Biodiversity Development Assessment Report

113 Orchard Street, Warriewood

Prepared by Ecological Consultants Australia Pty Ltd TA Kingfisher Urban Ecology and Wetlands

February 2024 updated July 2024

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Limitations Statement

Information presented in this report is based on an objective study undertaken in response to the brief provided by the client. Any opinions expressed in this report are the professional, objective opinions of the authors and are not intended to advocate any particular proposal or pre-determined position.

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1	8 February 2024	E. G. Dalby-Ball B. Thompson	Draft for Certification	Tony McLain c/o Jill Hunter
2	8 July 2024	Brooke Thompson	Updated in response to RFI	

Declarations

i. Certification under clause 6.15 Biodiversity Conservation Act 2016

I, Kathryn Duchatel, certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the *Biodiversity Conservation Act 2016* (BC Act).

Signature:

Date:

BAM Assessor Accreditation no: BAAS17054

This BDAR has been prepared to meet the requirements of BAM 2020. Appendix V assesses compliance with the minimum information requirements outlined in BAM Appendix K.

ii. Details and experience of author/s and contributors

Name	Position	Tasks performed	Relevant qualifications
Geraldene Dalby-Ball	Director Kingfisher Urban Ecology and Wetlands	BDAR preparation BAM field surveys	BSc. (Hons) (Syd) awaiting reaccreditation course. Previously accredited but lapsed.
Brooke Thompson	Senior Ecologist	BAM field surveys BAM-C analysis BDAR preparation	BSc Conservation Biology, (Wollongong)
Kathryn Duchatel	Director écologique	Review of BAM-C analysis BDAR findings and decisions based on data	BSc. Env. (Macq) EIANZ CEnvP #601

iii. Conflict of interest

I, Kathryn Duchatel, declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest.

This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client.

Signature:

Date: July 2024

BAM Assessor Accreditation no: BAAS17054

BDAR Preparation

This BDAR has been updated in response to the Natural Environment Referral Response – Biodiversity issued by Northern Beaches Council on the 17th of May 2024.

The table below outlines the requests in the referral and our response to each.

Information request	ECA response
The Ecologist has selected Belrose Coastal Slopes as the Mitchell Landscape in BOAMS. However, the BDAR has identified that the correct Mitchell Landscape is Sydney – Newcastle Barriers and Beaches. This is to be amended in BOAMS.	BOAMS has been amended to select Sydney – Newcastle Barriers and Beaches as the correct Mitchell Landscape.
The Ecologist has applied three different Vegetation Zones within PCT 3176: VZ1 – Moderate, VZ2 – Low (Sandstone Boulders) and VZ3 – Low. In accordance with the BAM Operational Manual (Stage 1), the assessor must stratify areas of each PCT that are in different broad condition states into separate Vegetation Zones (VZ). Council's Biodiversity Referrals team do not agree with the stratification of vegetation and have identified two VZs rather than three, these being VZ1 Moderate (east) and VZ2 Moderate (west), based largely on landscape position, presence of sandstone outcropping within the west of the site and slight differences in the Vegetation Integrity (VI) scores for each of the plots (undertaken by Council). Vegetation mapping is to be reviewed, to include all native vegetation within the site, including the south-eastern corner of Plot 4, which has not been mapped.	This BDAR now separates PCT 3176 into only two VZs, these being: • VZ1 – Good condition (east) • VZ2 – Good condition on sandstone outcropping (west) The cleared lawn on street side is still omitted. The vegetation mapping has been rvevised to add the portion of vegetation near the existing dwelling.
Furthermore, the Ecologist has identified five Management Zones (MZ) within each of the VZs, including new structures, footprint, APZ, 10 and 50. Council do not agree with the proposed MZs, and have instead identified two MZs to reflect either wholescale clearing or partial clearing (in accordance with future clearing entitlements). Council have identified that the development footprint (including the APZ) and the residual 10/50 area that extends past the APZ are the two proposed MZs. This is because the future VI score of the development footprint (including the APZ) will be 0 (reflective of wholescale clearing) and the future VI score of the residual area of the 10/50 clearing entitlement that extends past the APZ being reduced in BOAMS to clear all understory species (reflective of partial clearing).	This BDAR now identifies two MZs, these being: • MZ1 – Wholescale clearing (including the full APZ area) • MZ2 – Retained vegetation (outside of APZ) As per email from Council the 10:50 area has not bee included in impact area but has been used in área of impact' BOS trigger.

The Ecologist has miscalculated the full impact of native vegetation clearing in BOAMS within a number of MZs. Only two MZs have had the future VI score reduced to 0, including for 'structures' and '10' (of the 10/50). See Table 3.4 of the BDAR. The total area of the footprint, APZ and structures MZs should all be reduced to 0. The remaining MZ '50' (of the 10/50) has been correctly calculated by the Ecologist, reflecting the removal of understory and the retention of trees. This miscalculation within the MZs appears to intentionally underestimate the clearing impact and as a result reduces the generation of Ecosystem Credits required by the proposal.	VI scores for MZ1 have been reduced to 0. MZ1 includes the total area of the footprint, APZ and structures. VI scores for MZ2 have not been reduced. MZ2 is the area of retained vegetation. MZ2 will be unimpacted by the proposal and thus, the VI scores have not been changed.
Council's Biodiversity Officers undertook BAM Plots in the same location as the Ecologist had undertaken Plot 1 and Plot 3 and revealed a significant difference in the structure and composition of vegetation within the plots. A number of species were not identified within the BAM Plots by the Ecologist, reducing native species richness. Furthermore, the Ecologist had calculated a much lower cover percentage for many of the species recorded in the plot. Misrepresentation of vegetation condition has the potential to influence credit obligations, and in this instance, the result of the plots being undertaken at a low standard has meant that two VZs have such a low VI score that credits are not generated to offset the vegetation within those areas. As such, the proposed offset area for vegetation within the site is only 0.14 ha out of a total of 0.80 ha that is being impacted.	BAM plot 1 and 3 were revised on the 7/07/2024. Plot data is provided in Appendix I.
It is noted that two of the BAM plots undertaken by the Ecologist (Plots 2 and 3) are not entirely within the boundary of the subject site. Any additional or future plots are to be located within the boundaries of the lot.	BAM plots were revised on the 7th of July 2024 and were undertaken entirely within the subject site boundary.
Council's Biodiversity Officers calculated VI scores of 48.7 (Plot 1) and 43 (Plot 3). This depicts a more accurate representation of the moderate condition of vegetation found on site. As such, the Ecologist is required to revise the BAM plots and resubmit plot data.	BAM plots have been revised. The VI score for VZ1 is 49.4 and for VZ2 is 44.9.
Bat Surveys The Ecologist identified that targeted surveys were required for Large-eared pied bat, which is listed as threatened species under the BC Act, and is classified as a candidate Serious And Irreversible Impacts (SAII) species in accordance with the BAM (2020). One	The Anabat survey has been voided from this BDAR and the Large-eared Pied Bat has been assumed present. We note that for a small site such as this 4 detectors on site would all pick up the same bats. I have been advised verbally by BOS help

Anabat Swift detector was utilised for targeted survey and was installed on site between the 11/11/2022 and 17/11/2022, within the required survey period. However, the survey does not meet the minimum survey effort as prescribed in the 'Species credit' threatened bats and their habitats NSW guide for the Biodiversity Assessment Method (DPIE 2021). The minimum survey effort is four Anabat detectors over four nights or one device for 16 nights (or equivalent). As the survey does not meet the minimum requirements, the species is assumed present and species credits will be required to be generated for Large-eared pied bat and an SAII assessment for the species is to be included in the BDAR. Furthermore, the Ecologist has not included a map of the location of the Anabat Detector within the BDAR and has not specified the name, details or experience of the threatened bat surveyor who analysed the results of the survey. This information is required to be included in the BDAR in accordance with the 'Species credit' threatened bats and their habitats NSW guide for the Biodiversity Assessment Method (DPIE 2021). The Ecologist also stated in the BDAR that two species credit bat species potentially occurred within the site, but could not be confidently identified, including Southern Myotis and Eastern Cave Bat which are also candidate SAII species. As such, additional targeted survey is required to be undertaken in accordance with the guidelines, or, they are to be assumed present on site. If the latter is decided, species polygons must be mapped in accordance with the guidelines in order to calculate species credits. Note: suitable habitat is located on site for Eastern Cave Bat and Large-eared Pied Bat in accordance with requirements listed in the Threatened Biodiversity Database Collection (TBDC).	desk that for a small site 1 is adequate for 7 nights. Most BAM methods are not designed for small sites. We have added the LEPB back in to fulfil Counils requirement. The location was provide in earlier BDAR (2022) and may have not been repeated in most recent. The analysis was by Anna McConville PhD, B.Env.Sc. Ecologist / Director E: anna@echoecology.com.au M: 0423 801 779 https://www.echoecology.com.au/page/fauna-call-identification/  Location is point of triangle and wide microphone direction the flat surface and arrows. Report previously supplied and included again (seperately to BDAR) see PDF submitted with DA.
Avoid and Minimise The Ecologist has made no attempt to describe strategies in which the proposal has avoided and minimised impacts on biodiversity values associated with the proposals location or design. Rather, they have included screenshots of impacts associated with tree loss taken directly from the submitted Arborist Report. There are also no maps of alternative footprints considered by the proposal to avoid or minimise impacts to biodiversity. This	See Section 6 of this BDAR

should be provided given the previous Development Applications submitted in the past for the site. Council believe that there is potential to avoid and minimise, particularly with the location of the proposed dwelling. For example, If the dwelling was located closer to the road or within the footprint of the existing dwelling, the APZ and future 10/50 clearing entitlements would not extend so far into remnant native vegetation within the western portion of the site. There has been no consideration of this within the BDAR and there are no alternative designs discussed within the report.	
Clearing for Asset Protection Zones Advice provided by Council's Biodiversity Referrals team for the previously withdrawn Development Application (DA2023/1127) was that "the bushfire consultant and arborist are to confirm if tree removal is required in addition to the 25 trees proposed for removal in order for the APZ to meet the minimum requirements of Planning for Bushfire Protection. Additional tree removal may not be supported (29/09/2023)". This has not been addressed in the current application. From review of the Arborist Report, after consideration of the trees proposed for removal for the development footprint, it is unclear if canopy cover has been reduced enough to meet the minimum APZ requirements. As such, further tree removal may be required, in which case it must be considered in the impact assessment.	Up to an additional 5 trees may need to be removed / pruned in the APZ to have canopy seperation between APZ boundary and bushland. Pruning of connecting canopy will be preferential to removals. If additional tree removals are needed (eg north side) this will be wholly within APZ. Trees / branches selected for removal will be a joint decision by ecologist/ bushfire consultant. Priority retention will be to habitat trees (hollows), bloodwoods (for Gliders) and Forest She Oaks (for Glossy Blacks), tree species with low abundance on-site, trees of high SULE rating. Only minimum needed to meet the APZ requirements will be impacted. The Fire and Vegetation Mgt Plan outlines how the APZ is to be managed to maximise biodiversity while being complaint. The 'Development Footprint' management zone is representative of the extent of works (excluding the structures) being porous surfaces with the retention of some trees where the VI score is expected to be lowered but not completely to 0 given that some trees will be retained. All understorey vegetation (shrubs, grasses, forbs, ferns, other) in the BAM-C were reduced to 0. Number of tree species and cover of trees were reduced to reflect partial clearing as some trees are being retained in the footprint area. The APZ does not require the clearing of shrubs as the area already meets the requirements of an APZ IPA as per Appendix 4 for the Planning for Bushfire Protection (NSW RFS 2019).

	Grasses/ground plants need to be kept to less than 100mm but would not be removed (noting they already are in compliance with the requirements for an APZ IPA). Leaf litter will need to be reduced in some areas (most already complies with APZ IPA requirements). Leaf litter was reduced to 0 in the BAM-C. Reduction methods are provide in the VMP with leaf blowing favourable as it will not impact soil surface or 'scratch/rake' desirable plants. Length of logs was retained in the BAM-C as these will be relocated to the western side of the site outside of the APZ and hence, function value of logs is retained on site.
Biodiversity Management Plan (BMP) Council's Biodiversity referrals team previously requested that a Biodiversity Management Plan (BMP) be submitted with the application in order to clarify proposed impact mitigation measures. This has not been submitted with the current application and is required to be included with the application in order for Council's Biodiversity Referrals team to complete the referral. We note that the BDAR states that the preparation of a BMP will be via a condition of consent, however is considered that review of the the full BMP is required prior to determination in order to demonstrate how any retained vegetation and wildlife habitat will be protected and managed.	Noted and BMP – has been written.
Compliance with Council's LEP and DCP The BDAR has considered the applicable LEP and DCP controls, however has only considered the loss of trees as a potential impact. It is important to note that a key element of the BOS is the consideration of the future potential for native vegetation clearing within the property as a result of clearing entitlements such as APZs and 10/50. In addition, applicable local planning controls require consideration of impacts to all native vegetation. From calculations within the BDAR, it is estimated that up to 80% of native vegetation within the site will be modified. As such, the full impacts of the vegetation clearing should be reassessed by the Ecologist for compliance against the LEP and DCP controls.	See Section 1.4

Summary

Ecological Consultants Australia trading as Kingfisher Urban Ecology and Wetlands has been engaged by Tony McLain Architects c/o Jill Hunter to prepare a **Biodiversity Development Assessment Report** (BDAR) to accompany a development application for demolition works and construction of a dwelling house, horse arena, stables and paddocks at Lot 6 in DP 749791 known as 113 Orchard Street, Warriewood in the Northern Beaches local government area (LGA). The first BDAR was in 2022 and has been revised since then with site and design changes.

