unit and does not conform to a listing under the BC Act or EPBC Act.



Plate 17: BAM Plot 5

1.4.5 Dams and Waterbodies

The site contains two (2) mapped first order streams converging into one (1) second order stream at the centre of the site. The Georges River flows adjacent to the north of the Study Area. These features are further described in **Section 1.5.4.2**.

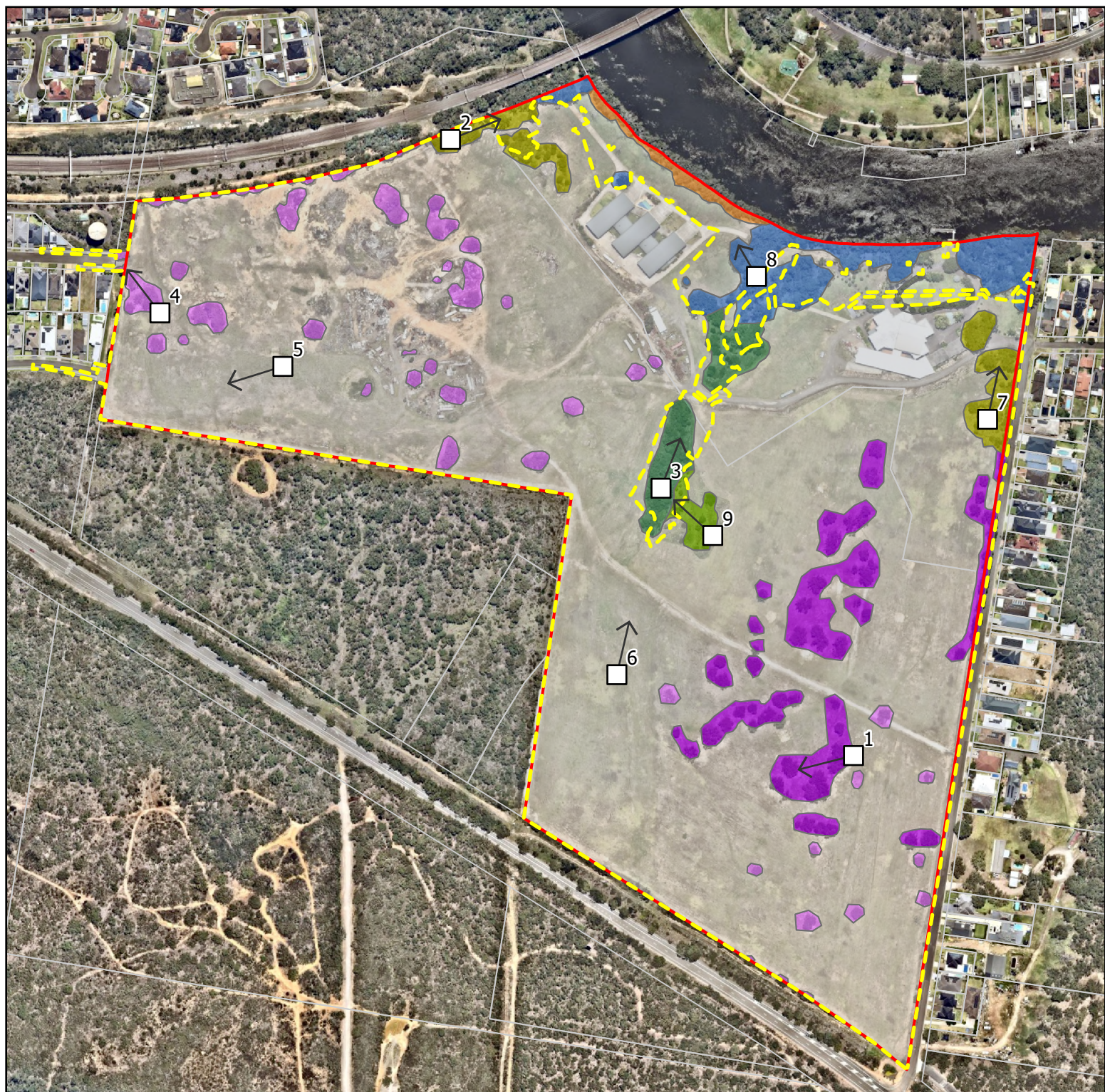
There are no dams present within the site.

Table 11 summarises the vegetation zones identified on site and quantifies the extent of each zone occurring within the Subject Site and within the Study Area.

Table 11: Summary of Vegetation Zones and Areas

Vegetation Zone	Condition	Total Study Area (ha)	Total Subject Site (ha)
PCT 4059: <i>Sydney Hinterland Sandy Creekflat Shrub Forest</i>	Good	0.63	0.14
	Degraded	0.18	0.15
PCT 4028: <i>Estuarine Swamp Oak Twig-rush Forest</i>	Not Assessed	0.19	0.00
PCT 4024: <i>Cumberland Blue Box Riverflat Forest</i>	Degraded	1.29	0.16
PCT 3619: <i>Sydney Hinterland Grey Gum Transition Forest</i>	Moderate	1.85	1.85
	Poor	1.16	1.16
PCT 3616: <i>Sydney Hinterland Enriched Sandstone Bloodwood Forest</i>	Moderate	0.75	0.63
Planted Native	N/A	0.06	0.04
Total Native Vegetation (ha)*		6.11	4.13
Cleared/Exotic and Infrastructure		33.32	31.85
Total Cleared/Exotic and Infrastructure		33.32	31.85
Total (ha)*		39.43	35.98

*Any discrepancies in numbers are due to rounding



Legend

- Subject Site
- Study Area
- Cadastre
- BAM Plot
- BAM Transect

Ground-truthed Vegetation

- 3616 - Sydney Hinterland Grey Gum Transition Forest - Moderate
- 3619 - Sydney Hinterland Enriched Sandstone Bloodwood Forest - Moderate
- 3619 - Sydney Hinterland Enriched Sandstone Bloodwood Forest - Poor
- 4024 - Cumberland Blue Box Riverflat Forest - Degraded
- 4028 - Estuarine Swamp Oak Twig-rush Forest
- 4059 - Sydney Hinterland Sandy Creekflat Shrub Forest - Good
- 4059 - Sydney Hinterland Sandy Creekflat Shrub Forest - Degraded
- Cleared Exotic and Infrastructure
- Planted Non-local Native

Figure 4 - Ground-truthed Vegetation

0 100 200
m
Scale: 1:5,000



1.4.6 Vegetation Integrity Assessment

1.4.6.1 Patch Size

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

1.4.6.2 Vegetation Integrity Score

Plot data was used to determine the composition, structure and function condition score of the vegetation zones within the Subject Site, which informed the vegetation integrity score. Plot data has been tabulated (refer **Table 12**) and includes corresponding condition scores along with the overall vegetation integrity score. Vegetation Condition Class has been rated using the following bands associated with the Vegetation Integrity Scores:

- 70 - 100 Good;
- 50 - 69 Moderate;
- 35 - 49 Poor;
- 25 - 34 Degraded;
- 16 - 24 Highly Degraded; and
- <15 Severely Degraded.

The following BAM plots were removed from the BAM-C:

- Plots 5 & 6: This area was determined to be exotic pasture vegetation and subsequently was removed from the BAM calculations.

A summary of vegetation zones assessed within the site is provided in **Table 11**, above.

Table 12: Plot Data and Vegetation Integrity Score

Site Attribute	PCT 4059 (Good)	PCT 4059 (Degraded)	PCT 4024 (Degraded)	PCT 3619 (Moderate)	PCT 3619 (Poor)	PCT 3616 (Moderate)	
Plot #	3	9	8	1	4	2	7
Location	313461 6239550	313509 6239507	313550 6239747	313640 6239302	312995 6239713	313265 6239874	313764 6239615
Bearing	358	46	330	240	306	57	13
Tree	8	4	7	2	2	5	5
Shrub	14	2	1	9	7	8	11
Grass & Grass-like	11	4	5	9	10	4	9
Forb	6	3	2	4	3	7	6
Fern	1	1	0	0	0	0	2
Other	3	0	1	1	4	1	2
Composition Condition Score	94.7	40.9	36.2	46.1	42.2	46	
Tree	8	4	7	2	2	5	5
Shrub	14	2	1	9	7	8	11
Grass & Grass-like	11	4	5	9	10	4	9
Forb	6	3	2	4	3	7	6
Fern	1	1	0	0	0	0	2
Other	3	0	1	1	4	1	2
Structure Condition Score	94.7	17.2	61.2	45.7	34.6	51.8	
Regenerating Stems (<5cm DBH)	Present	Present	Present	Present	Present	Present	Present
Stem Classes (cm DBH)	5-9cm 10-19cm 20-29cm 30-49cm 50-79cm	5-9cm 10-19cm 20-29cm 30-49cm	10-19cm 20-29cm 30-49cm 50-79cm	20-29cm 30-49cm 50-79cm 80+cm	20-29cm 30-49cm 50-79cm	5-9cm 10-19cm 20-29cm 30-49cm 50-79cm 80+cm	5-9cm 10-19cm 20-29cm 30-49cm
# Large Trees	4	1	5	5	7	4	3
Hollow-bearing Trees	0	0	0	1	0	0	0
Litter Cover (%)	55	80	27	58	31	46	58
Coarse Woody Debris (m)	0	0.5	0	0	4	0	10
High Threat Weed Cover	5.1	39.8	36	13.1	20.2	46.1	5.1
Function Condition Score	80	45	12.8	72.9	65.5	76.6	
Current Vegetation Integrity Score	89.5	31.6	30.5	53.5	45.7	56.8	

1.5 Threatened Species

Under the BAM, threatened species are classified into credit classes: 'Ecosystem Credit' and 'Species Credit' species, as detailed within the BioNet Atlas Threatened Species Profile Database (NSW DCCEEW 2024a).

A predicted Ecosystem Credit Species assessment is presented in **Table 13**, and a Candidate Threatened Species assessment is presented in **Table 14**.

Field surveys were undertaken on site from March 2024 to December 2024. The survey effort within the Subject Site and surrounding Study Area is described in **Section 1.5.3** and a summary is contained in **Table 16**. Species identified on site during the survey period are presented in **Appendix B** and **Appendix C**.

1.5.1 Ecosystem Credit Species

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

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

Those Ecosystem Credit species predicted to occur within the site are provided in **Table 13**.

Table 13: Predicted Ecosystem Credit Species

Scientific name	Common name	Sensitivity to Gain Class	Recorded within 10km* (NSW BioNet Wildlife Atlas 2025) Y/N	Recorded within site or nearby surrounds Y/N
<i>Rostratula australis</i>	Australian Painted Snipe	Moderate	N	N
<i>Limosa lapponica baueri</i>	Bar-tailed Godwit (baueri)	High	N	N
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	Moderate	Y	N
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	Moderate	Y	N
<i>Limicola falcinellus</i>	Broad-billed Sandpiper	High	N	N
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	High	N	N
<i>Calidris ferruginea</i>	Curlew Sandpiper	High	Y	N
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	Moderate	Y	N
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	High	Y	N
<i>Numenius madagascariensis</i>	Eastern Curlew	High	N	N
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	High	Y	Y
<i>Pandion cristatus</i>	Eastern Osprey	Moderate	Y	Y
<i>Petroica phoenicea</i>	Flame Robin	Moderate	Y	N
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Moderate	N	N
<i>Phoniscus papuensis</i>	Golden-tipped Bat	High	N	N
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	High	Y	N
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	High	Y	Y

Scientific name	Common name	Sensitivity to Gain Class	Recorded within 10km* (NSW BioNet Wildlife Atlas 2025) Y/N	Recorded within site or nearby surrounds Y/N
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	High	Y	Y
<i>Miniopterus australis</i>	Little Bent-winged Bat	High	Y	N
<i>Hieraaetus morphnoides</i>	Little Eagle	Moderate	Y	N
<i>Glossopsitta pusilla</i>	Little Lorikeet	High	Y	Y
<i>Anthochaera phrygia</i>	Regent Honeyeater	High	Y	Y
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	High	Y	N
<i>Petroica boodang</i>	Scarlet Robin	Moderate	Y	Y
<i>Calyptorhynchus lathami lathami</i>	South-eastern Glossy Black-Cockatoo	High	Y	N
<i>Circus assimilis</i>	Spotted Harrier	Moderate	Y	N
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	High	Y	N
<i>Lophoictinia isura</i>	Square-tailed Kite	Moderate	Y	N
<i>Lathamus discolor</i>	Swift Parrot	Moderate	Y	N
<i>Neophema pulchella</i>	Turquoise Parrot	High	Y	Y
<i>Daphoenositta chrysoptera</i>	Varied Sittella	Moderate	Y	N
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	High	Y	Y
<i>Hirundapus caudacutus</i>	White-throated Needletail	High	Y	N
<i>Petaurus australis</i>	Yellow-bellied Glider	High	Y	N
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	High	Y	Y

*The BioNet search comprises a 10km grid square centred on the site.

1.5.2 Species Credit Species

Additional threatened fauna species determined by the BAM calculator that have the potential to use the Subject Site as suitable habitat are identified in **Table 14**.

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

Table 14: Potential Species Credit Species

Species	Risk Weighting (BRW)	SAIL (Y/N)	BioNet Records (10km)	Details of BioNet Records	Habitat Requirements / Habitats Searched / General Notes
Flora					
<i>Acacia bynoeana</i> Bynoe's Wattle	2	N	2	Nearest record: 3.3km from Subject Site (2011) Most recent record: 4.1km from Subject Site (2017)	Bynoe's Wattle is found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. It has recently been found in the Colymea and Parma Creek areas west of Nowra. Occurs in heath or dry sclerophyll forest on sandy soils.
<i>Acacia flocktoniae</i> Flockton Wattle	2	N	0	N/A	The Flockton Wattle is found only in the Southern Blue Mountains (at Mt Victoria, Megalong Valley and Yerranderie). Grows in dry sclerophyll forest on sandstone.
<i>Acacia pubescens</i> Downy Wattle	2	N	257	Nearest record: within Subject Site (1997) Most recent record: 4.8km from Subject Site (2023)	Concentrated around the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravely soils, often with ironstone. Also, in open woodland and forest.
<i>Allocasuarina diminuta</i>	2	N	11	Nearest record: within Subject Site (1987) Most recent record: 4.8km from Subject Site (2021)	The endangered population occurs along sandstone ridges and upper hillsides in the region northwest from Heathcote, towards Menai and Holsworthy, in heathy and low open woodland communities. It is restricted to the Local Government Areas listed in this instance (Sutherland and Liverpool). Other occurrences in the Blue Mountains and Southern Highlands (Blackheath to Bundanoon and Taralga), and also in the coastal communities from Kingsford to Little Bay) are not included in the Endangered population listing.
<i>Allocasuarina glareicola</i>	3	Y	1	Record is 0.3km from Subject Site (1996)	Distribution in NSW is restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Grows in Castlereagh woodland on lateritic soil. Found in open woodland with <i>Eucalyptus parramattensis</i> , <i>Eucalyptus fibrosa</i> , <i>Angophora bakeri</i> , <i>Eucalyptus sclerophylla</i> and <i>Melaleuca decora</i> . Common associated understorey species include <i>Melaleuca nodosa</i> , <i>Hakea dactyloides</i> , <i>Hakea sericea</i> , <i>Dillwynia tenuifolia</i> , <i>Micromyrtus minutiflora</i> , <i>Acacia elongata</i> , <i>Acacia brownii</i> , <i>Themeda australis</i> and <i>Xanthorrhoea minor</i> .
<i>Callistemon linearifolius</i> Netted Bottle Brush	1.5	N	31	Nearest and most recent record: 1.2km from Subject Site (2014)	Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Recorded in 2000 at Coalcliff in the northern Illawarra. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. The species was more widespread in the past, and there are currently only 5-6 populations remaining from the 22 populations historically recorded in the Sydney area. Three of the remaining populations are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve and Spectacle Island Nature Reserve. Grows in dry sclerophyll forest on the coast and adjacent ranges.
<i>Dillwynia tenuifolia</i>	2	N	2	Nearest and most recent record: 5.2km from Subject Site (1996)	The core distribution is the Cumberland Plain from Windsor and Penrith east to Dean Park near Colebee. May be common in within scrubby/dry heath areas and transitional areas. <i>Eucalyptus fibrosa</i> is usually the dominant canopy species.
<i>Epacris purpurascens</i> var. <i>purpurascens</i>	1.5	N	6	Nearest and most recent record: 3.2km from Subject Site (2015)	Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Found in a range of habitat types, most of which have a strong shale soil influence.
<i>Genoplesium baueri</i> Bauer's Midge Orchid	3	Y	0	N/A	The species has been recorded from locations between Ulladulla and Port Stephens. About half the records were made before 1960 with most of the older records being from Sydney suburbs including Asquith, Cowan, Gladesville, Longueville and Wahroonga. No collections have been made from those sites in recent years. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments.
<i>Grevillea parviflora</i> subsp. <i>parviflora</i> Small-flower Grevillea	2	N	434	Nearest record: 0.9km from Subject Site (2018) Most recent record: 3km from Subject Site (2021)	Grows in sandy or light clay soils usually over thin shales, often with lateritic ironstone gravels and nodules. Sydney region occurrences are usually on Tertiary sands and alluvium, and soils derived from the Mittagong Formation. Soil landscapes include Lucas Heights or Berkshire Park. Occurs in a range of vegetation types from heath and shrubby woodland to open forest. In Sydney it has been recorded from Shale Sandstone Transition Forest and in the Hunter in Kurri Sand Swamp Woodland. however, other communities occupied include <i>Corymbia maculata</i> - <i>Angophora costata</i> open forest in the Dooralong area, in Sydney Sandstone Ridgetop Woodland at Wedderburn and in Cooks River / Castlereagh Ironbark Forest at Kemps Creek.
<i>Gyrostemon thesioides</i>	3	Y	0	N/A	Only identifiable within 3 - 4 years of a fire. Likely to be a persistent soil seedbank as it will re-appear post-fire. Within NSW, the species has most recently been recorded near Lake Burragorang in the Blue Mountains National Park, and near Long Point in Western Sydney. It has also been recorded in 2004 in Wollemi National Park, near the Colo River (one male plant), and historically at sites near the Georges and Nepean Rivers (more than 55 and 110 years ago respectively). In NSW, known from hillsides, slopes, terraces and riverbanks within 180 metres of watercourses. A fire-opportunist, with recruitment occurring from soil-stored seed bank following fire. Adult plants are killed by fire. Plants may reach maturity in less than a year and plants are presumably short-lived.
<i>Hibbertia puberula</i>	2	N	218	Nearest record: within Subject Site (2017) Most recent record: 4km from Subject Site (2021)	Recent work on this species (Toelken & Miller 2012) and its relatives have shown it to be widespread, but never common. It extends from Wollemi National Park south to Morton National Park and the south coast near Nowra. Early records of this species are from the Hawkesbury River area and Frenchs Forest in northern Sydney, South Coogee in eastern Sydney, the Hacking River area in southern Sydney, and the Blue Mountains. It favours low heath on sandy soils or rarely in clay, with or without rocks underneath (Toelken & Miller 2012). Habitats are typically dry sclerophyll woodland communities, although heaths are also occupied.

Species	Risk Weighting (BRW)	SAIL (Y/N)	BioNet Records (10km)	Details of BioNet Records	Habitat Requirements / Habitats Searched / General Notes
<i>Hibbertia</i> sp. Bankstown	3	Y	1	Record is 4.6km from Subject Site (2006)	This species is endemic to New South Wales and is currently known to occur in only one population at Bankstown Airport in Sydney's southern suburbs, in the Bankstown local government area. The airport site is very heavily modified from the natural state, lacks canopy species and is currently a low grass/shrub association with many pasture grasses and other introduced herbaceous weeds.
<i>Hibbertia stricta</i> subsp. <i>furcatula</i>	2	N	11	Nearest and most recent record: 2.2km from Subject Site (2012)	Habitat of the Southern Sydney population is broadly dry eucalypt forest and woodland. This population appears to occur mainly on upper slopes and above the Woronora River gorge escarpment, at or near the interface between the Lucas Heights soil landscape and Hawkesbury sandstone.
<i>Leucopogon exolasius</i> Woronora Beard-heath	2	N	3	Nearest and most recent record: 1.2km from Subject Site (2014)	Woronora Beard-heath is an erect shrub that grows to a metre tall and has hairy branchlets. Its sharp-pointed leaves grow to about 15 mm long by 2.5 mm wide and have a convex upper surface and striated lower surface. Up to three drooping, white, tubular flowers grow in the angles where the leaves meet the stems, on stalks to 5 mm long. Like most beard-heaths they have furry throats, but also have tiny hairs on the outside of the tube. The common and similar <i>Leucopogon setiger</i> has longer flower stalks, a smooth outer surface to the flower tube and shorter, wider leaves.
<i>Leucopogon fletcheri</i>	2	N	0	N/A	Restricted to north-western Sydney between St Albans in the north and Annangrove in the south, within the local government areas of Hawkesbury, Baulkham Hills and Blue Mountains. Occurs in dry eucalypt woodland or in shrubland on clayey lateritic soils, generally on flat to gently sloping terrain along ridges and spurs.
<i>Marsdenia viridiflora</i> subsp. <i>Viridiflora</i>	2	N	7	Nearest and most recent record: 5.5km from Subject Site (2010)	Recent records are from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Previously known north from Razorback Range. Grows in vine thickets and open shale woodland.
<i>Melaleuca deanei</i> Deane's paperbark	3	Y	12	Nearest record: 1km from Subject Site (1998) Most recent record: 2km from Subject Site (2021)	Deane's Paperbark occurs in two distinct areas, in the Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas respectively. There are also more isolated occurrences at Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone.
<i>Persoonia acerosa</i> Needle Geebung	2	N	0	N/A	The Needle Geebung has been recorded only on the central coast and in the Blue Mountains, from Mt Tomah in the north to as far south as Hill Top where it is now believed to be extinct. Mainly in the Katoomba/ Wentworth Falls/ Springwood area. The Needle Geebung occurs in dry sclerophyll forest, scrubby low-woodland and heath on low fertility soils. This species seems to benefit from the reduced competition and increased light available on disturbance margins including roadsides.
<i>Persoonia bargoensis</i> Bargo Geebung	2	N	0	N/A	The Bargo Geebung occurs in woodland or dry sclerophyll forest on sandstone and on heavier, well drained, loamy, gravelly soils of the Wianamatta Shale and Hawkesbury Sandstone. It favours interface soil landscapes such as between the Blacktown Soil Landscape and the complex Mittagong Formation soils (Lucas Heights Soil Landscape) with the underlying sandstone (Hawkesbury Soil Landscape and Gynea Soil Landscape). Some of the vegetation the species occurs within would be recognised as the Shale/Sandstone Transition Forest, a listed community.
<i>Persoonia hirsuta</i> Hairy Geebung	3	Y	2	Nearest and most recent record: 0.2km from Subject Site (1968)	<i>Persoonia hirsuta</i> has a scattered distribution around Sydney. The species is distributed from Singleton in the north, along the east coast to Hilltop in the south west, Dombarton in the south east and the Blue Mountains to the west. The Hairy Geebung is found in clayey and sandy soils in dry sclerophyll open forest, woodland and heath, primarily on the Mittagong Formation and on the upper Hawkesbury Sandstone.
<i>Persoonia nutans</i> Nodding Geebung	2	N	153	Nearest record: within Study Area (16m from Subject Site) (1996) Most recent record: 3.9km from Subject Site (2023)	Flowering typically occurs from November to March. The species is similar to <i>Persoonia bargoensis</i> , which is found in the southern part of the Cumberland Plain and nearer Southern Highlands. The species has a disjunct distribution, with the majority of populations (and 99% of individuals) occurring in the north of the species range in the Agnes Banks, Londonderry, Castlereagh, Berkshire Park and Windsor Downs areas. Core distribution occurs within the Penrith, and to a lesser extent Hawkesbury, local government areas, with isolated and relatively small populations also occurring in the Liverpool, Campbelltown, Bankstown and Blacktown local government areas. The southern and northern populations have distinct habitat differences.
<i>Pomaderris brunnea</i> Brown Pomaderris	2	N	0	N/A	Brown Pomaderris grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines. Flowers appear in September and October. The species is expected to live for 10 - 20 years, while the minimum time to produce seed is estimated to be 4 - 6 years. The species has been found in association with <i>Eucalyptus amplifolia</i> , <i>Angophora floribunda</i> , <i>Acacia parramattensis</i> , <i>Bursaria spinosa</i> and <i>Kunzea ambigua</i> .
<i>Prostanthera saxicola</i>	2	N	3	Nearest and most recent record: 1km from Subject Site (1987)	Primarily in Eucalypt Forest, heath and low shrubland, often in damp or moist sites. This population is restricted to the named local government areas (Liverpool and Sutherland) in the southern to south-western parts of Sydney. Recorded occurrences are mainly between Holsworthy station and Sutherland station, north from Lucas Heights and south of the Georges River. However, the population may extend beyond this into the adjacent parts of the relevant LGAs within the region (including the military reserve lands and the Royal and Heathcote National Parks).
<i>Pterostylis saxicola</i> Sydney Plains Greenhood	2	N	2	Nearest and most recent record: 1.5km from Subject Site (2007)	Occurs primarily on the Cumberland Plain along an ecological gradient from clay soils derived from Ashfield Shale to thin accumulations of humus rich sandy soils on Hawkesbury Sandstone sheets and rock shelves. Habitat ranges from grassy woodland on flat to gently sloping landscapes on shale soils, to open-forest on hilly landscapes on transitional soils, and woodland on the rims and steep sides of river valleys on sandstone soils. The species has also been recorded outside the Cumberland Plain in grassy woodland on Devonian slate.
<i>Rhodamnia rubescens</i> Scrub Turpentine	3	N	1	Record is 2km from Subject Site (1996)	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.

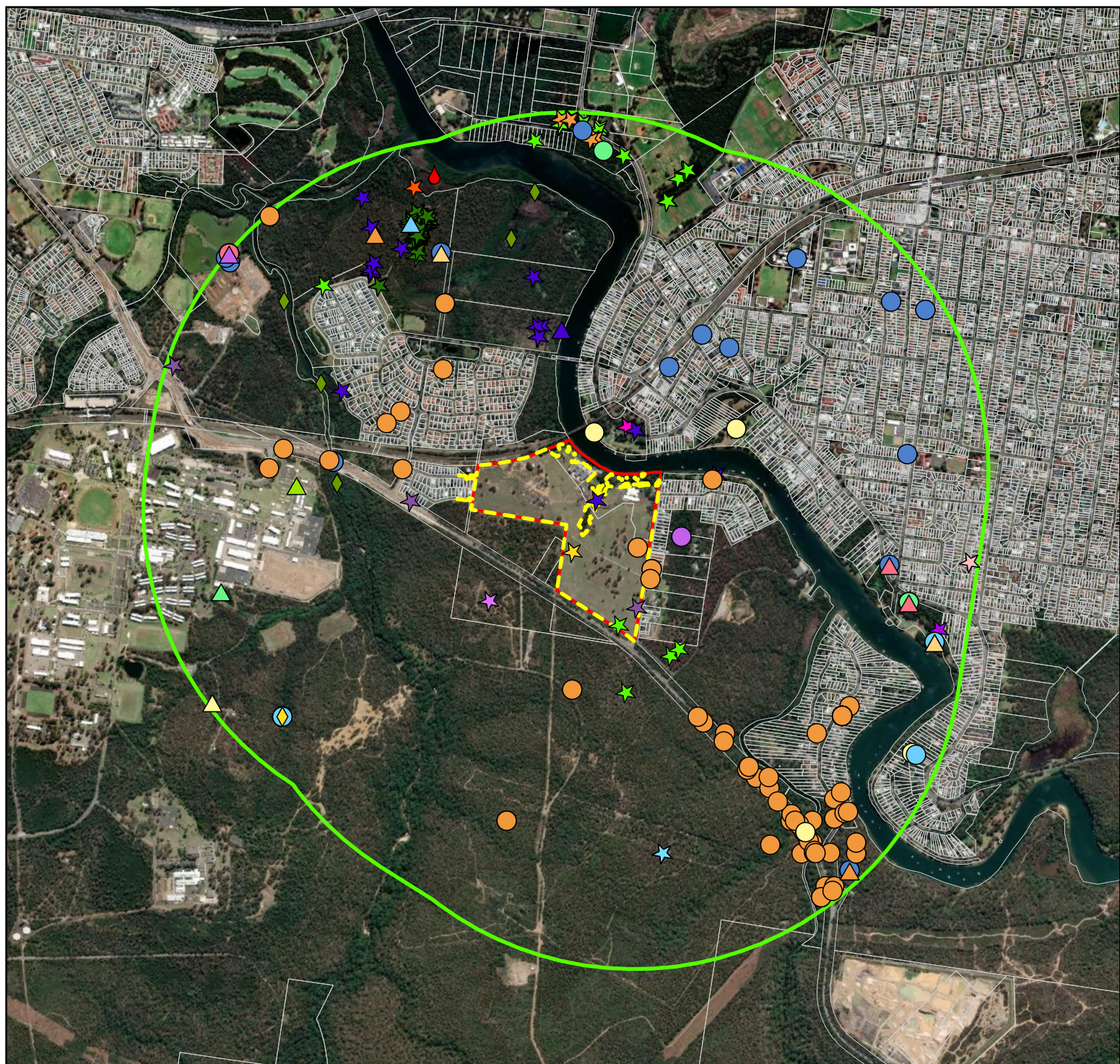
Species	Risk Weighting (BRW)	SAIL (Y/N)	BioNet Records (10km)	Details of BioNet Records	Habitat Requirements / Habitats Searched / General Notes
<i>Syzygium paniculatum</i> Magenta Lilly Pilly	2	N	1	Record is 3.5km from Subject Site (2019)	Found only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest.
Fauna					
<i>Callocephalon fimbriatum</i> Gang-gang cockatoo	2	N	0	N/A	The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern New South Wales. In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 7 cm in diameter or larger in eucalypts and 3 metres or more above the ground.
<i>Calyptorhynchus lathami lathami</i> South-eastern Glossy Black-cockatoo	2	N	5	Nearest and most recent record: 4.2km from Subject Site (2010)	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (<i>Allocasuarina littoralis</i>) and Forest Sheoak (<i>A. torulosa</i>) are important foods.
<i>Cercartetus nanus</i> Eastern Pygmy-possum	2	N	6	Nearest record: 0.1km from Subject Site (1993) Most recent record: 1.5km from Subject Site (2022)	In NSW the Eastern Pygmy-possum extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes. Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they frequently occur in rainforest.
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	2	N	31	Nearest record: 1km from Subject Site (1994) Most recent record: 2.3km from Subject Site (2022)	In New South Wales it is widespread along the east coast, and along all major inland rivers and waterways. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea.
<i>Hieraaetus morphnoides</i> Little Eagle	1.5	N	14	Nearest record: 1.8km from Subject Site (2014) Most recent record: 2km from Subject Site (2021)	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used
<i>Lophoictinia isura</i> Square-tailed Kite	1.5	N	3	Nearest record: 1.7km from Subject Site (1992) Most recent record: 5.3km from Subject Site (2019)	In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March.
<i>Meridolum corneovirens</i> Cumberland Plain Land Snail	2	N	39	Nearest record: 1.4km from Subject Site (2006) Most recent record: 3.1km from Subject Site (2020)	Lives in small areas on the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton and from Liverpool west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountains. known from over 100 different locations, but not all are currently occupied, and they are usually isolated from each other as a result of land use patterns. Primarily inhabits Cumberland Plain Woodland (a critically endangered ecological community).
<i>Myotis macropus</i> Southern Myotis	2	N	18	Nearest and most recent record: 1.2km from Subject Site (2021)	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. Generally, roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. In NSW females have one young each year usually in November or December.
<i>Pandion cristatus</i> Eastern Osprey	1.5	N	7	Nearest record: 1.2km from Subject Site (2014) Most recent record: 3.1km from Subject Site (2021)	Breeds from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.
<i>Petauroides Volans</i> Southern Greater Glider	2	N	0	N/A	The Southern Greater Glider occurs in eastern Australia, in eucalypt forests and woodlands. It has been found south through NSW. Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. Shelter during the day in tree hollows and will use up to 18 hollows in their home range.
<i>Petaurus norfolcensis</i> Squirrel Glider	2	N	1	Record is 1.5km from Subject Site (2022)	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum Forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas.
<i>Phascolarctos cinereus</i> Koala	2	N	163	Nearest record: within Subject Site (1997) Most recent record: 0.3km from Subject Site (2023)	In New South Wales, koala populations are found on the central and north coasts, southern highlands, southern and northern tablelands, Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range. Inhabit eucalypt woodlands and forests.
<i>Pommerhelix duralensis</i> Dural Land Snail	2	N	0	N/A	The species is a shale-influenced-habitat specialist, which occurs in low densities along the western and northwest fringes of the Cumberland IBRA subregion on shale-sandstone transitional landscapes. The species has a strong affinity for communities in the interface region between shale-derived and sandstone-derived soils, with forested habitats that have good native cover and woody debris.
<i>Pseudophryne australis</i> Red Crowned Toadlet	1.5	N	8	Nearest record: 1.4km from Subject Site (2010) Most recent record: 3.6km from Subject Site (2012)	The Red-crowned Toadlet has a restricted distribution. It is confined to the Sydney Basin, from Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains. Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones.
<i>Vespadelus troungtoni</i> Eastern Cave Bat	3	Y	0	N/A	The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT.

The following Potential Credit Species have been excluded from the species credits species list in accordance with Section 5.2.2.2 (a, b or c) and Section 5.2.3 (2a) of the BAM.

Table 15: Potential Species Credit Species excluded from BAM-C

Scientific Name	Common Name	Habitat Constraints (Y / N)	Habitat Degraded (Y / N)	Geographic Limitations (Y / N)	Species is Vagrant (Y / N)	Comments
<i>Acacia prominens</i>	Gosford Wattle	N	N	Y	N	The Subject Site does not occur within the Hurstville or Kogarah Local Government Areas which is a geographical limitation for this population. As such, it was excluded from the assessment under Section 5.2.1.b of the BAM.
<i>Anthochaera phrygia</i>	Regent Honeyeater	Y	N	N	N	There is one Regent Honeyeater record associated with the Nepean River approximately 1km to the west but the site is not mapped in the Important Habitat Map for this species. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Burhinus grallarius</i>	Bush Stone-curlew	Y	N	N	N	The Subject Site is underscrubbed and does not contain fallen/standing dead timber. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Calidris ferruginea</i>	Curlew Sandpiper	Y	N	N	N	The Subject Site is not mapped in the Important Habitat Map for this species. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Y	N	N	N	The Subject Site is not within 2km of rocky areas containing caves or overhangs or other suitable roosting features. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Deyeuxia appressa</i>	-	N	Y	N	Y	This species has not been recorded since 1942 and is considered extinct in the wild. As such, it was excluded from the assessment under Section 5.2.2 of the BAM.
<i>Gyrostemon thesioides</i>		N	Y	N	N	This species is only identifiable within 3-4 years of a fire. Only two (2) fires are mapped within the Subject Site according to the NPWS Fire History, one in 1997-98 and the most recent in 2002-03. The site is highly degraded and cleared with no recent fire history, as such it was excluded from assessment.
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	N	Y	N	N	Suitable breeding habitat consists of ephemeral flowing streams that have permanent pools or in upland swamps. These habitat features do not occur within the Subject Site. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	Y	N	N	N	This species requires large rocky areas for basking. Rocky outcrops are limited within the site and would not support this species. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Isoodon obesulus obesulus</i>	Southern Brown Bandicoot	Y	N	N	N	This species requires a dense cover of ground habitats which is absent from the site. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Lathamus discolor</i>	Swift Parrot	Y	N	N	N	The Subject Site is not mapped in the Important Habitat Map for this species. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Limicola falcinellus</i>	Broad-billed Sandpiper	Y	N	N	N	The Subject Site is not mapped in the Important Habitat Map for this species. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Limosa lapponica baueri</i>	Bar-tailed Godwit	Y	N	N	N	The Subject Site is not mapped in the Important Habitat Map for this species. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Litoria aurea</i>	Green and Golden Bell Frog	N	Y	N	Y	This species requires permanent waterbodies with emergent aquatic vegetation which do not occur within the Subject Site. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Miniopterus australis</i>	Little Bent-winged Bat	Y	N	N	N	This species requires caves or appropriate thermoregulatory structures to support maternity colonies which are absent from the site and surrounding area. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	Y	N	N	N	This species requires caves or appropriate thermoregulatory structures to support maternity colonies which are absent from the site and surrounding area. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Mixophyes balbus</i>	Stuttering Frog	N	Y	N	N	This species typically occurs in rainforest or wet sclerophyll forest in the upper tributaries of the Great Dividing Range. Requires permanent pools which are absent from the site. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Ninox strenua</i>	Powerful Owl	Y	N	N	N	No hollows suitable for this species were identified within the site. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.

Scientific Name	Common Name	Habitat Constraints (Y / N)	Habitat Degraded (Y / N)	Geographic Limitations (Y / N)	Species is Vagrant (Y / N)	Comments
<i>Numenius madagascariensis</i>	Eastern Curlew	Y	N	N	N	The Subject Site is not mapped in the Important Habitat Map for this species. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Y	N	N	N	No breeding camp occurs within the Subject Site. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Rhizanthella slateri</i>	Eastern Australian Underground Orchid	N	Y	N	N	This species requires undisturbed areas with significant leaf litter, which is not present within the Subject site. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.
<i>Tyto novaehollandiae</i>	Masked Owl	Y	N	N	N	No hollows suitable for this species were identified within the site. As such, it was excluded from the assessment under Section 5.2.2.2 a, b of the BAM.



Legend

 Subject Site

 Study Area

 Cadastre

 1500m Assessment Buffer

Amphibian Records

◆ Green and Golden Bell Frog

◆ Red-crowned Toadlet

Gastropod Records

● Cumberland Plain Land Snail

Flora Records

★ *Acacia pubescens*

★ *Allocasuarina diminuta* subsp. *mimica*

★ *Allocasuarina glareicola*

★ *Caesia parviflora* var. *minor*

★ *Callistemon linearifolius*

★ *Grevillea parviflora* subsp. *parviflora*

★ *Hibbertia puberula*

★ *Leucopogon exolasius*

★ *Melaleuca deanei*

★ *Persoonia hirsuta*

★ *Persoonia nutans*

★ *Prostanthera saxicola*

★ *Pterostylis saxicola*

★ *Wilsonia backhousei*

Mammal Records

● Eastern False Pipistrelle

● Eastern Pygmy-possum

● Grey-headed Flying-fox

● Koala

● Large Bent-winged Bat

● Large-eared Pied Bat

● Southern Brown Bandicoot (eastern)

● Southern Myotis

● Squirrel Glider

● Yellow-bellied Sheathtail-bat

Aves Records

▲ Bush Stone-curlew

▲ Curlew Sandpiper

▲ Eastern Osprey

▲ Little Lorikeet

▲ Masked Owl

▲ Powerful Owl

▲ Regent Honeyeater

▲ Scarlet Robin

▲ Sooty Owl

▲ Turquoise Parrot

▲ White-bellied Sea-Eagle

Figure 5 - BioNet Atlas Records

0 500 1,000
m
Scale: 1:25,000



1.5.3 Field Survey Methods

Surveys are deemed to fulfill minimum survey requirements. Details of the flora and fauna surveys are presented in **Table 16** and were conducted using relevant guidelines, in particular, survey guidelines for threatened plants (DPIE 2020a), Frogs (DPIE 2020d), Bats (OEH 2018), Mammals and Koalas (DPE 2022a). Flora Survey Effort and Fauna Survey Effort is shown in **Table 18**, and **Figures 6 to 8**.

1.5.3.1 Habitat Features Surveys

An assessment of the relative habitat values present within the Study Area was undertaken. This assessment focused primarily on the identification of specific habitat types and resources within the Study Area favoured by known threatened species listed in **Section 1.5.2**. The assessment also considered the potential value of the Subject Site (and surrounding areas) for all major guilds of native flora and fauna. The assessment was based on the specific habitat requirements of each threatened fauna species in regards to home range, feeding, roosting, breeding, movement patterns and corridor requirements.