Legislative pathway for the proposed development or activity to be considered

- Development that requires consent under Part 4 of the EP&A Act.

Reason for entering the BOS

- Threshold for clearing (0.5 ha or more) exceeded, above which the BAM and offsets scheme apply. 10:50 was included in determining threshold area.
- Clearing of native vegetation and other biodiversity impacts prescribed by clause 6.1 of the Biodiversity Regulation 2017 on land identified on the Biodiversity Values Map.

PCTs and TECs

Field surveys and collection of BAM plot data from within the subject land's vegetation validated the presence of PCT 3176 – Sydney Enriched Sandstone Moist Forest. No TEC was recorded within the subject land.

Avoid and Minimise then Mitigate

- The proposal has been altered from 2018 to present (detail as provided in Stage 2 of this BDAR). Changes include, reduced wastewater area, changes to location of horse arenas (moved away from the west (bushland). The proposed dwelling has been moved closer to the centre and out of the area of dense (albeit many smaller) trees. Internal roads and accessways have been reduced. Trees with hollows have been retained (all but one) and this is unavoidable. That hollow will be salvaged and relocated on site. The area outside the APZ has been dedicated as conservation areas within the Fire and Vegetation Mgt plan. See detail in this BDAR.
- Proposed works are outside the Tree Protection Zones (TPZs) of 114 trees.
- Tree protection measures and tree sensitive construction methods outlined in the Arboricultural Impact Assessment & Tree Protection Specification (L&Co 07 April 2023) will be implemented to minimise the likelihood of negative impacts on trees.
- All trees that are to be retained within the proposed horse paddocks will have a permanent trunk protection installed in the form of wooden fencing to prevent mechanical damage from horse activities.
- The proposal retains Tree 113. This tree contains a hollow being occupied by a native glider. Bunting shall be used to fence off this tree and others with hollows during development to ensure that the trees are not disturbed.
- An ecologist shall be present during tree removal to supervise the clearance of trees and other habitat to capture, treat and/or relocate any displaced native fauna to an appropriate nearby location. Also to work with the fire consultant to direct tree / limb removal during the creation of the APZ.
- Prior to the demolition of the existing dwelling, an ecologist shall undertake a pre-clearance survey to check the existing dwelling for any evidence of roosting microbats. Where roosting microbats are found, a suitability qualified and vaccinated person is to be engaged to relocate the species. For cave dwelling species, a temporary mock cave (e.g., shed) is to be installed on the subject land. The relocator is to encourage and move bats into the mock cave. When

microbats leave the mock cave, the structure may be removed. For hollow dwelling species, microbats are to be relocated into next boxes and the boxes are to be installed in trees to be retained on the subject land.

- The sites vegetation and APZ will be managed long-term via and Fire and Vegetation Mgt Plan.

Threatened Species

The Large-eared Pied Bat and Swift Parrot have been assumed present on the subject land.

Direct Impacts

The proposal requires the clearing of thirty-three (33) native trees to facilitate the development in its current form. With an additional possible 5 in the APZ (see method of selection and removal or pruning) in this BDAR and VMP.

The proposal has been assessed as permanent complete removal of 0.37 ha of PCT 3176 though of this 0.26ha is the APZ and this will not have complete removal. Credits for species credits has also been assessed on complete removal though this will not be the case. Northern Beaches Council has required the assumption of complete biodiversity loss in the APZ. AS can be seen in Table E2 this has resulted in a high number of credits for Swift Parrots this though is an over estimate of impact.

Table E1 Impacts that require an offset – ecosystem credits

PCT ID	PCT Name	TEC	Impact area (ha)	Number of ecosystem credits required
3176	Sydney Enriched Sandstone Moist Forest	Not a TEC	0.37	8

Table E2 Impacts that require an offset – species credits

Common name	Scientific name	Loss of habitat (ha) or individuals	Number of species credits required
Lathamus discolor	Swift Parrot	0.37	10
Chalinolobus dwyeri	Large-eared Pied Bat	0.37	10

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Acronyms and abbreviations

BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BAR	Biodiversity Assessment Report
BC Act	Biodiversity Conservation Act 2016 (NSW)
BCAR	Biodiversity Certification Assessment Report
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BCT	Biodiversity Conservation Trust
BDAR	Biodiversity Development Assessment Report
BSSAR	Biodiversity Stewardship Site Assessment Report
BOS	Biodiversity Offsets Scheme
CEEC	Critically endangered ecological community
DBH	Diameter at breast height over bark
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EEC	Endangered ecological community
HTW	High threat weed
IBRA	Interim Biogeographic Regionalisation for Australia
LGA	Local government area
LLS Act	Local Land Services Act 2013 (NSW)
NPW Act	National Parks and Wildlife Act 1974 (NSW)
NSW	New South Wales
PCT	Plant community type
SAII	Serious and irreversible impact
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened ecological community
Vegetation SEPP	State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017
VEC	Vulnerable ecological community

1 Introduction

1.1 Proposed development

1.1.1 Development overview

The proposed development is for demolition and vegetation removal works and the construction of a dwelling house, horse arena, stables and paddocks.

The legislative pathway for the proposed development or activity to be considered is development that requires consent under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and Northern Beaches Council (Council) is the consent authority.

The proposal would involve clearing of native vegetation on land identified as containing high biodiversity values on the NSW Biodiversity Values (BV Map). The BV map forms part of the Biodiversity Offsets Scheme (BOS) threshold, which has triggered the requirement for an accredited assessor to assess the impacts of the proposal on biodiversity values through the application of the NSW Biodiversity Assessment Method (BAM) and prepare this BDAR.

1.1.2 Subject land

The subject land is a panhandle shaped parcel of land legally identified as Lot 6 of DP 749791 (refer to site details in Table 1.1). Figure 1.1 shows the subject land boundary and proposed development footprint.

Table 1.1. Site details.

Title Reference (Lot/DP)	Lot 6 DP 749791
Area (ha)	0.97
Address	113 Orchard St, Warriewood NSW 2102
LGA	Northern Beaches Council
Land Zoning	RU2 – Rural Landscape
Local Environmental Plan	Pittwater Local Environmental Plan 2014

1.1.3 Proposed development and the subject land

The proposed development is for the construction of a dwelling house, horse arena, stables and paddocks as shown on Figure 1.2.

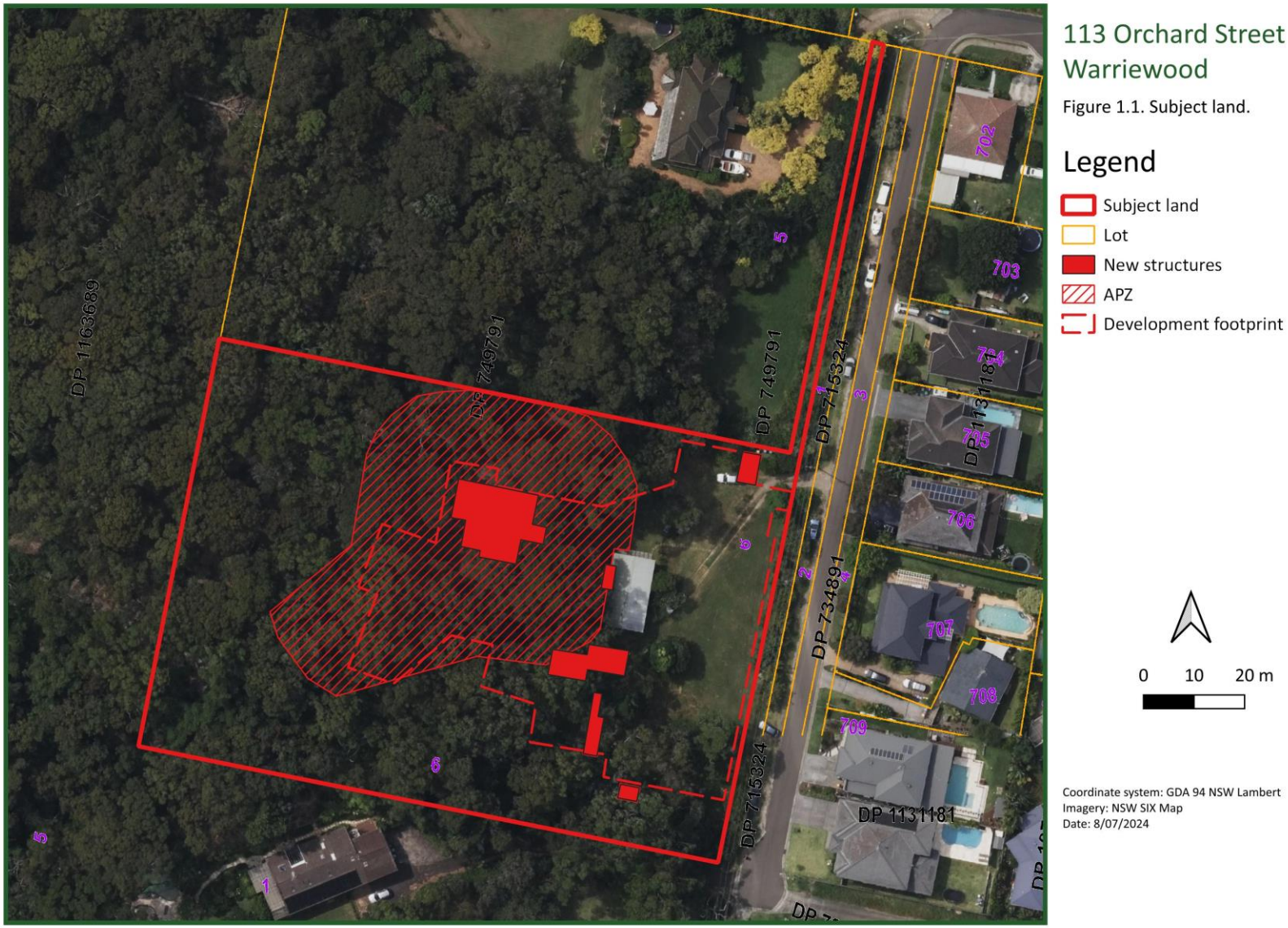
The proposal includes landscaping as shown on Figure 1.3.

The proposal requires the establishment of an asset protection zone (APZ) as identified in the Bushfire Risk Assessment Report (BPS 2022). Figure 1.4 shows the APZ identified by BPS (2022).

1.1.4 Other documentation

The following reports and plans were reviewed in this assessment:

- Site Plan (Rev J) prepared by Tony McLain Architect dated 11/05/2023.
- Landscape Concept Plan (Rev J) prepared by Tony McLain Architect dated May 2023.
- Arboricultural Impact Assessment and Tree Protection Specification (Ver 3) prepared by Laurence & Co dated 07/04/2023.
- Bushfire Risk Assessment prepared by Bushfire Planning Services dated 13/04/2022.



113 Orchard Street
Warriewood

Figure 1.1. Subject land.

Legend

- Subject land
- Lot
- New structures
- APZ
- Development footprint

0 10 20 m

Coordinate system: GDA 94 NSW Lambert
Imagery: NSW SIX Map
Date: 8/07/2024

Figure 1.1. Subject land.