Consideration was given to contributing factors including topography, soil, light and hydrology for threatened flora and assemblages. In particular, focus was put on documenting the presence of key habitat features such as tree hollows, feed trees and connectivity.

1.5.3.2 Flora Field Survey

All required flora survey techniques were utilised for targeted survey of the species listed in **Table 14** above and guided by state guidelines (DPIE 2020a) and the BAM (DPIE 2020b).

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

- Ground-truthing of vegetation mapping to identify all vegetation communities present onsite as well as segregate vegetation zones according to condition and current management practices;
- Seasonal threatened flora surveys utilising the parallel transect method;
- Identification of all vascular plant species encountered during fieldwork. Subject Site coverage was both systematic to ensure all key points of the site were checked, and therein the Random Meander Technique (Cropper 1993) was utilised to maximise species encountered;
- A total of 9 BAM plots were undertaken in accordance with BAM 2020 by AEP;
- One Rapid Data Point was undertaken within Planted Native vegetation; and,
- Updated/Refined Vegetation Community Mapping involving traversal over the entire Study Area.

1.5.3.3 Fauna Field Surveys

All required fauna survey techniques were utilised for targeted survey of the species listed in **Table 14** and guided by the *Threatened Species Survey and Assessment Guidelines* (2004). Survey effort is shown in **Figure 6**.

1.5.3.4 Incidental Observations

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

Table 16 below details the survey effort undertaken.

Table 16: Field Survey Periods

Date	Time	Total Survey Effort Hours	Field activity	Targeted Species	No. of Persons on Site	Rainfall (mm)	Company	Staff
18/03/2024	09:30 - 20:45	45	- Site Assessment - HBT Assessment - Bam Plots 1-6 - Flora Transects - NOCs	General assessment undertaken for suitability of the site to support threatened species in addition to targeted surveys for the following: <i>Acacia bynoeana</i> <i>Acacia pubescens</i> <i>Genoplesium baueri</i> <i>Persoonia hirsuta</i> <i>Persoonia nutans</i> - Eastern Pygmy-possum - Koala - Southern Myotis - Southern Greater Glider - Squirrel Glider	4	0	AEP	DK, JS, JB, ALR
19/03/2024	09:30 - 20:30	33	- Equipment Deployment - HBT Assessment - Bam Plots 7-8 - Flora Transects - NOCs		3	0	AEP	JB, JS, ALR
15/04/2024	09:45 - 13:00	6.5	Equipment Collection		2	0	AEP	BJ, ALR
26/07/2024	09:30 - 17:30	16	- BAM Plot 2 - Koala SATs 1 and 2 - Cumberland & Dural Snail Search - Diurnal Bird Survey - Flora Transects	- Cumberland Plain Land Snail - Dural Land Snail - Koala - South-eastern Glossy Black-cockatoo <i>Allocaeusuarina diminuta</i> <i>Allocaeusuarina glareicola</i> <i>Melaleuca deanei</i> <i>Rhodamnia rubescens</i> <i>Syzygium paniculatum</i>	2	0	AEP	JS, BJ
12/08/2024	17:45 - 19:15	1.5	Red Crowned Toadlet Nocturnal Survey	Red-crowned Toadlet	2	0	AEP	DK, BJ

Date	Time	Total Survey Effort Hours	Field activity	Targeted Species	No. of Persons on Site	Rainfall (mm)	Company	Staff
13/08/2024	09:30 - 18:45	18.5	- Cumberland & Dural Snail Search - Flora Transects - Red Crowned Toadlet Nocturnal Survey	- Cumberland Plain Land Snail - Dural Land Snail - Red-crowned Toadlet <i>Dillwynia tenuifolia</i> <i>Grevillea parviflora subsp. parviflora</i> <i>Leucopogon exolasius</i> <i>Leucopogon fletcheri</i> <i>Persoonia acerosa</i> <i>Acacia flocktoniae</i>	2	0	AEP	JS, ALR
02/09/2024	09:30 - 17:00	22.5	- Koala SAT 3 - Cumberland & Dural snail search - Diurnal bird survey - Flora Transects	- Cumberland Plain Land Snail - Dural Land Snail - Koala - White-bellied Sea-Eagle - Square-tailed Kite - Eastern Osprey - Little Eagle <i>Epacris purpurascens var. purpurascens</i> <i>Hibbertia sp. Bankstown</i> <i>Persoonia bargoensis</i> <i>Pomaderris brunnea</i> <i>Prostanthera saxicola</i>	3	0	AEP	JS, BJ, JP

Date	Time	Total Survey Effort Hours	Field activity	Targeted Species	No. of Persons on Site	Rainfall (mm)	Company	Staff
16/10/2024	10:00 – 17:30	15	Flora transects	<i>Pterostylis saxicola</i>	2	TBC	AEP	JS, BJ
19/12/2024	9:15 – 16:30	14.5	Flora Transects	<i>Callistemon linearifolius</i> <i>Hibbertia puberula</i> <i>Hibbertia stricta subsp. Furcatula</i> <i>Marsdenia viridiflora subsp. viridiflora</i>	2	TBC	AEP	ALR, BJ
23/12/2024	9:15 – 12:00	5.5	Flora transects	<i>Callistemon linearifolius</i> <i>Hibbertia puberula</i> <i>Hibbertia stricta subsp. Furcatula</i> <i>Marsdenia viridiflora subsp. Viridiflora</i>	2	TBC	AEP	JB, ED

1.5.4 Survey Effort Results

1.5.4.1 Habitat Trees

A total of six (6) hollow-bearing trees (HBTs) and a total of 12 stag trees were identified within the Study Area that contained small to medium hollows. Three (3) HBTs and four (4) stag trees are identified within the Subject Site and will be impacted by the proposals. Three (3) HBT and eight (8) stag trees are located outside the Subject Site and will be retained. No large or extra-large hollows were identified that may be suitable habitat for Forest Owls and other large hollow-dependent threatened species. Hollow-bearing tree locations are presented in **Figure 6**.

Table 17: Habitat Tree Detail

GPS Point ID	Scientific Name	DBH	XL	L	M	S	XS or Fissured Branches	Retain or Remove	Other Habitat Features
1	Stag	70	-	-	-	2	-	Remove	Loose bark
2	Stag	35	-	-	-	1	-	Retain	-
3	Stag	35	-	-	-	-	-	Retain	-
4	Stag	40	-	-	-	-	-	Retain	-
5	Stag	35	-	-	-	-	1	Retain	-
6	Stag	60	-	-	1	-	-	Retain	Potential for chimney hollow
7	<i>Eucalyptus sclerophylla</i>	50	-	-	-	1	-	Remove	-
8	<i>Eucalyptus sclerophylla</i>	60	-	-	-	-	1	Remove	-
9	Stag	40	-	-	-	-	-	Remove	Large hollow at base
10	<i>Eucalyptus sclerophylla</i>	81	-	-	-	-	-	Remove	-
11	Stag	60	-	-	-	-	-	Remove	-
12	Stag	65	-	-	-	-	-	Remove	-
13	Stag	45	-	-	-	-	-	Retain	-
14	Stag	35	-	-	-	-	-	Retain	-
15	Stag	65	-	-	-	-	-	Retain	-

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

1.5.4.2 Water Features and Hydrology

A total of three (3) hydrolines are mapped within the Subject Site, comprising two first-order hydrolines that converge into a second-order hydroline. These hydrolines have been evaluated in the Stream Riparian Management Plan (SRMP) (ADW Johnson 2024), which concluded that the first-order hydrolines do not meet the criteria for waterfront land. The mapped second order hydroline was assessed as meeting the criteria for waterfront land, and identified as a second order hydroline.

The second order hydroline traverses the centre of the site, following a natural depression in the landscape, and flows in a northerly direction towards the Georges River. The upper reaches of the stream are vegetated and feature ephemeral pools and ponds. Observations made during the assessment noted the presence of brown algae, potentially resulting from nutrient runoff from adjacent properties. The watercourse passes through a culvert beneath an access road in the central portion of the site and continues into a sandstone outcrop area that slopes toward the lower flats. Overall, the

condition of the watercourse in the northern section of the site is poor, with the stream gradually dissipating across the landscape. The SRMP outlines proposals to create a formalised drainage channel through the foreshore area to provide a connection from the central second order hydroline to the Georges River.

1.5.4.3 Other habitat features

No caves or karsts were identified on site. Some rocky outcrops were present at the north-east, north-west and central hydroline. These were not extensive enough to support species such as Broad-headed Snake however, they may offer potential refuge opportunities for other herptiles and small mammals. The lack of caves is considered a habitat constraint for cave dwelling microbats (Large Bent-winged Bat, Little Bent-winged Bat, Large-eared Pied Bat).

1.5.5 Species Credit Species Survey Results

Overall survey effort by AEP within the site (for BAM plots, targeted searches and habitat assessments) and within the Subject Site (from past surveys, including BAM plots, targeted searches, and habitat assessments) are outlined in **Table 16** and were conducted using relevant guidelines. Further survey details are shown in **Table 18** and survey effort is depicted in **Figures 6 to 9**.

Table 18: Candidate Threatened Species Survey Details

Species	Specified Survey Period (BAM – C)	Survey Guidelines	Surveyed in Season (Y/N)	Survey Method Undertaken	Date Surveyed	Suitable Habitat Within Subject Site (Y/N)	Condition of Habitat	Likelihood of Occurrence	Records from Deployed Equipment	Observed Within 10km (Y/N)	Observed within Subject Site (Y/N)	Assumed Present (Y /N)	Species Credits Apply (Y /N)
Flora													
<i>Acacia bynoeana</i> Bynoe's Wattle	All year	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	10 & 20m transects	18/03/2023 & 19/03/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed). Good quality habitat (PCT4059) along central hydroline is to be retained.	This species was not detected during surveys. Lack of records within the locality and marginal habitat within suggest this species is unlikely to occur within the Subject Site.	N/A	Y	N	N	N
<i>Acacia flocktoniae</i> Flockton Wattle	July - September	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	10 & 20m transects	13/08/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site.	N/A	N	N	N	N
<i>Acacia pubescens</i> Downy Wattle	All year	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	10 & 20m transects	18/03/2023 & 19/03/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site.	N/A	Y	N	N	N
<i>Allocasuarina diminuta</i>	All year	40m parallel field transects in open vegetation and 20m parallel transects in dense vegetation.	Y	20 & 40m transects	26/07/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur or remain undetected within the Subject Site.	N/A	Y	N	N	N
<i>Allocasuarina glaireicola</i>	All year	40m parallel field transects in open vegetation and 20m parallel transects in dense vegetation.	Y	20 & 40m transects	26/07/2024	Y	This species is not associated within any habitats on site. Similar habitats which are present on site are highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur or remain undetected within the Subject Site.	N/A	Y	N	N	N
<i>Callistemon linearifolius</i> Netted Bottle Brush	October - January	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	5 & 10m transects	19/12/2024 & 23/12/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	Targeted surveys were not conducted for this species. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site. However, as surveys were not undertaken, this species must be assumed present.	N/A	Y	N	N	N
<i>Dillwynia tenuifolia</i>	August – October	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	10 & 20m transects	13/08/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site.	N/A	Y	N	N	N

Species	Specified Survey Period (BAM – C)	Survey Guidelines	Surveyed in Season (Y/N)	Survey Method Undertaken	Date Surveyed	Suitable Habitat Within Subject Site (Y/N)	Condition of Habitat	Likelihood of Occurrence	Records from Deployed Equipment	Observed Within 10km (Y/N)	Observed within Subject Site (Y/N)	Assumed Present (Y /N)	Species Credits Apply (Y /N)
<i>Epacris purpurascens</i> var. <i>purpurascens</i>	Sept - October	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	10 & 20m transects	02/09/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site.	N/A	Y	N	N	N
<i>Genoplesium baueri</i> Bauer's Midge Orchid	February - March	10m parallel transects in open vegetation and 5m transects in dense vegetation.	Y	5 & 10m transects	18/03/2023 & 19/03/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site.	N/A	N	N	N	N
<i>Grevillea parviflora</i> subsp. <i>parviflora</i> Small-flower Grevillea	August - November	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	10 & 20m transects	13/08/2024	Y.	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site.	N/A	Y	N	N	N
<i>Hibbertia puberula</i>	October – December	15m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	N	10m transects	19/12/2024 & 23/12/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	Targeted surveys were not conducted for this species. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site. However, as surveys were not undertaken, this species must be assumed present.	N/A	Y	N	N	N
<i>Hibbertia</i> sp. Bankstown	September - December	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	10 & 20m transects	02/09/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Species is only known from one population within Bankstown Airport. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site.	N/A	Y	N	N	N
<i>Hibbertia stricta</i> subsp. <i>furcatula</i>	October - January	15m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	N	10m transects	19/12/2024 & 23/12/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	Targeted surveys were not conducted for this species. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site. However, as surveys were not undertaken, this species must be assumed present.	N/A	Y	N	N	N
<i>Leucopogon exolasius</i> Woronora Beard-heath	August – September	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	10 & 20m transects	13/08/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site.	N/A	Y	N	N	N

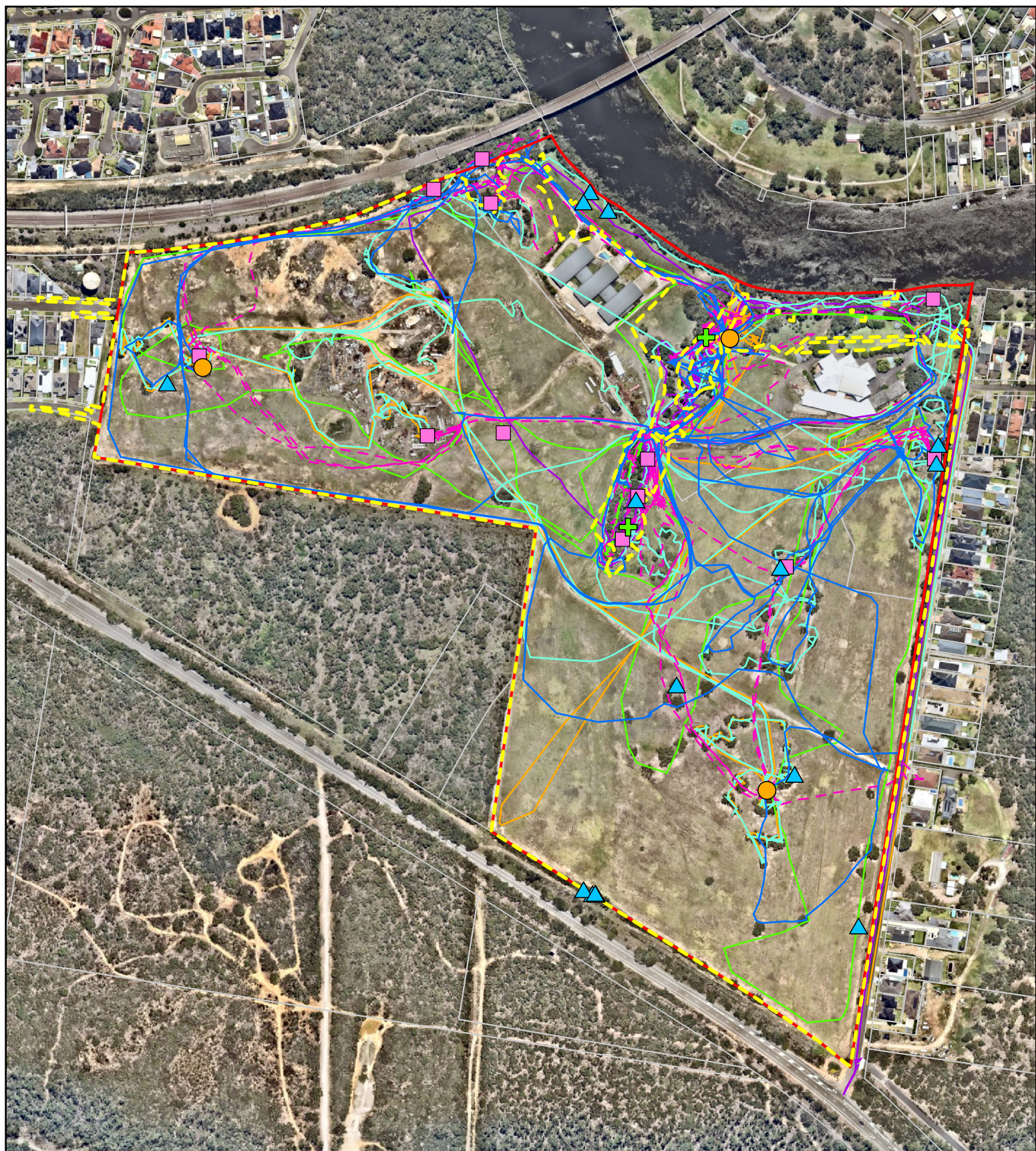
Species	Specified Survey Period (BAM – C)	Survey Guidelines	Surveyed in Season (Y/N)	Survey Method Undertaken	Date Surveyed	Suitable Habitat Within Subject Site (Y/N)	Condition of Habitat	Likelihood of Occurrence	Records from Deployed Equipment	Observed Within 10km (Y/N)	Observed within Subject Site (Y/N)	Assumed Present (Y /N)	Species Credits Apply (Y /N)
<i>Leucopogon fletcheri</i>	August - September	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	10 & 20m transects	13/08/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site.	N/A	N	N	N	N
<i>Marsdenia viridiflora subsp. viridiflora</i>	November - February	10m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	N	10m transects	19/12/2024 & 23/12/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	Targeted surveys were not conducted for this species. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site. However, as surveys were not undertaken, this species must be assumed present.	N/A	Y	N	N	N
<i>Melaleuca deanei</i> Deane's paperbark	All year	40m parallel field transects in open vegetation and 20m parallel transects in dense vegetation.	Y	20 & 40m transects	26/07/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site.	N/A	Y	N	N	N
<i>Persoonia acerosa</i> Needle Geebung	All year	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	10 & 20m transects	13/08/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site.	N/A	N	N	N	N
<i>Persoonia bargoensis</i> Bargo Geebung	All year	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	10 & 20m transects	02/09/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site.	N/A	N	N	N	N
<i>Persoonia hirsuta</i> Hairy Geebung	All year	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	10 & 20m transects	18/03/2023 & 19/03/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Lack of records within the locality and highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site.	N/A	Y	N	N	N
<i>Persoonia nutans</i> Nodding Geebung	All year	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	10 & 20m transects	18/03/2023 & 19/03/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site.	N/A	Y	N	N	N
<i>Pomaderris brunnea</i> Brown Pomaderris	August - October	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	10 & 20m transects	02/09/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species	N/A	N	N	N	N

Species	Specified Survey Period (BAM – C)	Survey Guidelines	Surveyed in Season (Y/N)	Survey Method Undertaken	Date Surveyed	Suitable Habitat Within Subject Site (Y/N)	Condition of Habitat	Likelihood of Occurrence	Records from Deployed Equipment	Observed Within 10km (Y/N)	Observed within Subject Site (Y/N)	Assumed Present (Y /N)	Species Credits Apply (Y /N)
								is unlikely to occur within the Subject Site.					
<i>Prostanthera saxicola</i>	July - November	20m parallel field transects in open vegetation and 10m parallel transects in dense vegetation.	Y	10 & 20m transects	02/09/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	This species was not detected during surveys. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site.	N/A	Y	N	N	N
<i>Pterostylis saxicola</i> Sydney Plains Greenhood	October	10m parallel field transects in open vegetation and 5m parallel transects in dense vegetation.	N	5 & 10m transects	16/10/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	Targeted surveys were not conducted for this species. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within the Subject Site. However, as surveys were not undertaken, this species must be assumed present.	N/A	Y	N	N	N
<i>Rhodamnia rubescens</i> Scrub Turpentine	All year	40m parallel field transects in open vegetation and 20m parallel transects in dense vegetation.	Y	20 & 40m transects	26/07/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed). However, good condition PCT 4059 provides suitable supporting habitat for this species.	A single species record exists within 10km and the species was not detected on site during field surveys. Highly disturbed and underscrubbed nature of majority of habitat within the site suggest this species is unlikely to occur within the Subject Site. Suitable habitat for this species is proposed for retention.	N/A	Y	N	N	N
<i>Syzygium paniculatum</i> Magenta Lilly Pilly	April - June	40m parallel field transects in open vegetation and 20m parallel transects in dense vegetation.	N	20 & 40m transects	26/07/2024	Y	Majority of associated habitat is highly disturbed and underscrubbed (regularly slashed).	Whilst surveys were conducted outside of the surveys period, no <i>Syzygium</i> were recorded within the site. Whilst seasonal surveys are necessary for identification to species level, absence of the genus (and subsequently, the target species) can be reliably inferred year-round. Highly disturbed and underscrubbed nature of habitat suggest this species is unlikely to occur within Subject Site.	N/A	Y	N	N	N
Fauna													
<i>Callocephalon fimbriatum</i> Gang-gang cockatoo	October - January	Area based survey methods such as transects	Y	Habitat Assessment, Diurnal Bird Survey	18/03/2023 19/03/2024 26/07/2024 02/09/2024 23/12/2024	Y	The site contains <i>Allocasuarina littoralis</i> which is a feed tree for this species. One (1) HBT within the Study Area is suitable for this species and will be retained.	The habitat for this species within the Study Area is marginal and only one (1) potential breeding feature exists with the site. However, surveys were not completed during the prescribed survey period thereby likely absence cannot be reliably inferred.	N	N	N	N	N

Species	Specified Survey Period (BAM – C)	Survey Guidelines	Surveyed in Season (Y/N)	Survey Method Undertaken	Date Surveyed	Suitable Habitat Within Subject Site (Y/N)	Condition of Habitat	Likelihood of Occurrence	Records from Deployed Equipment	Observed Within 10km (Y/N)	Observed within Subject Site (Y/N)	Assumed Present (Y /N)	Species Credits Apply (Y /N)
<i>Calyptrorhynchus lathamii lathamii</i> South-eastern Glossy Black-cockatoo	January – September	Area searches for signs of habitat and recent feeding, which consists of chewed cones.	Y	Habitat Assessment, Area Search, Diurnal Bird Survey	18/03/2023 19/03/2024 26/07/2024 02/09/2024	Y	The site lacks the old growth forest attributes this species prefers. One tree was observed within the Subject Site that may be suitable breeding habitat for this species.	No evidence of roosting was identified during habitat assessments, area searches, diurnal bird surveys, or any other surveys.	N	Y	N	N	N
<i>Cercartetus nanus</i> Eastern Pygmy-possum	October - March	Diurnal searches for signs and habitat resources. This can include searches for scats, tracks, and scratches.	Y	Habitat Assessment Nocturnal Survey Camera traps	18/03/2024 – 15/04/2024	Y	The Subject Site lacks a rich understorey which is preferred for foraging.	The presence of Eucalyptus alone is sufficient to support populations in low densities, however, abundance of flowering shrubs such as Banksia spp. is preferred. The species was not identified during surveys and the Subject Site supports limited suitable foraging resources. Not likely to occur within the Subject Site.	N	Y	N	N	N
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	July - December	Area searches for signs of habitat, nesting and breeding sites and recent feeding.	Y	Habitat Assessment, Diurnal Bird Survey	18/03/2024 19/03/2024 26/07/2024 13/08/2024 02/09/2024	Y	The site is located adjacent to a large watercourse (Georges River) and contains large trees suitable for nesting. The canopy cover on site is generally patchy and the site is subject to regular disturbance (motorbikes, heavy machinery, police dog training) – reducing the suitability of the site for nesting.	This species was not identified during targeted surveys and no large stick nests or other evidence of use were identified within the site. This species is likely to favour habitat within the wider landscape which is subject to less human disturbance e.g. larger areas of contiguous bushland along the Georges River to the south-east and north west.	N/A	Y	N	N	N
<i>Hieraaetus morphnoides</i> Little Eagle	August - October	Area searches for signs of habitat, nesting and breeding sites and recent feeding.	Y	Habitat Assessment, Diurnal Bird Survey	18/03/2024 19/03/2024 26/07/2024 13/08/2024 02/09/2024	Y	The site is located adjacent to a large watercourse (Georges River) and contains large trees suitable for nesting. The canopy cover on site is generally patchy and the site is subject to regular disturbance (motorbikes, heavy machinery, police dog training) – reducing the suitability of the site for nesting.	This species was not identified during targeted surveys and no large stick nests or other evidence of use were identified within the site. This species is likely to favour habitat within the wider landscape which is subject to less human disturbance e.g. larger areas of contiguous bushland along the Georges River to the south-east and north west.	N/A	Y	N	N	N
<i>Lophoictinia isura</i> Square-tailed Kite	September - January	Area searches for signs of habitat, nesting and breeding sites and recent feeding.	Y	Habitat Assessment, Diurnal Bird Survey	18/03/2024 19/03/2024 26/07/2024 13/08/2024 02/09/2024	Y	The site is located adjacent to a large watercourse (Georges River) and contains large trees suitable for nesting. The canopy cover on site is generally patchy and the site is subject to regular disturbance (motorbikes, heavy machinery, police dog training) – reducing	This species was not identified during targeted surveys and no large stick nests or other evidence of use were identified within the site. This species is likely to favour habitat within the wider landscape which is subject to less human disturbance e.g. larger areas of contiguous bushland along the Georges River to	N/A	Y	N	N	N

Species	Specified Survey Period (BAM – C)	Survey Guidelines	Surveyed in Season (Y/N)	Survey Method Undertaken	Date Surveyed	Suitable Habitat Within Subject Site (Y/N)	Condition of Habitat	Likelihood of Occurrence	Records from Deployed Equipment	Observed Within 10km (Y/N)	Observed within Subject Site (Y/N)	Assumed Present (Y /N)	Species Credits Apply (Y /N)
							the suitability of the site for nesting.	the south-east and north west.					
<i>Meridolum corneovirens</i> Cumberland Plain Land Snail	All year	Area searches for signs of habitat and subsequent hand-searches of woody debris, leaf litter and longer grassy patches for presence of live snails or shells.	Y	Habitat Assessment Targeted Hand Searches	13/08/2024 02/09/2024	Y	Site contains some areas of moderate-dense leaf litter and/or woody debris such as logs or shedding bark. The majority of the site is highly disturbed and underscrubbed (regularly slashed) and therefore provides limited habitat suitability.	This species was not detected during surveys and limited suitable habitat exists within the site.	N/A	Y	N	N	N
<i>Myotis macropus</i> Southern Myotis	October - March	Roost searches near bridges, tunnels, culverts or other structures as potential breeding habitat. Acoustic surveys.	Y	Habitat Assessment Ultrasonic recording (Anabat)	18/03/2024 – 15/04/2024	Y	Small number of hollows on site for roosting. Habitat is mainly limited to the Georges River and nearby vegetation at the north of the site.	Analysis of remote acoustic recording devices identified ultrasonic calls categorised within the <i>Myotis macropus</i> / <i>Nyctophilus spp.</i> species complex. It is likely that at least some of the calls recorded as part of the species complex will be <i>Myotis macropus</i> , given the location and setting of the ultrasonic recorder.	Y	Y	Y	N	Y
<i>Pandion cristatus</i> Eastern Osprey	April - November	Area searches for signs of habitat, nesting and breeding sites and recent feeding.	Y	Habitat Assessment, Diurnal Bird Survey	18/03/2024 19/03/2024 26/07/2024 13/08/2024 02/09/2024	Y	The site is located adjacent to a large watercourse (Georges River) and contains large trees suitable for nesting. The canopy cover on site is generally patchy and the site is subject to regular disturbance (motorbikes, heavy machinery, police dog training) – reducing the suitability of the site for nesting.	This species was not identified during targeted surveys and no large stick nests or other evidence of use were identified within the site. This species is likely to favour habitat within the wider landscape which is subject to less human disturbance particularly larger areas of contiguous bushland along the Georges River to the south-east – closer to the coast.	N/A	Y	N	N	N
<i>Petauroides volans</i> Southern Greater Glider	All year	Survey methodology includes transects, spotlighting.	Y	Habitat Assessment Nocturnal Surveys	18/03/2024 – 15/04/2024	Y	Site contains some potential habitat for this species, due to the presence of large trees and a hollow. However, this species requires a high density of hollows which was not observed on site.	Lack of species records and not detected on site during field surveys. A number of sugar gliders were observed during nocturnal surveys and camera trap surveys, but no evidence of this species was observed. Not likely to occur within the Subject Site.	N	N	N	N	N
<i>Petaurus norfolcensis</i> Squirrel Glider	All year	Survey methodology includes transects, spotlighting.	Y	Habitat Assessment Nocturnal Surveys	18/03/2024 – 15/04/2024	Y	Site contains some potential habitat for this species, due to the presence of large trees and a hollow. However, this species requires a high density of hollows which was not observed on site	A single species record exists within 10km and the species was not detected on site during field surveys. A number of sugar gliders were observed during nocturnal surveys and camera trap surveys, but no evidence of this species was observed. Not likely to occur within the Subject Site.	N	Y	N	N	N

Species	Specified Survey Period (BAM – C)	Survey Guidelines	Surveyed in Season (Y/N)	Survey Method Undertaken	Date Surveyed	Suitable Habitat Within Subject Site (Y/N)	Condition of Habitat	Likelihood of Occurrence	Records from Deployed Equipment	Observed Within 10km (Y/N)	Observed within Subject Site (Y/N)	Assumed Present (Y /N)	Species Credits Apply (Y /N)
<i>Phascolarctos cinereus</i> Koala	All year	Survey methods include scratch mark detection, scat searches, Spot Assessment technique within suitable habitat, spotlighting, passive acoustic, and aerial surveys using drones.	Y	Habitat Assessment Nocturnal Surveys SATs	18/03/2024 – 15/04/2024 26/07/2024 02/09/2024	Y	Koala use trees are present on site, however, there is only a limited coverage of feed trees.	This species was not detected during surveys and habitat within the site is marginal compared with the wider landscape. Furthermore, the site is enclosed by tall chain-link fencing with barbed wire – severely limiting permeability of the site to this species.	N	Y	N	N	N
<i>Pommerhelix duralensis</i> Dural Land Snail	All year	Area searches for signs of habitat and subsequent hand-searches of woody debris, leaf litter and longer grassy patches for presence of live snails or shells.	Y	Habitat Assessment Targeted Hand Searches	13/08/2024 02/09/2024	Y	Site contains some areas of moderate-dense leaf litter and/or woody debris such as logs or shedding bark. The majority of the site is highly disturbed and underscrubbed (regularly slashed) and therefore provides limited habitat suitability.	This species was not detected during surveys. Limited suitable habitat exists within the site and no records of this species exist within proximity to the site.	N/A	N	N	N	N
<i>Pseudophryne australis</i> Red-crowned Toadlet	All year	Survey methodology includes aural-visual surveys along transects of suitable habitat.	Y	Nocturnal Aural-visual Surveys	17/08/2024 & 18/08/2024	Y	Site contains a hydroline at its centre with dense leaf litter adjacent in the south and becoming sparser in the north. The water quality is poor and had high incidence of iron oxidising bacteria.	This species was not detected during surveys. Common Eastern Froglet was the only amphibian identified on site. There is limited suitable terrestrial or hydrological connectivity between the central hydroline and other suitable breeding habitat within the wider landscape (species is not associated with large watercourses such as the Georges River). The poor water quality also limits the suitability of the site. Not likely to occur within the Subject Site.	N/A	Y	N	N	N
<i>Vespadelus troughtoni</i> Eastern Cave Bat	November - January	Assessment of breeding habitat within 2km of the site (caves, scarps, cliffs, rock overhangs and disused mines) and acoustic surveys.	N	Habitat Assessment Ultrasonic recording (Anabat)	18/03/2024 – 15/04/2024	Y	The site comprises suitable foraging habitat for this species however no potential breeding habitat is present within the subject site.	Analysis of remote acoustic recording devices identified ultrasonic calls categorised within the <i>Vespadelus</i> species complex. No potential breeding habitat exists either within the site, or within 2km of the site as determined through review of geological datasets, topographical mapping and high-resolution aerial mapping. This species is highly mobile and can travel large distances from suitable roosting habitat. The ultrasonic recording of this species is considered likely to be a result of a bat commuting across the site.	Y	N	Y	N	N



Legend

Subject Site

Study Area

Cadastre

Hollow Bearing Tree (HBT)

Koala SAT (Central Tree)

Anabat

Camera Trap

Koala SAT Survey

Snail Search Survey

Red-crowned Toadlet Survey

Diurnal Bird Survey

March Nocturnal Survey

Equipment Deployment

Figure 6 - Fauna Survey Effort

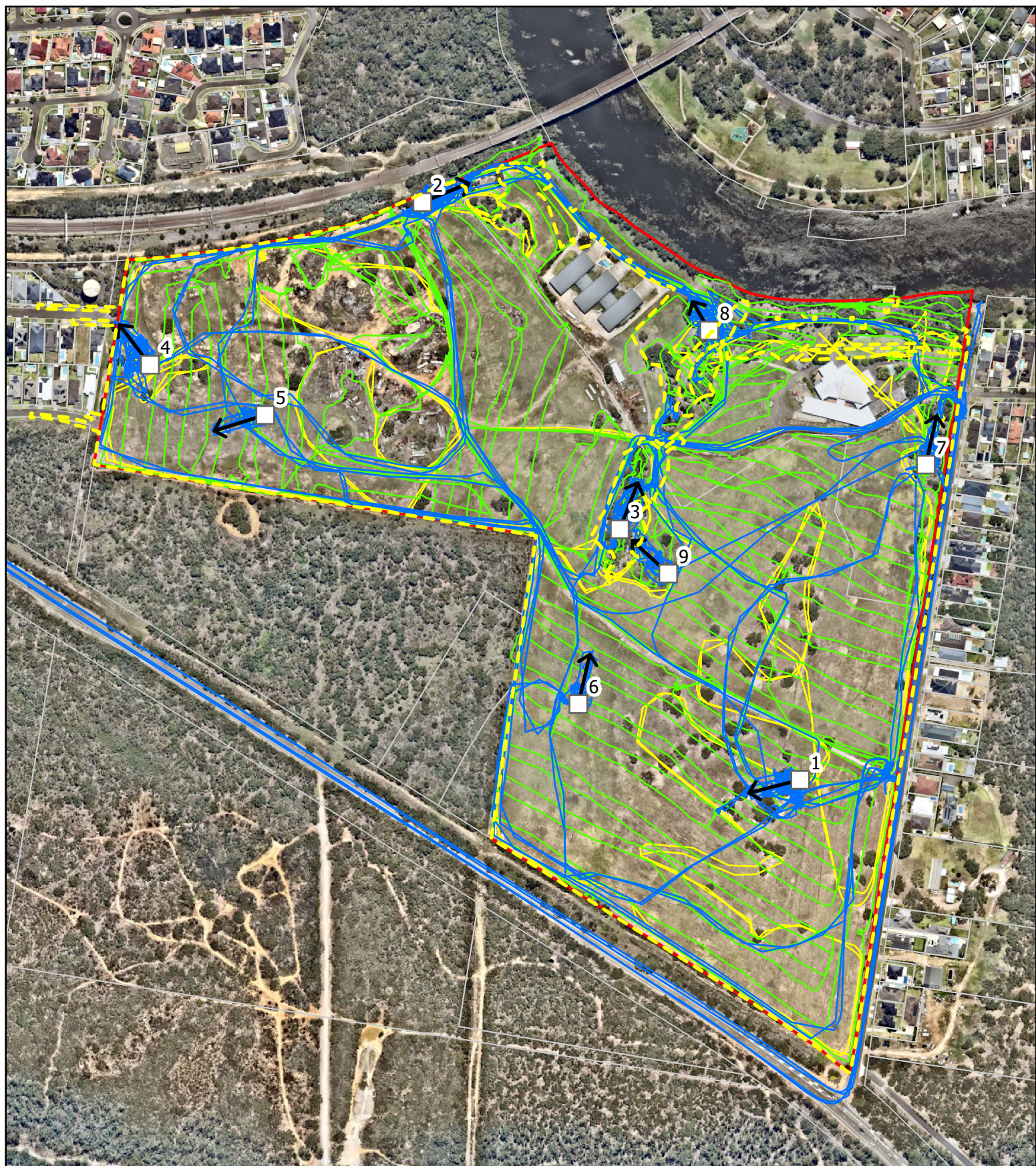
Address: Heathcote Road, Pleasure Point
Client: Hodge Developments Pty Ltd
AEP Ref: 3539 | Date: 10 April 2025

Imagery: Nearmap
Spatial Reference: GDA2020 MGA Zone 56

0 100 200
m
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.