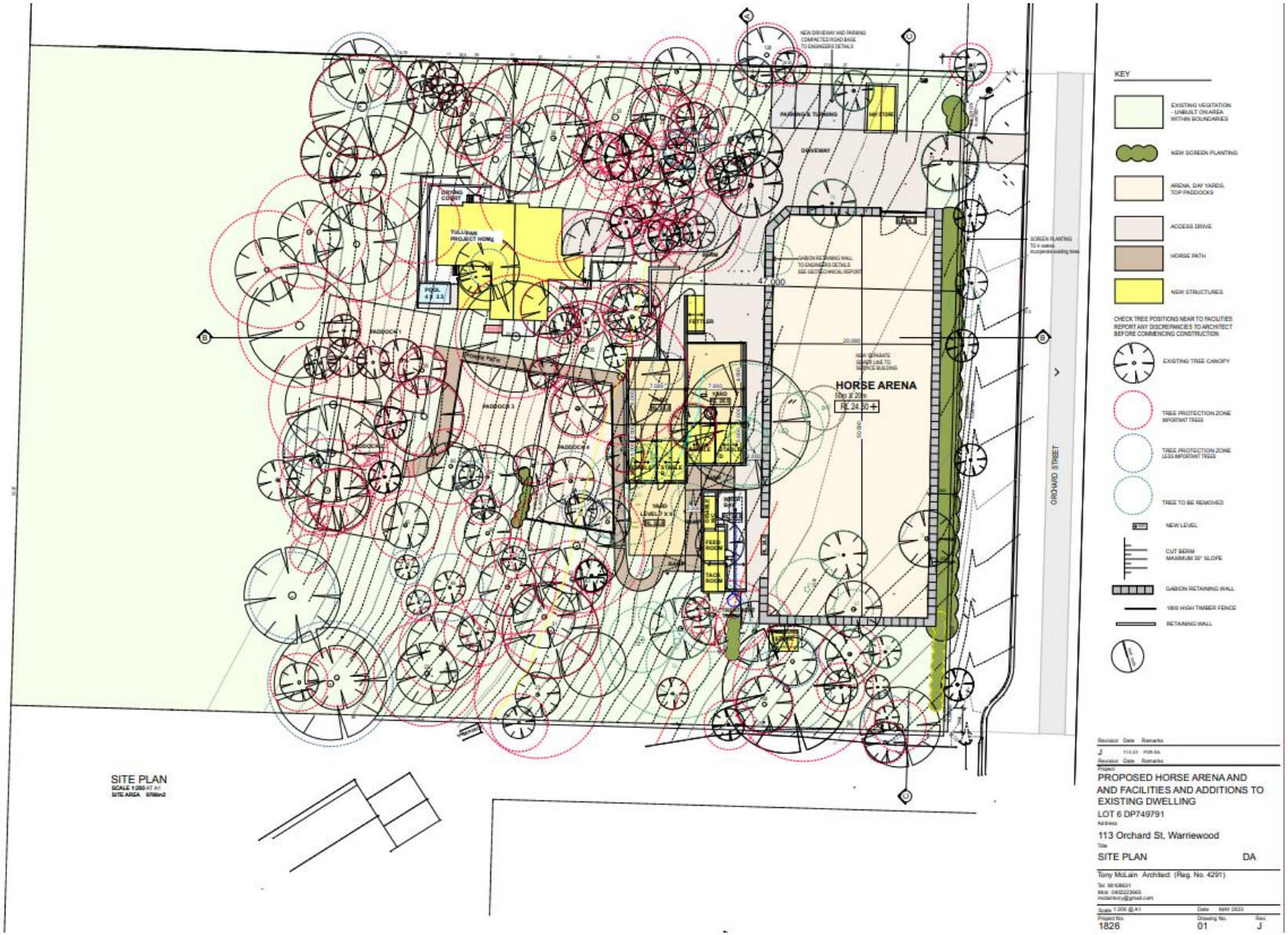


Figure 1.2. Site Plan.

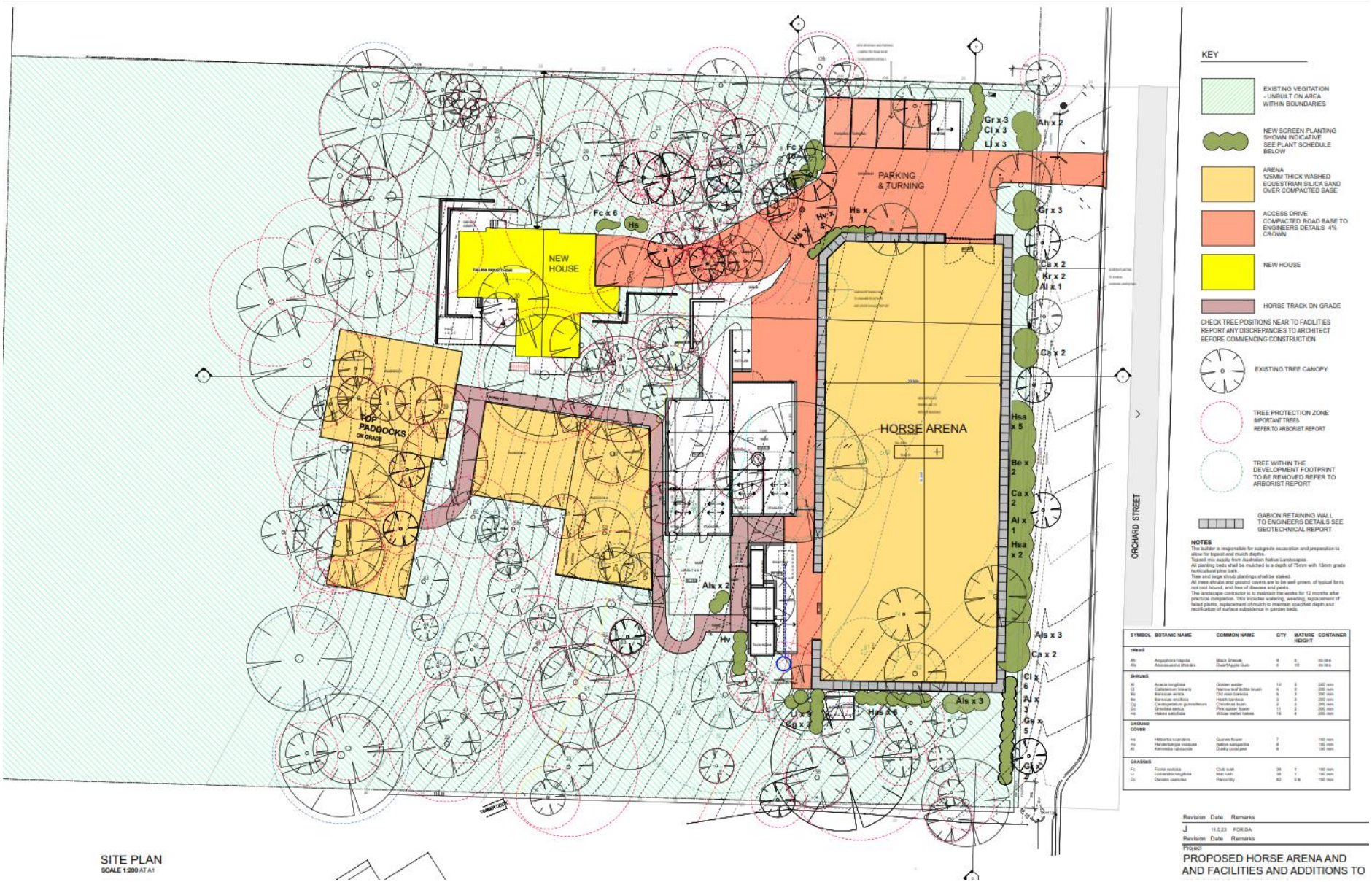
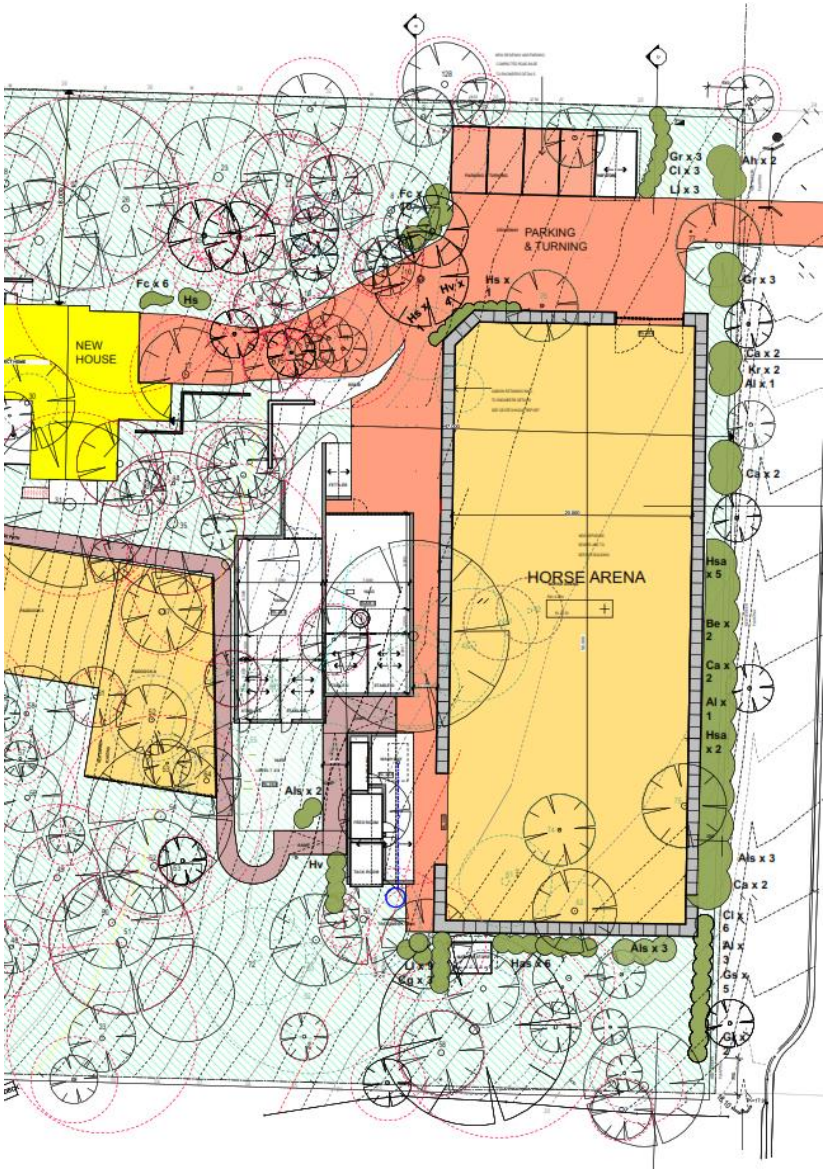


Figure 1.3a. Landscape Plan. See full plan submitted with DA for details. The landscaping is applied to areas 95% outside of the VMP area (mostly screening)



SYMBOL	BOTANIC NAME	COMMON NAME	QTY	MATURE HEIGHT	CONTAINER
TREES					
Ah	Angophora hispida	Black Sheoak	9	5	45 litre
Als	Allocasuarina littoralis	Dwarf Apple Gum	4	10	45 litre
SHRUBS					
Al	Acacia longifolia	Golden wattle	10	3	200 mm
Cl	Callistemon linearis	Narrow leaf Bottle brush	5	2	200 mm
Bs	Banksias errata	Old man banksia	5	3	200 mm
Be	Banksias ericifolia	Heath banksia	3	3	200 mm
Cg	Ceratopetalum gummiferum	Christmas bush	2	3	200 mm
Gc	Grevillea serica	Pink spider flower	11	2	200 mm
Hs	Hakea salicifolia	Willow leafed hakea	18	4	200 mm
GROUND COVER					
Hs	Hibbertia scandens	Guinea flower	7		150 mm
Hv	Hardenbergia violacea	Native sarsparilla	8		150 mm
Kr	Kennedia rubicunda	Dusky coral pea	6		150 mm
GRASSES					
Fc	Ficina nodosa	Club rush	34	1	150 mm
Li	Lomandra longifolia	Mat rush	34	1	150 mm
Dc	Daniela caerulea	Paroo lilly	82	0.6	150 mm

Figure 1.4b. Landscape Plan. Close up showing species – these are appropriate for the location. Smaller pot sizes could be used to ensure local nursery stock.See full plan submitted with DA for details

Figure 1.5. APZ. Source: BPS. 3000m^2 and required to achieve BAL 40.

1.2 Biodiversity Offsets Scheme

The *Biodiversity Conservation Act 2016* (BC Act) is the key legislation that enables the conservation of biodiversity within the state of NSW. The BC Act facilitates the assessment and on-going protection of flora and fauna, including threatened species and ecological communities. The BC Act outlines assessment and offsetting requirements for activities with the potential to impact threatened species and ecological communities in NSW, and the clearing of native vegetation.

The *Biodiversity Conservation Regulation 2017* (BC Reg.) sets out the threshold level for when the BOS will be triggered. The threshold has two elements:

1. **Whether the amount of native vegetation being cleared exceeds an area threshold**

The proposal does not trigger the area clearing threshold as per the BOS entry requirements as the impact area does not exceed the threshold for clearing, above which BAM and offsets scheme apply (refer to Table 1.2).