Legend

Subject Site

Study Area

Cadastre

Bam Plot

BAM Transect

BAM Transect

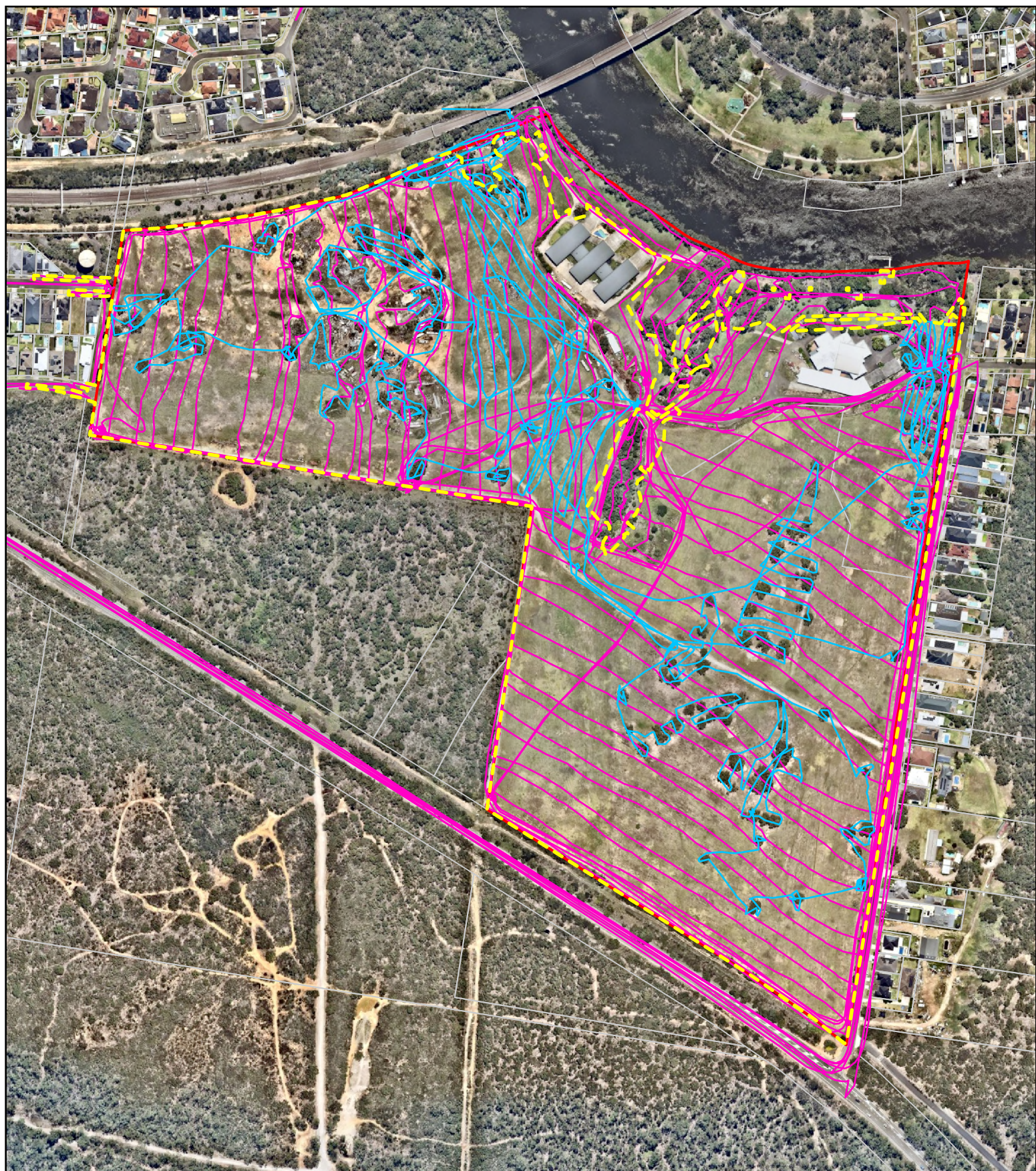
March Targeted Flora Transects

July Targeted Flora Transects

Figure 7 - Flora Survey Effort (1)

0 100 200
m
Scale: 1:5,000





Legend

 Subject Site

 Study Area

 Cadastre

— August Targeted Flora Transects

— September Targeted Flora Transects

Figure 8 - Flora Survey Effort (2)

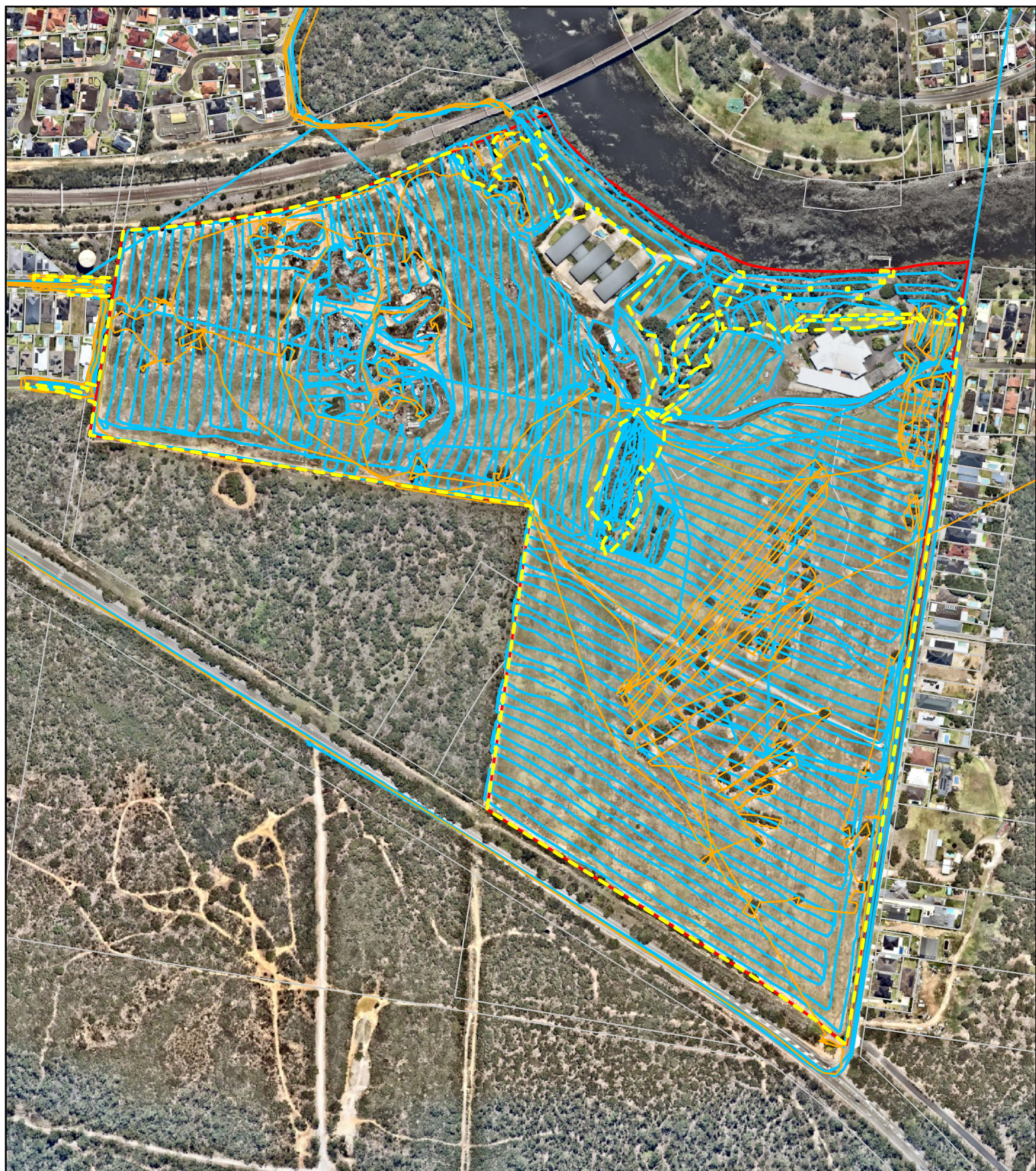
Address: Heathcote Road, Pleasure Point
Client: Hodge Developments Pty Ltd
AEP Ref: 3539 | Date: 10 April 2025

Imagery: Nearmap
Spatial Reference: GDA2020 MGA Zone 56

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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.



Legend

Subject Site

Study Area

Cadastre

October Targeted Flora Transects

December Target Flora Transects

Figure 9 - Flora Survey Effort (3)

Address: Heathcote Road, Pleasure Point
Client: Hodge Developments Pty Ltd
AEP Ref: 3539 | Date: 10 April 2025

Imagery: Nearmap
Spatial Reference: GDA2020 MGA Zone 56

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m
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.

2.0 Stage 2 – Impact Assessment (Biodiversity Values)

2.1 Avoid and Minimise Summary

Section 8 of the BAM provides a list of measures that need to be considered during project planning and design to minimise impacts upon native vegetation, habitat, and other prescribed biodiversity values. Applicable measures taken as part of this project to minimise impacts are provided below.

The Avoid and Minimise strategy for the development (in accordance with Section 8 of the BAM), is discussed in greater detail in **Table 20** below.

The impact footprint of the proposal is shown in **Figure 10**. The prescribed impact risk assessment and mitigation measures (in accordance with Section 9 of the BAM) are included in **Tables 21 to 25** below.

The following measures in **Section 2.2** have been provided to help mitigate the impacts of construction and the ongoing operation of the proposed development on the biodiversity values identified within the Subject Site and surrounds.

2.2 Impact Avoidance Measures

2.2.1 Project Design

The BC Act establishes a biodiversity offset hierarchy for managing the adverse impacts of a project on biological diversity are, in order of priority of action, avoidance, mitigation and offsets. AEP undertook ecological surveys between March and September 2024 to assess the biodiversity values of the site. A number of environmentally sensitive items were identified within the Study Area, including the presence of a TEC and riparian areas.

The final development location is the result of an iterative design process aimed at avoiding areas of higher biodiversity value within the site, such as habitat features that could be utilised by threatened species (e.g., hollows and feed trees), riparian lands, areas of higher quality vegetation, and habitat connectivity.

AEP was first engaged by Hodge Developments Pty Ltd in 2024 to conduct biodiversity surveys and assessment of the site, to identify biodiversity value of the site as a whole, and identify areas suitable for development. Investigations of the site identified that the majority of the Study Area comprised cleared areas, exotic vegetation, roads and residential buildings. Native vegetation was generally underscrubbed or degraded, with the site subject to regular landscape maintenance and slashing. Vegetation associated with the riparian zone of central hydroline presented the best habitat condition within the site owing to the presence of intact mid-storey and ground layer.

Surveys determined that full development of the Study Area was not feasible due to the presence of *Cumberland Blue Box Riverflat Forest* and its associated BC Act and EPBC Act listed TECs: *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (EEC) and *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria* (CEEC). Riparian areas were also identified as a key constraint for the site.

The proposed footprint has been designed to lie predominantly within the cleared areas, exotic vegetation, roads, and other infrastructure areas of the site as well as the underscrubbed areas of PCT 3616 and PCT 3619. Impacts to PCT 4059 and PCT 4024 are largely associated with the proposed hydrological management of the site i.e. the proposed channel works and location of stormwater basins in areas of suitable topography with outflows to the existing central hydroline.

Preliminary designs depicted a central road linking the eastern and western residential areas, located within the footprint of good condition PCT 4059, and crossing the central hydroline (Refer **Plate 18**). The road was subsequently moved further south to minimise impacts to the hydroline and the surrounding good quality vegetation in accordance with Avoid and Minimise principles (Refer **Plate 19**).



Plate 18: Initial design depicting road crossing central hydroline and PCT 4059



Plate 19: Revised designs depicting road design moved south to avoid PCT 4059

The central hydroline dissipates at its northern extent, lacking a formalised channel through the foreshore. Works are proposed to create a formalised channel through the foreshore area (Refer **Plate 20**). These works will provide an additional stretch of formal watercourse in addition to the restoration of existing vegetation to form a 20m Vegetated Riparian Zone (VRZ) on either side of the watercourse. These works will provide an increase in overall aquatic and riparian habitat within the site as well as proving surface water connectivity between the existing central hydroline and the Georges River.



Plate 20: Proposed Channel Works (taken from SRMP). Blue area shows the proposed channel and black dashed lines show the extent of the works area

To facilitate management and regeneration of the existing and proposed VRZs, a Vegetation Management Plan (VMP, Restore 2025) has been produced to outline the management of a 20m VRZ along the length of the existing central hydroline and proposed channel. Further to this, the VMP includes additional areas adjacent to the VRZ, which are proposed for management and revegetation sympathetic to PCT 4059 and PCT 4024 (**Refer Plate 21**). Following the initial submission of the Development Application, the extent of the VMP Lands were further increased by approximately 2.7ha encompassing lands within the foreshore of the Georges River. Overall, this will provide a wider corridor of vegetation than currently exists, surrounding the central hydroline and along the foreshore area. The management of retained vegetation along the foreshore will improve east-west ecological connectivity across the site (Refer **Plate 21** (VMP, Restore 2025)). To facilitate further ecological connectivity between the VMP lands and off-site bushland located to the south-west, additional landscape planting

has been incorporated to the proposals (Refer **Plate 22** (Landscape Plans, Habit8 2025)). This will provide continuous north-west ecological connectivity across the site.

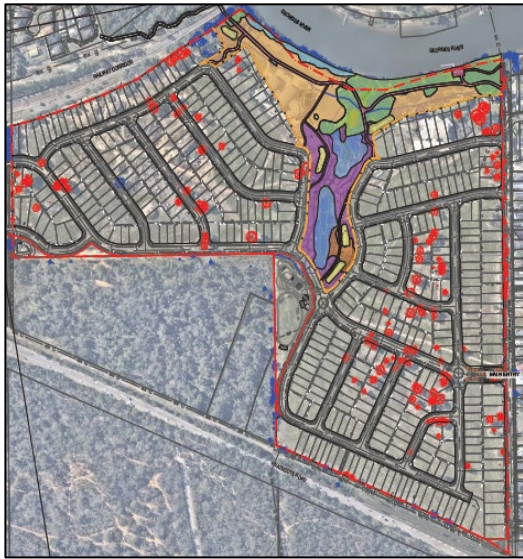


Plate 21: Proposed VMP Lands



Plate 22: Landscaping Plan depicting overall habitat connectivity of the proposals

The setting of the site within the wider landscape is such that the site presents a large area of historically cleared land, largely surrounded by existing development or larger areas of bushland. As such, the development is located within an optimal location for development in the context of the surrounding landscape.

2.2.2 Riparian Corridors

A total of three (3) hydrolines are mapped within the Subject Site, comprising two (2) first-order hydrolines that converge into a second-order hydroline. These hydrolines have been evaluated in the SRMP (ADW Johnson 2024), which concluded that the first-order hydrolines do not meet the criteria for waterfront land. The mapped second order watercourse was assessed as meeting the criteria for waterfront land, and identified as a second order stream. At the northern end of its reach, this hydroline dissipates and lacks a formal channel through the foreshore, to the Georges River. Overall, the condition of the hydroline in the northern section of the site is poor, with the stream gradually dissipating across the landscape.

The proposals seek to carry out works to create a formal channel through the foreshore, facilitating restoration of this feature and enhancing the extent of aquatic habitat within the site. Further details regarding these proposals are provided within the SRMP (ADW Johnson 2024).

To ensure water quality is maintained both on and offsite, Water Sensitive Urban Design (WSUD) and Stormwater Management principles have been incorporated into the proposal in accordance with the Stormwater Management Plan (ADW Johnson 2024) and Addendum (ADW Johnson 2025).

A VMP has been produced for the site, incorporating the VRZ of the hydroline, including the proposed realignment, additional adjacent lands and the foreshore of the Georges River - comprising a total area of 5.78ha (see **Section 2.2.3**, below). The VRZ is proposed for revegetation with species sympathetic to PCT 4024 and PCT 4059. As such, management of this zone will improve the site's biodiversity values relative to the baseline condition, i.e. a net positive outcome.

2.2.3 Vegetation Management Plan

A VMP (Restore Environmental Consultants 2025) has been created, encompassing an area of approximately 5.78 ha.

The VMP schedules differing ecological approaches to the regeneration of the VMP lands by implementing the principles of the Society for Ecological Restoration Australasia *National standards for*

the practice of ecological restoration in Australia (SERA 2021). This approach utilises three integrated restoration techniques to achieve the end goal of Natural Regeneration based on their history of disturbance:

1. Reconstruction – where damage is high and natural vegetation needs to be reintroduced through extensive revegetation and ongoing weed control;
2. Assisted regeneration – where natural vegetation needs active management, such as weed control and revegetation; and,
3. Natural regeneration – where natural vegetation can recover with minimal additional input, such as targeted weed control through bush regeneration techniques.

A summary of the management approaches outlined within the VMP and the extent of each approach is provided in **Table 19**, below.

Table 19: VMP Management Approach Summary

Management Approach	Area per Management Approach (ha)	Total Area of Management per PCT (ha)
MZ1 - PCT 4059 Natural regeneration	0.63	1.77
MZ2 - PCT 4059 Assisted regeneration	0.15	
MZ3 - PCT 4059 Reconstruction	0.99	
MZ4 - PCT 4028 Natural regeneration	0.19	0.19
MZ5 - PCT 4024 Assisted regeneration	1.21	3.13
MZ6 - PCT 4024 Canopy with mown grass	1.92	
MZ7 - Shared Paths	0.47	0.47
MZ8 - Basins	0.22	0.22

The management of vegetation through the VMP will enhance the overall quality of the vegetation within the site, contributing to the improved condition of ground-truthed vegetation communities and subsequently the conservation of Threatened Ecological Communities and their associated Threatened Species assemblages. Enhancing the ecological health of the VMP area will also strengthen regional ecological connectivity between the Georges River and bushland to the south.

2.2.4 Water Quality and Hydrology

- An Erosion and Sedimentation Control Plan (ESCP) has been prepared for the proposal following guidelines from *Landcom* (2004), as well as a Stormwater Management Plan (SWMP);
- Best practice erosion and sedimentation controls should be put in place to limit offsite movement of materials into the adjacent vegetation; and
- Erosion and sedimentation controls should be checked daily and maintained in working order especially after rain events.

2.2.5 Fencing

No barbed wire is to be used within the site. Land subject to the VMP should allow for movement of fauna through the VMP managed areas. Fencing surrounding the VMP lands is recommended, to

minimise wildlife conflict as a result of the proposals e.g. vehicle strikes on roads adjacent to VMP lands.

2.2.6 General Construction & Operation

Site specific Avoid and Minimise measures are discussed in **Table 20** and **Table 21**, while **Table 22** and **Table 24** outline the direct and indirect impacts associated with the development and how they are to be mitigated.

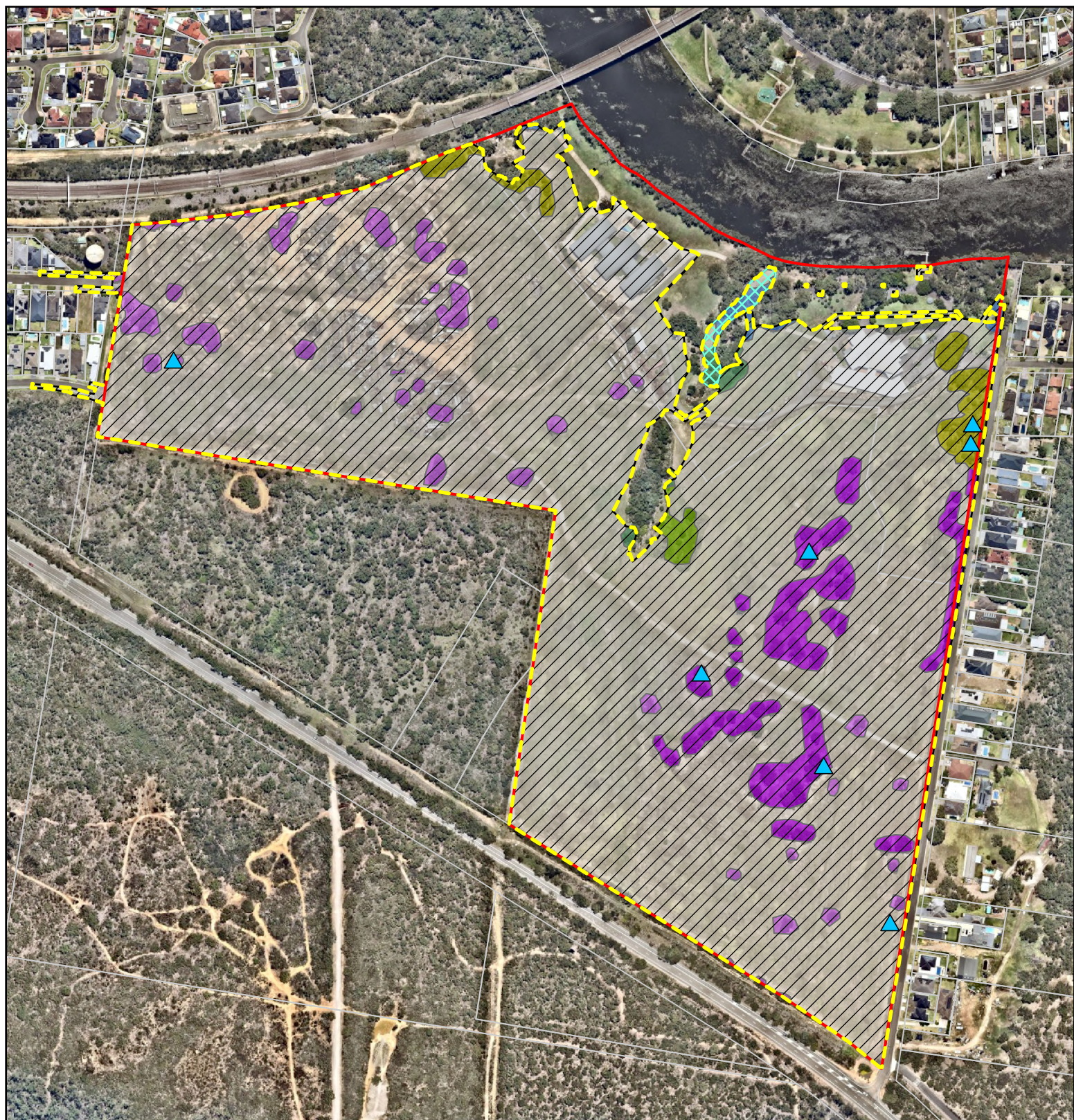
The following measures are provided to help mitigate impacts of the construction and ongoing operation of the proposed development on the biodiversity values on adjoining land:

- For the clearing phase, retained vegetation will be delineated by safety bunting flags, fencing and signage indicating environmental protection zone, which will still allow fauna to egress the development area as needed. Following the completion of clearing works, permanent delineation features such as logs should be installed to protect the retained vegetation during operational phase of the development;
- A staged approach to clearing is to be undertaken to provide fauna the opportunity to disperse outside the area of impact. Staging to include;
 - Phase 1 Clearing: Under scrubbing (where necessary);
 - Phase 2 Clearing: Removal of non-habitat trees;
 - Phase 3 Clearing: Removal of habitat and connecting trees;
- All clearing works within Phase 1, 2 and 3 are to be undertaken in consultation with the Project Ecologist;
- In order to mitigate impacts related to the displacement of resident fauna, all works should be timed to avoid critical life cycle events such as breeding;
- Prior to clearing of any vegetation, an ecologist is to inspect the area for any signs of resident fauna requiring attention, and in particular nesting birds. Where such is identified, appropriate strategies are to be developed and instigated to minimise impacts;
- Civil Construction staff to be inducted into pre-clearing and clearing protocols, and to identify environmental features for protection;
- All clearing works to be attended by a suitable equipped and experienced ecologist to deal appropriately with any displaced fauna species;
- Clearing should occur in a direction from previously disturbed lands towards retained vegetation;
- All hollow-bearing features will be sectionally lowered by tree climbers (where safe to do so);
- Any fauna rescued during vegetation clearing is to be assessed for injuries, and subsequently released into retained vegetation; this may require holding fauna until dusk for release in accordance with relevant animal ethics licencing and standards. If any fauna is injured during vegetation clearing, they are to be taken promptly to a nearby veterinarian or suitable wildlife carer contact;
- Installation of nest boxes within the retained lands prior to construction to mitigate the removal of HBTs within the development footprint and provide supplementary roosting / nesting habitat for resident fauna species that utilise such features;
- Any suitable hollows recovered during clearing works should be reconditioned into suitable hollows and installed in retained lands in addition to the manufactured nest boxes;
- Where installation of replacement or additional nest features is required, preference should be given to installation of chainsaw hollows or Hollow Hog habitat features as a mitigation measure for removal of hollows within the development over manufactured boxes;
- All manufactured boxes are to be industry best-practice including either marine or hardwood plywood with a minimum thickness of 15mm;

- Boxes will have hinged lids to enable maintenance of the boxes;
- Installation methods are to be used that will not inhibit growth of the host tree;
- All cleared vegetation is to be mulched on site and spread to help stabilise any exposed soil and minimise offsite movement of biomass. Fallen timber and hollow logs identified to be retained to be relocated into the retained lands;
- Live mulch and topsoil of local provenance is an ideal resource to assist rehabilitation of conservation lands;
- Plantings will be incorporated in the landscape design of the proposed development site to provide future resources for native fauna in the area;
- Implement hygiene protocols for machinery to prevent the spread of weeds outside the development site;
- Best practice erosion and sedimentation (ERSED) and dust suppression control methods are to be adopted, monitored and maintained throughout any vegetation clearing works, particularly for downstream areas, within the north of the site. Such are to be in accordance with “Soils and Construction-Managing Urban Stormwater” published by Landcom;
- Incorporation of Water Sensitive Urban Design (WSUD) principles within stormwater infrastructure is to occur to minimise downstream hydrology changes; and,
- Any bushfire protection measures in the form of Asset Protection Zones (APZs) or defendable space are to be incorporated within the development footprint to avoid requirements for additional vegetation removal in surrounding areas.

2.3 Assessment of Impacts

Section 8 of the BAM states that the BDAR “*must assess the impacts of the project on native vegetation and habitat*”. In addition to this, Sections 9.1.4 and 9.2 (DPIE 2020b) require that further assessment be produced for any impact, including biodiversity impacts, expected in land surrounding the Subject Site. **Tables 20 to 25** provide a summary of measures proposed to avoid and minimise direct, indirect, and residual impacts on biodiversity.



Legend

Subject Site

Study Area

Cadastre

ImpactArea

Proposed Channel Works

Impacted Hollow Bearing Trees

Impacted Vegetation

3616 - Sydney Hinterland Grey
Gum Transition Forest - Moderate

3619 - Sydney Hinterland
Enriched Sandstone
Bloodwood Forest - Moderate

3619 - Sydney Hinterland
Enriched Sandstone
Bloodwood Forest - Poor
4024 - Cumberland Blue Box
Riverflat Forest - Degraded
4059 - Sydney Hinterland
Sandy Creekflat Shrub Forest - Good

4059 - Sydney Hinterland
Sandy Creekflat Shrub Forest - Poor
Cleared Exotic and
Infrastructure
Planted Non-local Native

Figure 10 - Impact Area

Address: Heathcote Road, Pleasure Point
Client: Hodge Developments Pty Ltd
AEP Ref: 3539 | Date: 10 April 2025

Imagery: Nearmap
Spatial Reference: GDA2020 MGA Zone 56

0 100 200
m
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.



Legend

Study Area

Cadastre

Retained Area

▲ Retained Hollow Bearing Trees

Retained Vegetation

3616 - Sydney Hinterland Grey

Gum Transition Forest - Moderate

4024 - Cumberland Blue Box Riverflat Forest - Degraded

4028 - Estuarine Swamp Oak Twig-rush Forest

4059 - Sydney Hinterland

Sandy Creekflat Shrub Forest - Good

4059 - Sydney Hinterland Sandy Creekflat Shrub Forest - Poor

Cleared Exotic and Infrastructure

Planted Non-local Native

Figure 11 - Avoid and Minimise

Address: Heathcote Road, Pleasure Point
Client: Hodge Developments Pty Ltd
AEP Ref: 3539 | Date: 10 April 2025

Imagery: Nearmap
Spatial Reference: GDA2020 MGA Zone 56

0 100 200
m
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.

Table 20: Avoid and Minimise Impacts on Biodiversity Values

Objectives/Requirements	Evidence of compliance
Locate the proposal to avoid or minimise direct and indirect impacts on native vegetation, threatened species, threatened ecological communities and their habitat.	
<i>Knowledge of biodiversity values should inform decisions about the location of the proposal. The initial assessment of biodiversity values from Stage 1 may be used to inform the early planning of the route or location of a proposal.</i>	The Study Area is located in the suburb of Pleasure Point within the Liverpool LGA, where a subdivision is proposed. Avoid and minimise has been considered through an iterative design process involving multiple revisions to avoid impacts to higher biodiversity values. The site was assessed per Stage 1 and was found to have a number of key biodiversity value items that were factored into the Avoid and Minimise process. Following Stage 1 assessment, the site was found to contain a hydroline bisecting the site with an associated riparian corridor of PCT 4059 in mostly good condition. At the north of the site lies approx. 1.29ha of PCT 4024 (albeit in degraded condition), which is associated with State- and Federally-listed CEECs, in addition to a small area of PCT 4028 (which is also associated with State- and Federally-listed CEECs, however not assessed in this report) (approx. 0.19ha). The majority of the site south of PCT 4024 comprises cleared areas, exotic grassland and infrastructure with scattered areas of largely underscrubbed PCTs 3616 (approx. 0.75ha) and 3619 (approx. 3ha). The CEEC was identified as an area of avoidance for the development with only minor impacts within the extent of this community. Furthermore, the central hydroline has also been identified for large scale retention, with impacts to the extent of this community predominantly associated with hydrological management of the development. A number of stag trees and HBTs containing a number of small hollows and one (1) medium hollow were identified within the Study Area. The HBT containing the medium hollow, as well as two (2) HBTs with small hollows, and eight (8) stag trees, are to be retained by the proposals. In general, the development has been located within areas that have been heavily disturbed, containing large expanses of cleared areas, exotic vegetation and infrastructure with scattered mature canopy species. Within the wider landscape, the development is located within a largely cleared site and is strategically an excellent candidate for maximising the development footprint compared to the surrounding extensive bushland or other cleared areas in the surrounding landscape that are largely already designated for recreational use.

Objectives/Requirements	Evidence of compliance
<i>Selecting a final proposal location may be an iterative process. Decisions may need to be revisited after all field surveys have been completed.</i>	Surveys were conducted based on the proposed development design outlined in Appendix A. Following surveys, several critical findings were identified and subsequently integrated into the design process: • Identification of a vegetation community (PCT 4024) assessed as commensurate with both State- and Federally-listed TECs. This community has been almost completely avoided by the proposal. • Identification of a medium hollow: One (1) hollow, suitable for medium-sized birds such as Gang-Gang Cockatoo and other hollow-dependent threatened species, was identified within the development area. This feature has been conserved. • Recognition of Riparian Corridors: riparian corridors were identified during the surveys, associated with the central hydroline and the Georges River. As a result, the development has been strategically positioned to avoid adverse impacts on VRZs along these corridors. As discussed above, the final proposal location has been a result of an iterative design process that has sought to avoid areas of higher biodiversity value including riparian areas, high-quality and threatened vegetation communities and higher value HBTs.
<i>Impacts from clearing native vegetation and threatened species habitat can be avoided or minimised by locating the proposal in areas:</i> <i>lacking biodiversity values</i> <i>where the native vegetation or threatened species, habitat is in the poorest condition (i.e., areas that have a low vegetation integrity score)</i> <i>that avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or native vegetation that is a TEC or a highly cleared PCT.</i> <i>outside of the buffer area around breeding habitat features such as nest trees or caves.</i>	- As reflected in the BV Map, the Subject Site is not mapped as containing BV mapped land. The current design has acknowledged the areas of biodiversity value and avoided and minimised impacts to these areas. - No threatened species were identified during site surveys. Development is primarily located in cleared areas (approx. 31.85ha) and highly disturbed vegetation (approx. 1.47ha), with large portions of high-quality vegetation (approx. 0.49ha) retained along the central hydroline and CEEC largely retained in the northern portion (approx. 1.13ha). - No species with a high BRW were identified during surveys or have been assumed as present within the site. The site is not mapped as an 'Important Habitat' within the BAM – Important Areas Viewer. Whilst vegetation commensurate with State- and Federally-listed TECs was identified on site, the proposals have been designed to retain the vast majority of this community (approx. 1.13ha / 88%). The majority of clearance is associated with PCT 3619 which has a relatively low level of clearance across NSW (25.41%). - No known breeding habitat such as nest trees or caves are proposed to be impacted as part of this proposal. Further to this, a substantial amount of vegetation will be retained on site. No caves or significant rocky outcrops are located on site, and the larger HBT identified has been retained along with a number of stag trees. The central hydroline will also be retained.
<i>When selecting a proposal's location, all of the following should be analysed. Justification for the decisions in determining the final location must be based on consideration of:</i> <i>alternative modes or technologies that would avoid or minimise impacts on biodiversity values</i>	- Consideration of alternative modes or technologies include implementation of WSUD principles in design, to ensure that the water quality and quantity standards. - The development proposal seeks to use the existing sealed access to the site and utilise existing sealed tracks, where possible. The development also contains a proposed road which links the existing residential development within Pleasure Point to the east of the site with Voyager Point to

Objectives/Requirements	Evidence of compliance
<i>b. alternative routes that would avoid or minimise impacts on biodiversity values</i> <i>c. alternative locations that would avoid or minimise impacts on biodiversity values</i> <i>d. alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values.</i>	the west. This will assist the movement of traffic within the area and likely reduce the extent of future infrastructure upgrades within the local area (and therefore associated vegetation impacts). c. The site is considered an appropriate location as determined by the R2 land zoning - Low Density Residential, as given by the LEP. Within the current context of the development, the site has been chosen within a lot that consists of predominantly exotic grassland and has been subject to previous clearing and management. The remnant vegetation impact by the proposals comprises predominantly scattered canopy trees with a high level of disturbance through regular slashing. Within the wider landscape, the development is located within a largely cleared site and is strategically an excellent candidate for maximising the development footprint compared to the surrounding extensive bushland or other cleared areas in the surrounding landscape, which are largely already designated for recreational use. d. The current location is the result of adopting the principles of Avoidance and Minimisation of impacts as described above. The design of the proposed development is based on the findings of extensive ecological survey and assessment, in order to minimise impact of remnant vegetation, and situate the development primarily on pre-cleared or non-native vegetation zones. The proposed site location will have minimal impacts to the surrounding area.
<i>The proposal may also list and map site constraints, such as:</i> <i>a. bushfire protection requirements, including clearing for asset protection zones</i> <i>b. flood planning levels</i> <i>c. servicing constraints.</i>	Constraints have been considered and included in the impact area. No clearing of vegetation is necessitated for APZs.
<i>In the BDAR or BCAR, the assessor must document and justify any actions taken to avoid or minimise impacts through careful location of the proposal.</i>	As detailed above, the development footprint has been situated to protect large areas of intact vegetation and a CEEC, while maintaining connectivity and hydrological integrity. Considering the location of the project in the context of the locality, the proposed footprint has the least impact to biodiversity values and native vegetation.
Designing a Project to Avoid and Minimise Impacts on Native Vegetation and Habitat	
<i>The BDAR or BCAR must document the reasonable measures taken by the proponent to avoid or minimise clearing of native vegetation and threatened species habitat during proposal design, including placement of temporary and permanent ancillary construction and maintenance facilities. The types of measures that can be used to demonstrate this include:</i> <i>a. reducing the proposal's clearing footprint by minimising the number and type of facilities</i>	a-d) The proposed design of the development is such that it maximises use of existing cleared land and minimises impact to native vegetation. The proposal has been designed and refined such that the areas of higher biodiversity value within the site will be retained. The removal of native vegetation is largely limited to scattered canopy trees in highly disturbed condition. Design considerations have also minimised the extent of native vegetation clearance required, by utilising existing site access points, adjusting proposed road layouts (to avoid crossing through the central hydroline and associated riparian area) and largely siting facilities in cleared areas. Given the largely cleared nature of the site compared with the extensive bushland within the surrounding landscape

Objectives/Requirements	Evidence of compliance
<i>b. locating ancillary facilities in areas that have no biodiversity values</i> <i>c. locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e., areas with the lowest vegetation integrity scores)</i> <i>d. locating ancillary facilities in areas that avoid habitat for species and vegetation that has a high threat status (e.g., an endangered ecological community (EEC) or critically endangered ecological community (CEEC) or is an entity at risk of a serious and irreversible impact (SAIL))</i> <i>e. actions and activities that provide for rehabilitation, ecological restoration and/or ongoing maintenance of retained areas of native vegetation, threatened species, threatened ecological communities and their habitat on the subject land.</i>	it is considered that the proposal is located in the optimal position within the landscape and development should be maximised within this location. e) A substantial portion of land (approx. 5.78ha) will be retained and improved under a VMP. This plan encompasses a substantial portion of high-quality vegetation located along the central hydroline and the foreshore of the Georges River. The management of vegetation through the VMP will enhance the overall quality of the vegetation within the site, and increase the total area of River-flat Forest (PCT 4024), contributing to the recovery of this TEC. Consideration should also be given to utilising endemic native species in any landscaping associated with the development, to provide future supplementary resources and connectivity for mobile fauna.
<i>The BDAR or BCAR must document and justify efforts to avoid or minimise impacts through design.</i>	Details of proposed Avoidance and Minimisation measures are provided above.

Table 21: Prescribed Impact Avoidance and Minimisation

Objectives/Requirements	Evidence of compliance
Avoid or minimise prescribed impacts when planning the proposal	
<i>The timing and extent of a prescribed impact on the habitat of threatened entities can be difficult to assess and adequately offset through the provision of biodiversity credits. Prescribed impacts may occur on habitat features that are not native vegetation, e.g., caves, rocky outcrops, and flyways. Because these types of features cannot be readily replaced or offset, it is important that measures to avoid or minimise impacts are undertaken and are clearly documented in the BDAR or BCAR.</i>	The Subject Site has no caves or significant rocky outcrops. The riparian corridors associated with the central hydroline and the Georges River represent the best habitat corridors within the site – these areas will be retained through the proposals and restored through implementation of a VMP. The restoration of these lands will improve the condition of these habitats and increase their suitability for a wider range of species through increasing their extent and structure (i.e. introducing and improving shrub and ground layers).
Locate the proposal to avoid or minimise prescribed biodiversity impacts	
<i>To avoid or minimise prescribed biodiversity impacts, the proponent must consider how to:</i> a. <i>locate surface works to avoid direct impacts on the habitat features identified in Chapter 6</i> b. <i>locate subsurface works, in both the horizontal and vertical planes, to avoid and minimise operations beneath the habitat features identified in Chapter 6. For example, locating longwall panels away from geological features of significance, groundwater-dependent plant communities and their supporting aquifers</i> c. <i>locate the proposal to avoid severing or interfering with corridors connecting different areas of habitat and migratory flight paths, to important habitat or local movement pathway</i> d. <i>optimise the proposal layout to minimise interactions with threatened entities; for example, design a wind farm that has:</i> i. <i>100 m turbine-free buffers around features that attract and support aerial species, such as forest edges, riparian corridors, wetlands, ridgetops, and gullies</i> ii. <i>turbine-free corridors in zones of regular movement for species of concern, to avoid a barrier effect</i> e. <i>locate the proposal to avoid impacts on water bodies or hydrological processes.</i>	a) The Subject Site: i) Does not contain karsts, caves, crevices, cliffs, significant rocky outcrops or other features of geological significance supporting threatened species and ecological communities; ii) Does not contain rocks supporting habitat for threatened species and ecological communities; iii) Does not contain human made structures containing habitat for threatened species and ecological communities; iv) Does not contain non-native vegetation supporting threatened species and ecological communities; b) As discussed previously the developmental design has been designed to be contained primarily within cleared areas avoiding large areas of native vegetation. c) As discussed previously, the proposals seek to retain the riparian areas associated within the central hydroline and the Georges River which present the best features for supporting fauna movement within and across the site. Furthermore, the proposed VMP will improve these features and have an overall benefit on ecological connectivity within the context of the surrounding landscape. d) The proposed development is located in an area comprising predominantly cleared land with limited connectivity and has a limited amount of suitable habitat for flora and fauna species owing to its scattered and heavily disturbed nature through historic clearance and regular slashing. In addition, cryptic

Objectives/Requirements	Evidence of compliance
	species are unlikely to use this site for regular habitat use. As previously described, the riparian areas and CEEC have been largely avoided and will be enhanced through implementation of a VMP. Which will provide foraging and future habitat for species in the area. e) The SRMP (ADW Johnson 2024) identified that some hydrolines mapped on site did not have defined creek beds, banks or flowing water. VRZs will be implemented for the central hydroline which will be managed under a VMP.
<i>When locating a proposal, the following need to be analysed and justification should be provided for each alternative selected:</i> a. <i>alternative modes or technologies that would avoid or minimise prescribed impacts</i> b. <i>alternative routes that would avoid or minimise prescribed impacts</i> c. <i>alternative locations that would avoid or minimise prescribed impacts</i> d. <i>alternative sites within a property on which the proposal is located that would avoid or minimise prescribed impacts.</i>	a) Considering the placement of the project has occurred in areas which have minimised impacts to biodiversity, it is considered that proposal has avoided and minimise prescribed impacts through sensitive design. It is proposed to use WSUD principles through the development stage to minimise prescribed impacts. b) As described above, the proposed development will be utilising existing routes into the site and routes have been selected to minimise impacts to existing vegetation. Further to this, no prescribed impacts are expected, with higher value habitat such as streams and remnant vegetation, flyways and so forth will be retained on site. c) As discussed above the development is situated to Avoid and Minimise prescribed impacts. d) Other areas within the property, such as the central hydroline and the northern section adjacent to Georges River have higher associated prescribed biodiversity value and are not appropriate for the proposed development. Development has been situated to avoid and minimise prescribed impacts.
<i>Justifications for a proposal's location should identify any other site constraints that the proponent has considered in determining the location and design of the proposal, such as:</i> a. <i>bushfire protection requirements, including clearing for asset protection zones</i> b. <i>flood planning levels</i> c. <i>servicing constraints.</i>	Constraints have been considered and included in the impact area.
<i>The assessor must document and justify in the BDAR or BCAR all efforts to avoid, or the reasonable measures proposed to minimise, prescribed impacts when choosing the proposal's location.</i>	Details of proposed Avoidance and Minimisation measures are provided above.
Design the proposal to avoid or minimise prescribed impacts	
<i>Design measures that can avoid or minimise prescribed impacts include:</i> a) <i>Engineering solutions, such as proven techniques to:</i>	a) It is not anticipated that bedrock or geological features of significance, or groundwater dependent communities and their supporting aquifers will be

Objectives/Requirements	Evidence of compliance
<i>i. Minimise fracturing of bedrock underlying features of geological significance, or groundwater dependent communities and their supporting aquifers</i> <i>ii. Restore connectivity and movement corridors</i> <i>b) Design elements that minimise interactions with threatened entities, such as:</i> <i>i. Designing turbines to dissuade perching and minimise the diameter of the rotor swept area</i> <i>ii. Designing fencing to prevent animal entry to transport corridors</i> <i>iii. Providing vegetated buffers rehabilitated with native species</i> <i>c) Maintaining environmental processes that are critical to the formation and persistence of habitat features not associated with native vegetation</i> <i>d) Maintaining hydrological processes that sustain threatened entities</i> <i>e) Controlling the quality of water released from the site, to avoid or minimise downstream impacts on threatened entities.</i>	impacted by the proposal. Movement corridors will be restored through implementation of a VMP, as discussed above. <i>b) The connectivity features associated with the central hydroline and Georges River will be enhanced through implementation of a VMP, ensuring flyways and connectivity is maintained. No connectivity corridors are being impacted such that wildlife conflict will be increased. Planting of these areas will provide additional vegetated buffers between these features and the proposed development.</i> <i>c) A Stormwater Management Plan has been prepared for this development (ADW Johnson 2024), and Water Sensitive Urban Design (WSUD) principles have been considered and no significant impact on waterbodies or dependant entities is expected.</i> <i>d) As per section c).</i> <i>e) As per section c).</i>
<i>The proposed measures must be evidence-based and directed towards the threatened entities identified in Chapter 6. The BDAR or BCAR must document the designs that are proposed to avoid or minimise prescribed impacts.</i>	As discussed in Section 2.2 of the BDAR.

Table 22: Direct Impact Assessment

Aspect	Project Phase	Potential Impact	Mitigation	Timing	Responsibility	Risk before mitigation	Risk after mitigation
Native vegetation	Construction and Operation	Removal of approx. 4.13ha of native vegetation.	A VMP is proposed to manage retained vegetation. Landscaping within the development will utilise endemic native species suitable for future fauna use.	Operation and post-development	Council Project coordinator Ecologists	MR	LR
Threatened native vegetation	Pre-Construction and Construction	No threatened flora were identified within the Subject Site during targeted surveys. No threatened flora is proposed to be impacted as part of the proposal.	As discussed previously the developmental has been designed to be located primarily within cleared areas and highly disturbed remnant vegetation.	Pre-, during and post-development	Project coordinator Council Project Ecologist	MR	LR
Habitat in the form of tree hollows	Pre-construction and Construction	Removal of tree hollows providing habitat for native birds and mammals.	All hollows removed during the clearing process will be replaced. Preference should be given to installation of chainsaw hollows or HollowHog habitat features as a mitigation measure for removal of hollows within the development over manufactured boxes. Replacement at a ratio of 2:1 would be acceptable where chainsaw hollows or HollowHog features are installed in retained lands. A ratio of 2:1 with salvaged hollows and/or nest boxes to be installed if augmented hollows are not proposed in order to ensure no net loss of hollow resources. Nest boxes are to be installed in retained habitat within the site. Nest boxes are to be installed by qualified ecologists and according to the Habisure system (Franks & Franks 2006) or similar.	Pre-Construction	Civil Contractor Project Manager Project Ecologist	MR	LR
Fauna home range and connectivity	Pre-Construction and Construction	Disturbance to fauna habitat during clearing and construction operations.	Installation of a fauna-protecting fence, including relevant signage, to create a fauna protection zone.	Pre-, during and post-development	Project coordinator Construction staff Site manager Project Ecologist	MR	LR
Fauna home range and connectivity	Operation	Reduction in connectivity through removal of native canopy species	Reduction in connectivity will be negligible as connectivity features (i.e. riparian areas) will be enhanced through a VMP resulting in greater ecological connectivity across the site.	Post-development	Council Project coordinator Ecologists	LR	LR

Aspect	Project Phase	Potential Impact	Mitigation	Timing	Responsibility	Risk before mitigation	Risk after mitigation
Reduction of biodiversity values	Operation and Post Operation	Removal of remnant vegetation present on site	Landscaping within the development will utilise endemic native species suitable for future fauna use.	Pre-, construction and during-development	Construction staff Project Manager Project Ecologist	MR	LR
	Construction	Sediment run-off into retained vegetation area	Best practice erosion and sedimentation (ERSED) control methods to be adopted, enforced and maintained throughout vegetation works, so as to avoid any movement of sediment resulting from clearing and construction into the retained vegetation lands.	During development	Construction Staff Project Manager Project Ecologist	HR	LR
		Changes in stream flow, structure and stormwater evacuation	Incorporation of Water Sensitive Urban Design (WSUD) principles within stormwater infrastructure is to occur to minimise hydrology changes.	During development and Operational	Construction Staff Project Manager Project Ecologist	HR	LR

Table 23: Prescribed Impact Assessment

Subject of Prescribed Impact	Project Phase	Mitigation	Timing	Responsibility	Risk before mitigation	Risk after mitigation
Habitat of threatened species or ecological communities associated with: (i) Karst, caves, crevices, cliffs and other geological features of significance or (ii) rocks, or (iii) human made structures, or (iv) non-native vegetation	Not applicable	No such impacts are expected on site.	Not applicable	Not applicable	Not applicable	Not applicable
Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	Construction and operation	Reduction in connectivity will be negligible as mainly scattered canopy trees will be impacted. The riparian zones associated with the central hydroline and Georges River will be enhanced through implementation of a VMP as such, ecological connectivity is anticipated to improve as a result of the development proposals.	Pre-operation and operation	Pre-operation and operation	LR	LR
Movement of threatened species that maintains their lifecycle	Pre-operational	As stated above, ecological connectivity will be maintained through VMP management and tree retention.	Pre-operation and operation	Pre-operation and operation	LR	LR
Water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities	Construction	Incorporation of Water Sensitive Urban Design (WSUD) principles within stormwater infrastructure is to occur to minimise hydrology changes. Best practice erosion and sedimentation (ERSED) control methods to be adopted, enforced and maintained throughout vegetation works, so as to avoid any movement of sediments resulting from clearing and construction into the retained vegetation lands.	During and post development	Project coordinator Ecologists	MR	LR
Wind turbine strikes on protected animals	Not applicable	No wind turbines will be installed on site.	Not applicable	Not applicable	Not applicable	Not applicable
Vehicle strikes on threatened species or on animals that are part of a TEC	Construction, operation	Civil Construction staff to be inducted into pre-clearing and clearing protocols, and to identify environmental features for protection. During operation, such impacts will be mitigated through the introduction of fencing between the VMP lands and proposed roads, low-speed limits as well as speed limiting devices.	Pre- and during development	Construction Staff Site Manager Project Ecologist	HR	MR

Table 24: Indirect Impact Assessment

Aspect	Project Phase	Potential Impact	Mitigation	Timing	Responsibility	Risk before mitigation	Risk after mitigation
Noise	Construction	Noise during construction due to construction works and construction traffic. Potential disturbance to threatened species or reduced viability of adjacent retained habitat zone.	Timing of construction operations will be optimised as per an approved Construction Environmental Management Plan (CEMP) which will include a Noise Mitigation Plan.	Pre-operation and Operation	Project coordinator Construction staff Site manager	HR	MR
	Operation	Noise due to traffic. Potential disturbance to threatened species within the surrounding area.	Suitable fencing to be installed and maintained between development to prevent access and reduce potential interaction with threatened species. Standard local speed limits should apply which would limit traffic noise.	During operations and Operational	Civil Contractor	MR	LR
Vibration	Construction	Disturbance to fauna which may lead to displacement to adjacent areas.	Conditions of construction operations will be optimised as per an approved Construction Environmental Management Plan (CEMP).	During construction	Project coordinator Site manager Construction staff	HR	MR
Dust	Construction	Dust deposits on native flora and fauna habitat, resulting in disturbance to and reduced viability of adjacent habitat.	Dust levels during operations managed according to an approved CEMP: • Daily monitoring of dust generated by construction activities; and, • Dust suppression measures (setting maximum speed limits and application of dust suppressants) will be implemented during construction works to limit dust on site.	During construction	Project coordinator Site manager Construction staff	MR	LR
Light spill	Construction	Disturbance to nocturnal fauna, thus reducing viability of the adjacent habitat.	Optimal construction methods as per an approved CEMP will reduce instances of light spill. Such measures will include limiting use of lights where necessary and directing lights in such a way as to limit impact on adjacent vegetated lands.	During construction	Project coordinator Site manager Construction staff	LR	LR
	Operation	Disturbance to nocturnal fauna, thus reducing viability of adjacent retained habitat zone.	Provision of lighting will be in accordance with an approved CEMP. Permanent lighting shall be designed to minimise light spill into surrounding vegetation, particularly VMP lands.	During operations	Civil Contractor	MR	LR

Aspect	Project Phase	Potential Impact	Mitigation	Timing	Responsibility	Risk before mitigation	Risk after mitigation
Non-native vegetation	Construction	Soil disturbance may lead to proliferation of exotic flora (including invasive weeds) through seeds and vegetation fragments.	As per an approved CEMP: • Appropriate handling of mulch created from the removal of exotic vegetation; • Appropriate cleaning of all construction equipment to limit the risk of weed seed and fragments to adjacent retained areas; • Chemical and manual treatment of weeds where applicable; and, • Appropriate management of weeds within landscaping areas.	During construction	Project coordinator Site manager Construction staff	HR	LR
Visual amenity	Construction	Rubbish and waste retained onsite attracting native fauna.	Activities on the Site will be managed in accordance with an approved CEMP and designed to limit the amount of rubbish and waste onsite through good housekeeping practices.	During construction	Project coordinator Site manager Construction staff	LR	LR
	Operation	Rubbish and waste retained onsite attracting native fauna.	Suitable fencing to be installed and maintained between development and surrounding natural areas to prevent access and degradation of surrounding vegetation.	During operations	Civil Contractor	LR	LR

Table 25: Residual Impact Assessment

Aspect	Project Phase	Potential Impact	Mitigation / Minimisation	Residual Impact Description	Impact to be offset (see Section 2.3)
Reduction of biodiversity values	Construction Operation	Clearing of 4.13ha native vegetation.	The Subject Site has been located so as to avoid large sections of high-quality vegetation associated with the riparian areas of the central hydroline and the Georges River. It is therefore considered that development is occurring within optimal locations within the Parent Lots. A VMP has been produced which is anticipated to improve the biodiversity values of retained vegetation within the Study Area. Landscaping within the development should utilise endemic native species suitable for future fauna usage and providing supplementary connectivity through residential areas.	PCT 4059 (Good): 0.14ha PCT 4059 (Degraded): 0.15ha PCT4024 (Degraded): 0.16ha PCT 3619 (Moderate): 1.85ha PCT 3619 (Poor): 1.16ha PCT 3616 (Moderate): 0.63ha Planted Native: 0.04ha	Yes
		Removal of HBTs with potential for use by fauna	Installation of augmented hollows at a 1:1 ratio or nest boxes at a 2:1 ratio, as well as any recovered hollows in the Subject Site. To be installed within retained lands and managed under a VMP.		
Noise, vibration, dust and light spill	Construction Operation	Disturbance to local fauna	Application of CEMP.	Noise, dust, vibration and light spill will still occur but at a low magnitude, thus keeping the impact on local fauna to a minimum.	No

Table 26: Risk Matrix

		Probability						
		A	B	C	D	E		
Maximum reasonable consequence	1	CR	CR	HR	HR	MR	CRITICAL	CR
	2	CR	HR	HR	MR	LR	HIGH RISK	HR
	3	HR	HR	MR	LR	LR	MEDIUM RISK	MR
	4	HR	MR	LR	LR	LR	LOW RISK	LR
	5	MR	LR	LR	LR	LR		

Table 27: Assessment Criteria

Consequence criteria: Impacts on threatened species and/or threatened species habitat	
1. CRITICAL	
Impact – Severe; Spatial scale – Widespread; Time scale – Long-term. Requires consideration of whether impacts may result in a Serious and Irreversible Impact that may lead to local extinction.	
2. MAJOR	
Impact – Moderate; Spatial scale – Moderate to widespread; Time scale – Mid- to long-term. May result in temporary or long-term damage.	
3. MODERATE	
Impact – Moderate; Spatial scale – Local to moderate; Time scale – Short- to mid-term. May result in a moderate, temporary impact. However, it may be difficult to rehabilitate impact and may have negative implications on the ecosystem	
4. MINOR	
Impact – Minor; Spatial scale – Local; Time scale – Short-term. May result in minor impacts that are relatively easily rehabilitated. Not likely to have negative implications on the ecosystem.	
5. NEGLIGIBLE	
Impact – Minor; Time scale – Short-term with no lasting effect.	
Likelihood criteria	
A. ALMOST CERTAIN	
Very high or certain probability that impact will occur, or event is of a continuous nature.	
B. LIKELY	
Likely probability that impact will occur, or event is frequent (frequency 1-5 years).	
C. MODERATE	
Moderate probability that impact will occur, or event is infrequent (frequency 5-20 years).	
D. UNLIKELY	
Low probability that impact will occur, or event is very infrequent (frequency 100 years).	
E. REMOTE	
Very low probability that impact will occur or may occur under extenuating circumstances. Event is very rare or stochastic in nature (frequency 1000 years)	

2.4 Impacts Requiring Offsets

2.4.1 Ecosystem Credits

As per Section 10.3 of the BAM, the removal of native vegetation within the site will require offsetting to achieve the 'no net loss standard' detailed within Section 11 of the BAM. To calculate the required offsets in the form of ecosystem credits, the BAM Calculator has taken into consideration the impact area and the projected loss in Vegetation Integrity Score along with the Biodiversity Risk Weighting of the PCT. Details of each along with the required credit outputs is provided in **Table 28**. A total of 86 ecosystem credits are required to offset the proposed development. Impact areas requiring offset are shown in **Figure 9**.

Table 28: Ecosystem Credit Requirements

Vegetation Zone	Condition	Impact Area (ha)	Future VIS	Vegetation Integrity Score Loss	Biodiversity Risk Weighting	Credit Requirements
PCT 4059	Good	0.14	-	89.5	2.5	8
PCT 4059	Degraded	0.15	-	31.6	2.5	3
PCT 4024	Degraded	0.16	-	30.5	2	2
PCT 3619	Moderate	1.85	-	53.5	1.5	37
PCT 3619	Poor	1.16	-	45.7	1.5	20
PCT 3616	Moderate	0.63	-	56.8	1.75	16
Total		4.09*				86

*This value does not include the 0.04ha of planted native vegetation impacted. The total area of native vegetation impacted by the proposal is 4.13ha.

2.4.2 Species Credits

If a Species Credit species is either identified on the site during survey, assumed to be present, or confirmed present within an expert report, a 'species polygon' is required to be produced for the area of suitable habitat within the site for the species. The size of this polygon is entered into the BAM Calculator, which determines the number of credits required to offset the removal of suitable habitat based upon the quality of habitat and biodiversity risk weighting of the species. The following Species Credit species has been either recorded on site:

- Southern Myotis (*Myotis macropus*)

As per State guidelines (OEH 2018, DPIE 2020) and the TBDC, a species polygon has been mapped for this species as shown in **Figure 12**. **Table 29** below outlines the vegetation included within the species polygon as per the TBDC and additional notes regarding the extent of the species polygon are provided.

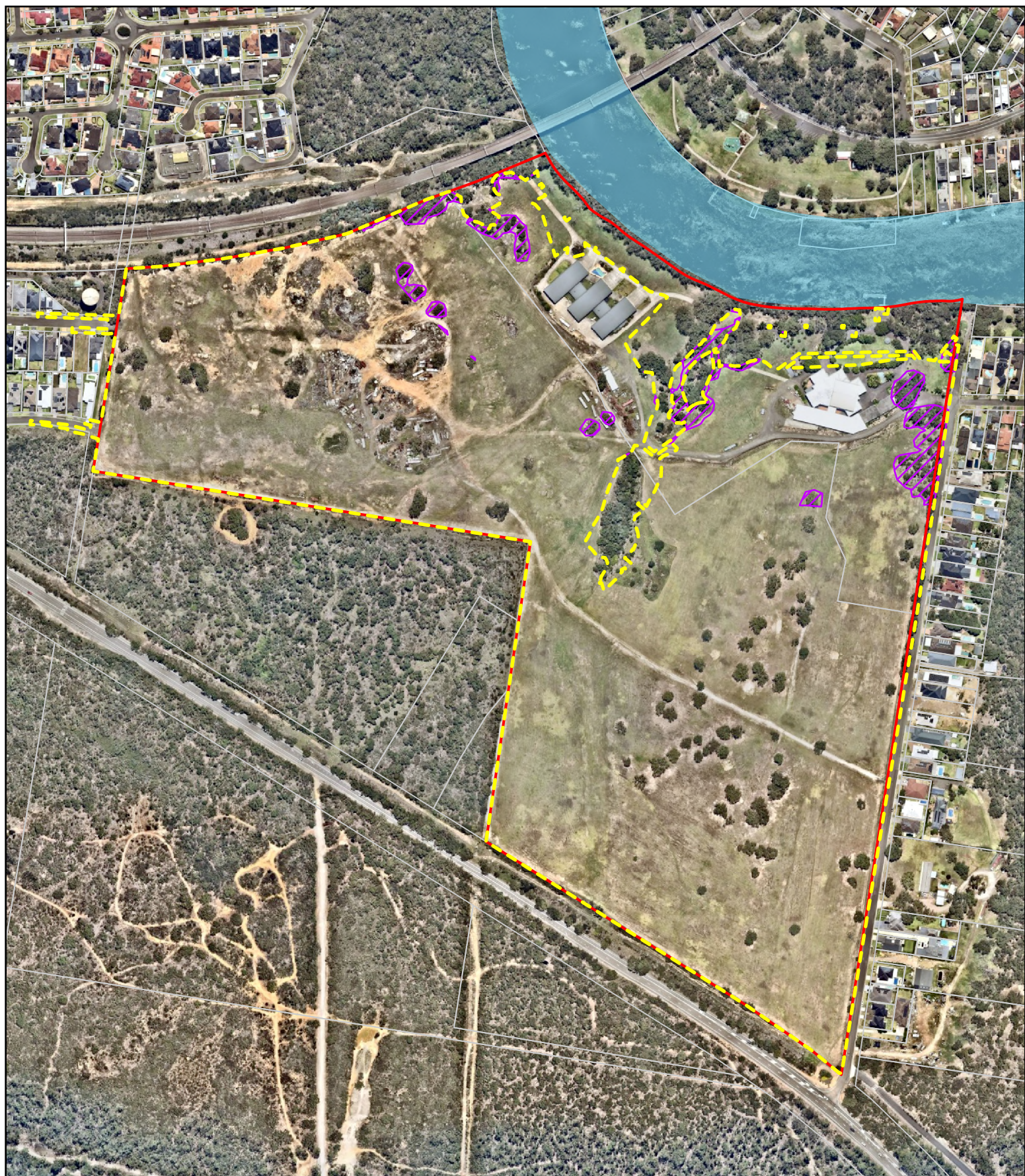
Table 29: Species Polygon Summary

Species	Subject Site Habitat Included Within Species Polygon			
	PCT 4059	PCT 4024	PCT 3619	PCT3616
Southern Myotis <i>Myotis macropus</i>	●	●	●	●
	Includes all PCTs listed in the TBDC within 200m of any medium to large permanent creeks, rivers, lakes or other waterways. Applicable PCTs within the Subject Site include PCT 4059, PCT 4024, PCT 3619 and PCT 3616.			

The total area of suitable vegetation impacted, relevant to the Species Credit species has been entered into the BAM-C, to calculate the subsequent credit obligation. The credit obligation is outlined in **Table 30**, below.

Table 30: Species Credit Requirements

Species	Impact	Biodiversity Risk Weighting	Credit Requirements
Southern Myotis <i>Myotis macropus</i>	1.05ha	2	27



Legend

- Subject Site
- Study Area
- Cadastre
- Hydroarea
- Southern Myotis Species Polygon

Figure 12 - Southern Myotis Species Polygon

Address: Heathcote Road, Pleasure Point
 Client: Hodge Developments Pty Ltd
 AEP Ref: 3539 | Date: 10 April 2025

Imagery: Nearmap
 Spatial Reference: GDA2020 MGA Zone 56

0 100 200
 m
 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.

2.4.3 Serious and Irreversible Impacts (SAlls)

Candidate Threatened Entities at risk of SAlls are determined by decision makers (i.e., Council) for each threatened species or vegetation community based upon four (4) principles listed within the Guidance and criteria to assist a decision maker to determine a serious and irreversible impact (DPE 2020).

The following Threatened Entities were predicted as potentially occurring within the Subject Site. The potential for these species to occur within the Subject Site was based on both the candidate species predicted by the BAM-C for the PCT present on site, as well as review of BioNet Atlas records from the locality and consideration of their potential to occur within or near the Subject Site. Threatened Entities excluded from the BAM-C owing to habitat constraints, degradation or geographic limitations are included in **Table 15** and are not repeated in this section.

The following species were listed as candidate species within the BAM-C or were manually added to the Candidate Species list owing to the presence of BioNet Atlas Records in proximity to the site (*Allocasuarina diminuta*) or their incidental detection through site surveys (Eastern Cave Bat):

- *Allocasuarina diminuta*
- *Genoplesium baueri* (Bauer's Midge Orchid)
- *Hibbertia* sp. Bankstown
- *Melaleuca deanei* (Deane's Paperbark)
- *Persoonia hirsuta* (Hairy Geebung)
- *Vespadelus troughtoni* (Eastern Cave Bat)

As per **Table 18**, it was concluded that the species listed above were not located on site or were excluded from assessment due to habitat constraints and did not require further assessment. Therefore, no SAll are expected due to the proposed development.

No other candidate species were detected on site.

2.5 Areas not requiring offset

Of the approx. 35.98ha identified as the impact area, approx. 4.13ha of native vegetation is proposed to be impacted. The remaining approx. 31.85ha of non-native vegetation does not require offset.

2.6 Area not requiring assessment

The total Subject Site is approx. 35.98ha, of which approx. 35.98ha has been assessed as the Impact Area, whereby the retention of vegetation within the proposed development (Refer to Tree Clearing Plan within **Appendix A**) has been taken into account. As per Section 9.3 of the BAM, areas outside of the proposed impact area do not require assessment for credits. The impact area is depicted in **Figure 9**.

2.7 Biodiversity Credit Report

The Biodiversity Credit Report generated within the BAM Calculator is provided in **Appendix E** and includes potential offset variations that are applicable to the proposal.

The proposed development will be delivered in stages as shown by the Staging Plan provided within **Appendix A**. Whilst the Biodiversity Credit Report considers the proposed development as a whole Credit Obligations may be satisfied in advance of clearing works, on a stage-by-stage basis, rather than for the whole development from the outset of works. The credit obligation for each stage of development is shown in **Table 31**, below.

Table 31: Staged Credit Obligation

Stage	Ecosystem Credits						Species Credits
	4059 Good	4059 Degraded	4024 Degraded	3619 Moderate	3619 Poor	3616 Moderate	Southern Myotis
1	-	-	-	13	3	-	-
2	-	-	-	-	1	-	-
3	-	-	-	2	1	-	-
4A	-	1	-	9	-	-	-
4B	-	-	-	7	-	-	-
5	-	-	-	-	6	1	1
6	-	-	-	-	6	-	-
7	-	-	-	-	3	-	1
8	8	2	2	6	-	13	24
9	-	-	-	-	-	2	1

3.0 Conclusion

Application of the BAM against the proposal has quantified current biodiversity values within the site and calculated offset requirements for residual impacts following avoid and mitigation efforts.

Native vegetation within the Subject Site was found to be commensurate with the following communities:

- PCT 4059: *Sydney Hinterland Sandy Creekflat Shrub Forest*;
- PCT 4024: *Cumberland Blue Box Riverflat Forest*;
- PCT 3619: *Sydney Hinterland Grey Gum Transition Forest*; and,
- PCT 3616: *Sydney Hinterland Enriched Sandstone Bloodwood Forest*.

An area of planted native vegetation consisting of *Waterhousea floribunda* was also identified within the north-east of the Subject Site. This vegetation was assessed utilising the *Streamlined Assessment Module Planted Native Vegetation* and impacts to threatened species assessed as part of the wider suite of ecological survey and assessment undertaken, of the site. This vegetation was not found to support any threatened species and as such no offsets are applicable under the BAM-C.

The remainder of the Subject Site comprised cleared areas, exotic vegetation and infrastructure. The Development Footprint has been situated to minimise impacts on intact vegetation.

The proposal will impact 4.13ha of native vegetation. As a result, it was determined that 86 ecosystem credits are incurred by the proposed native vegetation clearing.

One (1) threatened species was identified within the Subject Site. This species is listed below with the subsequent credit obligation:

- Southern Myotis (27 credits)

The full biodiversity credit report is attached as **Appendix E**. The credit obligation will be satisfied in stages as outlined in **Table 31**.

Works are proposed to create a formalised channel through the foreshore. The proposed channel works will result in a positive impact to biodiversity values within the site, following management under a VMP. As the channel works are situated within the foreshore, controlled activity approval will be required.

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Appendix A: Development Plans



M.G.A.



LEGEND	
—	SITE BOUNDARY
—	PROPOSED LOT BOUNDARY
—	EXISTING LOT BOUNDARY

STAGE SUMMARY	
STAGE No.	RESIDENTIAL LOT YIELD
STAGE 1	65
STAGE 2	29
STAGE 3	40
STAGE 4A	47
STAGE 4B	25
STAGE 5	72
STAGE 6	50
STAGE 7	40
STAGE 8	67
STAGE 9	27
TOTAL	462

STAGING PLAN
SCALE 1:2000

NOT FOR CONSTRUCTION

REV.	DATE	AMENDMENT	DESIGN	DRAWN	CHECKED	APPROVED	SCALES	 Central Coast 5 Pioneer Avenue, P.O. Box 3717, Tuggerah N.S.W. 2259 Phone: (02) 4305 4300 Fax: (02) 4305 4399 email: coast@adwjohnson.com.au www.adwjohnson.com.au ABN 62 129 445 398	CLIENT HODGE DEVELOPMENTS PTY LTD	PROPERTY DESCRIPTION LOT 1 IN D.P.875804 & LOT 2 IN D.P.817692 HEATHCOTE ROAD & PLEASURE POINT ROAD, PLEASURE POINT	PROJECT PROPOSED SUBDIVISION				
A B C	21.08.2024 03.09.2024 14.03.2025	INITIAL ISSUE ISSUED FOR DA UPDATED DESIGN	M.P. M.P. M.P.	J.J. J.J. L.K.	N.W. N.W. N.W.	B.M. B.M. B.M.	A1 0 50 100m A3 1:2000 1:4000				PLAN TITLE STAGING PLAN				
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300362-CENG-1005

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M.G.A.



LEGEND

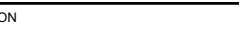
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- PROPOSED LOT BOUNDARY
- EXISTING LOT BOUNDARY

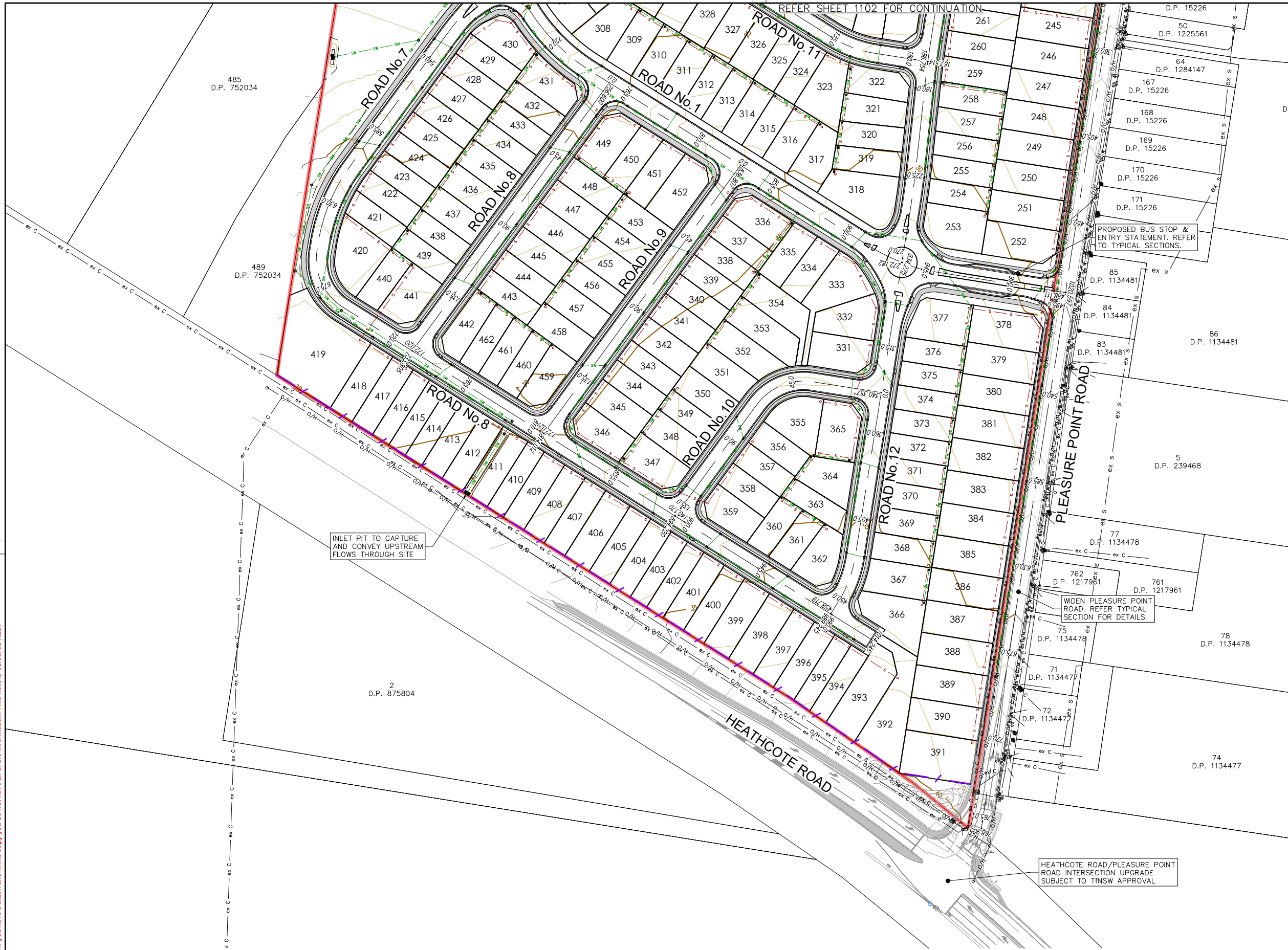
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- TREES SHOWN BASED UPON SITE SURVEY UNDERTAKEN BY ADWJ ON 24/07/2024. ONLY TREES OVER 300mm DIAMETER SHOWN. REFER TO ECOLOGICAL REPORT FOR ANY ADDITIONAL VEGETATION REMOVAL

TREE CLEARING PLAN
SCALE 1:2500

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A	B	C	M.P.	J.J.	N.W.	B.M.	LOT 1 IN D.P.875804 & LOT 2 IN D.P.817692 HEATHCOTE ROAD & PLEASURE POINT ROAD, PLEASURE POINT				PLAN TITLE	TREE CLEARING PLAN							
DESIGN FILE S:\300362\Design\12D\Pleasure Point\Pleasure_Point.project							ALL DIMENSIONS ARE IN METRES. DO NOT SCALE				SURVEYED ADW Johnson		DATUM GDA2020 M.G.A. ZONE 56 A.H.D.	PROJECT No. 300362	-	DISCIPLINE CENG	-	NUMBER 1005	REV. C



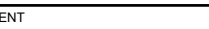
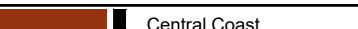
LEGEND

- SITE BOUNDARY
- EXISTING LOT BOUNDARY
- FUTURE LOT BOUNDARY
- MAJOR DESIGN CONTOURS
- MINOR DESIGN CONTOURS
- MAJOR NATURAL CONTOURS
- MINOR NATURAL CONTOURS
- PROPOSED KERB
- EXTENTS OF BATTER
- PROPOSED FOOTPATH
- PROPOSED STORMWATER
- PROPOSED SEWER
- EXISTING STORMWATER
- EXISTING SEWER
- EXISTING WATER
- EXISTING COMMS
- EXISTING ELECTRICITY
- EXISTING GAS
- EXISTING OVERHEAD POWER
- ACOUSTIC WALL
- TOP OF BANK
- PROPOSED SW PIT
- PROPOSED GPT
- PROPOSED LINTEL
- PROPOSED HEADWALL

- CONTOUR INTERVAL = 1.0m
- GENERAL NOTES:**
- FOR TYPICAL ROAD CROSS SECTIONS REFER SHEETS 1211-1212.
 - FOR ROAD LONGITUDINAL SECTIONS REFER TO SHEETS 1231-1256.

DETAIL PLAN
SCALE 1:1000

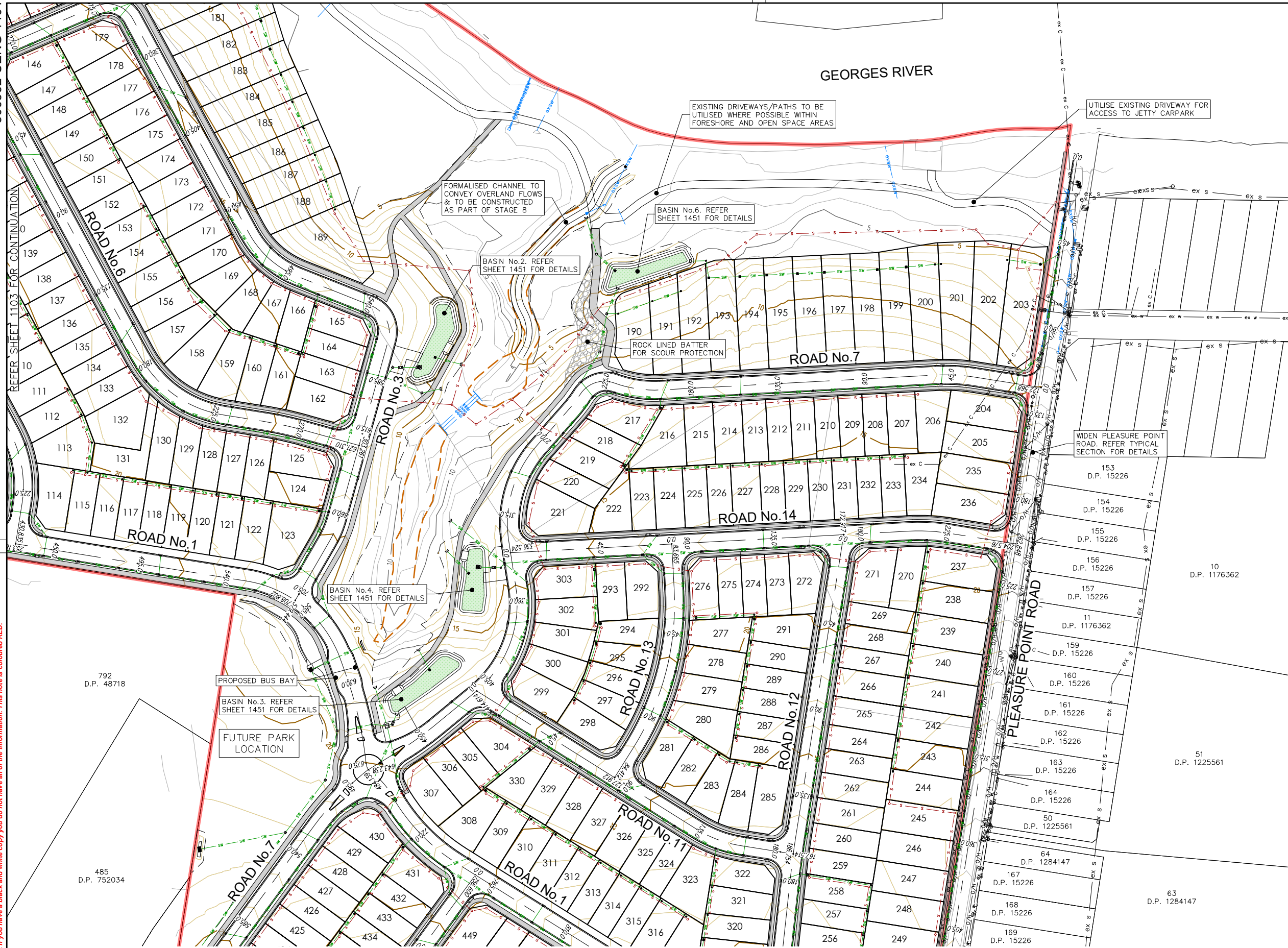
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REV.			DATE			AMENDMENT			DESIGN	DRAWN	CHECKED	APPROVED	SCALES		 Central Coast 5 Pioneer Avenue, P.O. Box 3717, Tuggerah N.S.W. 2259 Phone: (02) 4305 4300 Fax: (02) 4305 4399 email: coast@adwjohnson.com.au www.adwjohnson.com.au ABN 62 129 445 398		CLIENT	PROPERTY DESCRIPTION				PROJECT		PROPOSED SUBDIVISION	
A B C	21.08.2024		INITIAL ISSUE	M.P.	J.J.	N.W.	B.M.			HODGE DEVELOPMENTS PTY LTD	LOT 1 IN D.P.875804 & LOT 2 IN D.P.817692 HEATHCOTE ROAD & PLEASURE POINT ROAD, PLEASURE POINT	PLAN TITLE		DETAIL PLAN SHEET 1											
	03.09.2024		ISSUED FOR DA																						
	14.03.2025		UPDATED DESIGN																						
DESIGN FILE S:\300362\Design\12D\Pleasure Point\Pleasure_Point.project												ALL DIMENSIONS ARE IN METRES. DO NOT SCALE			SURVEYED ADW Johnson		DATUM GDA2020 M.G.A. ZONE 56 A.H.D.		PROJECT No. 300362	-	DISCIPLINE CENG	-	NUMBER 1101	REV. C	

300362-CENG-1101

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100mm AT FULL SIZE



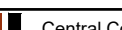
LEGEND

- SITE BOUNDARY
- EXISTING LOT BOUNDARY
- FUTURE LOT BOUNDARY
- MAJOR DESIGN CONTOURS
- MINOR DESIGN CONTOURS
- MAJOR NATURAL CONTOURS
- MINOR NATURAL CONTOURS
- PROPOSED KERB
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- EXISTING SEWER
- EXISTING WATER
- EXISTING COMMS
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- EXISTING GAS
- EXISTING OVERHEAD POWER
- ACOUSTIC WALL
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- PROPOSED SW PIT
- PROPOSED GPT
- PROPOSED LINTEL
- PROPOSED HEADWALL

- CONTOUR INTERVAL = 1.0m
- GENERAL NOTES:**
- FOR TYPICAL ROAD CROSS SECTIONS REFER SHEETS 1211-1212.
 - FOR ROAD LONGITUDINAL SECTIONS REFER TO SHEETS 1231-1256.

REFER SHEET 1101 FOR CONTINUATION
DETAIL PLAN
SCALE 1:1000

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REV.		DATE	AMENDMENT	DESIGN	DRAWN	CHECKED	APPROVED	SCALES		Central Coast 5 Pioneer Avenue, P.O. Box 3717, Tuggerah N.S.W. 2259 Phone: (02) 4305 4300 Fax: (02) 4305 4399 email: coast@adwjohnson.com.au www.adwjohnson.com.au ABN 62 129 445 398	CLIENT HODGE DEVELOPMENTS PTY LTD	PROPERTY DESCRIPTION		PROJECT PROPOSED SUBDIVISION		
A B C	21.08.2024 03.09.2024 14.03.2025	INITIAL ISSUE ISSUED FOR DA UPDATED DESIGN	M.P. M.P. M.P.	J.J. J.J. L.K.	N.W. N.W. N.W.	B.M. B.M. B.M.	A1 1:1000  A3 1:2000	PLAN TITLE DETAIL PLAN SHEET 2								
DESIGN FILE S:\300362\Design\120\Pleasure Point\Pleasure_Point.project								ALL DIMENSIONS ARE IN METRES. DO NOT SCALE				SURVEYED ADW Johnson	DATUM GDA2020 M.G.A. ZONE 56 A.H.D.	PROJECT No. 300362 -	DISCIPLINE CENG -	NUMBER 1102



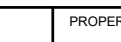
LEGEND	
	SITE BOUNDARY
	EXISTING LOT BOUNDARY
	FUTURE LOT BOUNDARY
	MAJOR DESIGN CONTOURS
	MINOR DESIGN CONTOURS
	MAJOR NATURAL CONTOURS
	MINOR NATURAL CONTOURS
	PROPOSED KERB
	EXTENTS OF BATTER
	PROPOSED FOOTPATH
	PROPOSED STORMWATER
	PROPOSED SEWER
	EXISTING STORMWATER
	EXISTING SEWER
	EXISTING WATER
	EXISTING COMMS
	EXISTING ELECTRICITY
	EXISTING GAS
	EXISTING OVERHEAD POWER
	ACOUSTIC WALL
	TOP OF BANK
	PROPOSED SW PIT
	PROPOSED GPT
	PROPOSED LINTEL
	PROPOSED HEADWALL

- CONTOUR INTERVAL = 1.0m
- GENERAL NOTES:**
- FOR TYPICAL ROAD CROSS SECTIONS REFER SHEETS 1211-1212.
 - FOR ROAD LONGITUDINAL SECTIONS REFER TO SHEETS 1231-1256.