Table 1.2. Minimum lot size and threshold trigger.

Minimum lot size	**1ha**
Threshold for clearing, above which the BAM and offsets scheme apply	**0.5ha or more**
Clearing area	**0.37ha**

2. **Whether the impacts occur on an area mapped on the Biodiversity Values Map published by the Environment Agency Head**

The BV Map identifies land of high biodiversity value, as defined by clause 7.3(3) of the BC Reg. The BOS applies to the clearing of native vegetation and other biodiversity impacts prescribed by clause 6.1 of the BC Reg. on land identified on the BV Map.

The proposal requires clearing of native vegetation identified on the BV Map and thus triggers the BV Map threshold (see Figure 1.5).

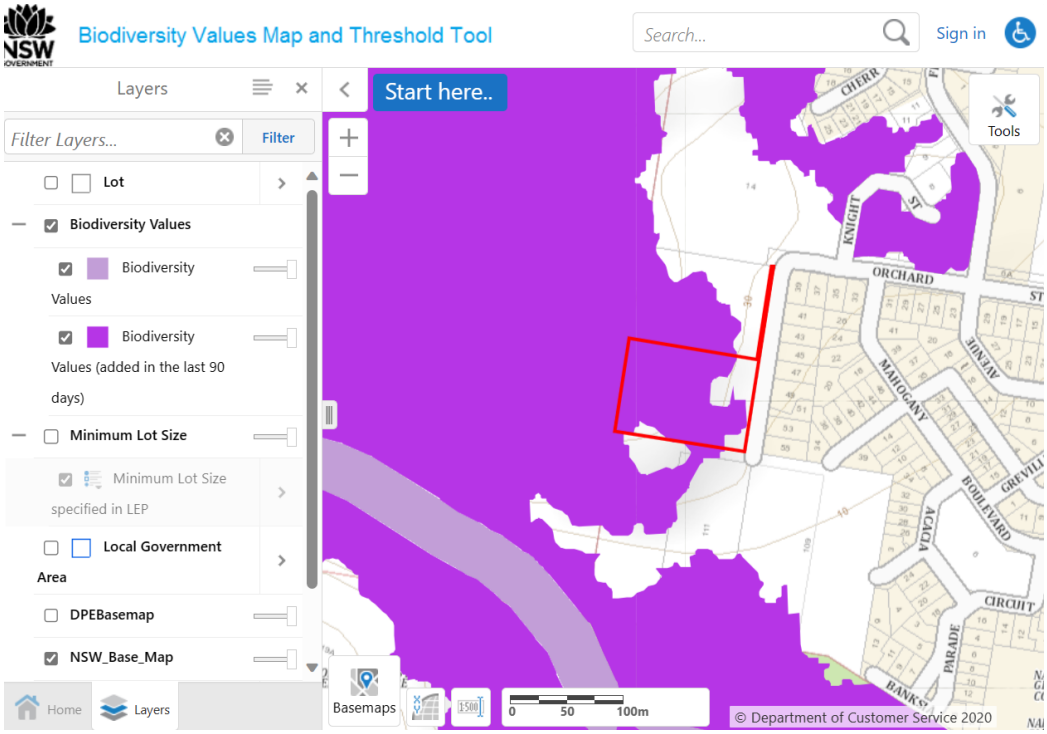


Figure 1.6. Biodiversity Values Map.

1.3 BAM module

This proposal has been assessed under the BAM Streamlined assessment module – Small area, which may be used in accordance with the area clearing threshold shown in Table 1.3 (Table 12 of the BAM 2020), which in this case is a minimum lot size of 1 ha and clearing of <1 ha.

Table 1.3. Area clearing limits for application of the small area development module.

Minimum lot size associated with the property*	Maximum area clearing limit for application of the small area development module
Less than 1 ha	≤ 1 ha
Less than 40 ha but not less than 1 ha	≤ 2 ha
Less than 1000 ha but not less than 40 ha	≤ 3 ha
1000 ha or more	≤ 5 ha
*shown in the lot size maps under the relevant local environmental plan (LEP), or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP	

1.4 Compliance with Council's LEP and DCP

1.4.1 Pittwater LEP cl. 7.6 Biodiversity Protection

Table 1.4. Compliance with cl. 7.6 Biodiversity Protection

cl. 7.6 Biodiversity Protection	Compliance
(1) The objective of this clause is to maintain terrestrial, riparian and aquatic biodiversity by— (a) protecting native fauna and flora, and (b) protecting the ecological processes necessary for their continued existence, and (c) encouraging the conservation and recovery of native fauna and flora and their habitats.	There will be a loss of trees and associated foraging habitat. This will be a local impact. The main corridor west of the site will remain intact. Areas of arenas will through time have low/no native vegetation cover. These are located in the area that is needed as an Asset protection Zone (without or without the development the APZ would be applied for bushfire safety). Encouraging the conservation and recovery of native fauna and flora and their habitats will be through the VMP and the retention and relocation and addition of nest boxes (microbats) and food trees for Glossy Black Cockatoos (Forest She Oaks (as has been listed in the VMP planting section).

(2) This clause applies to land identified as "Biodiversity" on the Biodiversity Map.	
(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider— (a) whether the development is likely to have— (i) any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and (ii) any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and (iii) any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and (iv) any adverse impact on the habitat elements providing connectivity on the land, and (b) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.	The proposal requires vegetation management in the APZ = 0.29 ha. Removal of vegetation with direct impacts from new structures = 0.04 ha This total of 0.37ha of native vegetation has been included in the BDAR as 100% impact. This impact is proposed to be offset through the generation of ecosystem credits and on-site management of the conservation areas. A total area of 0.45ha of native vegetation will be retained as conservation area. The after works VI will vary and has been set to be reduced to 0 for all works including the APZ. The APZ will not be VI zero in reality post works. The proposal retains 2 out of 3 hollow bearing trees. Tree 113 contains a hollow hosting a native glider which will be retained. The clearing of 1 hollow bearing tree will be supervised by an ecologist during vegetation clearing works. The hollow will be retained and relocated on-site. The proposal does not result in the fragmentation of habitat. The proposal is not expected to have any adverse impact on the habitat elements providing connectivity on the land. Connectivity of habitat on the subject land is to be retained post development. It is reduced in width on the northern side – this leads to the road and not connected with vegetation to the east. It is connected north to the neighbouring private land.
(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that— (a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or	See Section 6 details of Avoid and Minimise. Mitigate in include in Section 6 as well and in the VMP.

(b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or (c) if that impact cannot be minimised—the development will be managed to mitigate that impact.	

1.4.2 Pittwater 21 DCP cl. B4.18 Heathland/Woodland Vegetation

Table 1.5. Compliance with cl. B4.18 Heathland/Woodland Vegetation.

Controls	Compliance
Development shall retain and enhance habitat and wildlife corridors for threatened species, endangered populations, endangered ecological communities and other locally native species.	The proposal retains 0.45ha of native vegetation. No endangered populations or endangered ecological communities have been recorded on the subject land. Threatened species have been assumed present including microbats. Powerful Owls, and other large Forest Owls may utilise the site for foraging. The Swift Parrot (*Lathamus discolor*) may utilise the site for foraging given that the site is identified on the Important Habitat Map for the species. Threatened species include Red-crowned Toadlets and Giant Burrowing Frogs are in the nearby escarpment and thus could move through the sandstone area to the west of the site as part of a movement corridor – this area is being retained. The retained vegetation will be protected through the implementation of a VMP. Horses are being managed in agreed localised areas and horse poo is being contracted removed 2x per week or as needed to ensure no build up / run off from site.
Development shall not reduce or degrade habitat for locally native species, threatened species, endangered populations or endangered ecological communities.	The proposal is restricted to the development footprint and APZ as shown on Figure 1.1. The proposed development is not expected to reduce or degrade habitat outside the approved impact area assuming that a VMP is implemented.
Wastewater shall receive tertiary treatment and not be discharged directly into heathland.	The subject land does not contain heathland.
Compliance with Council's Water Management for Development Policy is required.	Noted.

Controls	Compliance
Caretakers of domestic animals shall prevent them from entering wildlife habitat areas.	Domestic animals will be within development footprint including APZ. Fencing will ensure domestic animals do no enter wildlife habitat or conservation area.
Development shall not negatively impact on heathland.	The subject land does not contain heathland.
Development shall ensure long-term sustainability of wetlands and must include an appropriate buffer - minimum of 10 metres from wetland edge.	The subject land does not contain any wetlands, nor does it occur 10 metres from a wetland edge.
Development shall ensure that at least 80% of any new planting incorporates native vegetation (as per species found on the site or listed in Native Plants for Your Garden available on the Pittwater Council website).	See Figure 1.3 Landscape Plan. This is compliant.
Landscaping works are to be outside areas of bushland and do not include environmental weeds.	Landscaping works are proposed within the development footprint only and part of screening. The Landscape Plan does not include planting environmental weeds.

1.5 Information sources

Databases reviewed in the assessment:

- BioNet Vegetation Classification
- BioNet Threatened Biodiversity Data Collection
- NSW BioNet Atlas
- Directory of Important Wetlands in Australia
- Biodiversity Values Map and Threshold tool
- BAM – Important Areas Viewer
- Protected Matters Search Tool
- NSW Planning Portal Spatial Viewer
- SEED
- eSPADE v2.2

Spatial data used in the assessment:

- NSW SIX Map
- Nearmap
- NSW Cadastre web service (2016)
- NSW Hydrography web service (2016)
- Biodiversity Values Map, Edition 16.10 (DPE 2024)
- IBRA Version 7 (Regions) (DCCEEW 2016)
- NSW (Mitchell) Landscapes Version 3.1 (DPE 2017)
- Soil Landscapes of Central and Eastern NSW, Edition 2.1 (DCCEEW 2020)
- NSW State Vegetation Type Map (SVTM) Edition C2.0M2.0 (DPE 2023)

2 Site context

2.1 Assessment area

The assessment area includes the subject land and the area of land within the 1500 metre buffer zone surrounding the subject land.

2.2 Landscape features

Landscape features identified within the subject land and assessment area are shown on Figure 2.1 to 2.3. A discussion of relevant landscape features is provided below in Table 2.1.

Table 2.1. Landscape Features.

IBRA bioregion	Sydney Basin
IBRA subregion	Pittwater
NSW (Mitchell)	Sydney – Newcastle Barriers and Beaches
Rivers, streams and estuaries	No rivers, streams or estuaries have been identified on the subject land. The closest waterway is Mullet Creek located approximately 160 metres southwest of the subject land. Mullet Creek flows southeast to enter Narrabeen Lagoon.
Wetlands	No wetlands have been identified on the subject land. Narrabeen Lagoon is located southeast of the subject land.
Habitat connectivity	The subject land's vegetation forms part of a significant vegetated link which connects Ku-ring-gai and Garigal National Parks with the Irrawong Reserve, Warriewood Wetlands and Narrabeen Lagoon.
Geological features	No karsts, caves, crevices, cliffs or areas of geological significance have been identified within the assessment area.
Areas of outstanding biodiversity values	No areas of outstanding biodiversity value have been identified within the assessment area.

2.3 Native vegetation cover

Native vegetation cover on the subject land has been assessed in relation to native vegetation cover across a broader area. Native vegetation cover within the assessment area was determined by clipping the extent of NSW State Vegetation Type Map (DPE 2022) within the assessment area using QGIS v3.28.10 and manually adding areas of native vegetation cover to the NSW State Vegetation Type Map shapefile not identified on the map. Table 2.2 summarises the extent of native vegetation cover within the assessment area. Figure 2.2 Location Map shows native vegetation cover within the assessment area.

Table 2.2. Native vegetation cover.

Assessment area (ha)	774.41
Total area of native vegetation cover (ha)	238.26
Percentage of native vegetation cover (%)	30%
Class (0-10, >10-30, >30-70 or >70%)	>30-70

Figure 2.1. Site Map.

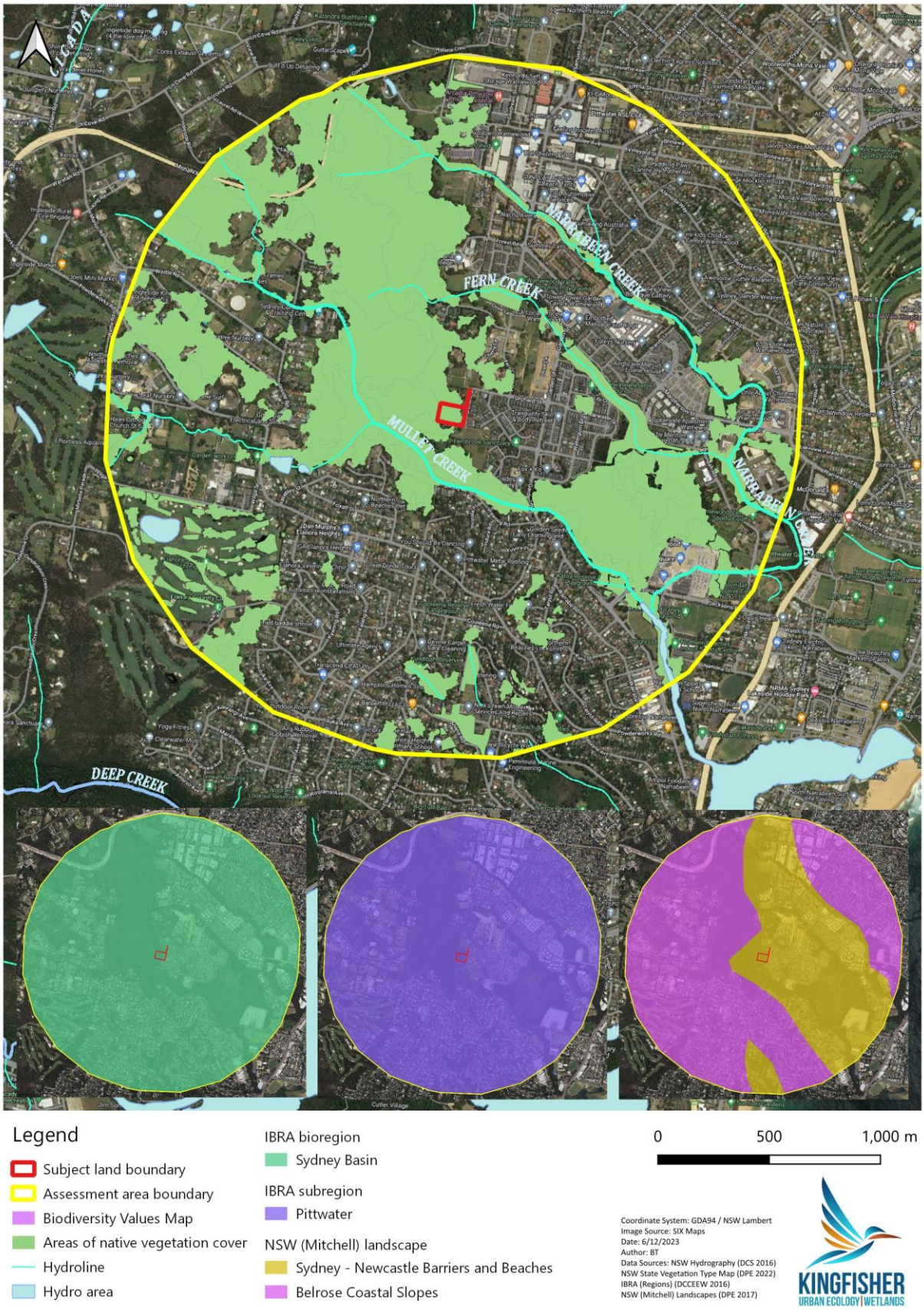


Figure 2.2. Location Map.

3 Native vegetation, threatened ecological communities and vegetation integrity

3.1 Native vegetation extent

3.1.1 Changes to the mapped native vegetation extent

A review of the SydneyMetroArea_v3_1_2016_E_4489 (OEH 2016) was initially undertaken and used to predict what Plant Community Type (PCT) might occur on the subject land. Figure 3.1 shows the PCTs mapped on the subject land via SydneyMetroArea_v3_1_2016_E_4489 (OEH 2016). Table 3.1 identifies the PCTs.

Table 3.1. PCTs mapped on the subject land via SydneyMetroArea_v3_1_2016_E_4489 (OEH 2016).

PCT ID	PCT Name	PCT Scientific Name	PCT Percent Cleared
1841	Coastal enriched sandstone moist forest	Smooth-barked Apple - Turpentine - Blackbutt tall open forest on enriched sandstone slopes and gullies of the Sydney region	67.00
1250	Coastal sandstone gully forest	Sydney Peppermint - Smooth-barked Apple - Red Bloodwood shrubby open forest on slopes of moist sandstone gullies, eastern Sydney Basin Bioregion	30.00

Since initial investigations were completed for the proposal, the NSW State Vegetation Type Map (SVTM) (DPE 2022) became available. The release of SVTM coincided with an ecological systematic review of PCTs in eastern NSW. This resulted in PCT 1250 changing to PCT 3595 (Sydney Coastal Sandstone Gully Forest) and the area formally mapped as PCT 1841 changing to PCT 3136 (Blue Gum High Forest) (Figure 3.2).

It is anticipated that the change of PCT 1841 to PCT 3136 in this area is an error in the ecological systematic review. Legacy PCT 1841 has the strongest association with new PCT 3176 (Sydney Enriched Sandstone Moist Forest) (BioNet Vegetation Classification database), with areas formally identified as PCT 1841 changing to PCT 3176 (in most cases). Additionally, vegetation within the subject land is not indicative of Blue Gum High Forest. Vegetation surveys and collection of BAM plot data from within the subject land's vegetation validated the presence of PCT 3176. Figure 3.3 shows the extent of PCT 3176 within the subject land, being measured at approximately 0.8 ha in extent.

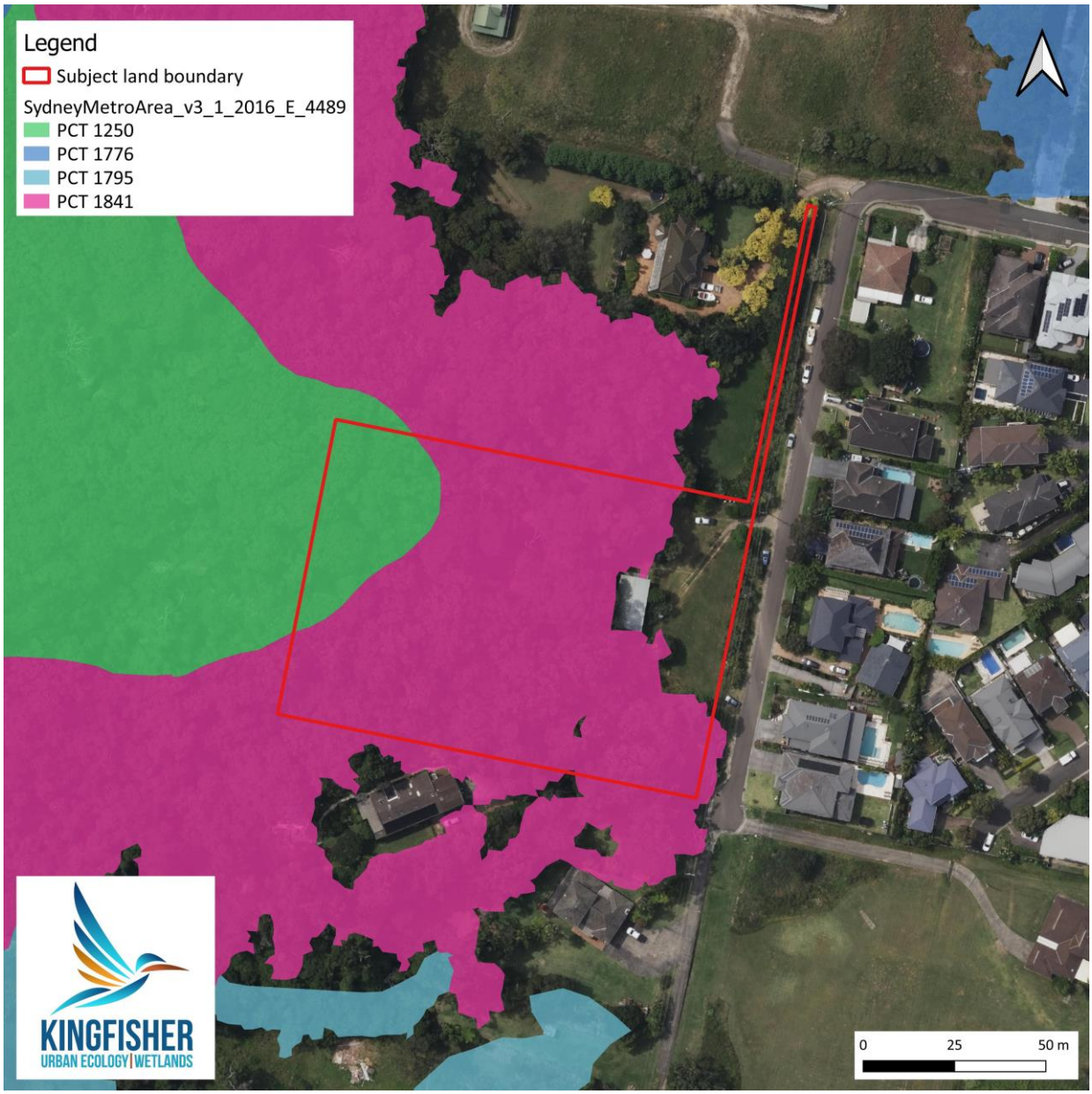


Figure 3.1. PCTs mapped on the subject land via SydneyMetroArea_v3_1_2016_E_4489 (OEH 2016).

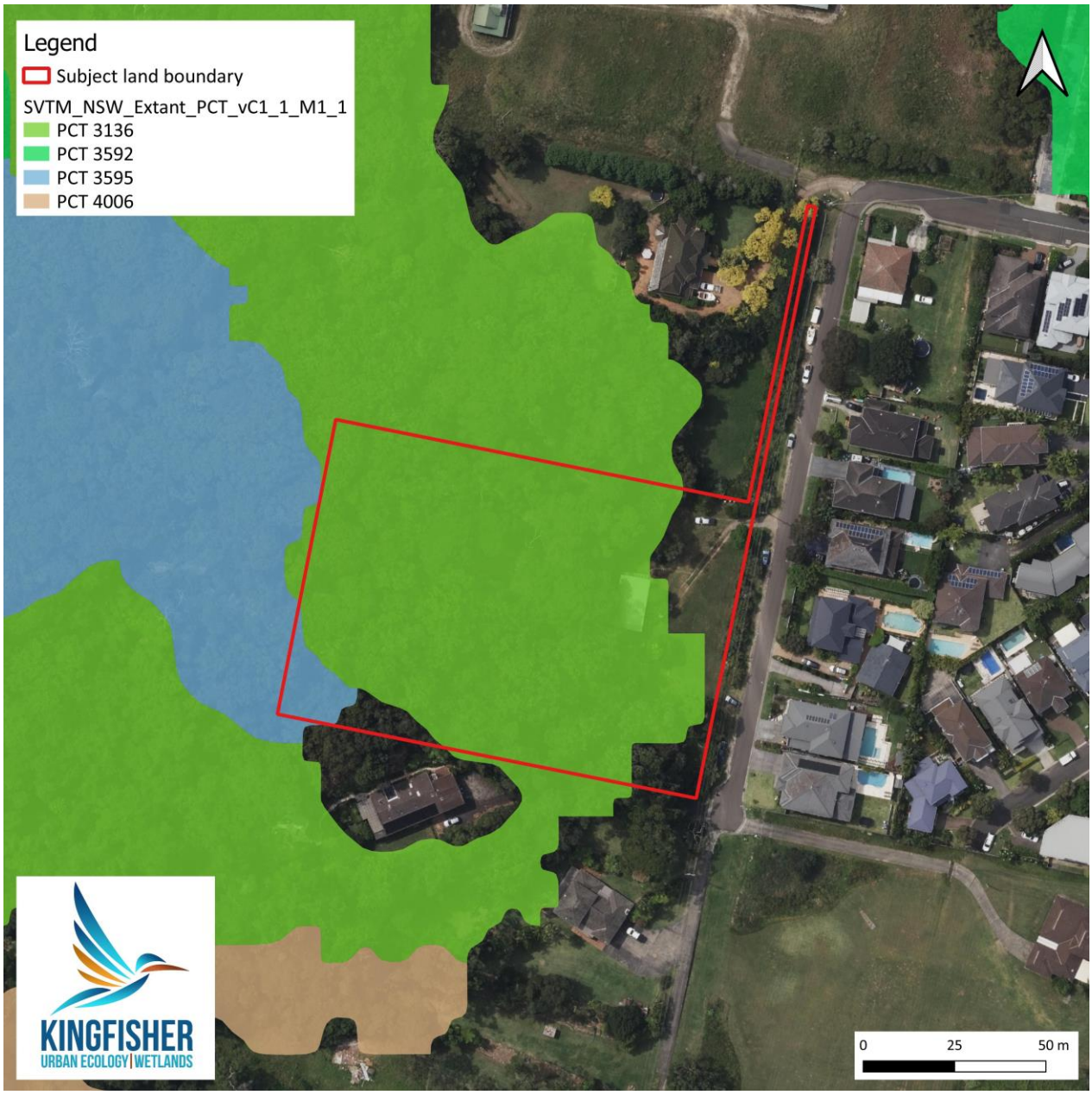


Figure 3.2. PCTs mapped within the subject land via NSW State Vegetation Type Map (DPE 2022).