REFER SHEET 1102 FOR CONTINUATION

REFER SHEET 1101 FOR CONTINUATION

NOT FOR CONSTRUCTION

REV.		DATE	AMENDMENT	DESIGN	DRAWN	CHECKED	APPROVED	SCALES		Central Coast 5 Pioneer Avenue, P.O. Box 3717, Tuggerah N.S.W. 2259 Phone: (02) 4305 4300 Fax: (02) 4305 4399 email: coast@adwjohnson.com.au www.adwjohnson.com.au ABN 62 129 445 398	CLIENT HODGE DEVELOPMENTS PTY LTD	PROPERTY DESCRIPTION		PROJECT PROPOSED SUBDIVISION											
A	B	C	21.08.2024 03.09.2024 14.03.2025	INITIAL ISSUE ISSUED FOR DA UPDATED DESIGN	M.P. M.P. M.P.	J.J. J.J. L.K.	N.W. N.W. N.W.	B.M. B.M. B.M.				LOT 1 IN D.P.875804 & LOT 2 IN D.P.817692 HEATHCOTE ROAD & PLEASURE POINT ROAD, PLEASURE POINT		PLAN TITLE DETAIL PLAN SHEET 3											
DESIGN FILE S:\300362\Design\12D\Pleasure Point\Pleasure_Point.project <td colspan="2">ALL DIMENSIONS ARE IN METRES. DO NOT SCALE</td> <td colspan="2">SURVEYED ADW Johnson</td> <td colspan="2">DATUM GDA2020 M.G.A. ZONE 56 A.H.D.</td> <td colspan="2">PROJECT No. 300362</td> <td colspan="2">DISCIPLINE - CENG -</td> <td colspan="2">NUMBER 1103</td> <td colspan="2">REV. C</td>												ALL DIMENSIONS ARE IN METRES. DO NOT SCALE		SURVEYED ADW Johnson		DATUM GDA2020 M.G.A. ZONE 56 A.H.D.		PROJECT No. 300362		DISCIPLINE - CENG -		NUMBER 1103		REV. C	

Appendix B: Flora Species List

Family	Scientific Name	Common Name
Fabaceae (Mimosoideae)	<i>Acacia binervia</i>	Coast Myall
Fabaceae (Mimosoideae)	<i>Acacia brownii</i>	Heath Wattle
Fabaceae (Mimosoideae)	<i>Acacia decurrens</i>	Black Wattle
Fabaceae (Mimosoideae)	<i>Acacia falcata</i>	Sickle Wattle
Fabaceae (Mimosoideae)	<i>Acacia hispidula</i>	Little Harsh Acacia
Fabaceae (Mimosoideae)	<i>Acacia longifolia</i>	Long-leaved Wattle
Fabaceae (Mimosoideae)	<i>Acacia melanoxylon</i>	Blackwood
Fabaceae (Mimosoideae)	<i>Acacia myrtifolia</i>	Red-stemmed Wattle
Fabaceae (Mimosoideae)	<i>Acacia terminalis</i>	Sunshine Wattle
Fabaceae (Mimosoideae)	<i>Acacia ulicifolia</i>	Prickly Moses
Polygonaceae	<i>Acetosa sagittata</i> *	Rambling Dock
Apiaceae	<i>Actinotus helianthi</i>	Flannel Flower
Asteraceae	<i>Ageratina adenophora</i> *	Crofton Weed
Casuarinaceae	<i>Allocasuarina littoralis</i>	Black She-Oak
Poaceae	<i>Andropogon virginicus</i> *	Whisky Grass
Myrtaceae	<i>Angophora bakeri</i>	Narrow-leaved Apple
Myrtaceae	<i>Angophora costata</i>	Sydney Red Gum
Myrtaceae	<i>Angophora floribunda</i>	Rough-barked Apple
Basellaceae	<i>Anredera cordifolia</i> *	Madeira Vine
Apocynaceae	<i>Araujia sericifera</i> *	Moth Vine
Poaceae	<i>Aristida vagans</i>	Threeawn Speargrass
Asparagaceae	<i>Asparagus aethiopicus</i> *	Asparagus Fern
Asparagaceae	<i>Asparagus asparagoides</i> *	Bridal Creeper
Aspleniaceae	<i>Asplenium flabellifolium</i>	Necklace Fern
Poaceae	<i>Axonopus fissifolius</i> *	Narrow-leaved Carpet Grass
Proteaceae	<i>Banksia spinulosa</i>	Hairpin Banksia
Asteraceae	<i>Bidens pilosa</i> *	Cobbler's Pegs
Pittosporaceae	<i>Billardiera scandens</i>	Hairy Apple Berry
Fabaceae (Faboideae)	<i>Bossiaea ensata</i>	Sword Bossiaea
Fabaceae (Faboideae)	<i>Bossiaea heterophylla</i>	Variable Bossiaea
Brassicaceae	<i>Brassica fruticulosa</i> *	Twiggy Turnip
Lauraceae	<i>Cassytha pubescens</i>	Downy Dodder-laurel
Casuarinaceae	<i>Casuarina glauca</i>	Swamp Oak
Poaceae	<i>Cenchrus clandestinus</i> *	Kikuyu Grass
Gentianaceae	<i>Centaurium spp.</i> *	Centaury
Apiaceae	<i>Centella asiatica</i>	Indian Pennywort
Cunoniaceae	<i>Ceratopetalum gummiferum</i>	Christmas Bush
Pteridaceae	<i>Cheilanthes sieberi</i>	Rock Fern
Poaceae	<i>Chloris gayana</i> *	Rhodes Grass

Family	Scientific Name	Common Name
Lauraceae	<i>Cinnamomum camphora</i> *	Camphor Laurel
Asteraceae	<i>Cirsium vulgare</i> *	Spear Thistle
Commelinaceae	<i>Commelina cyanea</i>	-
Asteraceae	<i>Conyza sumatrensis</i> *	Tall fleabane
Poaceae	<i>Cortaderia selloana</i> *	Pampas Grass
Myrtaceae	<i>Corymbia gummifera</i>	Red Bloodwood
Apiaceae	<i>Cyclospermum leptophyllum</i> *	Slender Celery
Poaceae	<i>Cymbopogon refractus</i>	Barbed Wire Grass
Poaceae	<i>Cynodon dactylon</i>	Common Couch
Cyperaceae	<i>Cyperus gracilis</i>	Slender Flat-sedge
Apiaceae	<i>Daucus carota</i> *	Wild Carrot
Asphodelaceae	<i>Dianella caerulea</i>	Blue Flax-lily
Asphodelaceae	<i>Dianella revoluta</i>	Blueberry Lily
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>	Flowery Parrot-pea
Fabaceae (Faboideae)	<i>Dillwynia phyllicoides</i>	Parrot-pea
Fabaceae (Faboideae)	<i>Dillwynia retorta</i>	Small-leaf Parrot-pea
Sapindaceae	<i>Dodonaea triquetra</i>	Large-leaf Hop-bush
Poaceae	<i>Echinopogon ovatus</i>	Forest Hedgehog Grass
Poaceae	<i>Ehrharta erecta</i> *	Panic Veldtgrass
Chenopodiaceae	<i>Einadia trigonos</i>	Fishweed
Poaceae	<i>Entolasia marginata</i>	Bordered Panic
Poaceae	<i>Entolasia stricta</i>	Wiry Panic
Poaceae	<i>Eragrostis brownii</i>	Brown's Lovegrass
Poaceae	<i>Eragrostis curvula</i> *	African Lovegrass
Fabaceae (Faboideae)	<i>Erythrina x sykesii</i> *	Coral Tree
Myrtaceae	<i>Eucalyptus baueriana</i>	Blue Box
Myrtaceae	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
Myrtaceae	<i>Eucalyptus globoidea</i>	White Stringybark
Myrtaceae	<i>Eucalyptus moluccana</i>	Grey Box
Myrtaceae	<i>Eucalyptus piperita</i>	Sydney Peppermint
Myrtaceae	<i>Eucalyptus punctata</i>	Grey Gum
Myrtaceae	<i>Eucalyptus resinifera</i>	Red Mahogany
Myrtaceae	<i>Eucalyptus sclerophylla</i>	Hard-leaved Scribbly Gum
Asteraceae	<i>Gamochaeta coarctata</i> *	Cudweed
Phyllanthaceae	<i>Glochidion ferdinandi</i>	Cheese Tree
Fabaceae (Faboideae)	<i>Glycine tabacina</i>	Variable Glycine
Haloragaceae	<i>Gonocarpus tetragynus</i>	Poverty Raspwort
Haloragaceae	<i>Gonocarpus teucroides</i>	Germander Raspwort
Goodeniaceae	<i>Goodenia hederacea</i>	Ivy Goodenia

Family	Scientific Name	Common Name
Proteaceae	<i>Grevillea sericea</i>	Pink Spider Flower
Proteaceae	<i>Grevillea speciosa</i>	Red Spider Flower
Fabaceae (Faboideae)	<i>Grona varians</i>	Slender Tick-Trefoil
Proteaceae	<i>Hakea sericea</i>	Needlebush
Fabaceae (Faboideae)	<i>Hardenbergia violacea</i>	False Sarsaparilla
Dilleniaceae	<i>Hibbertia aspera</i>	Rough Guinea Flower
Fabaceae (Faboideae)	<i>Hovea lanceolata</i>	Nitrogen Fixer Shrub
Fabaceae (Faboideae)	<i>Hovea linearis</i>	Common Hovea
Poaceae	<i>Hyparrhenia hirta</i> *	Coolatai Grass
Asteraceae	<i>Hypochaeris glabra</i> *	Smooth Catsear
Asteraceae	<i>Hypochaeris radicata</i> *	Catsear
Poaceae	<i>Imperata cylindrica</i>	Blady Grass
Juncaceae	<i>Juncus spp.</i>	-
Juncaceae	<i>Juncus usitatus</i>	Common Rush
Myrtaceae	<i>Kunzea ambigua</i>	Tick Bush
Asteraceae	<i>Lactuca serriola</i> *	Prickly Lettuce
Cyperaceae	<i>Lepidosperma laterale</i>	Variable Sword-sedge
Myrtaceae	<i>Leptospermum polygalifolium</i>	Tantoon
Myrtaceae	<i>Leptospermum squarrosum</i>	-
Myrtaceae	<i>Leptospermum trinervium</i>	Slender Tea-tree
Ericaceae	<i>Lissanthe strigosa</i>	Peach Heath
Campanulaceae	<i>Lobelia andrewsii</i>	Trailing Lobelia
Campanulaceae	<i>Lobelia purpurascens</i>	Whiteroot
Lomandraceae	<i>Lomandra cylindrica</i>	Needle-Mat rush
Lomandraceae	<i>Lomandra filiformis subsp. coriacea</i>	Wattle Mat-rush
Lomandraceae	<i>Lomandra glauca</i>	Pale Mat-rush
Lomandraceae	<i>Lomandra gracilis</i>	Slender Mat-rush
Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
Lomandraceae	<i>Lomandra obliqua</i>	-
Proteaceae	<i>Lomatia silaifolia</i>	Crinkle Bush
Poaceae	<i>Megathyrsus maximus</i> *	-
Myrtaceae	<i>Melaleuca linariifolia</i>	Flax-leaved Paperbark
Myrtaceae	<i>Melaleuca nodosa</i>	-
Meliaceae	<i>Melia azedarach</i>	White Cedar
Picrodendraceae	<i>Micrantheum ericoides</i>	-
Poaceae	<i>Microlaena stipoides</i>	Weeping Grass
Malvaceae	<i>Modiola caroliniana</i> *	Red-flowered Mallow
Ericaceae	<i>Monotoca scoparia</i>	Prickly Broom Heath
Oleaceae	<i>Notelaea longifolia f. longifolia</i>	-

Family	Scientific Name	Common Name
Ochnaceae	<i>Ochna serrulata</i> *	Mickey Mouse Plant
Rubiaceae	<i>Opercularia</i> spp.	-
Oxalidaceae	<i>Oxalis corniculata</i> *	Creeping Oxalis
Oxalidaceae	<i>Oxalis perennans</i>	-
Asteraceae	<i>Ozothamnus diosmifolius</i>	White Dogwood
Caryophyllaceae	<i>Paronychia brasiliensis</i> *	Chilean Whitlow Wort, Brazilian Whitlow
Poaceae	<i>Paspalum dilatatum</i> *	Paspalum
Poaceae	<i>Paspalum distichum</i>	Water Couch
Poaceae	<i>Paspalum urvillei</i> *	Vasey Grass
Malvaceae	<i>Pavonia hastata</i> *	-
Proteaceae	<i>Persoonia linearis</i>	Narrow-leaved Geebung
Rutaceae	<i>Philotheca myoporoides</i>	Long-leaf Wax Flower
Phyllanthaceae	<i>Phyllanthus hirtellus</i>	Thyme Spurge
Thymelaeaceae	<i>Pimelea linifolia</i>	Slender Rice Flower
Plantaginaceae	<i>Plantago lanceolata</i> *	Lamb's Tongues
Poaceae	<i>Poa annua</i>	Winter Grass
Araliaceae	<i>Polyscias sambucifolia</i>	Elderberry Panax
Rubiaceae	<i>Pomax umbellata</i>	Pomax
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken
Fabaceae (Faboideae)	<i>Pultenaea</i> spp.	Tufted Bush-pea
Rubiaceae	<i>Richardia humistrata</i> *	-
Rubiaceae	<i>Richardia stellaris</i> *	-
Euphorbiaceae	<i>Ricinocarpos pinifolius</i>	Wedding Bush
Euphorbiaceae	<i>Ricinus communis</i> *	Castor Oil Plant
Rosaceae	<i>Rubus anglocandicans</i> *	Blackberry
Poaceae	<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass
Asteraceae	<i>Senecio madagascariensis</i> *	Fireweed
Poaceae	<i>Setaria parviflora</i>	-
Poaceae	<i>Setaria sphacelata</i> *	South African Pigeon Grass
Malvaceae	<i>Sida rhombifolia</i> *	Paddy's Lucerne
Smilacaceae	<i>Smilax glyciphylla</i>	Sweet Sarsaparilla
Asteraceae	<i>Sonchus asper</i> *	Prickly Sowthistle
Asteraceae	<i>Sonchus oleraceus</i> *	Common Sowthistle
Poaceae	<i>Sporobolus africanus</i> *	Parramatta Grass
Ericaceae	<i>Styphelia laeta</i>	Five Corners
Arecaceae	<i>Syagrus romanzoffiana</i> *	Cocos Palm
Poaceae	<i>Themeda triandra</i>	-
Araliaceae	<i>Trachymene incisa</i> subsp. <i>incisa</i>	Wild Parsnip

Family	Scientific Name	Common Name
Anthericaceae	<i>Tricoryne simplex</i>	Yellow Rush Lily
Verbenaceae	<i>Verbena quadrangularis</i> *	-
Verbenaceae	<i>Verbena rigida</i> var. <i>rigida</i> *	Veined Verbena
Verbenaceae	<i>Verbena</i> spp.*	-
Fabaceae (Faboideae)	<i>Vicia</i> spp.*	Vetch
Xanthorrhoeaceae	<i>Xanthorrhoea media</i>	-
Apiaceae	<i>Xanthosia pilosa</i>	Woolly Xanthosia
Proteaceae	<i>Xylomelum pyriforme</i>	Woody Pear

* Indicates a non-native species

Appendix C: Observed Fauna Species List

O – Observed, W – Heard call, OW – Observed and Heard call, H – Hair, feathers or skin

Class Name	Scientific Name	Common Name	NSW Status	Comm Status	Surveyed Observations
Amphibia	<i>Crinia signifera</i>	Common Eastern Froglet	P		W
Aves	<i>Eolophus roseicapilla</i>	Galah	P		OW
Aves	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	P		OW
Aves	<i>Threskiornis moluccus</i>	Australian White Ibis	P		O
Aves	<i>Gymnorhina tibicen</i>	Australian Magpie	P		OW
Aves	<i>Manorina melanocephala</i>	Noisy Miner	P		OW
Aves	<i>Grallina cyanoleuca</i>	Magpie-lark	P		O
Aves	<i>Trichoglossus moluccanus</i>	Rainbow Lorikeet	P		O
Aves	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	P		O
Aves	<i>Cracticus torquatus</i>	Grey Butcherbird	P		O
Aves	<i>Rhipidura leucophrys</i>	Willie Wagtail	P		O
Aves	<i>Platycercus eximius</i>	Eastern Rosella	P		H
Aves	<i>Vanellus miles</i>	Masked Lapwing	P		OW
Aves	<i>Neochmia temporalis</i>	Red-browed Finch	P		W
Aves	<i>Anas superciliosa</i>	Pacific Black Duck	P		W
Mammalia	<i>Lepus europaeus*</i>	European Hare			O
Mammalia	<i>Rattus fuscipes</i>	Bush Rat	P		O
Mammalia	<i>Petaurus breviceps</i>	Sugar Glider	P		O
Mammalia	<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum	P		O
Mammalia	<i>Vespadelus spp</i>	Bat	V		W
Mammalia	<i>Myotis macropus</i>	Southern Myotis	V		W
Reptilia	<i>Amphibolurus muricatus</i>	Jacky Lizard	P		O
Reptilia	<i>Lampropholis guichenoti</i>	Flecked Garden Skink	P		O

* Indicates a non-native species

Appendix D: BAM Field Sheets

Plot no: 1 Job: Pleasure Point Job no: 3539 Date: 18.03.24 Observers: JS DK

Mapped Regional Vegetation community:

3619 & 3448

Upper stratum	Unknown (Comment)	C	Ab	Mid stratum	(Comment)	C	Ab	Lower stratum	Unknown (Comment)	C	Ab
Eucalyptus sclerophylla	scribbly	20	4					Banksia spinulosa	banksia spinulosa	0.1	3
Corymbia gummifera	gummifera	15	2					Richardia	richardia humistrata	2	100
								Entolasia stricta	entolasia stricta	0.5	25
								Lomandra obliqua	lomandra obliqua	3	50
								Trachymene incisa	geranium sp.	0.2	25
								Dianella revoluta	Dianella revoluta	0.1	10
								Xanthorrhoea media	Xanthorea sp.	0.1	5
								Axonopus fissifolius	axonopus fiss	10	100
								Setaria parviflora	setaria parv	1	20
								Eragrostis brownii	eragrostis brownii	2	15
								Aristida vagans	aristids vegans	3	40
								Andropogon	andropogon virginicus	1	30
								Goodenia hederacea	Goodenia hederacea	0.1	15
								Themeda triandra	themedra triandra	10	40
								Eragrostis curvula	eragrostis curvula	2	25
								Pimelea linifolia	pimelia linifolia	0.5	10
								Rytidosperma	rytidosperma ceas	5	50
								Lobelia andrewsii	lamiacea purple flower	0.1	5
								Hypochaeris glabra	hypochaeris glab	0.1	5
								Lomandra glauca	lomandra sp.	1	40
								Microleana	microleana stip	1	100
								Dillwynia	small epacrid bagged	0.1	1
								Phyllanthus hirtellus	phyllanthus hirt	1	5
								Poa annua	poa Anna	0.1	1
								Senecio	senecio	0.1	1
								Plantago lanceolata	plantago lanceolata	1	10
								Hovea lanceolata	hovea lanceolata	0.1	1
								Bossiaea ensata	Bossiaea ensata	0.2	2
								Micrantheum	micrantheum ericoides	0.1	1
								Acacia ulicifolia	Acacia ulicifolia	0.2	2
								Imperata cylindrica		35	1
								Acacia brownii	Acacia brownii	0.1	1
Total Cover		35				0				80.8	

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

Arrival time:	10.4		Departure time:	12	Weather:	22 mostly cloudy	TWO transect photos (one landscape, one portrait) taken	Done	Tansect GPS points taken	Done
Start	313,640	6239302	End	313,588	6239289	Zone:	56	Bearing:	240	
Tree Stem Size Class	Presence(TRUE)/Absence(F	Number	Count of	Leaf Litter Cover within 5 x 1m2 sub-plots						
< 5 cm	TRUE		1		Leaf	Live	Bare ground	Rocks	Other	Total
5 - 9 cm	FALSE			1	60	15	25	0	0	100
10 - 19 cm	FALSE			2	70	20	10	0	0	100
20 - 29 cm	TRUE		Length of logs	3	60	30	10	0	0	100
30 - 49cm	TRUE	2	0	4	60	10	30	0	0	100
50 -79cm	TRUE	2		5	40	20	40	0	0	100
>80cm	TRUE	1		Average	58	19	23	0	0	100
Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)										
A BAM plot was placed at this location to capture Scribbly gum dominant sandstone / ridge top vegetation with the site. This vegetation zone consists of scattered native trees, of which Scribbly gum and Corymbia gummifera are most common. Occasional Stringybarks are present (potentially capitellata). A number of larger trees are present, but lacks old growth vegetation and large hollows. Native re-growth is occuring under canopy, which grades into exotic dominant grassland. These areas are regularly slashed, inhibiting native re-growth										
Habitat features, comments and incidental fauna observations:										

Plot no: 2 Job: Pleasure Point Job no: 3539 Date: 18.03.24 Observers: JS DK

Mapped Regional Vegetation community:

3629

Upper stratum	Unknown (Comment)	C	Ab	Mid stratum	(Comment)	C	Ab	Lower stratum	(Comment)	C	Ab
Eucalyptus crebra	ironbark	15		Acacia binervia	silver wattle	5	2	Dianella revoluta	dianella rev	0.2	5
Eucalyptus punctata	punctata	25						Asparagus	asparagus	1	5
								Iomandra longifolia	lomandra	0.5	5
								Eragrostis curvula	eragrostis	5	50
								Hypochaeris	hypochaeris	0.2	10
								Syagrus	syagrus?	0.1	1
								Pimelea linifolia	Pimelia	1	5
								Acacia terminalis	acacia	0.1	2
								Kunzea ambigua	kunzia	0.1	1
								Grevillea speciosa	grevillia	0.1	3
								Ochna serrulata	ochnq	0.1	1
								Hyparrhenia hirta	hyporeania	40	
								Entolasia stricta	entolasia	1	20
								Poa annua	poa Anna	0.2	1
								Angophora bakeri	angophora	0.1	1
								Setaria sphacelata	setaria	2	25
								Lactuca serriola	lactuca	0.1	1
								Gonocarpus	gonocarpus	1	15
								Melia azedarach	frazinus	0.1	1
								Cynodon dactylon	cynodon	10	
								Lepidosperma	lepidosperma	1	5
								Dianella caerulea	dianella c	0.1	5
								Goodenia hederacea	goodenia sp	0.2	20
								Pomax umbellata	pomax	1	10
								Glycine tabacina	glycin	0.1	5
								Dillwynia retorta	dillwynia	0.1	1
								Acacia falcata	acacia falcata	0.1	1
								Tricoryne simplex	Linum sp.	0.1	1
								Centella asiatica	centella	2	50
								Ozothamnus	ozothamnus	0.2	1
								Styphelia laeta		0.1	1
Total Cover		40				5				67.9	

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

Arrival time:	12.3		Departure time:	1.07	Weather:	25 mostly cloudy	TWO transect photos (one landscape, one portrait) taken	Done	Tansect GPS points taken	Done
Start	313,265	6239874	End	313,311	6239893	Zone:	56	Bearing:	57	
Tree Stem Size Class	Presence(TRUE)/Absence(F	Number	Count of	Leaf Litter Cover within 5 x 1m2 sub-plots						
< 5 cm	TRUE		0		Leaf	Live	Bare ground	Rocks	Other	Total
5 - 9 cm	TRUE			1	90	10	0	0	0	100
10 - 19 cm	TRUE			2	80	20	0	0	0	100
20 - 29 cm	TRUE		Length of logs	3	20	60	20	0	0	100
30 - 49cm	TRUE	1	0	4	30	20	0	50	0	100
50 -79cm	TRUE	2		5	10	30	60	0	0	100
>80cm	TRUE	1		Average	46	28	16	10	0	100
Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)										
Disturbed portion of vegetation along fenceline. No scribbly gums within the vegetation zone, dominated by E. punctata & E. crebra.										
Habitat features, comments and incidental fauna observations:										

Plot no: 3 Job: Pleasure Point Job no: 3539 Date: 18.03.24 Observers: JS DK

Mapped Regional Vegetation community: 4059

Upper stratum	Unknown (Comment)	C	Ab	Mid stratum	(Comment)	C	Ab	Lower stratum	Unknown (Comment)		Ab
Eucalyptus punctata	punctata	15		Allocasuarina littoralis	allocas lit	2	5	Lomatia silaifolia	lomatia silaifolia	0.2	2
Corymbia gummifera	corymbia gunmifera	10		Persoonia linearis	persoonia	2	3	Pavonia hastata	Pavonia hastata	5	50
Melaleuca linariifolia	melaleuca linearifolia	3	2	Ceratopetalum	ceratopetalum	5	10	Pteridium esculentum	bracken	5	20
Eucalyptus sclerophylla	scribbly	5	1	Cinnamomum	cinnamomum	2	1	Schoenus melanostachys	thin rush Baumia	30	
Eucalyptus piperita	piperita	5	1	Xylomelum pyriforme	woody pair	0.2	1	Themeda triandra	themedra triandra	1	10
Eucalyptus resinifera	resinifera	10		Acacia terminalis	acacia	0.5	2	Imperata cylindrica	imperata cylindrica	5	200
								Lobelia purpurascens	lobelia purp	1	40
				Angophora bakeri	bakeri	10		Syagrus romanzoffiana	syagrus	0.1	1
				Leptospermum	leptospermum	10		Lomandra obliqua	lomandra obliqua	0.1	5
								Commelina cyanea	commelina cyanea	0.5	10
								Dianella revoluta	revoluta dianella	0.2	1
								Acacia longifolia	acacia longifolia	1	2
								Lepidosperma laterale	lepidosperma laterale	0.5	15
								Pultanea spp.	pultanea sp.	0.1	1
								Phyllanthus hirtellus	phyllanthus hirt	2	20
								Smilax glycyphylla	smilax sp.	2	15
								Polyscias sambucifolia	polyscias sambucifolia	0.1	1
								Actinotus helianthi	actinotus helianthi	1	5
								Entolasia stricta	entolasia stricta	5	50
								Bossiaea heterophylla	bossia heter	0.1	10
								Lomandra longifolia	lomandra longifolia	5	20
								Verbena quadrangularis	verbena quaf	0.5	10
								Paspalum distichum	paspalum dic	0.5	20
								Microlaena stipoides	microlena stip	3	80
								Hypochoeris radicata	hypochoeris radicata	0.1	5
								Rubus anglocandicans	rubus angocandicans	0.1	5
								Ageratina adenophora	crouton weed	2	50
								Cirsium vulgare	cirsium.vulgare	0.1	2
								Erythrina x sykesii	erythrina sykesii	0.1	5
								Oxalis perennans	oxalis pere	0.1	2
								Dianella caerulea	dianella c	0.2	10
								Conyza sumatrensis	comyza suma	0.2	5
								Philothea myoporoides	ptilothea sp.	0.1	2
								Entolasia marginata	entolasia marginata	1	10
								Paspalum urvillei	paspalum urvelii	1	10
								Billardiera scandens	billardiera scan	0.2	20
								Cassytha pubescens	Cassytha pubescens	0.1	20
								Ozothamnus diosmifolius		0.2	5
								Hibbertia spp.		0.1	1
								Lomandra gracilis		0.1	1
Total Cover		48				31.7				73.9	

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

Arrival time:	1.3		Departure time:	3	Weather:	Overcast, 24	TWO transect photos (one landscape, one portrait) taken	Done	Transect GPS points taken	Done
Start	313,461	6239550	End	313,479	6239596	Zone:	56	Bearing:	358	
Tree Stem Size Class	Presence(TRUE)/Absence(F	Number	Count of	Leaf Litter Cover within 5 x 1m2 sub-plots						
< 5 cm	TRUE		0		Leaf	Live	Bare ground	Rocks	Other	Total
5 - 9 cm	TRUE			1	70	30	0	0	0	100
10 - 19 cm	TRUE			2	65	25	10	0	0	100
20 - 29 cm	TRUE		Length of logs	3	70	30	0	0	0	100
30 - 49cm	TRUE	3	0	4	30	70	0	0	0	100
50 -79cm	TRUE	1		5	40	20	0	40	0	100
>80cm	FALSE	0		Average	55	35	2	8	0	100
Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)										
Bam plot 3 placed in landscape depression with more wetland species (melaleuca / Baumea / euc res). This are has been historically disturbed and has ecotonal components that were unable to be avoided. A section of blackberry is present at the ~40-50m part of the plot, which could not be transected in detail. Due to this, the 5th subplot was taken 8m of the centre line. Some standing pools of water present, crinia signifera heard calling (recorded on fulcrum). Weediness with the area.										
Habitat features, comments and incidental fauna observations:										

Plot no: 4 Job: Pleasure Point Job no: 3539 Date: 18.03.24 Observers: JS DK

Mapped Regional Vegetation community:

Not Classified

Upper stratum	Unknown (Comment)	C	Ab	Mid stratum	(Comment)	C	Ab	Lower stratum	(Comment)	C	Ab
Eucalyptus sclerophylla	scribbly	20		Melaleuca nodosa	nodosa	0.2	2	Hardenbergia	hard viol	0.1	1
Corymbia gummifera	gummifera	5	2	Acacia falcata	acacia falcata	0.1	1	Xanthorrhoea media	xanth sp.	0.1	1
				Acacia terminalis	acacia	0.1	1	Aristida vagans	aristida sp.	2	20
								Paspalum dilatatum	pasp dila	10	
								eragrostis curvula	erag curve	10	
								Dillwynia	pult thin	0.2	5
								Micrantheum	micranthum	0.5	5
								Billardiera scandens	billa scan	0.1	5
								Dianella revoluta	dianella revo	0.1	5
								Plantago lanceolata	Plantago	2	25
								Entolasia marginata	entolasia	1	25
								Entolasia stricta	entol stricta	1	25
								Monotoca scoparia	ericacea	0.2	5
								Cymbopogon	cymbopogon	0.1	5
								Sporobolus	sporob	1	10
								Cynodon dactylon	cynodon	15	
								Lomandra filiformis	lomandra fili	0.1	2
								Hypochaeris	hypochearis	1	5
								Ozothamnus		0.2	1
								Grona varians	grona varians	0.1	5
								Setaria parviflora	seta parv	0.2	15
								Poa annua	Poa annua	0.1	5
								Centaurium spp.	centaurium sp	0.1	2
								Hypochaeris glabra	hypochearis	0.2	5
								Paspalum distichum	paspalum dic	1	10
								Echinopogon ovatus	echinoogon	0.2	15
								Cyclosporum	cyclosporum	0.1	5
								Verbena	verbena sp.?	0.2	5
								Eragrostis brownii	eragrostis	15	
								Centella asiatica	centella	1	15
								Gamochaeta	gamocheata	0.1	5
								Lomandra cylindrica	thin lomandra	0.1	5
								Axonopus fissifolius	axonopus	0.2	5
								Hovea linearis	Hovea linearis	1	10
Total Cover		25				0.4				64.3	

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

Arrival time:	3.45		Departure time:	4.3	Weather:	24 mostly cloudy	TWO transect photos (one landscape, one portrait) taken	Done	Transect GPS points taken	Done
Start	312,995	6239713	End	312,965	6239753	Zone:	56	Bearing:	306	
Tree Stem Size Class	Presence(TRUE)/Absence(F	Number	Count of	Leaf Litter Cover within 5 x 1m2 sub-plots						
< 5 cm	TRUE		0		Leaf	Live	Bare ground	Rocks	Other	Total
5 - 9 cm	FALSE			1	15	85	0	0	0	100
10 - 19 cm	FALSE			2	30	5	65	0	0	100
20 - 29 cm	TRUE		Length of logs	3	70	15	0	0	15	100
30 - 49cm	TRUE	4	4	4	25	30	25	0	20	100
50 -79cm	TRUE	3		5	15	50	35	0	0	100
>80cm	FALSE	0		Average	31	37	25	0	7	100
Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)										
The 20x20 was offset fr the start line (approx 7m) to better encapsulate canopy vegetation. Due to the awkward spacing of trees, if the 20x20 plot was undertaken at the start of the transect, it will artificially deflate the cover scores. By using this method, there will be a higher canopy score which is more reflective of the vegetation zone. Compared to plot 1, this area has less trees and native understorey species. Leaf litter higher around the base of trees, as reflected in sub plot 8										
Habitat features, comments and incidental fauna observations:										

Plot no: 5 Job: Pleasure Point Job no: 3539 Date: 18.03.24 Observers: JS DK
 Mapped Regional Vegetation community: Not Classified

Upper stratum	Unknown (Comment)	C	Ab	Mid stratum	(Comment)	C	Ab	Lower stratum	(Comment)	C	Ab
								Paspalum dilatatum	paspalum dila	15	
								Cynodon dactylon	cynodon	15	
								Eragrostis curvula	eragrostis	20	
								setaria parviflora	setaria parv	5	80
								Plantago lanceolata	plantago lance	5	50
								Hypochaeris glabra	hypochaeris	5	50
								Andropogon	andropogon	1	10
								Verbena rigida var.	verbena rigid	0.2	15
								themeda triandra	themeda	0.2	20
								Eragrostis brownii	eragrostis	1	10
								Axonopus fissifolius	axonopis	2	50
								Hyparrhenia hirta	hypereania	15	
								Sporobolus	sporob	5	100
Total Cover		0				0				89.4	

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

Arrival time:	4.4		Departure time:	4.55	Weather:	24 mostly cloudy	TWO transect photos (one landscape, one portrait) taken	Done	Tansect GPS points taken	Done
Start	313,110	6239663	End	313,060	6239648	Zone:	56	Bearing:	238	
Tree Stem Size Class	Presence(TRUE)/Absence(F	Number	Count of	Leaf Litter Cover within 5 x 1m2 sub-plots						
< 5 cm	FALSE		0		Leaf	Live	Bare ground	Rocks	Other	Total
5 - 9 cm	FALSE			1	10	90	0	0	0	100
10 - 19 cm	FALSE			2	5	60	35	0	0	100
20 - 29 cm	FALSE		Length of logs	3	10	80	10	0	0	100
30 - 49cm	FALSE	0	0	4	10	50	40	0	0	100
50 -79cm	FALSE	0		5	20	80	0	0	0	100
>80cm	FALSE	0		Average	11	72	17	0	0	100
Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)										
Paddock area, regularly slashed, exotic grass dominant, limited habitat for native species.										
Habitat features, comments and incidental fauna observations:										

Plot no: 6 Job: Pleasure Point Job no: 3539 Date: 18.03.24 Observers: JS DK

Mapped Regional Vegetation community:

Not Classified

Upper stratum	Unknown (Comment)	C	Ab	Mid stratum	(Comment)	C	Ab	Lower stratum	(Comment)	C	Ab
								Richardia humistrata	Richardia	5	50
								Cynodon dactylon	cyno	10	
								Paspalum dilatatum	pasp dila	1	10
								Hypochoeris glabra	hypo glab	10	
								Chloris gayana	chlorisngayan	10	
								Hyparrhenia hirta	hyporeana	5	50
								Plantago lanceolata	plantago lance	5	20
								Eragrostis curvula	erag curv	20	
								Senecio	senecio mada	1	10
								Gamochoeta	gamocheat	1	15
								Eragrostis brownii	eragrostis	2	15
								Sporobolus	sporob	15	
								Kunzea ambigua	Kunzea	0.1	2
								Echinopogon ovatus	Echinopogon	1	10
								Axonopus fissifolius	axonopus	10	
Total Cover		0				0				96.1	

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

Arrival time:	5		Departure time:	5.3	Weather:	24 mostly cloudy	TWO transect photos (one landscape, one portrait) taken	Done	Transect GPS points taken	Done
Start	313,419	6239378	End	313,431	6239427	Zone:	56	Bearing:	0	
Tree Stem Size Class	Presence(TRUE)/Absence(F	Number	Count of	Leaf Litter Cover within 5 x 1m2 sub-plots						
< 5 cm	FALSE		0		Leaf	Live	Bare ground	Rocks	Other	Total
5 - 9 cm	FALSE			1	10	60	30	0	0	100
10 - 19 cm	FALSE			2	5	65	30	0	0	100
20 - 29 cm	FALSE		Length of logs	3	5	70	25	0	0	100
30 - 49cm	FALSE	0	0	4	10	90	0	0	0	100
50 -79cm	FALSE	0		5	20	60	20	0	0	100
>80cm	FALSE	0		Average	10	69	21	0	0	100
Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)										
Exotic dominant plot. Limited native vegetation.										
Habitat features, comments and incidental fauna observations:										

Plot no: 7 Job: Pleasure Point Job no: 3539 Date: 18.03.24 Observers: JS

Mapped Regional Vegetation community:

3629

Upper stratum	Unknown (Comment)	C	Ab	Mid stratum	(Comment)	C	Ab	Lower stratum	Unknown (Comment)	C	Ab
Angophora bakeri	bakeri	15		Glochidion ferdinandi	gloch ferd	3	1	Lomandra longifolia	lom long	2	5
Eucalyptus sclerophylla	scribbly	10		Allocasuarina littoralis	allocas sp.	10		Lomandra obliqua	lom oblique	2	40
Eucalyptus punctata	punctata	7		Leptospermum	lepto tri	5	5	Polyscias sambucifolia	polyscais Sam	0.5	2
				Kunzea ambigua	kunzea ambig	2	3	Entolasia marginata	entolasia marginata	0.5	20
								Lepidosperma laterale	lepido laterale	2	15
								Philotheca myoporoides	ptilotheca	0.5	2
								Entolasia stricta	entolasia stricta	3	30
								Lomandra cylindrica	thin lomandra	1	15
								Grevillea speciosa	grev spec	0.1	1
								Asparagus aethiopicus	asp eath	0.1	1
								Dillwynia retorta	thin spikey thing	0.1	2
								Opercularia spp.	opercularia sp.	0.2	5
								Acacia terminalis	acacia terminals	0.1	10
								Imperata cylindrica	imperata cylindrica	30	
								Goodenia hederacea	goodenia sp.	0.2	20
								Pimelea linifolia	pime line	0.1	10
								Hovea linearis	hovea sp.	0.1	1
								Micrantheum ericoides	micrantheum	0.5	50
								Poa annua	poa annual	0.1	1
								Phyllanthus hirtellus	phyllanthus hirt	0.2	15
								Monotoca scoparia	epacrid photos	0.2	2
								Pomax umbellata	pomax umbellata	0.5	5
								Cassytha pubescens	cassytha sp.	1	40
								Themeda triandra	themeda Australia	10	
								Xanthorrhoea media	Xanthorea	1	2
								Eragrostis curvula	eragrostis curvula	5	80
								Asplenium flabellifolium	asplenium long and thin	0.1	2
								Gonocarpus teucroides	gonocarpus teuc	0.5	10
								Cheilanthes sieberi	cheilanthes sieb	0.2	15
								Pavonia hastata	pavonia hastata	0.1	2
								Dianella revoluta	dianella revo	1	5
								Syagrus romanzoffiana	syagrus	0.1	1
								Microlaena stipoides	microleana stipodes	15	
Total Cover		32				20				78	