Figure 3.3. Native vegetation extent.

3.1.2 Areas that are not native vegetation

A parallel field traverse survey was conducted within the front lawn to determine the percent cover of native species. The survey involved searching along a grid of parallel transects set 5 metres apart.

The native groundcover within this area was concluded to be less than 10% (most areas being less than 1% or 0%). Along the driveway are planted natives in the form of *Callistemon viminalis* (Weeping bottlebrush), however these trees do not increase the native species cover within this area over 15%, nor is the species characteristic of PCT 3176.

The subject land contains less than 15% native cover within the front lawn.

Photos of the front lawn have been included below. Photos were taken during the 15th of December 2023 site survey.











3.2 PCT allocation

Field surveys and collection of BAM plot data from within the subject land's vegetation validated the presence of PCT 3176-Sydney Enriched Sandstone Moist Forest as described in the BioNet Vegetation Classification database. BAM plot data is provided in Appendix I.

This PCT is a wet sclerophyll forest community occupying the western portion of the subject land. This PCT was not mapped by the SVTM (DPE 2022) but the closely related PCT, PCT 1841 – Coastal enriched sandstone moist forest, was mapped by OEH (2016).

Table 3.1 outlines the attributes and features used to justify the allocation of PCT 3176 to the native vegetation within the subject land.

Table 3.2. PCT 3176 allocation.

PCT ID	3176
PCT Name	Sydney Enriched Sandstone Moist Forest
IBRA Bioregion	Sydney Basin
IBRA Subregion	Pittwater
Vegetation Formation	Wet Sclerophyll Forests (Shrubby sub-formation)
Vegetation Class	North Coast Wet Sclerophyll Forests
Extent within the subject land (ha)	0.82
Location	The distribution of this forest is widespread though patchy across the Sydney area. Typically, it is situated in sandstone gullies and sheltered slopes enriched by clay material. This material is sourced from shale bands in the sandstone bedrock associated with Narrabeen sandstone on the Pittwater escarpment or Hawkesbury sandstone in the Lane Cove River valley. At other places the material is sourced from shale caps situated on ridgelines above the creek. Outcropping rocks and benches are common.
Elevation	The PCT occurs at elevations between 10 and 120 metres above sea level. The subject land occurs at elevations between 20 and 50 metres above sea level.
Constituent species present in the subject land	Trees: *Angophora costata* (Sydney red gum), *Syncarpia glomulifera* (Turpentine), *Allocasuarina torulosa* (Forest oak), *Glochidion ferdinandi* (Cheese tree), *Eucalyptus piperita* (Sydney peppermint), *Allocasuarina littoralis* (Black she oak), *Corymbia gummifera* (Red bloodwood), *Eucalyptus resinifera* (Red mahogany), *Angophora floribunda* (Rough barked apple), *Banksia integrifolia* (Coast banksia), *Banksia serrata* (Old man banksia), *Eucalyptus robusta* (Swamp mahogany)

	Shrubs: *Elaeocarpus reticulatus, Breynia oblongifolia, Hibbertia aspera* Grasses: *Lomandra longifolia, Entolasia stricta, Microlaena stipoides, Entolasia marginata, Lomandra filiformis, Imperata cylindrica, Oplismenus aemulus, Lomandra obliqua, Themeda australis, Echinopogon caespitosus* Forbs: *Dianella caerulea, Xanthosia pilosa, Commelina cyanea, Pomax umbellata, Centella asiatica, Poranthera microphylla* Ferns: *Pteridium esculentum, Adiantum aethiopicum, Asplenium flabellifolium* Other: *Livistona australis, Calochlaena dubia, Eustrephus latifolius, Hibbertia dentata, Stephania japonica, Cayratia clematidea, Hibbertia scandens, Glycine clandestina, Xanthorrhoea arborea*

3.3 Alignment with TECs

PCT 3176 is identified as being associated with the Hygrocybeae Community of Lane Cove Bushland Park in the Sydney Basin Bioregion Critically Endangered Ecological Community (CEEC) listed under the BC Act in the BioNet Vegetation Classification database.

The CEEC is not present on the subject land. Lane Cove Bushland Park is located 25 km southwest of the subject land. No macro fungi characteristic of the community was recorded on the subject land.

3.4 Site photos

Photo plate 1. Start of plot 1.

Photo plate 2. End of plot 1.

Photo plate 3. Start of plot 2.

Photo plate 4. End of 20m x 20m plot 2.

Photo plate 5. Start of Plot 3.

3.5 Vegetation zones and patch size

PCT 3176 was delineated into two vegetation zones based on landscape position and the presence of sandstone outcropping. Table 3.3 identifies the vegetations zones. Vegetation zones are shown in Figure 3.4.

Table 3.3. Vegetation zones and patch size.

Vegetation zone ID	PCT ID number and name	Condition / other defining features	Area (ha)	Patch size class	No. BAM plots required	No. BAM plots completed	No. BAM plots used in assessment	Plot IDs of BAM plots used in assessment
VZ1	3176-Sydney Enriched Sandstone Moist Forest	Good	0.56	>100 ha	1	2	2	Plot 1 and Plot 2
VZ2	3176-Sydney Enriched Sandstone Moist Forest	Good / sandstone boulders	0.26	>100 ha	1	1	1	Plot 3

3.6 Management zones

Two management zones have been identified on the subject land. Management zone 1 is reflective of wholescale clearing associated with the new structures, development footprint and APZ. Management zone 2 is reflective of the areas of vegetation to be retained. Management zones are shown in Figure 3.5.

113 Orchard Street
Warriewood

Figure 3.4. Vegetation zones.

Legend

Subject land
BAM plot

Vegetation zones

VZ1
VZ2

0 10 20 m

Coordinate system: GDA 94 NSW Lambert
Imagery: NSW SIX Map
Date: 8/07/2024

Figure 3.4. Vegetation zones.

Figure 3.5. Management zones.

3.7 Vegetation integrity

Table 3.4 identifies the vegetation zones and current vegetation integrity scores.

Table 3.4. Vegetation integrity scores.

Vegetation zone ID	PCT ID number and name	Condition / other defining features	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score	Hollow bearing trees present?
VZ1	3176-Sydney Enriched Sandstone Moist Forest	Good	0.56	50.5	44	54.2	49.4	Yes
VZ2	3176-Sydney Enriched Sandstone Moist Forest	Good / sandstone boulders	0.26	47.7	34.7	54.7	44.9	Yes

4 Habitat suitability for threatened species

4.1 Identification of threatened species for assessment

4.1.1 Ecosystem credit species

Ecosystem credit species are those where the likelihood of occurrence of the species and/or elements of its habitat can generally be predicted by vegetation surrogates and landscape features.

A targeted survey is not required to identify or confirm the presence of ecosystem credit species.

All ecosystem credit species automatically generated in the BAM-C have been retained for further assessment.

4.1.2 Species credit species

Species credit species are those where the likelihood of their occurrence of the species cannot reliably predicted by habitat surrogates.

A targeted survey or an expert report is required to confirm the presence of these species on the subject land.

Under the streamlined assessment module for small areas, all of the candidate species credit species identified for the proposal according to Step 1 and Step 2 that are at risk of an SAII must be further assessed in accordance with Steps 3–5 in Section 5.2. Species credit species that are not at risk of an SAII and are not incidentally recorded on the subject land do not require further assessment.

Table 4.1 lists candidate species credit species automatically generated by the BAM-C and whether they have been retained or excluded from further assessment based on geographic limitations and/or habitat constraints.

Table 4.1. Species credit species.

Scientific name	Common name	Retained for further assessment?	Justification for exclusion
Flora			
Camarophyllopsis kearneyi	--	Yes	n.a.
Deyeuxia appressa	--	Yes	n.a.
Diuris bracteata	--	Yes	n.a.
Hygrocybe anomala var. ianthinomarginata	--	Yes	n.a.
Hygrocybe aurantipes	--	Yes	n.a.
Hygrocybe austropratensis	--	Yes	n.a.
Hygrocybe collucera	--	Yes	n.a.
Hygrocybe griseoramosa	--	Yes	n.a.
Hygrocybe lanecovensis	--	Yes	n.a.
Hygrocybe reesiae	--	Yes	n.a.

Scientific name	Common name	Retained for further assessment?	Justification for exclusion
Hygrocybe rubronivea	--	Yes	n.a.
Prostanthera marifolia	Seaforth Mintbush	Yes	n.a.
Rhizanthella slateri	Eastern Australian Underground Orchid	Yes	n.a.
Rhodamnia rubescens	Scrub Turpentine	Yes	n.a.
Aves			
Lathamus discolor	Swift Parrot	Yes	n.a.
Mammalia			
Chalinolobus dwyeri	Large-eared Pied Bat	Yes	n.a.
Miniopterus australis	Little Bent-winged Bat	No	Subject land does not contain caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding.
Miniopterus orianae oceanensis	Large Bent-winged Bat	No	Subject land does not contain caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding.

4.2 Presence of candidate species credit species

Table 4.2 identifies the remaining list of candidate species credit species and the method used to determine presence on the subject land.

Table 4.2. Presence of candidate species credit species.

Scientific name	Common name	BC Act	EPBC Act	Sensitivity to gain class	Method used to determine presence	Present?	Further assessment required?
Flora							
Camarophyllopsis kearneyi	--	Endangered	Not listed	High	Targeted threatened species survey	No	No
Deyeuxia appressa	--	Endangered	Endangered	High	Targeted threatened species survey	No	No
Diuris bracteata	--	Endangered	Extinct	High	Targeted threatened species survey	No	No
Hygrocybe anomala var. ianthinomarginata	--	Vulnerable	Not listed	High	Targeted threatened species survey	No	No
Hygrocybe aurantipes	--	Vulnerable	Not listed	High	Targeted threatened species survey	No	No
Hygrocybe austropratensis	--	Endangered	Not listed	High	Targeted threatened species survey	No	No

Scientific name	Common name	BC Act	EPBC Act	Sensitivity to gain class	Method used to determine presence	Present?	Further assessment required?
Hygrocybe collucera	--	Endangered	Not listed	High	Targeted threatened species survey	No	No
Hygrocybe griseoramosa	--	Endangered	Not listed	High	Targeted threatened species survey	No	No
Hygrocybe lanecovensis	--	Endangered	Not listed	High	Targeted threatened species survey	No	No
Hygrocybe reesiae	--	Vulnerable	Not listed	High	Targeted threatened species survey	No	No
Hygrocybe rubronivea	--	Vulnerable	Not listed	High	Targeted threatened species survey	No	No
Prostanthera marifolia	Seaforth Mintbush	Critically Endangered	Critically Endangered	High	Targeted threatened species survey	No	No
Rhizanthella slateri	Eastern Australian Underground Orchid	Vulnerable	Endangered	High	Targeted threatened species survey	No	No
Rhodamnia rubescens	Scrub Turpentine	Critically Endangered	Critically Endangered	High	Targeted threatened species survey	No	No
Aves							

Scientific name	Common name	BC Act	EPBC Act	Sensitivity to gain class	Method used to determine presence	Present?	Further assessment required?
Lathamus discolor	Swift Parrot	Endangered	Critically Endangered	Moderate	Important Habitat Map	Assumed present	Yes
Mammalia							
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Endangered	Very High	Assumed present	Assumed present	Yes

4.3 Threatened species surveys

Table 4.3 identifies the threatened species surveys undertaken.

Table 4.3. Surveys undertaken.