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

Arrival time:	10.3		Departure time:	12	Weather:	cloudy, humid	TWO transect photos (one landscape, one portrait) taken	Done	Transect GPS points taken	Done
Start	313,764	6239615	End	313,775	6239664	Zone:	56	Bearing:	13	
Tree Stem Size Class	Presence(TRUE)/Absence(F	Number	Count of	Leaf Litter Cover within 5 x 1m2 sub-plots						
< 5 cm	TRUE		0		Leaf	Live	Bare ground	Rocks	Other	Total
5 - 9 cm	TRUE			1	95	5	0	0	0	100
10 – 19 cm	TRUE			2	40	20	0	40	0	100
20 – 29 cm	TRUE		Length of logs	3	30	70	0	0	0	100
30 – 49cm	TRUE	3	10	4	95	5	0	0	0	100
50 -79cm	TRUE	1		5	30	70	0	0	0	100
>80cm	FALSE	0		Average	58	34	0	8	0	100
Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)										
Habitat features, comments and incidental fauna observations:										

Plot no: 8 Job: Pleasure Point Job no: 3539 Date: 18.03.24 Observers: JS

Mapped Regional Vegetation community:

4024

Upper stratum	Unknown (Comment)	C	Ab	Mid stratum	(Comment)	C	Ab	Lower stratum	(Comment)	C	Ab
Eucalyptus	eucalyptus baueriana	10		Acacia decurrens	acacia	5	1	Ehrharta erecta	ehrharter	10	
Eucalyptus crebra	crebra	15						Polyscias	polyscias	0.1	1
Eucalyptus moluccana	mollucana	5	1					Entolasia marginata	entolasia	1	5
Casuarina glauca	cas glauca	2	1					Entolasia stricta	entolasia	1	10
Angophora floribunda	angophora floribunda	3	1					Plantago lanceolata	plantago	5	100
Angophora bakeri	angophora bakeri	2	1					Cenchrus	kikuyu	10	1000
								Eragrostis curvula	eragristis	15	
								Paronychia	paronychia	2	50
								sonchus oleraceus	sonchus oler	1	5
								Sida rhombifolia	sida	1	5
								Dichondra repens	dichondra	5	1000
								Richardia humistrata	richardia	1	15
								Modiola caroliniana	modiola caro	0.2	15
								Cyperus gracilis	Cyprus	1	100
								Hypochaeris glabra	hypochaeris	0.2	10
								Einadia trigonos	einadia	0.1	5
								Asparagus	asparagus	1	5
								Glycine tabacina	glycine	0.1	5
								Microlaena stipoides	microlean	15	
								Oxalis corniculata	oxalis	0.1	5
								Richardia stellaris	richardia	0.1	15
								Cynodon dactylon	cynodon	20	
Total Cover		37				5				89.9	

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

Arrival time:	01:00		Departure time:	02:00	Weather:	cloudy, humid	TWO transect photos (one landscape, one portrait) taken	Done	Tansect GPS points taken	Done
Start	313,550	6239747	End	313,533	6239776	Zone:	56	Bearing:	330	
Tree Stem Size Class	Presence(TRUE)/Absence(F	Number	Count of	Leaf Litter Cover within 5 x 1m2 sub-plots						
< 5 cm	TRUE		0		Leaf	Live	Bare ground	Rocks	Other	Total
5 - 9 cm	FALSE			1	5	95	0	0	0	100
10 - 19 cm	TRUE			2	95	5	0	0	0	100
20 - 29 cm	TRUE		Length of logs	3	65	35	0	0	0	100
30 - 49cm	TRUE	2	0	4	5	95	0	0	0	100
50 -79cm	TRUE	3		5	10	90	0	0	0	100
>80cm	FALSE	0		Average	36	64	0	0	0	100
Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)										
Habitat features, comments and incidental fauna observations:										

Plot no: 9 Job: Pleasure Point Job no: 3539 Date: 25.07.24 Observers: JS BJ
Mapped Regional Vegetation community: 3619 & 3629

Upper stratum	Unknown (Comment)	C	Ab	Mid stratum	(Comment)	C	Ab	Lower stratum	(Comment)	C	Ab
acacia melanoxylon	acacia melanoxylon??	3	1	Cortaderia selloana	Pampas grass	3	3	pteridium	pteridium	60	200
Casuarina glauca	Casuarina glauca	5	1					eragrostis curvula	eragrostis	20	200
Eucalyptus sclerophylla	Eucalyptus sclerophylla	7	1					Anredera cordifolia	maideria vine	3	50
								Brassica fruticulosa	Brassica	2	25
								Megathyrus	megathyrus	2	50
								acetosa sagittata	acetosa	5	200
								daucus carota	daucus carota	0.1	20
								Cirsium vulgare	cirsium.vulgar	0.5	25
								Senecio	sene mada	1	25
								Sonchus asper	sonchus	0.2	20
								Sonchus oleraceus	sonchus oler	0.2	20
								Lomandra longifolia	lom long	0.3	5
								Ageratina	agertina	0.1	20
								Paspalum dilatatum	paspalum	0.1	5
								Xanthosia pilosa	xanthosia	0.1	10
								Ricinocarpos	rutacea thing	0.1	1
								Notelaea longifolia	notelea	0.2	2
								Conyza sumatrensis	conyza suma	0.1	50
								Commelina cyanea	commelina	0.1	5
								vicia spp.	vicia sp.	0.1	10
								Bidens pilosa	bidens pilosa	0.1	2
								Imperata cylindrica	imperata	1	50
								Juncus usitatus	juncus	0.1	5
								cynodon dactylon	cynodon	0.2	50
								Araujia sericifera	moth vine	0.1	5
								Cenchrus	cenc clan	5	80
								Verbena spp.	verbena sp.	0.1	0.1
								Axonopus fissifolius	axonopis	0.3	20
								Plantago lanceolata	plantago	0.2	20
								Ricinus communis	ricinus	0.1	10
								Rubus	rubus	0.2	5
								Pimelea linifolia	pimelia linifolia	0.1	5
Total Cover		15				3				102.7	

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

Arrival time:	00:00		Departure time:	00:00	Weather:	Cool, cloudy	TWO transect photos (one landscape, one portrait) taken		Done	Transect GPS points taken	Done
Start	313,509	6239507	End	313,473	6239540	Zone:		56	Bearing:	46	
Tree Stem Size Class	Presence(TRUE)/Absence(F	Number	Count of	Leaf Litter Cover within 5 x 1m2 sub-plots							
< 5 cm	TRUE		0		Leaf	Live	Bare ground	Rocks	Other	Total	
5 - 9 cm	TRUE			1	75	25	0	0	0	100	
10 - 19 cm	TRUE			2	80	15	0	5	0	100	
20 - 29 cm	TRUE		Length of logs	3	80	20	0	0	0	100	
30 - 49cm	TRUE	1	0.5	4	80	15	0	5	0	100	
50 -79cm	FALSE	0		5	85	15	0	0	0	100	
>80cm	FALSE	0		Average	80	18	0	2	0	100	
Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)											
This bam plot was positioned to capture the lower quality vegetation commensurate with 4059.											
Habitat features, comments and incidental fauna observations:											
Rock out crops, termite mounds											

Scientific Name	Common Name	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9
<i>Acacia binervia</i>	Coast Myall		5							
<i>Acacia brownii</i>	Heath Wattle	0.1								
<i>Acacia decurrens</i>	Black Wattle								5	
<i>Acacia falcata</i>			0.1		0.1					
<i>Acacia hispidula</i>										
<i>Acacia longifolia</i>				1						
<i>Acacia melanoxylon</i>	Blackwood									3
<i>Acacia myrtifolia</i>	Red-stemmed Wattle									
<i>Acacia terminalis</i>	Sunshine Wattle		0.1	0.5	0.1			0.1		
<i>Acacia ulicifolia</i>	Prickly Moses	0.2								
<i>Acetosa sagittata</i>	Rambling Dock									5
<i>Actinotus helianthi</i>	Flannel Flower			1						
<i>Ageratina adenophora</i>	Crofton Weed			2						0.1
<i>Allocasuarina littoralis</i>	Black She-Oak			2				10		
<i>Andropogon virginicus</i>	Whisky Grass	1				1				
<i>Angophora bakeri</i>	Narrow-leaved Apple		0.1	10				15	2	
<i>Angophora costata</i>	Sydney Red Gum									
<i>Angophora floribunda</i>	Rough-barked Apple								3	
<i>Anredera cordifolia</i>	Madeira Vine									3
<i>Araujia sericifera</i>	Moth Vine									0.1
<i>Aristida vagans</i>	Threeawn Speargrass	3			2					
<i>Asparagus aethiopicus</i>	Asparagus Fern		1					0.1		
<i>Asparagus asparagoides</i>	Bridal Creeper								1	
<i>Asplenium flabellifolium</i>	Necklace Fern							0.1		
<i>Axonopus fissifolius</i>	Narrow-leaved Carpet Grass	10			0.2	2	10			0.3
<i>Banksia spinulosa</i>	Hairpin Banksia	0.1								
<i>Bidens pilosa</i>	Cobbler's Pegs									0.1
<i>Billardiera scandens</i>	Hairy Apple Berry			0.2	0.1					
<i>Bossiaea ensata</i>	Sword Bossiaea	0.2								
<i>Bossiaea heterophylla</i>	Variable Bossiaea			0.1						
<i>Brassica fruticulosa</i>	Twiggy Turnip									2
<i>Cassytha pubescens</i>	Downy Dodder-laurel			0.1				1		
<i>Casuarina glauca</i>	Swamp Oak								2	5
<i>Cenchrus clandestinus</i>	Kikuyu Grass								10	5
<i>Centaurium spp.</i>					0.1					
<i>Centella asiatica</i>	Indian Pennywort		2		1					
<i>Ceratopetalum gummiferum</i>	Christmas Bush			5						
<i>Cheilanthes sieberi</i>	Rock Fern							0.2		
<i>Chloris gayana</i>	Rhodes Grass						10			
<i>Cinnamomum camphora</i>	Camphor Laurel			2						
<i>Cirsium vulgare</i>	Spear Thistle			0.1						0.5
<i>Commelina cyanea</i>				0.5						0.1
<i>Conyza sumatrensis</i>	Tall fleabane			0.2						0.1
<i>Cortaderia selloana</i>	Pampas Grass									3
<i>Corymbia gummifera</i>	Red Bloodwood	15		10	5					
<i>Cyclopermum leptophyllum</i>	Slender Celery				0.1					
<i>Cymbopogon refractus</i>	Barbed Wire Grass				0.1					
<i>Cynodon dactylon</i>	Common Couch		10		15	15	10		20	0.2
<i>Cyperus gracilis</i>	Slender Flat-sedge								1	
<i>Daucus carota</i>	Wild Carrot									0.1
<i>Dianella caerulea</i>	Blue Flax-lily		0.1	0.2						
<i>Dianella revoluta</i>	Blueberry Lily	0.1	0.2	0.2	0.1			1		
<i>Dichondra repens</i>	Kidney Weed								5	
<i>Dillwynia floribunda</i>										
<i>Dillwynia phyllicoides</i>	Parrot-pea	0.1			0.2					
<i>Dillwynia retorta</i>			0.1					0.1		
<i>Dodonaea triquetra</i>	Large-leaf Hop-bush									
<i>Echinopogon ovatus</i>	Forest Hedgehog Grass				0.2		1			
<i>Ehrharta erecta</i>	Panic Veldtgrass								10	
<i>Einadia trigonos</i>	Fishweed								0.1	
<i>Entolasia marginata</i>	Bordered Panic			1	1			0.5	1	
<i>Entolasia stricta</i>	Wiry Panic	0.5	1	5	1			3	1	
<i>Eragrostis brownii</i>	Brown's Lovegrass	2			15	1	2			
<i>Eragrostis curvula</i>	African Lovegrass	2	5		10	20	20	5	15	20
<i>Erythrina x sykesii</i>	Coral tree			0.1						
<i>Eucalyptus baueriana</i>	Blue Box								10	
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark		15						15	

<i>Eucalyptus globoidea</i>	White Stringybark									
<i>Eucalyptus moluccana</i>	Grey Box								5	
<i>Eucalyptus piperita</i>	Sydney Peppermint			5						
<i>Eucalyptus punctata</i>	Grey Gum		25	15				7		
<i>Eucalyptus resinifera</i>	Red Mahogany			10						
<i>Eucalyptus sclerophylla</i>	Hard-leaved Scribbly Gum	20		5	20			10		7
<i>Gamochaeta coarctata</i>					0.1		1			
<i>Glochidion ferdinandi</i>	Cheese Tree							3		
<i>Glycine tabacina</i>	Variable Glycine		0.1						0.1	
<i>Gonocarpus tetragynus</i>	Poverty Raspwort		1							
<i>Gonocarpus teucroides</i>	Germander Raspwort							0.5		
<i>Goodenia hederacea</i>	Ivy Goodenia	0.1	0.2					0.2		
<i>Grevillea sericea</i>	Pink Spider Flower									
<i>Grevillea speciosa</i>	Red Spider Flower		0.1					0.1		
<i>Grona varians</i>					0.1					
<i>Hakea sericea</i>	Needlebush									
<i>Hardenbergia violacea</i>	False Sarsaparilla				0.1					
<i>Hibbertia</i> spp.				0.1						
<i>Hovea lanceolata</i>		0.1								
<i>Hovea linearis</i>					1			0.1		
<i>Hyparrhenia hirta</i>	Coolatai Grass		40			15	5			
<i>Hypochaeris glabra</i>	Smooth Catsear	0.1			0.2	5	10		0.2	
<i>Hypochaeris radicata</i>	Catsear		0.2	0.1	1					
<i>Imperata cylindrica</i>	Blady Grass	35		5				30		1
<i>Juncus</i> spp.				30						
<i>Juncus usitatus</i>										0.1
<i>Kunzea ambigua</i>	Tick Bush		0.1				0.1	2		
<i>Lactuca serriola</i>	Prickly Lettuce		0.1							
<i>Lepidosperma laterale</i>	Variable Sword-sedge		1	0.5				2		
<i>Leptospermum polygalifolium</i>	Tantoon			10						
<i>Leptospermum squarrosus</i>										
<i>Leptospermum trinervium</i>	Slender Tea-tree							5		
<i>Lissanthe strigosa</i>	Peach Heath									
<i>Lobelia andrewsii</i>	Trailing Lobelia	0.1								
<i>Lobelia purpurascens</i>	whiteroot			1						
<i>Lomandra cylindrica</i>					0.1			1		
<i>Lomandra filiformis</i> subsp. <i>coriacea</i>	Wattle Matt-rush				0.1					
<i>Lomandra glauca</i>	Pale Mat-rush	1								
<i>Lomandra gracilis</i>				0.1						
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush		0.5	5				2		0.3
<i>Lomandra obliqua</i>		3		0.1				2		
<i>Lomatia silaifolia</i>	Crinkle Bush			0.2						
<i>Megathyrsus maximus</i>										2
<i>Melaleuca linariifolia</i>	Flax-leaved Paperbark			3						
<i>Melaleuca nodosa</i>					0.2					
<i>Melia azedarach</i>	White Cedar		0.1							
<i>Micranthemum ericoides</i>		0.1			0.5			0.5		
<i>Microlaena stipoides</i>	Weeping Grass	1		3				15	15	
<i>Modiola caroliniana</i>	Red-flowered Mallow								0.2	
<i>Monotoca scoparia</i>					0.2			0.2		
<i>Notelaea longifolia</i> f. <i>longifolia</i>										0.2
<i>Ochna serrulata</i>	Mickey Mouse Plant		0.1							
<i>Opercularia</i> spp.								0.2		
<i>Oxalis corniculata</i>	Creeping Oxalis								0.1	
<i>Oxalis perennans</i>				0.1						
<i>Ozothamnus diosmifolius</i>	White Dogwood		0.2	0.2	0.2					
<i>Paronychia brasiliensis</i>	Chilean Whitlow Wort, Brazilian V								2	
<i>Paspalum dilatatum</i>	Paspalum				10	15	1			0.1
<i>Paspalum distichum</i>	Water Couch			0.5	1					
<i>Paspalum urvillei</i>	Vasey Grass			1						
<i>Pavonia hastata</i>				5				0.1		
<i>Persoonia linearis</i>	Narrow-leaved Geebung			2						
<i>Philotheca myoporoides</i>	Long-leaf Wax Flower			0.1				0.5		
<i>Phyllanthus hirtellus</i>	Thyme Spurge	1		2				0.2		
<i>Pimelea linifolia</i>	Slender Rice Flower	0.5	1					0.1		0.1
<i>Plantago lanceolata</i>	Lamb's Tongues	1			2	5	5		5	0.2
<i>Poa annua</i>	Winter Grass	0.1	0.2		0.1			0.1		
<i>Polyscias sambucifolia</i>	Elderberry Panax			0.1				0.5	0.1	
<i>Pomax umbellata</i>	Pomax		1					0.5		
<i>Pteridium esculentum</i>	Bracken			5						60

<i>Pultenaea</i> spp.				0.1						
<i>Richardia humistrata</i>		2					5		1	
<i>Richardia stellaris</i>									0.1	
<i>Ricinocarpus pinifolius</i>	Wedding Bush									0.1
<i>Ricinus communis</i>	Castor Oil Plant									0.1
<i>Rubus anglocandicans</i>	Blackberry			0.1						0.2
<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass	5								
<i>Senecio madagascariensis</i>	Fireweed	0.1					1			1
<i>Setaria parviflora</i>		1			0.2	5				
<i>Setaria sphacelata</i>	South African Pigeon Grass		2							
<i>Sida rhombifolia</i>	Paddy's Lucerne								1	
<i>Smilax glycyphylla</i>	Sweet Sarsparilla			2						
<i>Sonchus asper</i>	Prickly Sowthistle									0.2
<i>Sonchus oleraceus</i>	Common Sowthistle								1	0.2
<i>Sporobolus africanus</i>	Parramatta Grass				1	5	15			
<i>Styphelia laeta</i>			0.1							
<i>Syagrus romanzoffiana</i>	Cocos Palm		0.1	0.1				0.1		
<i>Themeda triandra</i>		10		1		0.2		10		
<i>Trachymene incisa</i> subsp. <i>incisa</i>		0.2								
<i>Tricoryne simplex</i>			0.1							
<i>Verbena quadrangularis</i>				0.5	0.2					
<i>Verbena rigida</i> var. <i>rigida</i>	Veined Verbena					0.2				
<i>Verbena</i> spp.										0.1
<i>Vicia</i> spp.	Vetch									0.1
<i>Xanthorrhoea media</i>		0.1			0.1			1		
<i>Xanthosia pilosa</i>	Woolly Xanthosia									0.1
<i>Xylomelum pyriforme</i>	Woody Pear			0.2						

Appendix E: Biodiversity Credit Report



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00047545/BAAS23016/24/00047546	Pleasure Point BDAR Residential Subdivision	28/10/2024
Assessor Name	Assessor Number	BAM Data version *
Joelan Sawyer	BAAS23016	Current classification (live - default) (80)
Proponent Names	Report Created	BAM Case Status
	14/04/2025	Finalised
Assessment Revision	BOS entry trigger	Assessment Type
3	BOS Threshold: Area clearing threshold	Part 4 Developments (General)
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.	
14/04/2025		

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
00047545/BAAS23016/24/00047546	Pleasure Point BDAR Residential Subdivision



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
3619-Sydney Hinterland Enriched Sandstone Bloodwood Forest	Not a TEC	3.0	37	20	57
3616-Sydney Hinterland Grey Gum Transition Forest	Not a TEC	0.6	0	16	16
4059-Sydney Hinterland Sandy Creekflat Shrub Forest	Not a TEC	0.3	0	11	11
4024-Cumberland Blue Box Riverflat Forest	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.2	0	2	2



BAM Biodiversity Credit Report (Like for like)

3616-Sydney Hinterland Grey Gum Transition Forest	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Sydney Hinterland Dry Sclerophyll Forests This includes PCT's: 621, 3609, 3616	Sydney Hinterland Dry Sclerophyll Forests >=50% and <70%	3616_Moderate	No	16	Sydney Cataract, Burragorang, Cumberland, Illawarra, Moss Vale and Pittwater. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
3619-Sydney Hinterland Enriched Sandstone Bloodwood Forest	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region

BAM Biodiversity Credit Report (Like for like)

	Sydney Hinterland Dry Sclerophyll Forests This includes PCT's: 612, 621, 624, 1614, 1631, 1666, 1667, 3599, 3600, 3601, 3602, 3603, 3604, 3605, 3606, 3607, 3608, 3609, 3610, 3611, 3612, 3613, 3614, 3615, 3616, 3617, 3618, 3619, 3620, 3621, 3622, 3623, 3625, 3626, 3627	Sydney Hinterland Dry Sclerophyll Forests <50%	3619_Moderate	Yes	37	Sydney Cataract, Burragorang, Cumberland, Illawarra, Moss Vale and Pittwater. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Sydney Hinterland Dry Sclerophyll Forests This includes PCT's: 612, 621, 624, 1614, 1631, 1666, 1667, 3599, 3600, 3601, 3602, 3603, 3604, 3605, 3606, 3607, 3608, 3609, 3610, 3611, 3612, 3613, 3614, 3615, 3616, 3617, 3618, 3619, 3620, 3621, 3622, 3623, 3625, 3626, 3627	Sydney Hinterland Dry Sclerophyll Forests <50%	3619_Poor	No	20	Sydney Cataract, Burragorang, Cumberland, Illawarra, Moss Vale and Pittwater. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

4024-Cumberland Blue Box Riverflat Forest	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 3145, 3181, 3185, 3188, 3192, 3258, 3328, 4024, 4025, 4039, 4041, 4058, 4138	-	4024_Degraded	No	2	Sydney Cataract, Burragorang, Cumberland, Illawarra, Moss Vale and Pittwater. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
4059-Sydney Hinterland Sandy Creekflat Shrub Forest	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region

BAM Biodiversity Credit Report (Like for like)

	Coastal Floodplain Wetlands This includes PCT's: 4024, 4029, 4034, 4055, 4059	Coastal Floodplain Wetlands >=90%	4059_Good	No	8	Sydney Cataract, Burragorang, Cumberland, Illawarra, Moss Vale and Pittwater. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Coastal Floodplain Wetlands This includes PCT's: 4024, 4029, 4034, 4055, 4059	Coastal Floodplain Wetlands >=90%	4059_Degraded	No	3	Sydney Cataract, Burragorang, Cumberland, Illawarra, Moss Vale and Pittwater. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Myotis macropus / Southern Myotis	3619_Moderate, 3616_Moderate, 4059_Good, 3619_Poor, 4024_Degraded	0.9	27.00

Credit Retirement Options

Like-for-like credit retirement options



BAM Biodiversity Credit Report (Like for like)

Myotis macropus / Southern Myotis	Spp	IBRA subregion
	Myotis macropus / Southern Myotis	Any in NSW

Appendix F: Other Legislation

BC Act TEC Assessment

PCT 4024 Assessment of Association with EEC: River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

Characteristics	Assessment of Vegetation Community – Subject Site
Definition of EEC: <i>River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions</i> is the name given to the ecological community associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. Floodplains are level landform patterns on which there may be active erosion and aggradation by channelled and overbank stream flow with an average recurrence interval of 100 years or less. It generally occurs below 50 m elevation, but may occur on localised river flats up to 250 m above sea level in the NSW North Coast, Sydney Basin and South East Corner bioregions. The structure of the community may vary from tall open forests to woodlands, although partial clearing may have reduced the canopy to scattered trees. Typically, these forests and woodlands form mosaics with other floodplain forest communities and treeless wetlands, and often they fringe treeless floodplain lagoons or wetlands with semi-permanent standing water. The composition is primarily determined by the frequency and duration of waterlogging and the texture, nutrient and moisture content of the soil. Composition also varies with latitude.	Subject PCT is a tall open forest, located at an elevation <50m within the riparian corridor of the Georges River and associated tributary. Subject PCT meets Characteristic.
EEC specific assemblage of species: <i>Acacia floribunda</i> <i>Acacia parramattensis</i> <i>Acmena smithii</i> <i>Adiantum aethiopicum</i> <i>Angophora floribunda</i> <i>Angophora subvelutina</i> <i>Austrostipa ramosissima</i> <i>Backhousia myrtifolia</i> <i>Breynia oblongifolia</i> <i>Bursaria spinosa</i> <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> <i>Casuarina glauca</i> <i>Cayratia clematidea</i> <i>Centella asiatica</i> <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> <i>Clematis aristata</i> <i>Clematis glycinoides</i> <i>Commelina cyanea</i> <i>Cymbopogon refractus</i> <i>Galium propinquum</i> <i>Geitonoplesium cymosum</i> <i>Geranium solanderi</i> <i>Glycine clandestina</i> <i>Glycine microphylla</i> <i>Glycine tabacina</i> <i>Hardenbergia violacea</i> <i>Hydrocotyle peduncularis</i> <i>Hymenanthera dentata</i> <i>Hypolepis muelleri</i> <i>Imperata cylindrica</i> var. <i>major</i> <i>Livistona australis</i> <i>Lomandra filiformis</i> <i>Lomandra longifolia</i> <i>Lomandra multiflora</i> subsp. <i>multiflora</i> <i>Melaleuca decora</i> <i>Melaleuca linariifolia</i> <i>Melaleuca styphelioides</i> <i>Melia azedarach</i> <i>Microlaena stipoides</i> var. <i>stipoides</i>	Upper stratum present: <i>Angophora floribunda</i> <i>Casuarina glauca</i> <i>Eucalyptus baueriana</i> <i>Eucalyptus moluccana</i> Mid stratum present: Ground stratum present: <i>Dichondra repens</i> <i>Einadia trigonos</i> <i>Entolasia stricta</i> <i>Glycine tabacina</i> <i>Microlaena stipoides</i> var. <i>stipoides</i> Subject PCT meets Characteristic.

Characteristics	Assessment of Vegetation Community – Subject Site
<i>Desmodium varians</i> <i>Dichelachne micrantha</i> <i>Dichondra repens</i> <i>Digitaria parviflora</i> <i>Doodia aspera</i> <i>Echinopogon caespitosus</i> var. <i>caespitosus</i> <i>Echinopogon ovatus</i> <i>Einadia hastata</i> <i>Einadia trigonos</i> <i>Entolasia marginata</i> <i>Entolasia stricta</i> <i>Eragrostis leptostachya</i> <i>Eucalyptus amplifolia</i> <i>Eucalyptus baueriana</i> <i>Eucalyptus benthamii</i> <i>Eucalyptus botryoides</i> <i>Eucalyptus elata</i> <i>Eucalyptus grandis</i> <i>Eucalyptus longifolia</i> <i>Eucalyptus moluccana</i> <i>Eucalyptus ovata</i> <i>Eucalyptus saligna</i> <i>Eucalyptus tereticornis</i> <i>Eucalyptus viminalis</i> <i>Euchiton sphaericus</i> <i>Eustrephus latifolius</i> <i>Opercularia diphylla</i> <i>Oplismenus aemulus</i> <i>Oxalis perennans</i> <i>Ozothamnus diosmifolius</i> <i>Pandorea pandorana</i> <i>Paspalidium distans</i> <i>Persicaria decipiens</i> <i>Phyllanthus gunnii</i> <i>Plectranthus parviflorus</i> <i>Poranthera microphylla</i> <i>Pratia purpurascens</i> <i>Pteridium esculentum</i> <i>Rubus parvifolius</i> <i>Sigesbeckia orientalis</i> subsp. <i>orientalis</i> <i>Solanum prinophyllum</i> <i>Stephania japonica</i> var. <i>discolor</i> <i>Themeda australis</i> <i>Trema aspera</i> <i>Tristaniopsis laurina</i> <i>Vernonia cinerea</i> <i>Veronica plebeia</i> <i>Viola hederacea</i> <i>Wahlenbergia gracilis</i>	
Local Government Area Distribution: This EEC is known from parts of the Local Government Areas of Port Stephens, Maitland, Singleton, Cessnock, Lake Macquarie, Wyong, Gosford, Hawkesbury, Baulkham Hills, Blacktown, Parramatta, Penrith, Blue Mountains, Fairfield, Holroyd, Liverpool, Bankstown, Wollondilly, Camden, Campbelltown, Sutherland, Wollongong, Shellharbour, Kiama, Shoalhaven, Eastern Capital City Regional, Eurobodalla and Bega Valley but may occur elsewhere in these bioregions. Major examples once occurred on the floodplains of the Hunter, Hawkesbury, Moruya, Bega and Towamba Rivers, although many smaller floodplains and river flats also contain examples of the community. Small areas of <i>River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions</i> are contained within existing conservation reserves, including Blue Mountains, Cattai, Dharug, Georges River, Marramarra, Morton, Deua and Wadbilliga National Parks, and Gulguer and Mulgoa Nature Reserves, and these are unevenly distributed throughout the range and unlikely to represent the full diversity of the community. The reserved examples are on localised, sheltered river flats between hills, rather than the large open floodplains that comprised the majority of the original habitat.	Subject PCT is located within Liverpool LGA. Subject PCT meets Characteristic.

Characteristics	Assessment of Vegetation Community – Subject Site
<i>River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions</i> includes and replaces <i>Sydney Coastal River-Flat Forest Endangered Ecological Community</i>. <i>River-Flat Eucalypt Forest on Coastal Floodplains</i> may adjoin or intergrade with several other endangered ecological communities, which collectively cover all remaining native vegetation on the coastal floodplains of New South Wales. These include: • <i>Lowland Rainforest on Floodplain in the NSW North Coast bioregion</i>; • <i>Subtropical Floodplain Forest of the NSW North Coast bioregion</i>; • <i>Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions</i> (including the formerly listed <i>Sydney Coastal Estuary Swamp Forest in the Sydney Basin bioregion</i>); • <i>Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions</i>; and • <i>Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions</i>. For example, northwards from the Hunter valley, <i>River-Flat Eucalypt Forest on Coastal Floodplains</i> may intergrade with, or be replaced by, <i>Subtropical Floodplain Forest of the NSW North Coast bioregion</i>. As soil salinity increases, <i>River-Flat Eucalypt Forest</i> may adjoin or intergrade with <i>Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions</i>. The boundaries between all of these communities are dynamic and may shift in response to changes in hydrological regimes, fire regimes or land management practices. The Determinations for these communities collectively encompass the full range of intermediate assemblages in transitional habitats.	Subject PCT has been assessed as <i>River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions</i> and as such this characteristic does not apply.
Is the PCT associated with this EEC (Yes or No)?	Yes
Is the PCT EPBC listed under a different CEEC or EEC name (Yes or No)?	Yes
Detailed Justification of Assessment: The subject PCT meets the geographic, topographic and species composition characteristics for this TEC and as such is considered commensurate with the BC Act Listed EEC.	

Assessment of the Subject PCTs association with the BC Act Listed TEC identified that the Subject PCT is representative of EEC- *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*.

EPBC Act Assessment

A Protected Matters Search of an area of 5km radius of the Study Area was conducted in April 2025 for Matters of National Environmental Significance as relevant to the Environment Protection & Biodiversity Conservation Act 1999 (EPBC Act). The following Matters of National Significance are considered in this assessment.

World Heritage Properties:

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

National Heritage Places:

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

Wetlands of International Significance (declared Ramsar wetlands):

The site is within the buffer area of the Towra Point Nature Reserve.

Great Barrier Reef Marine Park:

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

Commonwealth Marine Areas:

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

Threatened Ecological Communities:

From a search of the EPBC Act Protected Matters website (11/04/2025), 12 listed Threatened Ecological Communities (TECs) were considered likely to occur within a 5km radius of the Study Area.

Six (6) Critically Endangered Ecological Communities (CEEC);

- *Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion;*
- *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest;*
- *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria;*
- *Shale Sandstone Transition Forest of the Sydney Basin Bioregion;*
- *Turpentine-Ironbark Forest of the Sydney Basin Bioregion; and,*
- *Western Sydney Dry Rainforest and Moist Woodland on Shale.*

Five (5) Endangered Ecological Communities (EEC);

- *Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion;*
- *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community;*
- *Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland;*
- *Coastal Upland Swamps in the Sydney Basin Bioregion; and,*
- *Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion.*

One (1) Vulnerable Ecological Community (VEC);

- *Subtropical and Temperate Coastal Saltmarsh.*

Ground truthing of vegetation within the Study Area identified PCT 4024 - *Sydney Hinterland Sandy Creekflat Shrub Forest*, which is associated with the EPBC Act listed CEEC: *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria*. An assessment against the key diagnostic features and conditions thresholds, as set out in the listing advice, is undertaken below.

Key Diagnostic Characteristics

Diagnostic characteristics	Comment
<i>Occurs in the South East Corner and Sydney Basin IBRA Bioregions, in eastern Victoria and south eastern New South Wales.</i>	Subject PCT is located within the Sydney Basin Bioregion. Subject PCT Meets Characteristic.
<i>Occurs within catchments of the eastern and southern watershed of the Great Dividing Range.</i>	Subject PCT occurs within the catchment of the eastern watershed of the Great Dividing Range. Subject PCT Meets Characteristic.
<i>Occurs at elevations up to 250 metres above sea-level (ASL), but most typically below 50 metres ASL.</i>	Subject PCT is situated at an elevation <50m above sea level. Subject PCT Meets Characteristic.
<i>Occurs on alluvial landforms related to coastal river floodplains and associated sites where transient water accumulates, including floodplains, river-banks, riparian zones, lake foreshores, creek lines (including the floors of tributary gullies), floodplain pockets, depressions, alluvial flats, fans, terraces, and localised colluvial fans.</i>	Subject PCT occurs within the floodplain of the Georges River. Subject PCT Meets Characteristic.
<i>Occurs on alluvial soils of various textures including silts, clay loams, sandy loams, gravel and cobbles. Does not occur on soils that are primarily marine sands, or aeolian sands.</i>	Subject PCT occurs on sandy loams. Subject PCT Meets Characteristic.
<i>Occurs as a tall closed-forest, tall open-forest, closed forest, open forest, tall woodland, or woodland. The canopy has a crown cover of at least 20 percent.</i>	Subject PCT occurs as a tall forest comprises areas of closed-forest and areas of open-forest. Crown cover is >30%. Subject PCT Meets Characteristic
<i>Has a canopy dominated by one or a combination of the following species: Angophora floribunda, A. subvelutina, Eucalyptus amplifolia, E. baueriana, E. benthamii, E. bosistoana, E. botryoides, E. botryoides x E. saligna, E. elata, E. grandis, E. longifolia, E. moluccana, E. ovata, E. saligna, E. tereticornis, E. viminalis.</i>	Subject PCT is dominated by <i>E. baueriana</i> and <i>E. moluccana</i> with <i>Angophora floribunda</i> also present. Subject PCT Meets Characteristic
Subject PCT meets all of the Diagnostic Characteristics of River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria.	

The Subject PCT meets the key diagnostic characteristics outlined above, indicating the Subject PCT is representative of *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria*. The Subject PCT must meet additional condition thresholds in order to qualify as the Federally Listed Ecological Community.

Table 4 of the *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria* Conservation Advice outlines three patch size categories and four condition thresholds, which can be utilised to determine whether the Subject PCT qualifies as the Federally Listed Ecological Community and its subsequent condition class. An assessment of whether the subject PCT meets these condition thresholds is shown below.

Condition Thresholds

Category	Threshold	Assessment
Patch size	Large patch Patch size ≥ 2 ha	The distinction between these thresholds does not alter the assessment of condition class below. Their assessment has therefore been combined. By adopting a precautionary approach, to assessing the patch size of PCT4024 and utilising SVTM 2024 mapping for areas of vegetation mapped outside the Study Area, the patch size is >2ha. Therefore, the large patch threshold would be triggered. However, if the data outside the Study Area were scrutinised further and the patch-size was subsequently reduced, the 'small contiguous patch' would be triggered as >0.5ha of PCT 4024 is mapped within the Study Area, which is contiguous with native vegetation exceeding 5ha in extent. Subject PCT meets Condition Threshold.
	Small contiguous patch Patch size ≥ 0.5 ha within a larger area of native vegetation ≥ 5 ha	
	Small patch Patch size ≥ 0.5 ha	Does not apply to Subject PCT.
And		
Condition	High condition $\geq 80\%$ of its total perennial understory vegetation cover is comprised of native species AND Ground cover richness ≥ 10 native species per sample plot AND ≥ 20 large trees per ha	Native perennial understory is 48% ($<80\%$) Subject PCT does not meet Condition Threshold.
	Good condition with arboreal mammals $\geq 50\%$ of its total perennial understory vegetation cover is comprised of native species AND Ground cover richness ≥ 6 native species per sample plot AND At least 10 large trees per ha AND Evidence of 4 or more species of arboreal mammals detected in the patch	Native perennial understory cover is 48% ($<50\%$) Subject PCT does not meet Condition Threshold.
	Good condition $\geq 50\%$ of its total perennial understory vegetation cover is comprised of native species AND Ground cover richness ≥ 6 native species per sample plot AND At least 10 large trees per ha	Native perennial understory cover is 48% ($<50\%$) Subject PCT does not meet Condition Threshold.

Category	Threshold	Assessment
	Moderate condition ≥ 30% of its total perennial understory vegetation cover is comprised of native species AND Ground cover richness ≥ 4 native species per sample plot	Native perennial understory cover is 48% (>30%) Ground cover richness is 9 native species. Subject PCT meets Condition Threshold.
As the large patch size and moderate condition thresholds have been triggered, the Subject PCT is considered commensurate with the EPBC listed CEEC and assigned a Condition Class of C2 – large or contiguous patch in moderate condition.		

PCT 4024 identified within the Study Area meets the necessary characteristic and condition thresholds for *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria*. This threatened entity is therefore further assessed in the table, below.

Threatened Species:

Threatened species listed under the EPBC Act considered likely to occur on site were assessed from field inspections/surveys, Bird Data and using the BioNet Atlas search tool within a 10km search radius to the Study Area with most recent records assessed. A number of EPBC listed threatened species have potential to occur within the locality of the Study Area, however no species were detected during targeted surveys.

Migratory Species:

A number of EPBC listed migratory species have potential to utilise the areas adjacent to the site on an irregular basis. The limited number and sporadic nature of records close to the Study Area appear to reflect opportunistic rather than regular use of any habitat considered of importance to any threatened species.

It is not considered that the development of this land is likely to significantly affect the availability of potential habitat for such mobile species, or disrupt migratory patterns.

Matters of National Environmental Significant Impact Guidelines.

Considering an EPBC listed entity will be impacted by the proposal, an assessment is undertaken against the significant impact criteria for critically endangered ecological communities (DoE 2013).

MNES Impact Criteria

Criteria	Assessment
<i>River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria</i>	
<i>Critically endangered and endangered ecological communities</i>	
<i>An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:</i>	
<i>reduce the extent of an ecological community</i>	A total of approx. 0.16ha of <i>River-flat eucalypt forest</i> will be impacted as part of this proposal. However, approx. 0.08ha of the total impact to this CEEC is due to the proposed channel works, which is considered to benefit this community. The impact to this CEEC will be offset within the site through the management of approx. 3.13ha of <i>River-flat eucalypt forest</i> which includes approx. 1.21ha of Assisted Regeneration in addition to management (including canopy replanting) of approx. 1.92ha of canopy with mown grass understory. This will result in a net increase of approx. 1.84ha of <i>River-flat eucalypt forest</i> within the Study Area, increasing both the extent and quality of this CEEC. The proposal does not meet this criterion.
<i>fragment or increase fragmentation of an ecological community, for example</i>	The proposal does not impact this CEEC such that fragmentation would be increased. Further, the net increase of

Criteria	Assessment
by clearing vegetation for roads or transmission lines	approx. 1.84ha of this community as a result of the proposal will improve continuity and connectivity of this community within the site and the wider landscape. The proposal does not meet this criterion.
adversely affect habitat critical to the survival of an ecological community	Impacts to this CEEC will occur as part of this development, however, the management of retained lands will improve the occupancy of this community and reduce impacts from threats such as weeds and pests. The proposal does not meet this criterion.
modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	The site is currently in a degraded condition. The management of the central hydroline and creation of a formalised channel through the foreshore will benefit this CEEC. In addition, management practices listed in the VMP, WMP and SRMP will improve abiotic factors within the Study Area and have a net-positive effect. The proposal does not meet this criterion.
cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	Species diversity is low within this CEEC due to historical and on-going land practices. Proposed management practices within retained lands will improve species diversity and composition through target weed removal and re-vegetation. The proposal does not meet this criterion.
- cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: - assisting invasive species, that are harmful to the listed ecological community, to become established, or - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or	Management practices detailed in the VMP will increase the overall extent and quality of <i>River-flat eucalypt forest</i> within the Study Area. The proposal does not meet this criterion.
interfere with the recovery of an ecological community.	Management of vegetation under a VMP will assist in the recovery of this ecological community. The alternative 'do-nothing approach' would result in a smaller area of more degraded vegetation. The proposal does not meet this criterion.

EPBC Act Assessment Conclusion:

River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria

Native vegetation present within the site has been assessed as being commensurate with the EPBC listed CEEC: *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria*. A total of approx. 0.16ha of this community will be impacted. However, management within a VMP of vegetation associated with *River-flat eucalypt forest*, will include approx. 1.21ha of Assisted Regeneration and management (including canopy replanting) of approx. 1.92ha of canopy with mown grass understory. This will increase the overall extent and quality of this CEEC and as such, no significant adverse impact is likely.

Given EPBC a listed entity is present, referral to the Commonwealth Government is recommended to confirm agreement with this assessment, or otherwise.

State Environment Planning Policy (Resilience and Hazards) 2021

The State Environmental Planning Policy (Resilience and Hazards) 2021 commenced on 1 March 2022. The State Environment Planning Policy (Coastal Management) 2018 (Coastal SEPP) was one SEPP that was consolidated within the Resilience and Hazards SEPP 2021 under Chapter 2 Coastal Management. No policy changes were made as part of the consolidation nor did the legal effect of the existing SEPPs, with section 30A of the Interpretation Act 1987 applying to the transferred provisions. The consolidation was undertaken in accordance with section 3.22 of the Environmental Planning and Assessment Act 1979.

Consultation of Chapter 2 Coastal Management maps revealed that the Northern portion of the site is mapped as containing land mapped under the following coastal management areas:

- 'Coastal Wetlands' (Study Area only) and Proximity Areas (Study Area and Subject Site);
- 'Coastal Environment Area' (Study Area and Subject Site); and,
- 'Coastal Use Area' (Study Area and Subject Site).

As such, an assessment under the relevant Division of Chapter 2 Coastal Management has been undertaken for each coastal management area.

Coastal Wetlands

The following assessment has been undertaken with regard to Division 1 – Clause 7 (Development on certain land within coastal wetlands and littoral rainforests area) of Chapter 2 Coastal Management.

Clause Number	Clause	Assessment
7 (1-6)	<i>Development on certain land within coastal wetlands and littoral rainforests area.</i>	The Subject Site does not contain Coastal Wetlands and therefore no direct impacts will occur. Proposed VMP and Landscape Plan lands will incorporate these areas and adjacent lands. Measures include revegetation with species complementary to the identified plant communities; and, weed and pest control. These measures will be beneficial to the management of the Coastal Wetland Area.
8 (1)	<i>Development on land in proximity to coastal wetlands or littoral rainforest</i> <i>Development consent must not be granted to development on land identified as "proximity area for coastal wetlands" or "proximity area for littoral rainforest" on the Coastal Wetlands and Littoral Rainforests Area Map unless the consent authority is satisfied that the proposed development will not significantly impact on—</i> <i>(a) the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest, or</i> <i>(b) the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest.</i>	The northern portion of the Study Area is mapped within the Coastal Wetland Proximity Area. An SRMP has been produced for the central hydroline and a WCMP has been produced for the development, incorporating WSUD (water sensitive urban design) principles. The implementation of these hydrological measures, in addition to the implementation of a VMP and Landscape Plan should ensure the proposals will have minimal impact on the biophysical, hydrological and ecological integrity of Coastal Wetland. With the use of proper sediment and erosion controls in accordance with council guidelines, the development should not degrade the area. Furthermore, implementation of the proposed VMP and Landscape Plan is anticipated to provide a net benefit to the Coastal Wetland Area.
8 (2)	<i>This section does not apply to land that is identified as "coastal wetlands" or "littoral rainforest" on the Coastal Wetlands and Littoral Rainforests Area Map.</i>	N/A – this is addressed within Clause 7 (1-6), above.

Coastal Environment

The following assessment has been undertaken with regard to Division 3 – Clause 10 (Development on land within the coastal environment area) of Chapter 2 Coastal Management.

Clause Number	Clause	Assessment
10 (1)	<i>Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following:</i>	
	<i>(a) the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment</i>	As assessed under Clause 8 (1) within the Coastal Wetlands assessment, above.
	<i>(b) coastal environmental values and natural coastal processes</i>	The proposed development will impact a small area of land, whereas residue protected lands with higher biodiversity value within Study Area and the wider locality will not be impacted. Furthermore, management of VMP and Landscape Plan Lands will enhance the environmental value of the Coastal Environment Area. As such, impacts to coastal environmental values and natural coastal processes will be limited.
	<i>(c) the water quality of the marine estate (within the meaning of the Marine Estate Management Act 2014), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1</i>	Refer to assessment against Clause 10 (1.a) above.
	<i>(d) marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms</i>	Impacts to native biodiversity are addressed within the BDAR. No impact on marine vegetation, undeveloped headlands or coastal rock platforms is expected.
	<i>(e) existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability</i>	No impacts to existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability will be impacted by the proposed development.
	<i>(f) Aboriginal cultural heritage, practices and places</i>	No known sites were identified on DPIE's website.
	<i>(g) the use of the surf zone</i>	The subject site is not proximate to any surf zone.
10 (2)	<i>Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:</i>	
	<i>(a) the development is designed, sited and will be managed to avoid an adverse impact referred to in subclause (1), or</i>	The proposed development is located predominantly outside of the Coastal Use Area. Implementation of the SRMP and WCMP in addition to erosion and sedimentation controls during construction will avoid adverse hydrological impacts. Proposed management of VMP and Landscape Plan Lands will provide an overall benefit to the Coastal Environment Area through; weeding regimes, complementary revegetation and landscaping.
	<i>(b) if that impact cannot be reasonably avoided—the development is designed,</i>	As above.

Clause Number	Clause	Assessment
	<i>sited and will be managed to minimise that impact, or</i>	
	<i>(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.</i>	As above.

The following assessment has been undertaken with regard to Division 4 – Clause 11 (Development on land within the coastal use area) of Chapter 2 Coastal Management.

Coastal Use Area

Clause Number	Clause	Assessment
11 (1)	<i>Development consent must not be granted to development on land that is within the coastal use area unless the consent authority -</i> <i>(a) has considered whether the proposed development is likely to cause an adverse impact on the following—</i> <i>(i) existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,</i> <i>(ii) overshadowing, wind funnelling and the loss of views from public places to foreshores,</i> <i>(iii) the visual amenity and scenic qualities of the coast, including coastal headlands,</i> <i>(iv) Aboriginal cultural heritage, practices and places,</i> <i>(v) cultural and built environment heritage, and</i> <i>(b) is satisfied that—</i> <i>(i) the development is designed, sited and will be managed to avoid an adverse impact referred to in paragraph (a), or</i> <i>(ii) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or</i> <i>(iii) if that impact cannot be minimised—the development will be managed to mitigate that impact, and</i> <i>(c) has taken into account the surrounding coastal and built environment, and the bulk, scale and size of the proposed development.</i>	This clause has been assessed within the Ecological & Riparian Issues & Assessment Report (Gunninah 2024) which concludes that the Proposals satisfy the requirements of the Resilience and Hazards SEPP.
11 (2)	<i>This section does not apply to land within the Foreshores and Waterways Area within the meaning of State Environmental Planning Policy (Biodiversity and Conservation) 2021, Chapter 6.</i>	The site does not meet the meaning of Foreshores and Waterways Area as per the BC SEPP and therefore this section does apply.

Conclusion

As a result of the avoid and minimise process outlined within **Section 2.2** of this BDAR, in addition to the implementation of an SRMP, WCMP, VMP and Landscaping Plan, no significant adverse effects are anticipated as a result of the proposals. Instead, the proposals are anticipated to benefit the Coastal Wetland, Coastal Environment and Coastal Use Areas through the implementation of formal management and enhancement and provision of public access to the foreshore.

State Environmental Planning Policy (Biodiversity Conservation) 2021

Chapter 4 Koala Habitat Protection

State Environmental Planning Policy (Biodiversity and Conservation) 2021 (BC SEPP) commenced on the 1st March 2022, under the *Environmental Planning and Assessment Act 1979*, and repealing the previous *State Environmental Planning Policy (Koala Habitat Protection) 2020* and *State Environmental Planning Policy (Koala Habitat Protection) 2021*. This Policy aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline.

The application of this chapter differs between local government areas in addition to exclusions between applicable to certain land designations, as detailed below:

Chapter 4 Considerations	Application
Local government area as listed within Schedule 2.	City of Liverpool Council
Koala Management Area(s) as defined in Schedule 2.	Central Coast
This Chapter does not apply to: - land dedicated or reserved under the National Parks and Wildlife Act 1974, or acquired under Part 11 of that Act, or - land dedicated under the Forestry Act 2012 as a State forest or a flora reserve, or - land on which biodiversity certification has been conferred, and is in force, under Part 8 of the Biodiversity Conservation Act 2016, or - land in the following land use zones, or an equivalent land use zone, unless the zone is in a local government area marked with an * in Schedule 2— - Zone RU1 Primary Production, - Zone RU2 Rural Landscape, - Zone RU3 Forestry.	Chapter 4 applies.

According to Section 4.9 *Development assessment process – no approved koala plan of management for land*, of the BC SEPP 2021, the policy applies if:

- (1) *This clause applies to land to which this Policy applies if the land—*
- (a) *has an area of at least 1 hectare (including adjoining land within the same ownership), and*
 - (b) *does not have an approved koala plan of management applying to the land.*

The total Subject Site is over 1ha and does not have a koala plan of management. Therefore, the BC SEPP 2021 applies and additional assessment is required under the *Development assessment process – no approved koala plan of management*. The following clauses are therefore applicable and have been assessed.

Development Assessment Process – no Koala plan of Management

Clause	Assessment
(2) Before a council may grant consent to a development application for consent to carry out development on the land, the council must assess whether the development is likely to have any impact on koalas or koala habitat	Clauses apply to City of Liverpool Council.
(3) If the council is satisfied that the development is likely to have low or no impact on koalas or koala habitat, the council may grant consent to the development application.	
(4) If the council is satisfied that the development is likely to have a higher level of impact on koalas or koala habitat, the council must, in deciding whether to grant consent to the development application, take into account a koala assessment report for the development	
(5) However, despite subsections (3) and (4), the council may grant development consent if the applicant provides to the council— (a) information, prepared by a suitably qualified and experienced person, the council is satisfied demonstrates that the land subject of the development application— (i) does not include any trees belonging to the koala use tree species listed in Schedule 3 for the relevant koala management area, or (ii) is not core koala habitat, or (b) information the council is satisfied demonstrates that the land subject of the development application— (i) does not include any trees with a diameter at breast height over bark of more than 10 centimetres, or (ii) includes only horticultural or agricultural plantations.	5(a)(i) – Koala use trees applicable to the Central Coast Management Area were identified within the Study Area. Exclusion does not apply. 5(a)(ii) – Further assessment is required to determine whether the site comprises Core Koala Habitat. 5(b)(i) – Trees with a DBH>10cm were identified within the Study Area. Exclusion does not apply. 5(b)(ii) – The site includes native vegetation which does not comprise a horticultural or agricultural plantation. Exclusion does not apply.

In order to assess whether the site comprises core koala habitat, a Koala Assessment has been undertaken.

Koala Assessment

The Koala Assessment is structured as follows:

- Assessment of whether the site comprises Core Koala habitat;
 - Assessment of whether the site comprises 'Highly Suitable Koala Habitat';
 - Site based assessment of current/recent Koala presence within the site;
 - Desktop assessment of recorded Koala presence within the site; and,

- Assessment of the site and proposal development against the 5 key principles listed within the Koala Sepp 2021 Factsheet – Development Applications.

Core Koala Habitat Assessment

Core Koala Habitat is defined within Section 4.2 of the SEPP as:

- an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or*
- an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.*

Both qualifications of defined Core Koala Habitat consider whether the site is an area of land that has been assessed as ‘Highly Suitable Koala Habitat’. This assessment has been undertaken below:

Highly Suitable Koala Habitat Assessment

Definition of ‘ <i>Highly Suitable Koala Habitat</i> ’	Assessment
<i>‘where 15% or greater of the total number of trees within any Plant Community Type (PCT) are the regionally relevant species of those listed in Schedule 2 of the SEPP.’</i>	Each PCT identified within the site contains >15% abundance of tree species listed under the Central Coast koala management area, under Schedule 2 of the SEPP The most abundant species identified on site was <i>Eucalyptus Sclerophylla</i> . Other canopy species identified within the site and listed under the Central Coast koala management area include <i>Corymbia gummifera</i> , <i>E. crebra</i> , <i>E. punctata</i> , <i>E. piperita</i> , <i>E. resinifera</i> , <i>E. baueriana</i> , <i>E. moluccana</i> , <i>Casuarina glauca</i> , <i>Angophora bakeri</i> and <i>A. floribunda</i> .
The site meets the definition and as such is considered to comprise ‘<i>Highly Suitable Koala Habitat</i>’.	

Given the site comprises ‘*Highly Suitable Koala Habitat*’ the qualifications of defined Core Koala Habitat subsequently consider whether Koalas have been recorded as present within the site at the time of assessment or recorded as being present within the previous 18 years. This has been addressed by carrying out site surveys and a desktop assessment of Koala records within or in proximity to the site.

Core Koala Habitat Assessment

Qualification of ‘ <i>Core Koala Habitat</i> ’	Assessment
<i>‘koalas are recorded as being present at the time of assessment’</i>	The following surveys were undertaken to assess current/recent presence: Camera trap surveys were undertaken between 19/03/2024 and 15/04/2024; 3x Spot Assessment Technique (SATs) were undertaken within the site; two (2) on 26/07/2024 and one (1) on (02/09/2024); and, Nocturnal surveys were undertaken on 18/03/2024 & 19/03/2024. No koalas, scats or markings were identified within the Study Area. The site does not meet this qualification of Core Koala Habitat.
<i>‘koalas have been recorded as being present in the previous 18 years’</i>	The site is located within the Central Coast Koala Management Area, as such a 2.5km maximum search radius applies to this assessment. One record of koala from 1997 exists within the site, however this record is more than 18 years old. An additional 95 koala records exist within 2.5km of the Study area. The site does meet this qualification of Core Koala Habitat.
The site does meet at least one qualification to be defined as Core Koala Habitat.	

Assessment of the site against the prescribed definition of Core Koala Habitat concludes that the site does meet the definition and therefore comprises Core Koala Habitat.

Assessment of the 5 Key Principles

Assessment of sites qualification under the definition of Core Koala Habitat has concluded that the site does comprise Core Koala Habitat.

Therefore, an assessment of the site and development proposals has been undertaken against the 5 key principles listed within the Koala Sepp 2021 Factsheet – Development Applications. This aims to also satisfy Chapter 3, Section 4.9, Clauses 2, 3 and 4 of the biodiversity and Conservation SEPP whereby the Council may grant consent to a development application following assessment of development impact on koalas or koala habitat.

The proposed development comprises clearance of approximately 4.13ha of native vegetation to facilitate the proposed development. The assessment of the site and proposed development in relation to the 5 Key principles is undertaken below.

Assessment of 5 Key Principles

Principle	Criteria	Assessment
1. Understand Koala habitat values	1. <i>The site is established as containing core koala habitat if a site area survey undertaken by a suitably qualified and experienced person has identified the presence of core koala habitat.</i>	The Study Area has been assessed as comprising core Koala Habitat, as assessed above.
	2. <i>Further analysis is undertaken in order to understand the broader values of the core koala habitat, including information about the koala population using the habitat and any specific ecological functions the habitat might serve.</i>	Whilst the Study Area has been assessed as meeting the definition for comprising core Koala Habitat, the actual ecological function of the site for Koala is negligible owing to its containment within tall chain link fencing topped with barbed wire. Therefore, whilst the site provides suitable habitat for Koala, it is extremely unlikely that the species could gain access to these resources – as evidenced by the lack of recent records within the Study Area, and the absence of Koalas or associated field signs, during targeted surveys conducted within the Study Area.
2. Avoid intensifying land use in koala habitat areas through appropriate landscape planning and site selection	3. <i>Site selection for development takes into account koala habitat values.</i>	Given the lack of ecological functionality of the site in its current form, with regards to Koala, the selection of the development site is not considered to impact Koala habitat values. As Koala are unable to utilise the site as a foraging resource, the development is not considered to result in the direct loss of core koala habitat.
3. Encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas	4. <i>Development avoids the direct loss of core koala habitat within the site area and avoids fragmentation</i>	Development of the site will result in the removal of the tall chain-link fencing and subsequently provide access to retained vegetation within the Study Area. The retained vegetation will be enhanced through the implementation of a VMP therefore providing an improvement to Koala habitat values as a result of the development proposals. Furthermore, the enhancement of VMP lands will result in improved connectivity for the species throughout the surrounding landscape.
	5. <i>Core koala habitat is excluded from the development footprint</i>	
4. Minimise potential direct impacts to	6. <i>Development avoids direct impacts to core koala habitat within the site area.</i>	

Principle	Criteria	Assessment
koalas through koala sensitive design	7. Where some loss of core koala habitat cannot be avoided (and provided it is consistent with all other criteria), development is designed in a way that retains higher value areas across the site and avoids fragmentation of habitat within the site area and more broadly within the region.	
	8. Development is undertaken in a way that maintains the potential function of the core koala habitat.	
5. Implement best practice measures for the management of identified risks to koalas.	9. All relevant indirect impacts to koalas and koala habitat associated with the development are identified.	It has been recommended that the Subject Site is fenced off from the retained lands to be managed under a VMP. This measure will reduce the likelihood of indirect impacts to Koala as a result of the development proposals by reducing the interface of wildlife and operational activities within the site. Indirect construction and operational impacts and mitigation strategies are addressed in Tables 24 and 25 of this report.
	10. Development uses best practice management measures to address the potential impacts considered likely to pose an increased risk to koalas or their habitat.	
Additional Principles		
6. Use compensatory measures only where they can be shown to better promote the aim of the SEPP	11. Compensatory measures are only used once it has been demonstrated that options to avoid, minimise and manage impacts to core koala habitat have been exhausted.	A VMP has been produced for retained native vegetation within the Study Area. The VMP will facilitate improvement of the native vegetation condition within the Study Area, in addition to increasing the extent of native vegetation through natural regeneration and planting. This will immediately result in improved ecological connectivity for the species (through removal of the chain-link fencing) and over time, increase the available foraging resource.
	12. Where there is any direct loss of habitat or compromise in the potential function of a koala habitat area (and provided it is consistent with all other criteria outlined here), suitable compensatory measures are provided.	
7. Use adaptive management strategies to monitor, evaluate and deliver appropriate planning outcomes for koalas	13. The development application includes a monitoring, adaptive management and reporting component against the key outcomes.	Given the proposed development will result in an overall increase in available habitat for Koala, monitoring and adaptive management is not considered necessary.

Conclusion

Field surveys identified that the site contained highly suitable koala habitat, as such further assessment was undertaken. Detailed koala surveys were undertaken on site but did not detect evidence of koalas within the Study Site. However, desktop assessment showed that there were multiple records of koala within 2.5km of the site and as such, the site met the definition of core koala habitat. Further consideration of the Koala habitat values of the site concluded that the site did not currently provide ecological function Koala owing to its containment within tall chain link fencing topped with barbed wire.

Development of the site and enhancement of retained vegetation through implementation of a VMP is considered to benefit Koala in the immediate term by providing access to previously restricted lands and through increasing the potential foraging resource in the longer term.

As such, assessment of the site and development proposals, against the Key Principles outlined in the Koala Sepp 2021 Factsheet – Development Applications, addresses the Key Principles such that Council may consider granting Development Consent under Chapter 3, Section 4.9, Clauses 2, 3 & 4 of the biodiversity and Conservation SEPP.

Water Management Act 2000

DPIE (Water) administers the WM Act and is required to assess activities carried out on waterfront land. Waterfront land includes the bed and bank of any river, lake or estuary and all land within 40 meters of the highest bank of the river, lake or estuary. Certain activities within waterfront land are designated as 'Controlled Activity' and required approval from NSW DCCEEW.

Three (3) hydrolines have been mapped within the Study Area and one named watercourse flows adjacent to the site's northern boundary. An SRMP has been produced detailing assessment of these mapped hydrolines. The SRMP concluded that the mapped second order watercourse was present, however, the two mapped first order streams did not meet the definition of Waterfront Land.

The SRMP identifies that the downstream section of the second order watercourse flattens out towards the foreshore and proposes the creation of a formalised drainage channel through the foreshore area to connect the central hydroline to the Georges River. A VMP and WCMP have been produced to support the SRMP and address the ecological and hydrological considerations associated with these features.

The ERIAR provides further commentary regarding the Water Management Act and consideration of Controlled Activity Approval.

This BDAR recommends that Water Sensitive Urban Design (WSUD) and Stormwater Management is incorporated into the design to ensure water quality is maintained on and offsite.

Fisheries Management Act 1994

No Key Fish habitat is mapped within the Study Area therefore no direct impacts to key fish habitat will occur as a result of the proposals. The Georges River which flows adjacent to the northern boundary of the Study Area is mapped as Key Fish Habitat. Potential indirect impacts to the Georges River will be addressed through the implementation of the SRMP, WCMP and mitigation measures for indirect impacts as outlined within **Table 24** of this BDAR. As such the proposals are not “likely” to impose a “significant effect” upon any “threatened species or ecological communities, or their habitats” as per Section n 221ZV of the Fisheries Management Act. This has been considered in further detail within the Ecological & Riparian Issues & Assessment Report (Gunninah 2024).

Liverpool Local Environment Plan 2008

The Liverpool Local Environment Plan 2008 (LEP) provides environmental planning provisions with the Liverpool LGA. The north and central areas of the site are mapped as 'Environmentally Significant Land' as depicted below:



Environmentally Significant Land within Lot 1 DP875804 and Lot 2 DP817692 (Liverpool LEP - Environmentally significant land map - sheet ESL-015)

As per Clause 7.6 of the LEP, the objectives of this land are to:

- (a) *to maintain bushland, wetlands and wildlife corridors of high conservation value,*
- (b) *to identify areas of significance for revegetation to connect to or buffer bushland, wetlands and wildlife corridors,*
- (c) *to protect rare and threatened native flora and native fauna,*
- (d) *to ensure consideration of the significance of vegetation, the sensitivity of the land and the impact of development on the environment prior to the giving of any development consent.*

The consent authority must consider the following before granting consent to development on Environmentally Significant Land:

- (a) *the condition and significance of the vegetation on the land and whether it should be substantially retained in that location,*
- (b) *the importance of the vegetation in that particular location to native fauna,*
- (c) *the sensitivity of the land and the effect of clearing vegetation,*
- (d) *the relative stability of the bed and banks of any waterbody that may be affected by the development, whether on the site, upstream or downstream,*
- (e) *the effect of the development on water quality, stream flow and the functions of aquatic ecosystems (such as habitat and connectivity),*
- (f) *the effect of the development on public access to, and use of, any waterbody and its foreshores.*

The land identified as Environmentally Significant Land has been subject to comprehensive ecological survey and assessment. The vegetation within this land has been largely avoided by the proposed development with only minor impacts proposed to remnant vegetation within these lands. Whilst some minor impacts are proposed, these lands will be subject to an overall enhancement in biodiversity values through the management of their management under a VMP. In addition to the VMP, an SRMP and WCMP have been produced, which detail the hydrological considerations associated with subclauses D & E. The ERIAR addresses subclause F, concluding that the Pleasure Point residential project will enhance "public access to, and use of" the Georges River and its foreshores.

Liverpool Development Control Plan 2008

This Development Control Plan (DCP) commenced in 2008. The aim of the DCP is to facilitate development in accordance with the LEP. The table below assesses the relevant ecological clauses within the DCP demonstrating compliance.

DCP Assessment Table

Liverpool Development Control Plan 2008		
Clause Number	Clause	AEP Assessment
Part 1 – General Controls for all Development		
1.3 Objectives	3 - Landscaping and Incorporation of Existing Trees	The avoid and minimise process has been undertaken following site assessment, ground-truthing and mapping of vegetation within the site. Vegetation retention has been considered through the design process as detailed in Section 2.2 .
	a) Promote landscape planning and design as part of a fully integrated approach to site development. b) Assist in improving the climate of the local environment. c) Retain as many existing trees as possible. d) To provide habitat for locally indigenous plants and animals and contribute to biodiversity. e) To encourage landscaping that is appropriate to the natural, cultural, built and heritage characteristics of its locality. f) Improve the amenity of developments and adjoining areas by ensuring proposals adequately complement the proposed building forms and surrounding streetscape. g) Ensure that the proposed landscape designs provide functional attributes such as privacy, shade and wind protection, while discouraging the opportunity for crime and vandalism.	
1.3 Controls (Retention of existing on-site trees)	Existing trees and native vegetation are to be retained, protected and incorporated into the development proposal. This is particularly important for vegetation which forms part of a ridgeline tree canopy and in foreshore and riparian areas (with the exception of weed species).	
	Prior to the commencement of the design of a development existing tree should be identified. The design of a development should consider options to retain existing trees.	
	Existing indigenous trees within any building setback should be retained where possible, as an integral component of the site's landscaping, and to protect local habitats.	
	It is important that all plans accompanying the development application including engineering and hydraulics plans are consistent with the landscape plan. This is particularly important where trees are to be retained. For example, storm water lines and excavation should not be within the drip line of trees to be retained. Note: Where trees are located outside the normal building envelope for a development, Council will give particular attention to the retention of those trees.	
1.4 Objectives	4 – Bushland and Fauna habitat preservation	This report documents the fauna and flora assessment for this site, appropriate to the scale and impact of the
	a) To protect and manage natural assets in association with the development of land. b) To conserve the natural heritage of Liverpool.	

Liverpool Development Control Plan 2008		
Clause Number	Clause	AEP Assessment
	c) To maintain and improve the amenity and scenic qualities of Liverpool. d) To maintain and enhance the biodiversity and natural ecology of Liverpool.	proposed development as prescribed by the Biodiversity Assessment Method.
1.4 Controls	Bushland, particularly that identified as a threatened community or habitat for a threatened species shall be substantially retained and incorporated within a development. Clearing of bushland in association with any development shall be limited to the extent necessary to facilitate the safe and orderly use of the land.	The vegetation and fauna habitat present within the Study Area has been identified through site assessments, with good quality vegetation and CEEC retained through the proposals as detailed above. Retained vegetation will be managed under a VMP, which will result in an overall increase in the area of occupancy of Cumberland Blue Box Riverflat forest within the Study Area, in addition to improving quality. No bushfire management measures are proposed.
	Where impacts on threatened biodiversity are unavoidable, offsetting utilising the NSW Government BioBanking Scheme will be required where practicable.	
	Where bushfire management measures are required that involve clearance or alteration to bushland, details of proposed measures shall be submitted. Clearing for the purposes of bushfire management involving a substantial loss of bushland shall not be permitted.	
	Prior to the commencement of the design of a development, existing bushland and fauna habitat should be identified. The design of the development should consider retention of this bushland and fauna habitat.	
	Development shall not adversely impact on the long-term viability of bushland. Existing connectivity and contiguity of bushland stands, and fauna corridors shall be retained.	
	Where a proposal is likely to adversely impact on bushland, a Vegetation Management Plan (VMP) for the conservation of the bushland shall be submitted. The VMP shall be undertaken in accordance with pertinent NSW Office of Water Guidelines.	
	Any imported soils and/or mulches used shall be purchased from an appropriate supplier and be free of contaminants, seeds, propagules of weeds and undesirable species. Mulch shall not be used on flood liable land and/or areas where it is likely to be washed away.	
	Any proposed re-vegetation shall: • Augment remaining bushland. • Consist predominately of species which occur naturally on the site or are of local provenance. • Reflect the structure of natural bushland. • Be undertaken in accordance with a vegetation management plan which forms part of the consent.	
	Any proposed re-vegetation, seed collection and weed removal to be undertaken as part of the implementation of the approved vegetation management plan shall be undertaken by an appropriately qualified and licensed bushland restoration contractor.	

Liverpool Development Control Plan 2008		
Clause Number	Clause	AEP Assessment
	Council may require measures to restrict access to bushland areas where it considers necessary, to ensure the conservation of bushland. A flora and fauna assessment is required where a site is identified as containing native vegetation or habitat for threatened flora or fauna. The flora and fauna assessment shall consider all impacts associated with the development on the habitat, including the impacts of APZ's and water management practices. Flora and Fauna Assessments should be prepared in accordance with pertinent NSW Office of Environment and Heritage survey and assessment guidelines. The assessment must be prepared by a suitably qualified person.	
1.7 Objectives	7 – Development Near a watercourse	The Water Management Act 2000 has been considered within this appendix (Appendix F). An SRMP, WCMP and VMP have been produced to address the ecological and hydrological considerations associated with development near a watercourse. The ERIAR also provides further commentary on regarding controlled activities approval.
	a) To protect, restore and maintain ecological processes, natural systems and biodiversity in wetlands and waterfront areas. b) To maintain watercourse bed and bank stability. c) To minimise sedimentation and pollution of watercourses and wetlands. d) Ensure conservation and long-term maintenance of existing native vegetation in waterfront areas. e) To maintain lateral connectivity between waterways and riparian vegetation. f) To protect the visual amenity of the water and land interface.	
1.7 Controls	If any works are proposed near a water course, the Water Management Act 2000 may apply, and you may be required to seek controlled activity approval from the NSW Office of Water. Please consult with the NSW Office of Water regarding your proposal. Section 4 Bushland and Fauna Habitat Preservation of this DCP should also be addressed when pertinent.	
Part 2.13 – Land Subdivision in Pleasure Point		
2.4 Open Space		
2.4 Objectives	a) To provide for a high-quality environment. b) To provide for a high amenity subdivision by retaining as many mature trees as is possible. c) To create a series of linked public spaces which are attractive and memorable. d) To preserve mature trees, saplings and natural bushland. e) To provide public access to the Georges River Foreshore for residents.	1 & 2 - A proposal for the dedication of lands along the foreshore of the Georges River has been produced as part of the Development Application. The proposals also include the provision of pedestrian and vehicle access to RE1 Lands.
2.4 Controls	1. Land identified for open space under <i>Liverpool LEP 2008</i> shall be dedicated to Council in conjunction with the subdivision of adjoining residential land. 2. Direct vehicle and pedestrian connection shall be provided between the land identified as RE1 along the Foreshore and with future residential subdivision of the adjoining land via a public road.	3, 4 & 5 - The avoid and minimise process has been undertaken following site assessment, ground-truthing and mapping of vegetation within the site. Vegetation retention has been considered through the design process as detailed in Section 2.2.

Liverpool Development Control Plan 2008		
Clause Number	Clause	AEP Assessment
	3. The street network should be designed to avoid removal of large stands of existing trees. 4. The street network should be designed to preserve mature trees within the verge of the road reservation. 5. Public roads should be located between private allotments and open space areas. 6. Open Space is to be designed in accordance with Planning for Bushfire Protection 2006 to minimise potential impacts of bushfire on life and property. 7. To create visually interesting streetscapes through the use of native plantings and street plantings.	6 – Addressed by the Bushfire Hazard Report (Building Code & Bushfire Hazard Solutions 2024). 7 – Addressed by the Landscaping Plan (Habitat8 2025)
2.7 Creek Corridors		
2.7 Objectives	a) To protect and enhance native vegetation. b) To protect and enhance archaeological and cultural values. c) To protect and enhance aquatic habitats.	1 - An SRMP, WCMP and VMP have been produced to address the ecological and hydrological considerations associated with development near a watercourse. 3 - The avoid and minimise process has been undertaken following site assessment, ground-truthing and mapping of vegetation within the site. Vegetation retention has been considered through the design process as detailed in Section 2.2 . 4 – Service utilities are not proposed within the creek corridor.
2.7 Controls	1. Provide for the protection of the creek environment, including water quality, soil stability and creek bed habitat. 2. Bush fire asset protection zones are to be incorporated into boundary road design and outside the conservation areas and creek zones. 3. Avoid the removal of existing trees in the following zones: - RE1 - Recreation - Public - W1 – Natural Waterways - E3 – Environmental Management 4. Service utilities can only be provided within Creek Corridors if no other practical or feasible opportunity exists to cross the corridor at designated crossing points, such as streets and pedestrian crossings.	

Appendix G: Site Photographs



Above: Entrance at north-eastern corner of the site – facing west.

Below: PCT 4024 within retained lands – facing west.





**Above: Facing south from central gully, PCT 3619 shown on the left-hand side.
Below: Facing north-west from southern end of central gully. PCT4059 within foreground to right-hand side.**





Above: Facing west towards Voyager Point from within western portion of site.

Below: Facing west from northern corner of site (PCT 3619).





Above: Facing north along central gully vegetation – PCT4059.

Below: Example of chain-link fencing surrounding the site.





**Above: Large area of west of site used to store various containers and waste.
Below: Medium HBT in stag within central gully.**



Appendix H: BDAR Checklist

Biodiversity Development Assessment Report: Stage 1 Checklist

BAM Reference	Information	BDAR Section	Completed
Report			
Introduction - Chapters 2 and 3	Introduction to the biodiversity assessment including: - brief description of proposed development - identification of subject land boundary, including: operational footprint (if BDAR), construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure (if BDAR), land proposed for biodiversity certification (if BDAR) - general description of the subject land	1.1	Yes
	Sources of information used in the assessment, including reports and spatial data	1.1.6	Yes
	Identification of assessment method applied (i.e. linear or site-based)	1.3.1	Yes
Landscape - Section 3.1, 3.2 and Appendix E	General description of subject land topographic and hydrological setting, geology and soils	1.1.5, 1.2.2	Yes
	Percent native vegetation cover in the assessment area (as described in BAM Subsection 3.2).	1.3.2	Yes
	IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	1.2.1	Yes
	Rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3.) and Appendix E)	1.2.2	Yes
	Wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(3.))	1.2.2	Yes
	Connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	1.2.2	Yes
	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.))	1.2.2	Yes
	Areas of geological significance and soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(8-9.))	1.2.2	Yes
	Any additional landscape features identified in any SEARs for the proposal	N/A	N/A
	NSW (Mitchell) landscape on which the subject land occurs	1.2.1	Yes

Native vegetation, Chapter 4, Appendix A and Appendix H	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)	1.4	Yes
	Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2)	1.4.4	Yes
	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)	1.4.1	Yes
	Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2	1.4.2	Yes
	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	N/A
	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(1–3.)) • 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.))	1.4.3	Yes
	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 Vegetation Classification (as described in BAM Subsection 4.3.3(5.))	1.4	Yes

		Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A): • identify the PCT or vegetation class for which local benchmark data will be applied • identify published sources of local benchmark data (if benchmarks obtained from published sources) • describe methods of local benchmark data collection (if reference plots used to determine local benchmark data) • provide justification for use of local data rather than BioNet Vegetation Classification benchmark values • provide written confirmation from the decision-maker that they support the use of local benchmark data	N/A	N/A
Threatened Chapter 5	Species,	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	1.5.1	Yes
		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) • 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	1.5.2	Yes
		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.))	1.5.2	Yes

	- 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.))		
	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)	1.5.5	Yes
	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	1.5.3	Yes
	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
	Where use of local data is proposed (BAM Subsection 1.4.2): - identify relevant species - identify data to be amended	N/A	N/A

		• 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		
		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 • Identify the biodiversity risk weighting for each species credit species identified as present within the subject land (as described in BAM Section 5.4)	2.4.2	Yes
Prescribed impacts - Chapter 6		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)	2.3	Yes

	- 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) - 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)		
	Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts	N/A	N/A
	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)	N/A	N/A
	Where the proposed development is for a wind farm: - 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.))	N/A	N/A
Maps			
Introduction - Chapters 2 and 3	Map of the subject land boundary showing the final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure (if BDAR)	Figure 1	Yes
Landscape - Section 3.1, 3.2 and Appendix E	Site Map Boundary of subject land Cadastre of subject land Landscape features identified in BAM Subsection 3.1.3	Figure 1	Yes
	Location Map Digital aerial photography at 1:1,000 scale or finer Boundary of subject land	Figure 2	Yes

	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 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	Figure 1 and Figure 2	Yes
Native vegetation, Chapter 4, Appendix A and Appendix H	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)	Figure 3, Figure 4	Yes
	Map of PCTs within the subject land (as described in BAM Section 4.2(1.))	Figure 4	Yes
	Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCTs boundaries	Figure 4	Yes
	Map of TEC distribution on the subject land and table of TEC listing, status and area (ha)	Figure 4	Yes
	Map of patch size locations for each native vegetation zone and table of patch size areas (as described in BAM Subsection 4.3.2)	Figure 2	Yes
Prescribed impacts Chapter 6	Map showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.)	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	

Tables			
Native vegetation, Chapter 4, Appendix A and Appendix H	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	Table 12	Yes
Threatened Species, Chapter 5	Table showing ecosystem credit species in accordance with BAM Section 5.1.1, and identifying: - the ecosystem credit species removed from the list - the sensitivity to gain class of each species	Table 13	Yes
	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	Table 14, Table 15	Yes
	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)	Table 18	Yes
Prescribed impacts Chapter 6	No table		
Data			
Landscape - Section 3.1, 3.2 and Appendix E	All report maps as separate jpeg files / Individual digital shape files of: subject land boundary assessment area ((i.e. subject land and 1500 m buffer area) boundary cadastral boundary of subject land areas of native vegetation cover landscape features	Attached files	Yes

Native vegetation, Chapter 4, Appendix A and Appendix H	All report maps as separate jpeg files Plot field data (MS Excel format) Plot field data sheets		Yes
	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		Yes
Threatened Species, Chapter 5	Digital shape files of suitable habitat identified for survey for each candidate species credit species		Yes
	Survey locations including GPS coordinates of any plots, transects, grids		Yes
	Digital shape files of each species polygon including GPS coordinates of located individuals		Yes
	Species polygon map in jpeg format		Yes
	Expert reports and any supporting data used to support conclusions of the expert report		N/A
	Field data sheets detailing survey information including prevailing conditions, date, time, equipment used, etc		Yes
Prescribed impacts Chapter 6	Digital shape files of prescribed impact feature locations Prescribed impact features map in jpeg format		Yes

Biodiversity Development Assessment Report: Stage 2 Checklist

BAM Reference	Information	BDAR Section	Completed
Report			
Avoid and minimise impacts – Chapter 7	Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative: • modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology • 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	2.1	Yes
	Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Subsections 7.1.2 and 7.2)	2.2	Yes
	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.))	N/A	N/A
Assessment of Impacts - Chapter 8, Section 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)	2.3, 2.4	Yes
	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 • reporting any limitations or assumptions, etc. made during the assessment • identification of the threatened entities and their habitat likely to be affected	2.3	Yes

	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 wind turbine strikes on protected animals • assessment of the impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC	2.3	Yes
Mitigation and Management of Impacts - Chapter 8, Section 8.4 and 8.5	Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM 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	2.2	Yes
	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)	2.2	Yes
	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	N/A
Impact Summary - Chapter 9	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) including:	2.4.3	Yes

	• 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		
	Identification of impacts requiring offset in accordance with BAM Section 9.2	2.4	Yes
	Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	2.5	Yes
	Identification of areas not requiring assessment in accordance with BAM Section 9.3	2.6	Yes
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)	2.4, 2.7	Yes
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
	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	N/A	N/A

Maps			
Avoid and minimise impacts – Chapter 7	Map of alternative footprints considered to avoid or minimise impacts on biodiversity values; and of the final proposal footprint, including construction and operation	N/A	N/A
	Maps demonstrating indirect impact zones where applicable	N/A	N/A
Assessment of Impacts - Chapter 8, Section 8.1 and 8.2	No Maps		
Mitigation and Management of Impacts - Chapter 8, Section 8.4 and 8.5	No Maps		
Impact Summary – Chapter 9	Map showing the extent of TECs at risk of an SAI within the subject land	N/A	N/A
	Map showing location of threatened species at risk of an SAI within the subject land	N/A	N/A
	Map showing location of: - impacts requiring offset - impacts not requiring offset - areas not requiring assessment	Figure 9	Yes
Impact Summary - Chapter 10	No Maps		
Biodiversity credit report – Chapter 10	No Maps		
Biodiversity certification offsets and strategy (biodiversity certification only) - Chapter 12 and Appendix J	Maps of parcels of land proposed for land-based conservation measures	N/A	N/A
	Maps as per Appendix M as required in relation to any land-based conservation measures	N/A	N/A
Tables			

Avoid and minimise impacts – Chapter 7	Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	Tables 20-25	Yes
Assessment of Impacts - Chapter 8, Section 8.1 and 8.2	Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Table 28	Yes
Mitigation and Management of Impacts - Chapter 8, Section 8.4 and 8.5	Table of measures to be implemented to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	Tables 20-25	Yes
Impact Summary - Chapter 9	No Tables		
Impact Summary - Chapter 10	Table of PCTs requiring offset and the number of ecosystem credits required	Table 28	Yes
	Table of threatened species requiring offset and the number of species credits required	Table 30	Yes
Biodiversity credit report – Chapter 10	Table of credit class and matching credit profile	See Appendix E	
Biodiversity certification offsets and strategy (biodiversity certification only)	Tables as per Appendix M as required in relation to any land-based conservation measures	N/A	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	N/A
Data			
Avoid and minimise impacts – Chapter 7	Digital shape files of: final proposal footprint direct and indirect impact zones Maps in jpeg format	Attached files	Yes

Assessment of Impacts - Chapter 8, Section 8.1 and 8.2	No data.		
Mitigation and Management of Impacts - Chapter 8, Section 8.4 and 8.5	No data.		
Impact Summary - Chapter 9	Digital shape files of: extent of TECs at risk of an SAI within the subject land location of threatened species at risk of an SAI within the subject land boundary of impacts requiring offset boundary of impacts not requiring offset boundary of areas not requiring assessment		Yes
	Maps in jpeg format		Yes
Impact Summary - Chapter 10	Submitted proposal in the BAM Calculator		Yes
Biodiversity credit report – Chapter 10	BAM credit report in pdf format		Yes
Biodiversity certification offsets and strategy (biodiversity certification only) - Chapter 12 and Appendix J	Digital shape files of parcels of land proposed for land-based conservation measures	N/A	N/A
	Maps in jpeg format	N/A	N/A

Appendix I: Authors CVs

JOELAN SAWYER

Senior Ecologist

Profile Summary

Joelan works with AEP in the Role of Senior Ecologist, Joelan Specialises in botany with experience focused in the Greater Sydney area and along the NSW coastline. He is proficient in performing flora and fauna surveys, plant identification and taxonomy, GIS, and reporting for biodiversity and impact assessments. He also has in-depth knowledge of the NSW legislative pathways, namely the Biodiversity Conservation Act 2016 and the associated Biodiversity Assessment Method (BAM). Joelan is an accredited assessor. Accreditation No. BAAS23016

Academic Qualifications

- Bachelor of Science (Biology), The University of Western Sydney, completed September 2018
- BAM Assessor; accreditation number: BAAS23016.