Scientific name	Common name	Optimal survey period	Survey date	Survey details	Surveyor
Camarophyllopsis kearneyi	--	May-Jun	25/06/2022	5-10 m parallel field traverses were conducted across the entire subject land and the species were not observed.	GDB
Deyeuxia appressa	--	Dec	4/12/2020 15/12/2023	10-20 m parallel field traverses were conducted across the entire subject land and the species was not observed.	GDB BT (15/12/2023)
Diuris bracteata	--	Aug-Sep	9/09/2022	10-20 m parallel field traverses were conducted across the entire subject land and the species was not observed.	GDB
Hygrocybe anomala var. ianthinomarginata	--	May-Jun	25/06/2022	5-10 m parallel field traverses were conducted across the entire subject land and the species were not observed.	GDB
Hygrocybe aurantipes	--	May-Jun	25/06/2022	5-10 m parallel field traverses were conducted across the entire subject land and the species were not observed.	GDB
Hygrocybe austropratensis	--	May-Jun	25/06/2022	5-10 m parallel field traverses were conducted across the entire subject land and the species were not observed.	GDB

Scientific name	Common name	Optimal survey period	Survey date	Survey details	Surveyor
Hygrocybe collucera	--	Jun	25/06/2022	5-10 m parallel field traverses were conducted across the entire subject land and the species were not observed.	GDB
Hygrocybe griseoramosa	--	May-Jun	25/06/2022	5-10 m parallel field traverses were conducted across the entire subject land and the species were not observed.	GDB
Hygrocybe lanecovensis	--	May-Jun	25/06/2022	5-10 m parallel field traverses were conducted across the entire subject land and the species were not observed.	GDB
Hygrocybe reesiae	--	May-Jun	25/06/2022	5-10 m parallel field traverses were conducted across the entire subject land and the species were not observed.	GDB
Hygrocybe rubronivea	--	May-Jun	25/06/2022	5-10 m parallel field traverses were conducted across the entire subject land and the species were not observed.	GDB
Prostanthera marifolia	Seaforth Mintbush	Year-round	25/02/2019, 16/10/2020, 4/12/2020, 3/04/2022, 25/06/2022, 9/09/2022, 11/11/2022, 8/02/2022, 15/12/2023, 7/07/2024	10-20 m parallel field traverses were conducted across the entire subject land and the species was not observed.	GDB BT (15/12/2023)
Rhizanthella slateri	Eastern Australian Underground Orchid	Sep-Nov	16/10/2020, 9/09/2022, 11/11/2022	5-10 m parallel field traverses were conducted across the entire subject land and the species was not observed.	GDB

Scientific name	Common name	Optimal survey period	Survey date	Survey details	Surveyor
Rhodamnia rubescens	Scrub Turpentine	Year-round	25/02/2019, 16/10/2020, 4/12/2020, 3/04/2022, 25/06/2022, 9/09/2022, 11/11/2022, 8/02/2022, 15/12/2023, 7/07/2024	10-20 m parallel field traverses were conducted across the entire subject land and the species was not observed.	GDB BT (15/12/2023)

4.4 Species polygon

The Important Habitat Map for the Swift Parrot that occurs within the subject land has been used as a species polygon for this species (see Figure 4.1).

The species polygon for the Large-eared Pied Bat includes all areas of native vegetation allocated to PCT 3176 (see Figure 4.2).

Figure 4.1. Swift Parrot species polygon.

Figure 4.2. Large-eared Pied Bat species polygon.

5 Prescribed Impacts

Clause 6.1 of the Biodiversity Conservation Regulation 2017 identifies prescribed additional biodiversity impacts (prescribed impacts) to be assessed as part of the BOS. Such prescribed impacts (including direct and indirect impacts) are impacts:

a. on the habitat of threatened entities including:
   i. karst, caves, crevices, cliffs, rocks and other geological features of significance, or
   ii. human-made structures, or
   iii. non-native vegetation
b. on areas connecting threatened species habitat, such as movement corridors
c. that affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining)
d. on threatened and protected animals from turbine strikes from a wind farm
e. on threatened species or fauna that are part of a TEC from vehicle strikes.

Table 5.1 lists prescribed impacts and whether each prescribed impact is relevant to the proposal.

Table 5.1. Prescribed Impacts.

Feature	Relevant (Y/N)	If yes, address assessment questions (BAM Section 6 and 8)
Karst, caves, crevices, cliffs, rocks or other geological features of significance	Y	The western portion of the subject land contains large sandstone boulders and rock crevices. There are no karst, caves, cliffs, or other geological features of significance on the subject land. **Prepare a list of threatened entities that use or are likely to use these habitat features on the subject land and within the surrounding assessment area (BAM Section 6.1.1(a.)).** Based on nearby records and habitat requirements the Rosenberg's Goanna (*Varanus rosenbergi*) is considered likely to use these habitat features on the subject land and within the surrounding assessment area. **Describe how these features provide habitat for, or are used by, each threatened entity (BAM Section 6.1.1(b.)).** Rosenberg's Goanna shelters in hollow logs, rock crevices and in burrows. The subject land provides habitat for the species in the form of hollow logs and rock crevices. These habitat features are being retained. **Predict the nature, extent and duration of short-term and long-term impacts (BAM Section 8.3.1(a.)).** Short-term impacts to the Rosenberg's Goanna are expected during the construction phase of the development. It is expected that the species would avoid the subject land due to noise during construction. Long-term impacts to the species would include the impacts of domestic animals. Cats and dogs are to be kept inside or restrained to areas adjacent to where this species occurs. Horses are to be kept within paddocks. **Predict the consequences of impacts on threatened entities (BAM Section 8.3.1(b.)).** The habitat features within the subject land are not considered to be an important or limiting resource for the Rosenberg's Goanna. Critical habitat

		for the species is forests and woodlands containing termite mounds where the species lay their eggs. The subject land does not contain any termite mounds. The species is only predicted to utilise the habitat within the subject land intermittently for shelter or foraging. These habitats are being retained and no breeding habitat would be impacted by the proposal.
Human-made structures	Y	The subject land contains a residential dwelling. **Provide a description of the type of human-made structure (BAM Section 6.1.2(a.)).** The dwelling is a single storey timber cottage with a metal roof. **Prepare a list of threatened species that use these features as habitat (BAM Section 6.1.2(b.)).** The Greater Broad-nosed Bat, Yellow-bellied Sheathtail-bat, Southern Myotis, Eastern False Pipistrelle, Eastern Coastal Free-tailed Bat, Little Bent-winged Bat and Large Bent-winged Bat are known to use buildings and other man-structures for roosting. **Describe how each threatened species could, or does, use the human-made structure as habitat (BAM Section 6.1.2(c.)).** The existing dwelling was inspected by ecologists for potential microbat habitat. The existing dwelling did not host any roosting microbats (December 2023) and is not considered suitable roosting habitat for these species. **Describe the nature, extent and duration of short-term and long-term impacts (BAM Section 8.3.2(a.)).** The demolition of human-made structures is not anticipated to impact any threatened species. **Predict the consequences of impacts on threatened entities (BAM Section 8.3.2(b.)).** The demolition of human-made structures is not anticipated to impact any threatened species.
Non-native vegetation	N	The proposal does not involve the clearing of any non-native vegetation that provides habitat for threatened species.
Movement corridors	Y	The subject land's vegetation forms part of a significant vegetated link which connects Ku-ring-gai and Garigal National Parks with the Irrawong Reserve, Warriewood Wetlands and Narrabeen Lagoon. **Prepare a list of threatened entities that are likely to use or are a part of the connectivity or corridor** The corridor contains records of the Giant Burrowing Frog, Red-crowned Toadlet, Rosenberg's Goanna, White-bellied Sea-eagle, Scarlet Robin, Freckled Duck, Gang-gang Cockatoo, Little Lorikeet, Swift Parrot, Powerful Owl, Eastern Pygmy-possum, Squirrel Glider, Grey-headed Flying-fox, Large-eared Pied Bat, Little Bent-winged Bat, Large Bent-winged Bat, Eastern Coastal Free-tailed Bat, Eastern Cave Bat, and Southern Myotis. **Describe the importance of the connectivity to threatened entities, particularly for maintaining movement that is crucial to the species' life cycle**

		The proposal would remove 35 trees from the edge of the habitat corridor. The affected area of foraging habitat would represent a small percentage of the total extent of the habitat corridor. **Describe the nature, extent and duration of short-term and long-term impacts** The proposal would remove 35 trees. The long-term impact of tree removal is the loss of foraging habitat for threatened species within the locality. **Predict the consequences of impacts for the persistence of the threatened entities identified in Subsection 6.1.3, taking into consideration mobility, abundance, range and other relevant life history factors** Threatened microbats are highly mobile and would freely fly long distances over open areas including urbanised city centres to move between foraging sites and roost sites. The proposal would not affect the movement of threatened microbats between habitat patches.
Waterbodies, water quality and hydrological processes	N	The subject land does not contain waterbodies.
Wind turbine strikes	N	The proposal is not a wind farm development.
Vehicle strikes	N	The proposal does not increase car parking above that which already exists and is not anticipated to result in additional vehicle strike risk to any threatened species.

Stage 2: Impact Assessment

6 Avoid and Minimise Impacts

6.1 Direct Impacts

6.1.1 Location on the site – bulk and scale

Changes have occurred over the years from 2018 to 2024. Actions have been take to reduce the scale and the area of impact. The plan has also changed as it is understood the current dwelling could not be extended onto and a new dwelling is required. This dwelling has been moved out of the area of dense trees and closer to the existing building. Roads and internal access has been reduced and arena placements brought forward (towards the road) and are within the APZ areas.

The 2018 plan had a large portion of the site (right to the base of the rock escarpment to the west) planned for paddocks, arenas and stables as well as an expansion of the dwelling and an internal road network. Tree loss was far higher than subsequent proposals and a large part of the site was proposed to be impacted.

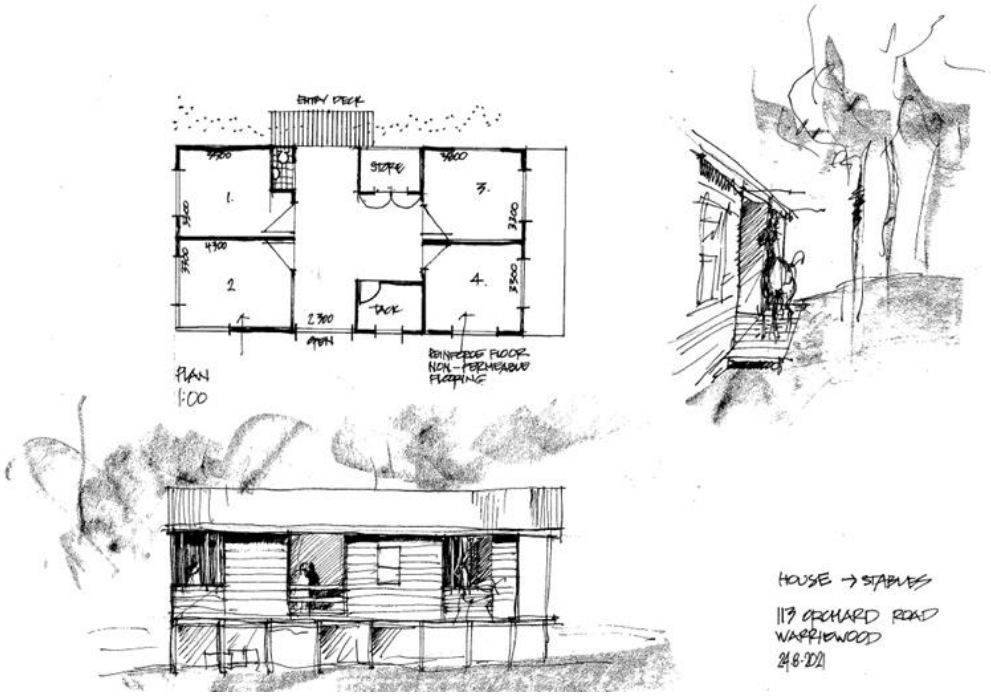
At that time it was also proposed to removed trees from within the arenas. The on-site waste water mgt was a system that required a larger disposal area and subsequent long-term degradation of trees in the disposal zone and some direct removals. While I don't have access to exact numbers the tree loss proposed was greater.' The existing older small house was planned to be converted to stables and a larger home built. The new home was shown on later drawings. A sketch from 2018 plans is included below.

2018 plans

Oct 2018 saw the reduction of the internal roads and associated tree loss.

Oct 2018 road redesign to reduce tree loss.