Training, Licences and Professional Memberships

- NSW Class C Driver's Licence
- WHS NSW Construction Induction White Card
- First Aid (Provide First Aid HLTAID011)

Professional Experience

Senior Ecologist Anderson Environment & Planning Sydney NSW	2023 – Present
Ecologist Anne Clements & Associates	2017 - 2023
Nursery Worker / Horticulturalist Wingham Nursery & Florist	2015 - 2017

Relevant Project Experience

Ecological Surveys

- Flora
 - Targeted surveys for *Dichanthium setosum* in the Hunter Region;
 - Targeted surveys for *Tetratheca glandulosa* and *Hibbertia procumbens* on the Somersby Plateau;
 - Targeted surveys for *Eucalyptus benthamii*, *Dillwynia tenuifolia* and *Grevillia juniperina*, Western Sydney;
 - Targeted surveys for *Genoplesium baueri*, and *Grammitis stenophylla* Northern Sydney;
- Fauna
 - Spot Analysis Techniques surveys: Muswellbrook, Gunnedah, Scone, Bermagui, Blue Mountains, Western Sydney;
 - Targeted surveys for Cumberland Plain Land Snail, Western Sydney;

- Targeted surveys for Broad Headed Snake, Cattai;
- Targeted surveys for Striped Legless Lizard and Pink Tailed Legless Lizard, Muswellbrook;
- Targeted surveys for Green and Golden Bell Frog, Eastern Suburbs, Sydney;
- Bushfire
 - Bushfire vegetation inspection and assessment in accordance with PBP 2019, various sites;
- Arboriculture
 - Waste recycling facility, 120 trees assessed, West Gosford;
 - Industrial development, 140 trees assessed, Stanmore Park;
 - Commercial development, 80 trees assessed, Marsden Park;

Ecological Assessment

- BAM assessment for Biodiversity Development Assessment Reports;
 - Sandstone quarry extension, Cattai;
 - Aged care housing, Bermagui;
 - Residential development, Pleasure Point;
 - Solar Farm, Stubbo;
 - Eco cabins, Colo;
 - Farm building and agricultural infrastructure, Richmond;
 - Mountain bike track, Delrio, Webbs Creek;
 - Aged care housing, Mollymook;
 - Hunter Gas Pipeline project, Hunter region;
- Accredited assessor for Landscaping Material Supply Facility Biodiversity Development Assessment Report, Greendale;
- BAM assessment and PCT for Ecological Assessment Reports;
 - Horse stabling development, Clarendon;
 - Great southern walk accommodation, Illawarra Escarpment;
 - Rezoning for Carrathool Shire Council at Merriwagga and Rankin Springs;
 - Biodiversity assessment of various Sydney Water assets, Greater Sydney;
 - Biodiversity assessment of Newcastle Councils bushland assets, Newcastle;
 - Biodiversity assessment of Penrith Councils assets at St Marys industrial area;

Ecological Monitoring

- Vegetation monitoring on VMP lands;
 - St Narsai Assyrian Christian College, Horsley Park;
 - Residential development, Cooranbong;
 - Sandstone Quarry restoration, Red Hill Reserve, Beacon Hill;
- Publications
 - Sawyer, J. (2021). *Achieving resilient biodiversity offsets on reconstructed landforms* [Poster Presentation]. Ecological Society of Australia 2021 "Symposium: Practitioners collaborating to restore and rewild landscapes" Darwin, Australia

Ian Benson

Director & Principal Ecologist

Profile Summary

Ian has been with AEP since 2016 and was appointed as a Director in 2022 and continues in the role of Principal Ecologist. Ian has detailed knowledge of environmental legalisation and biodiversity approval pathways. He is highly proficient in the implementation of the NSW Biodiversity Assessment Method including a detailed understanding of the Biodiversity Credit market to inform feasibility studies as well as minimising the costs of providing biodiversity offsets.

Ian's special interest areas and expertise include Song Meter surveys for Koala and Forest Owl, camera trapping for cryptic fauna, avifauna surveys in challenging wetland & shorebird environs and nocturnal survey of arboreal mammals and nocturnal birds

Ian is a conservation detection dog handler and is currently working with his purpose breed working Cocker Spaniel "Dash" who is currently trained to detect Koala scat, Forest Owl pellets and Cane Toads.

Ian also volunteers moderating and vetting bird surveys from *Birddata* which is the Birdlife Australia Atlas to ensure a robust database for both the Hunter Valley and Central Coast reporting areas totalling approximately 5000 surveys per year. This important data from Birdlife is periodically included in the NSW Bionet Atlas.

Academic Qualifications

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

Training, Licences and Professional Memberships

- Biodiversity Accredited Assessor System: 18147
- Ecological Consultants Association: Member
- Environment Institute of Australia and New Zealand: Member
- Zoological Society of NSW: Scientific Member
- Hunter Bird Observers Club: Member
- Birdlife Australia: Member
- NSW Class C Driver's Licence. Experienced 4WD operator
- WHS NSW Construction Induction White Card
- First Aid (Provide First Aid HLTAID003)
- Advanced Plant Identification (University of New South Wales)
- Remoted Piloted Aircraft Excluded Category Training with Aviassist Pty Ltd

Professional Experience

Director & Principal Ecologist	2022 - Present
Anderson Environment & Planning	
Principal Ecologist	2019 – 2022
Anderson Environment & Planning	
Senior Ecologist	2018 – 2019
Anderson Environment & Planning	

Ecologist Anderson Environment & Planning	2016 – 2018
Geotechnical Engineer/Project Manager Douglas Partners, Newcastle	2008 – 2016
General Council Member, Ecological Consultants Association of NSW	2024
Birddata Moderator, Birdlife Australia	2017 - Present

Relevant Project Experience

Ecological Survey examples

- Targeted surveys for *Dichanthium setosum* in Glen Innes Region;
- Target surveys for *Eucalyptus cannonii*, Western Rail Coal Unloader, Pipers Flat;
- White-bellied Sea-Eagle nest locating and monitoring Glenning Valley and Chisholm;
- Powerful Owl nest locating and monitoring: Salamander Bay, Soldiers Point, Anna Bay North, Wallsend, Cameron Park and Edgeworth;
- Spot Analysis Techniques surveys: Nelsons Plains, Wallsend, Anna Bay, Boat Harbour, Salamander Bay, North Arm Cove, Warnervale, Hamlyn Terrace, Kincumber, Palmdale, Wyee, Charlestown, Chisholm, Gillieston Heights, Mount Vincent, Radford Park and Cessnock;
- Surveys for Squirrel Glider (*Petaurus norfolcensis*) Warnervale Area June 2020;
- Cat Tracker Pilot Program Associated with The Hunter Estuary Wetlands for Hunter Local Land Services;

Ecological Assessment examples

- Accredited Assessor for approved Biodiversity Development Assessment Reports:
 - Cromarty Lane, Bobs Farm
 - Teraglin Village, Chain Valley Bay;
 - Berkeley Vale Road, Glenning Valley;
 - Railway Road, Warnervale;
 - Barden Ridge Townhouses;
 - McFarlane's Road, Chisholm;
 - Fairlands Road, Medowie;
 - Rosella Rise, Warnervale;
 - Carr's Road, Neath;
 - Jack Grant Avenue, Warnervale;
 - Minnesota Road, Hamlyn Terrace;
 - Bellbird North;
 - Waterford, Chisholm;
 - The Entrance Road, Erina Heights;
 - Port Macquarie Rezoning;
 - Blanch Street, Boat Harbour
 - Newell Highway, Gilgandra
 - Narromine Road, Dubbo

- Ecological Assessment Report for Proposed Modification To Approved Western Rail Coal Unloader At Pipers Flat;
- Infrastructure;
 - Gwandalan Recycled Water Main;
 - Lower Belford Water Main;
 - Raymond Terrace Rising Main;
 - Astra Street Landfill Rehabilitation Assessment;

Ecological Offsets and Monitoring

- Biodiversity Stewardship Agreements including:
 - Bobs Farm;
 - Cedar Brush Creek;
 - Girvan;
 - Mardi;
 - Wallsend;
 - Ellalong;
 - Blueys Beach;
 - South-West Rocks.

Publications

- Callaghan, C.T., Benson, I., Major, R.E., Martin, J.M., Longden T., Kingsford, R.T. (2020) *Birds are valuable: the case of vagrants*. Journal of Ecotourism 19:82-92 January 2020.
- Fawcett, A., Benson, I., Roderick, M. (2024) *First confirmed sighting of Great Frigatebird within the Hunter Region, NSW*. The Whistler 18 (2024): 10-13.

DARCY KILVERT

Senior Ecologist & Sydney Office Manager

Profile Summary

Darcy works with AEP in the role of Senior Ecologist / Sydney Office Manager, overseeing the Sydney Office since its establishment in 2023. With a comprehensive grasp of environmental legislation and approval processes, he possesses extensive expertise in implementing the Biodiversity Assessment Method. Having worked in the Natural Resource Management sector since 2015, Darcy has developed skills in Botany, Report Writing, Project Management, and GIS. His areas of special interest include Botany and Ecological Community identification, with a particular focus on the Greater Sydney Region.

Academic Qualifications

- Bachelor of Science (Biology), The University of Newcastle, completed in September 2021

Training, Licences and Professional Memberships

- NSW Class C Driver's Licence
- WHS NSW Construction Induction White Card
- First Aid (Provide First Aid HLTAID011)
- Working at Heights
- Chemcert and EPA ground applicator licence

Professional Experience

Senior Ecologist / Sydney Office Manager Anderson Environment & Planning Newcastle NSW	2023 - Present
Ecologist / Project Lead Anderson Environment & Planning Newcastle NSW	2022 - 2023
Ecologist Anderson Environment & Planning Newcastle NSW	2021 - 2022
Senior Field Supervisor Traditional Aussie Gardens Newcastle	2018 - 2021
Field Worker Newcastle City Council Newcastle	2015 - 2017



Relevant Project Experience

Ecological Survey examples

- Botanical surveys including BAM plots: Bermagui, Greendale, Waringah, Gosford, Lake Macquarie, Singleton, Quirindi, Lake Cathie, Dilkoon and Tweed Heads.
- Threatened flora surveys: Carrai, Blueys Beach, Dilkoon, and South West Rocks.
- Targeted Koala Nocturnal searches: Upper Rouchel, Greendale, South West Rocks, and Bundanoon.
- Spot Analysis Techniques surveys: Newcastle, Maitland, Hawkesbury, Camden, and Penrith.

Ecological Assessment examples

- Biodiversity Development Assessment Report project management: Greendale, Empire Bay, Hawkesbury, Pleasure Point, South West Rocks
- Ecological Assessment Reports: Carramar, Lake Macquarie, Gosford, and Woolwich.
- Biocertification Assessments: West Wilton, Strathfield, Schofields, and Rouse Hill
- Part-5 Ecological Assessments: Liverpool, Wollongong, and Homebush.
- BDAR Waivers: Revesby, Strathfield and Schofields.

Ecological Monitoring

- Biodiversity Stewardship Agreements including Blueys Beach and South West Rocks;
- Vegetation Monitoring Plots: Pheasants Nest and Warriewood.

Ben Jones

Ecologist - Project Manager

Profile Summary

Ben is an Ecologist and Project Manager with Anderson Environmental & Planning. He began his career as an Ecologist in 2015, working in the United Kingdom across a range of sectors including nationally significant infrastructure, minerals extraction, coastal defence and residential and mixed-use developments (urban and rural). Ben has worked in private consultancy and as an Ecology Manager on behalf of client organisations. He is also a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM).

Ben joined Anderson Environmental & Planning in April 2024, having relocated to Sydney from the United Kingdom. His early career involved conducting terrestrial field surveys for a wide range of flora and fauna, with particular skills gained with regards to herptiles, microbats and small mammals. As he progressed within the ecology field, Ben gained experience undertaking a wide range of assessments, producing reports and applications to undertake licensed ecological work. For the four years prior to joining AEP, Ben's roles have been more focussed towards technical review of contractor reports, documentation and licence applications in addition to management of ecological programmes of work for Tier 1 contractors.

Academic Qualifications

- Bachelor of Science (Zoology) Honours – Cardiff University, 2014

Training, Licences and Professional Memberships

- Full Member - Chartered Institute of Ecology and Environmental Management
- WHS NSW Construction Induction White Card
- First Aid (Provide First Aid HLTAID011)
- 4 x4 Vehicle Capability

Professional Experience

Ecologist - Project Manager Anderson Environment & Planning Sydney NSW	2024– Present
Ecology Manager EKFB Joint Venture Aylesbury, UK	2022 - 2023
Senior Ecologist Fusion Joint Venture Aylesbury, UK	2020 - 2022
Director Jones Ecology Ltd London, UK	2020 - Present

Ecologist
Ricardo Energy and Environment

2017 - 2020

Ecologist
Wardell Armstrong

2015 - 2017

Relevant Project Experience

Ecological Surveys

- Experience undertaking a large number of surveys for microbats, including roost assessments and monitoring as well as activity surveys and assessment
- Experience undertaking a large number of surveys for amphibians, reptiles and mammals for the purpose of assessing presence or absence as well as population monitoring
- Botanical surveys including BAM plots: Pleasure Point, Homebush, Cattai, Terrey Hills, Belrose, Bulli and Austral
- Threatened flora surveys: Pleasure Point, Ingleside, Bulli, Belrose, Homebush
- Nocturnal fauna surveys Pleasure Point, Cattai, Ingleside, Oxford Falls, Bulli and Somersby
- Spot Analysis Technique (SAT) surveys: Pleasure Point, Ingleside and Cattai
- Microbat Survey of multiple sites in Sydney

Ecological Assessment

- Experience in undertaking a wide range of ecological assessments in the UK including: Preliminary Ecological Appraisals; Protected Species assessments; BREAAM; Biodiversity Net Gain; Ecological Impact Assessment; and, Habitat Regulations Assessment
- Experience undertaking and reviewing a range of Ecological Assessments within NSW including:
 - BDAR: Greendale, Pleasure Point and Wadalba
 - BDAR Waiver: Strathfield, Revesby, Mount Druitt and Belmore
 - EAR: Woolwich, Terrey Hills, Lower Boro and Goulburn
 - EA: Auburn, Cowan and Eastwood
 - Biocertification: Oakville, Leppington, Bradfield and Schofields
 - BMPs: Empire Bay, Wadalba and Bundanoon
 - BARs: Managed delivery of 15 Biodiversity Assessment Reports for a series of sites throughout Greater Sydney

CHRIS WARK

Project Manager

Profile Summary

Chris has been with AEP since 2018 and works as a Senior Ecologist along with managing the Bushfire team within AEP. He has been involved in ecology for the past 15 years both in the UK and Australia undertaking a diverse range of terrestrial fauna surveys. Chris has a detailed knowledge of environmental and bushfire legislation and approvals pathways associated with both.

Chris' special interests and expertise include microbat roost investigations, ultrasonic survey and call identification, camera trapping for cryptic fauna, nocturnal survey of arboreal mammals.

With these skills and interests Chris leads the microbat and bushfire team at AEP and is involved in management of diverse range of projects across AEP including Biodiversity Assessments, Stewardship Site Assessments, Ecological Assessments, Clearing Methods Statements, Management Planning and Bushfire Threat Assessments.

Academic Qualifications

- Graduate Certificate in Bushfire Protection (2023)
- Diploma of Conservation and Land Management (2017)
- Bachelor of Teaching (Secondary School), University of Technology, NSW (2008)
- Bachelor of Science Hons (Ecology and Zoology), University of Sydney (2004)
- Bachelor of Science (Cell Biology and Biochemistry), University of Newcastle (2000)

Training, Licences and Professional Memberships

- NSW Class C Driver's Licence
- QLD WHS General Construction Induction (White Card)
- First Aid (Provide First Aid HLTAID011)
- Advanced Microbat Call Analysis Workshop
- Experienced 4wd operator
- GIS Mapping and training courses (ArcGIS, QGIS and Mapinfo)
- BTO Ringers association - expired
- CIEEM (Chartered Institute of Ecology and Environmental Management) - expired

Professional Experience

Senior Ecologist and Bushfire Manager Anderson Environment & Planning Newcastle NSW	2018 – Present
Ecological Consultant Applied Ecology Ltd Cambridge UK	2013 - 2017
Laboratory and Field Technician Cygnet Potato Breeders Cambridge UK	2012
Secondary School Teacher Taylors College Waterloo Sydney	2009 - 2011
Research Assistant and University Tutor Biological Sciences, University of Sydney Sydney NSW	2005 - 2007

Relevant Project Experience

Ecological Surveys

- Fauna survey including bird and reptile survey, spotlighting, koala habitat and SAT assessment, microbat emergence and return surveys along with transect surveys;
- Trapping and translocation work with mammals, reptiles, and amphibians;
- Camera trapping, acoustic detection, and call playback surveys;
- Vegetation quadrats and transects to identify flora species presence and abundance;
- Targeted vegetation transects for cryptic species;
- Brush-tailed Rock-wallaby habitat survey and macropod scat identification;
- Audio lure surveys including track and carnivore scat identification.

Ecological Assessment

- Fauna survey and identification utilising camera traps and audio technology
- Microbat survey, call analysis and ID
- GIS mapping and analysis
- Land conservation management
- Ecological field survey, covering terrestrial flora and fauna
- Arid zone ecology and feral cat management

Ecological Monitoring

- Ecological field survey, covering terrestrial flora and fauna, to inform the production of Ecological Reports within NSW and the UK;
- Assessment of sites using the Biodiversity Assessment Method (BAM) for the production of Biodiversity Assessment Reports (BDAR);



- Assessment of development proposals against the provisions of the EPBC Act, Koala Plans of Management, SEPP 44 and SEPP Koala Habitat Protection, Coastal Management SEPP and other associated legislative requirements;
- Analysis and reporting of microbat species relating to conservation and development within Australia and the UK.

Additional Project Experience

- Bushfire Threat Assessment analysis and reporting for Subdivision, State Significant Development (SSD), Infill, General residential, Special Fire Protection Purpose and Planning Proposal developments.
- GIS analysis and mapping for ecological reports, bushfire threat assessments, stewardship reporting and monitoring, management planning and development pathway planning and constraints assessment.

FRANCES O'BRIEN

Project Manager

Profile Summary

Frances is a Senior Ecologist and Lead Botanist with Anderson Environment and Planning, being an Accredited Assessor with over 12 years-experience in environmental impact assessment, environmental education, conservation land management, bush regeneration, wildlife rescue and rehabilitation, environmental sustainability, and environmental law. Frances has a particular interest in native edible and medicinal plants, and often runs educational tours and workshops on this topic.

Academic Qualifications

- Master of Environmental Law (University of Sydney NSW)
- Graduate Diploma of Legal Practice (Australian National University ACT)
- Bachelor of Environment (Climate Science) with Bachelor of Laws (Macquarie University NSW)
- Biodiversity Accredited Assessor Scheme no. 20013

Training, Licences and Professional Memberships

- NSW Class C Driver's Licence
- WHS NSW Construction Induction White Card
- First Aid (Provide First Aid HLTAID011)
- Advanced Plant Identification (University of New South Wales NSW)
- Ecological Consultants Association of NSW member
- Australian Plants Society NSW member
- Australian Association of Bush Regenerators NSW member
- Hunter Wildlife Rescue rescuer and Carer (past)
- Sydney Wildlife Rescuer and Carer (past)
- Hunter Intrepid Landcare – Group Coordinator (past)
- Wahroonga Waterways Landcare - Group Coordinator (past)
- Lane Cove National Park Bushcare volunteer (past)
- Ku-ring-gai Municipal Council Bushcare volunteer (past)



Professional Experience

Senior Ecologist (Lead Botanist) Anderson Environment & Planning Sydney, NSW	2021 – Present
Ecologist / Senior Ecologist Anderson Environmental & Planning Newcastle	2018 - 2021
Senior Scientist - Ecology Ecology Team, Sustainability, Ecology and Climate Change Division, SMEC Newcastle	2021
Senior Conservation Planning Officer North-west Planning Team, Biodiversity Conservation Division, Department of Planning and Environment Dubbo	2021
Environmental Officer Projects Team, Seventh-day Adventist Aged Care Greater Sydney, Wahroonga	2014 - 2017

Relevant Project Experience

Ecological Survey examples

Ecological Communities

- Critically Endangered Ecological Community identification and mapping for Department of Planning and Environment, Northern Tablelands
- Plant Community Type determination through Biodiversity Assessment Method: Sutton Forest, Bundanoon, Tarago, Galambine, Gilgandra, Peak Hill, Goulburn, Wagga Wagga, Cooma, Jindabyne, Pambula, Meroo Meadow, Dunmore, Culcairn, Blueys Beach, South West Rocks, New Italy, Wadalba, Lochinvar, Mt Malumla, Scone, Wahroonga, Rouse Hill, Box Hill, Thornton, Kanwal

Flora

- Targeted surveys for *Rhodamnia rubescens*: Blueys Beach, Wallsend, Ourimbah
- Targeted surveys for *Eucalyptus benthami* at Eastern Creek
- Targeted surveys for *Rhodomyrtus psidioides* at Charlotte Bay
- Targeted surveys for *Eucalyptus glaucina* at Pokolbin
- Targeted surveys for *Hibbertia procumbens* at Somersby
- Targeted surveys for *Leucochrysum albicans* subsp. *tricolor* at Cooma
- Targeted surveys for *Acacia bynoeana* and *Grevillea parviflora* subsp. *parviflora* at Ellalong

Fauna

- Koala Spot Analysis Technique Surveys: Mount Victoria, Sutton Forest, Bundanoon, Bermagui, Medowie
- Targeted nocturnal surveys for Greater Glider at Mittagong
- Targeted surveys for Wallum Froglet at Doyalson
- Targeted surveys for Green and Golden Bell Frog at Kooragang

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Riparian and Aquatic Assessment

- Hydroline assessment: Galambine, Bundanoon
- Aquatic assessment: Sutton Forest, South West Rocks

Ecological Assessment examples

- Accredited Assessor for Biodiversity Development Assessment Reports for:
 - Boomerang Drive, Blueys Beach
 - Newell Highway Service Station, Gilgandra
 - Yallakool Rd, Cooma
 - Annangrove Road, Rouse Hill
 - Terrigal Rd, Morisset
 - Weakleys Dr, Beresfield
 - Jensen Rd, Wadalba
- Supporting assessor on Biodiversity Development Assessment Report for New Italy, including early examination of 'Guideline for applying the Biodiversity Assessment Method at severely burnt sites'

Ecological Monitoring examples

- Biodiversity Management Plan monitoring and reporting for:
 - Wahroonga Estate, Wahroonga
 - Ampol Service Station, Pheasants Nest
 - Hue Hue Road, Wyee
 - Fal Brook Wildlife Refuge, Mount Royal
 - Nelson Road, Nelson
 - Various Sydney Water assets, western Blue Mountains region
 - Eucalyptus cryptica (previously sp. Catti) health monitoring at Rouse Hill
 - Epacris purpurascens, Callistemon linearifolius and Persoonia bargoensis health monitoring at Pheasants Nest
- Powerful Owl roost tree monitoring at Wahroonga

Publications

- O'Brien, Frances (2018) Waterway. ISBN 978-0-244-13152-4. Lulu Publishing.
- Roddis, Marc, O'Brien, Frances (2008) 'Aspects of the biology and behaviour of Ligia exotica - the wharf 'louse''. Metamorphosis Australia 51. December 2008.

JEREMY BURRILL

Ecologist & Project Manager

Profile Summary

Jeremy works with AEP in the role of Ecologist / Project Manager. He is a graduate of environmental science and management, and has experience in voluntary roles in environmental fields, involving threatened fauna and flora surveying, biodiversity reporting, management plans, consultancy projects and project management. His background in environmental fields with his growing ecological knowledge and management experience is utilised in a diverse array of applications in his current role.

Academic Qualifications

- Bachelor of Environmental Science (Environmental Management and Sustainability) Deakin University (2020)

Training, Licences and Professional Memberships

- NSW Class C Driver's Licence
- WHS NSW Construction Induction White Card
- First Aid (Provide First Aid HLTAID011)
- Work Safely at Heights

Professional Experience

Ecologist / Project Manager Anderson Environment & Planning Sydney NSW	2022 – Present
Ecologist Anderson Environment & Planning Sydney NSW	2020 – 2022

Relevant Project Experience

Ecological Surveys

- Botanical surveys including Biodiversity Assessment Method (BAM) vegetation plots under supervision of BAM accredited assessors Frances O'Brien and Timothy Mouton across various sites.
- Threatened flora surveys: Bundanoon, Greendale, Edmondson Park, Loftus, Glenning Valley, Wyee, Wadalba, Halloran, Somersby, Mardi, Wallsend, North Kellyville, Loftus and Pleasure Point.
- Threatened Nocturnal Fauna surveys: Bundanoon, Greendale, Edmondson Park, Loftus, Glenning Valley, Wyee, Wadalba, Halloran, Somersby, Mardi, Wallsend, Cattai, Barrington Tops and Somersby.
- Threatened Diurnal Fauna Surveys: Bundanoon, Greendale, Edmondson Park, Loftus, Glenning Valley, Wyee, Wadalba, Halloran, Somersby, Mardi, Wallsend, Cattai, Barrington Tops, Pleasure Point and Somersby.
- Microbat Nocturnal Harp Trapping: Wallsend and Mardi.



- Koala Spot Assessment Technique Surveys: Greendale, Wadalba, Girvan and Somersby.
- Nestbox installation: Glenning Valley and Narellan Vale.
- Habitat surveys including hollow bearing tree identification: Bundanoon, Greendale, Edmondson Park, Wyee, Somersby, Cattai, Barrington Tops and Somersby.
- Vegetation Clearance Surveys and Supervision: Glenning Valley, Wyee, Warnervale, Chain Valley Bay, Narellan Vale and Carramar.

Ecological Assessment

- Biodiversity Development Assessment Report contribution: Greendale, Edmondson Park, Austral, Rouse Hill and Annangrove.
- Ecological Assessment Reports: Minto, Berkeley Vale, Rooty Hill, Warriewood, Macquarie Park, Carramar and Ambarvale.
- Biocertification Assessments: West Wilton, Edmondson Park and Schofields.
- Weed Management Plan: Pheasants Nest and Tahmoor.
- Vegetation/ Biodiversity Management Plans: Woy Woy, Pheasants Nest, Vineyard, Grantham Farm, Warriewood, Loftus and Greendale.
- Riparian Assessment Reports: Schofields, Greendale, Quakers Hill and Ingleside.
- BDAR Waiver Letters: Revesby, Strathfield and Schofields.
- Plant Community Type determination.
- GIS Mapping.

Ecological Monitoring

- Vegetation Monitoring Plots: Pheasants Nest, Warriewood and Werrington.
- Fauna Monitoring/ Nestbox Monitoring: Glenning Valley and Wyee.

ALANA GUEST

Project Lead

Profile Summary

Alana has worked with AEP since 2022 in the role of Ecologist and has gained experience in a variety of environmental work, including targeted flora and fauna field surveys, reporting, and data management. She has competence in wildlife handling of Long-nosed Bandicoots, Bush Rats, and Brown Antechinus including microchipping of said species.

Alana has managed and implemented a Wildlife / Ecological Management Plan at North Head Sanctuary since commencement in November 2023, to monitor threatened species including the Critically Endangered Ecological Community, Eastern Suburbs Banksia Scrub and the Endangered Population of Long-nosed Bandicoots (*Perameles nasuta*). Additionally, she has implemented monitoring of biodiversity and threats at North Head through targeted bird, reptile, amphibian, mammal (including microbats) and invertebrates surveys, and feral predator and bushfire monitoring.

Alana's interest areas include camera trapping for cryptic fauna, targeted fauna trapping surveys of threatened species for population estimates and genetic diversity analysis, microbat call analysis and nocturnal surveys for arboreal mammals, nocturnal birds and amphibians.

Academic Qualifications

- Bachelor of Science, Biology major and Bachelor of Arts, History major and Ancient History minor – University of Newcastle, 2022

Training, Licences and Professional Memberships

- NSW Class C Driver's Licence
- WHS NSW Construction Induction White Card
- First Aid (Provide First Aid HLTAID011)
- CPR (Provide Cardiopulmonary resuscitation HLTAID009)
- Working with Children's Check
- Micro-Workshop: Basics of Bat Calls, 2023
- Australian Association of Bush Regenerators Grass Identification Workshop, 2023
- Bat Call Analysis Workshop: Bat Detection for Beginners & Intermediate/Advanced Call Analysis, 2024
- Microchip Training Workshop (provided by Taronga Zoo's Institute of Science and Learning), 2024

Professional Experience

Ecologist / Project Lead - North Head	2023 – Present
Anderson Environment & Planning Sydney NSW	
Ecologist	2022 – 2023
Anderson Environment & Planning Newcastle NSW	



Relevant Project Experience

Ecological Surveys

- Targeted Long-nosed Bandicoot cage trapping surveys in North Head, Manly in coordination with National Parks and Wildlife Services (NPWS) (2024 - present);
- Targeted Bush Rat, Brown Antechinus and Eastern Pygmy-possum Elliott trapping survey in North Head, Manly (2023 - present);
- Targeted Koala surveys via completion of Spot Analysis Techniques, various sites across NSW (2022 - 2023);
- Targeted threatened orchid and ground cover surveys via 5m transects, various sites across NSW (2022 - 2023);
- Targeted threatened shrub surveys via 10m transects, various sites across NSW (2022 - 2023);
- Targeted threatened tree surveys via 10m transects, various sites across NSW (2022 - 2023);
- Targeted microbat surveys and call analysis via ultrasonic recorders (Anabat), various sites across NSW (2022 - present);
- Camera trapping surveys for ground and arboreal species, various sites across NSW (2022 - present);
- Diurnal bird surveys, various sites across NSW (2022 - present);
- Targeted threatened frog surveys via spotlighting and call playback, various sites across NSW (2022 - present);
- Targeted nocturnal surveys for threatened forest owls via spotlighting, stagwatching, and call playback, various sites across NSW (2022 - 2023);
- Hollow Bearing Tree Assessment, various sites across NSW (2022 - 2023).

Ecological Assessment

- Bushfire Threat Assessment Reports: various sites across NSW (2023 - present);
- Ecological Assessment Reports: various sites across NSW (2022 - 2023);
- Streamlined Biodiversity Development Assessment Reports: various sites in Sydney Region and Newcastle and the Greater Hunter Region (2023);
- Biodiversity Development Assessment Reports: various sites in Central Coast Region, Newcastle and the Greater Hunter Region and Northern Rivers Region (2023).

Ecological Monitoring

- Camera trap monitoring at Biodiversity Stewardship Agreement in Blueys Beach;
- Biodiversity monitoring targeting the Critically Endangered Ecological Community, Eastern Suburbs Banksia Scrub and the Endangered Population of Long-nosed Bandicoots (*Perameles nasuta*) at North Head.

ALESSANDRO RONCOLATO

Ecologist

Profile Summary

Alessandro is an ecologist at Anderson Environmental & Planning, where he applies his knowledge and experience to a variety of environmental projects. Having recently completed his undergraduate degree in Environmental Science, he has developed a wide set of skills that are crucial to his role.

During his time at AEP, Alessandro has honed his abilities in fauna and flora identification and surveys, GIS, animal handling, environmental planning, ecological assessments, restoration, land management and report writing. His knowledge and practical experience make him a valuable asset in promoting sustainable environmental practices and effective ecological restoration.

Academic Qualifications

- Bachelor of Science (Environmental Biology) and Bachelor of Arts in International Studies – University of Technology Sydney, 2023

Training, Licences and Professional Memberships

- NSW Class C Driver's Licence
- WHS NSW Construction Induction White Card
- First Aid (Provide First Aid HLTAID011)
- SSI Open Water Divers License

Professional Experience

Ecologist Anderson Environment & Planning Newcastle NSW	2023 – Present
Sales Assistance Rebel Sport	2019 – 2024
Construction Labourers Bedrock	2017

Relevant Project Experience

Ecological Surveys

- Camera trapping surveys for ground and arboreal species including deployment, completion, and analysis at Bermagui, Scone and Pleasure Point.
- Completed threatened orchid and ground cover surveys via 5m transects at various sites.
- Completed threatened shrub surveys via 10m transects at various sites.
- Completed threatened tree surveys via 20m transects at various sites.
- Microbat surveys by Anabat deployment, and collection at Santa Sabina, Revesby, Pleasure Point, Mount Vicotria, Blackheath.
- Spot Analysis Techniques surveys: Colo heights, Mount Victoria, Scone and Singleton.



- Nocturnal surveys for forest owls such as Powerful Owls, Sooty Owls and Barking Owls which includes stag watching, call playback and spot lighting at various sites.
- Diurnal bird surveys which include the deployment and collection song meters at various sites.
- Conducting frog surveys for threatened species at various sites.
- Bushfire vegetation inspection and assessment in accordance with PBP 2019 at various sites.
- Habitat and Hollow Bearing Tree Assessments completed at Wyee, Illawarra, Wentworth and Mount Victoria.
- Arborist Assessment for Austin Butler Reserve, Yanco and Catherine fields
- Conducted target surveys for a variety of threatened flora and fauna at various sites in the Blue Mountains.

Ecological Assessment

- Biodiversity Assessment Method (BAM) plots completed at various sites under the supervision of BAM accredited assessor Joelan Sawyer.

Ecological Monitoring

- Assisted in the locating, trapping, handling and microchipping of native bush rats at North head.

Jodie Pullen

GIS Officer

Profile Summary

Jodie works with AEP in the role of GIS Officer since 2023. She conducts advanced geospatial analyses at AEP using a range of different software's including ArcPro, QGIS and MapInfo. She has completed mapping for a wide range of environmental projects including BTA, EAR, BDAR, BSSAR, and RAR. During her time at AEP, she also has experience in flora and fauna surveys. Jodie has a sound understanding of NSW and Commonwealth environmental legislation and guidelines including the Biodiversity Conservation Act, Environment Protection and Biodiversity Conservation Act.

She graduated from the University of South Wales with a Bachelor of Geography (Honours) and a postgraduate masters in Wildlife and Conservation Management. Jodie previously worked in marine approvals before coming to AEP where she was the GIS lead for the team. She also wrote detailed environmental assessments and engaged both internally and externally to determine complex marine applications. Some of the projects she approved include offshore windfarms, tidal energy, aquaculture projects and more. She was also a volunteer at the Wildlife Trust where she completed flora and fauna surveys. Jodie has a variety of environmental work, both paid and unpaid in GIS and mapping, terrestrial field surveys, reporting, project management and data analysis.

Academic Qualifications

- MSc Wildlife and Conservation Management | Upper Second-Class honour – University of South Wales (2018-2019)
- BSc (Hons) Geography accredited by the Royal Geographical Society- University of South Wales (2015-2018)

Training, Licences and Professional Memberships

- NSW Class C Driver's Licence
- WHS NSW Construction Induction White Card
- First Aid (Provide First Aid HLTAID011)
- Project Management for Wildlife Conservation (WildTeam UK)
- Open Water Diver (PADI)
- ORCA Marine Mammal Observer
- ORCA Ocean Watcher

Professional Experience

GIS Officer Anderson Environment & Planning Newcastle NSW	2023 – Present
Marine Approvals Officer Natural Resources Wales Wales, United Kingdom	2019 - 2023
Wildlife Surveyor Wildlife Trust Wales, United Kingdom	2019

Relevant Project Experience

Data & Geospatial Analysis

- Create maps for various reports such as Ecological Assessment, Biodiversity Management Plans, Riparian and Aquatic Assessment, Bushfire Assessment, Biodiversity Stewardship Site Assessment and Biodiversity Development Assessment.

Natural Resources Wales (NRW)

- GIS lead for the team, delivered training on different software's including ArcMap and QGIS.
- Used open-source data in ArcMap to analyse and predict possible impact pathways from proposed developments.

Ecological Surveys

Wildlife Trust, Wales

- Nest box bird surveys, water vole surveys, vegetation management, pest control and various practical habitat management for nature conservation (Various sites across South Wales).

AEP

- Deployed and reviewed camera trapping surveys for ground and arboreal species;
- Microbat surveys by deploying Anabat devices (Bermagui, NSW);
- Frog surveys (Bermagui, NSW);
- Ground cover and shrub targeted flora surveys (Various sites).

Ecological Assessment

NRW

- Conducted Habitat Regulation Assessments and Water Framework Directives for numerous application types including, offshore windfarms, tidal and wave energy, aquaculture sites, dredge and disposal licences and many more.
- Assisted in creating a new Water Framework Directive template in line with updated policy and legislation after Brexit.

Ecological Monitoring

- Community-based conservation fieldwork in South Africa.
- Passive acoustic monitoring for marine mammals across the Welsh coastline.
- Marine approvals - post licence conditions to monitor marine mammals, sediment accretion etc.