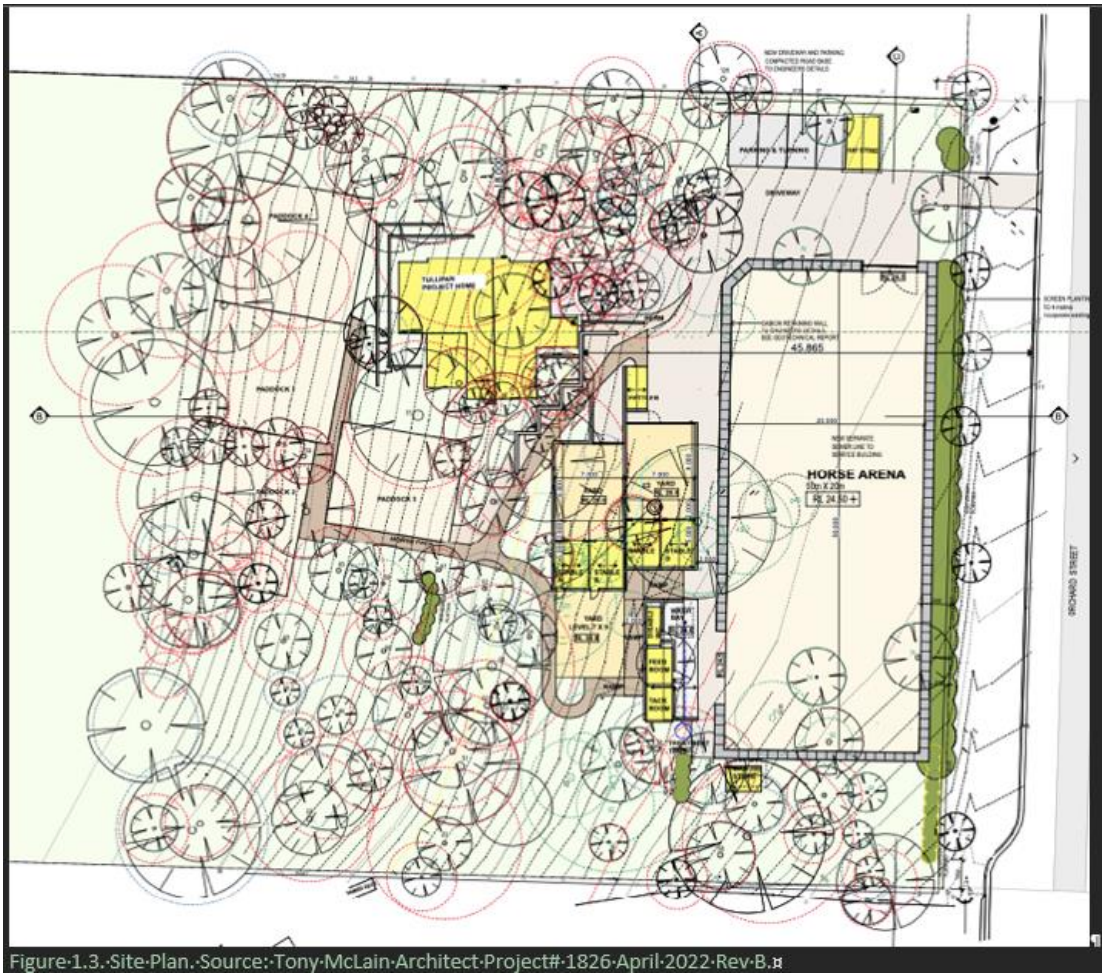
In 2019 the existing house was found to be non-viable to expand. So the plan above (expanded house) was no longer an option and the existing dwelling was planned as stables (see 2021 sketches).



Also there was a need to separate the residential area from the horses due to potential conflicts/dangers of young children and horse in close proximity.

The extract below shows the 2021 plans with the separate house and existing dwelling as stables. This plan 2021 also have extensive internal roads and paddocks.

At this time 2020 ECA was commissioned to work on the ecological considerations of the proposal by way of a BDAR.



Figure·1.3.·Site·Plan.·Source:·Tony·McLain·Architect·Project#·1826·April·2022·Rev·B.¤

The 2022 plan had a reduced footprint with the dwelling moved out of the heavily treed area and moved close to the existing dwelling. Internal routes were reduced, the area to the north has no directed impact, though will be in APZ. Stables have been removed from the western, reserve adjoining, boundary and moved to be concentrated in the centre within and around the existing house footprint. Paddocks have been located in areas with fewer trees. The proposed arena/paddock areas currently have sparse understory and almost no mid story. Trees within and around the proposed arenas are to have permanent trunk protection, that is inspected and adjusted as trees grow. Root protection is also required – as per Arborist report (update 2024) and noted in the VMP (July 2024).

The total development footprint for 2024 is smaller than original. The APZ being the largest impact.
The APZ will be only a partial reduction in vegetation and created and maintained in accordance with the VMP (July 2024).

Activities that impact the ecology such as arenas are within the APZ.
Total development footprint area = 0.51ha (yellow area), comprised of:
APZ = 0.29 ha (see red plan below as well).
New structures = 0.04 ha
Development footprint = 0.36 ha
The remaining is on cleared land, existing house and turf front area.

Total development footprint area = 0.51ha (yellow area

6.1.2 Bushfire Management (landscape)

The APZ are has been indicated in the Bushfire Mgt plan. In this area canopy is to be reduced to 20% cover. The Arborist advised this is best determined by ecologist with Fire consultants at time of works. An agreed estimate of up to 5 additional trees was determined as the potential impact in addition to branch pruning. The ground and mid-layer already meet the APZ requirements. The Horse paddocks will see the removal of ground/shrub species in those areas and this will provide more than required in the APZ for ground/mid layer.
Areas outside the APZ will be managed to retain and maximise biodiversity in keeping with APZ requirements. It is noted that the 10:50 'rule' does not apply to new DAs and fire mitigation by landscape modification is only permitted in the area of the APZ. In calculations of impact the whole APZ has been assumed to be impacted 100% with the vegetation condition after APZ implementation being zero. This will not be the case however as many trees will be retained and the current ground layer will see no change from APZ, only from direct impact of arenas, dwelling etc.

Map 3 shows the estimated APZ to achieve BAL-40. The total area of the APZ as shown is 2934m2.Some of the above area of the required APZ is already managed land.

The figure below from the July 2024 plan shows the APZ (hatched) and additional built structure footprint (solid red). Horse arenas are within the APZ. All areas outside of the red hatched area will be managed as bushland and the that in the APZ area, out of approved development activities) will be managed as reduced fuel and disconnected canopy.

The APZ area (excluding built or to be built areas) is 0.29ha (red hatching). Solid red are the proposed new buildings (0.04ha).

APZ area and development outline (red) showing arenas etc are, for the most part, within the APZ or existing cleared areas.

July 2024 photos showing areas that are within the APZ area. A leaf blower can be used to thin leaf little without impacting native ground vegetation.

APZ establishment and maintenance on the property will require removal of smaller trees so cover is under 20% and not over hanging the building.

Due to the current site condition no ground or shrub species need to be removed. Weeds such as Lantana (abundant next door) have seedling in the APZ and these will be removed as per the Fire and Vegetation Mgt Plan.

Ground and shrub cover is less than 10% within the APZ, therefore meeting the requirements of an APZ Inner Protection Area (IPA) as per Appendix 4, Planning for Bushfire Protection (NSW RFS 2019) (Appendix E) have been included in the VMP.

Grasses (existing native) are to be maintained 150mm in height to meet the requirements of the APZ IPA. No native grasses are to be removed. Majority of the groundcover species within the subject land are less than 100mm in height. The species greater than 100mm in height included *Lomandra longifolia* (Spiny-headed Mat-rush) this is not considered to be a bushfire risk species (this species does not need to be cut /mown). The location of tall ground plants and shrubs being retained need just not to connect ground with canopy.

Excessive leaf litter and woody debris will be removed from the APZ to satisfy the requirements of the APZ IPA. Woody debris will be relocated to the bushland within the western portion of the subject land. Leaf litter will not be relocated as to not increase fuel loads to the west. Leaf litter will be removed via green waste. A shallow (few leaves thick) layer of material in contact with the earth is fully complying in an APZ. As is the current condition.

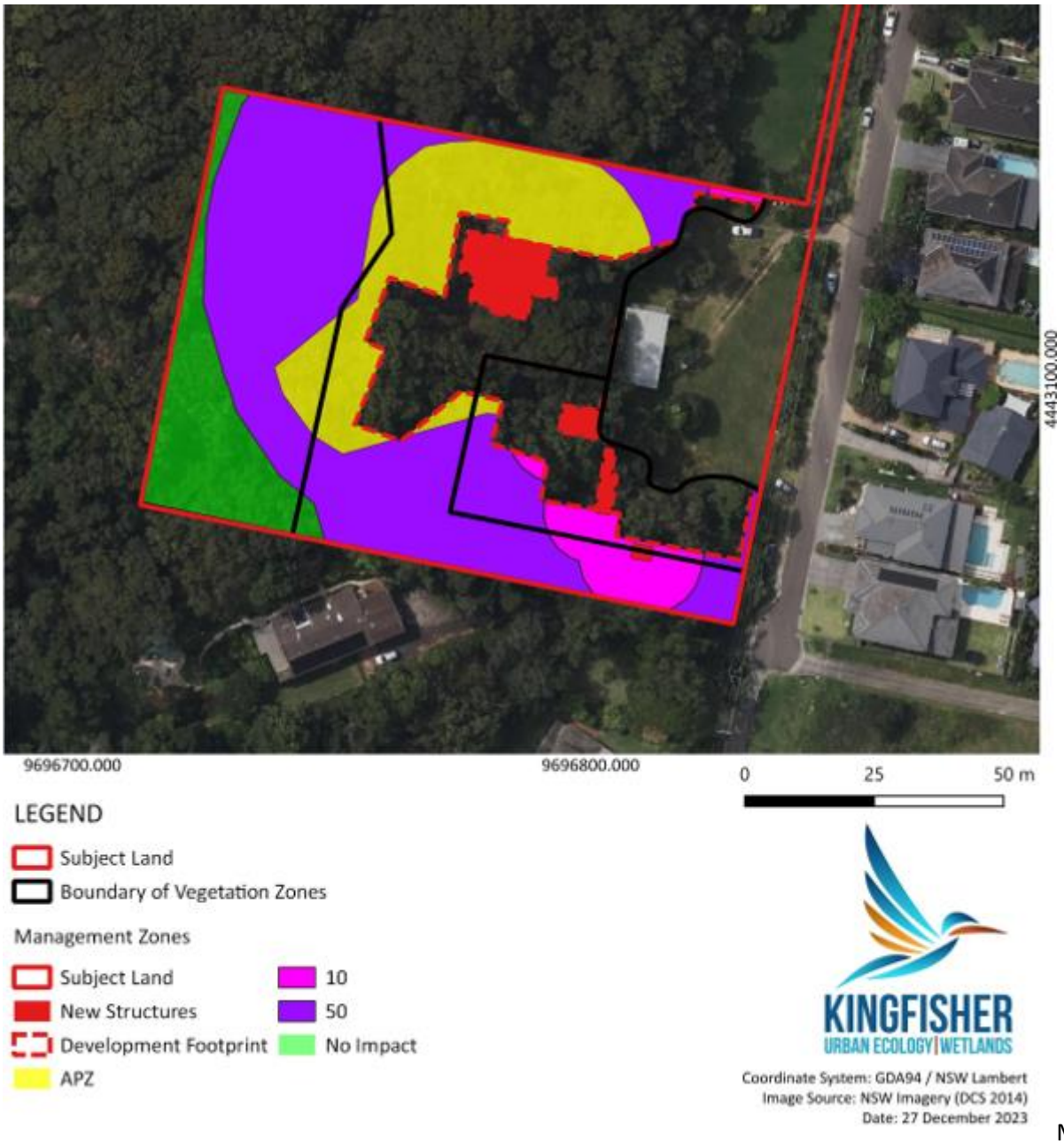
Leaf litter has been reduced in the BAM-C to 0 for APZ management zone. Lengths of logs has been retained within the APZ management zone to reflect the retention of logs within the subject land (habitat logs will be moved out of the APZ and retained within the bushland within the western portion of the subject land). See below log in the APZ area. This can be retained in situ. Logs that link ground and canopy areas will need to be relocated.

Outside the APZ – retained and bushland with active weed management as per VMP (July 2024).

Right: Canopy separation can be achieved by pruning at times not requiring tree removal. This will be the preference when creating the APZ.

Below: Western portion of the subject land consisted of large sandstone boulders. Any woody debris that is removed from APZ will be relocated here, allowing for the retention of habitat features within the subject land for native fauna. The proposal does not cause any impacts to this area. This area will be retained and protected with the implementation of a Biodiversity Management Plan.

Previous plans had been requested (by Council) to indicate the area that would fall under the 10:50 clearing rule.. This was shown in Jan 2024 as requested. The 10:50 rule though does not apply to new Das as it is super ceded by the site specific DA APZ requirements. Areas outside the APZ will be managed as per the VMP and this the areas shown here in purple and pink are not assumed nor permitted to be cleared or impacts for fire mitigation purposes.



MP).

6.1.3 Trees: Retention, Impact, Removal

House location has been moved out of the main area of tree and drive taken for the Northern Boundary (reducing trees loss), Arborist report provides information on how the trees are to be protected from horses.

Avoid trees

The 2022 plan shows the area for tree protection fencing – to protect trees during development. This pink outline is the line of direct tree impact from built form. Other tree loss is proposed from APZ implementation. Paddock trees existing will be retained however future natural regeneration will be stopped within used paddocks/ arenas (due to horses walking in these areas).

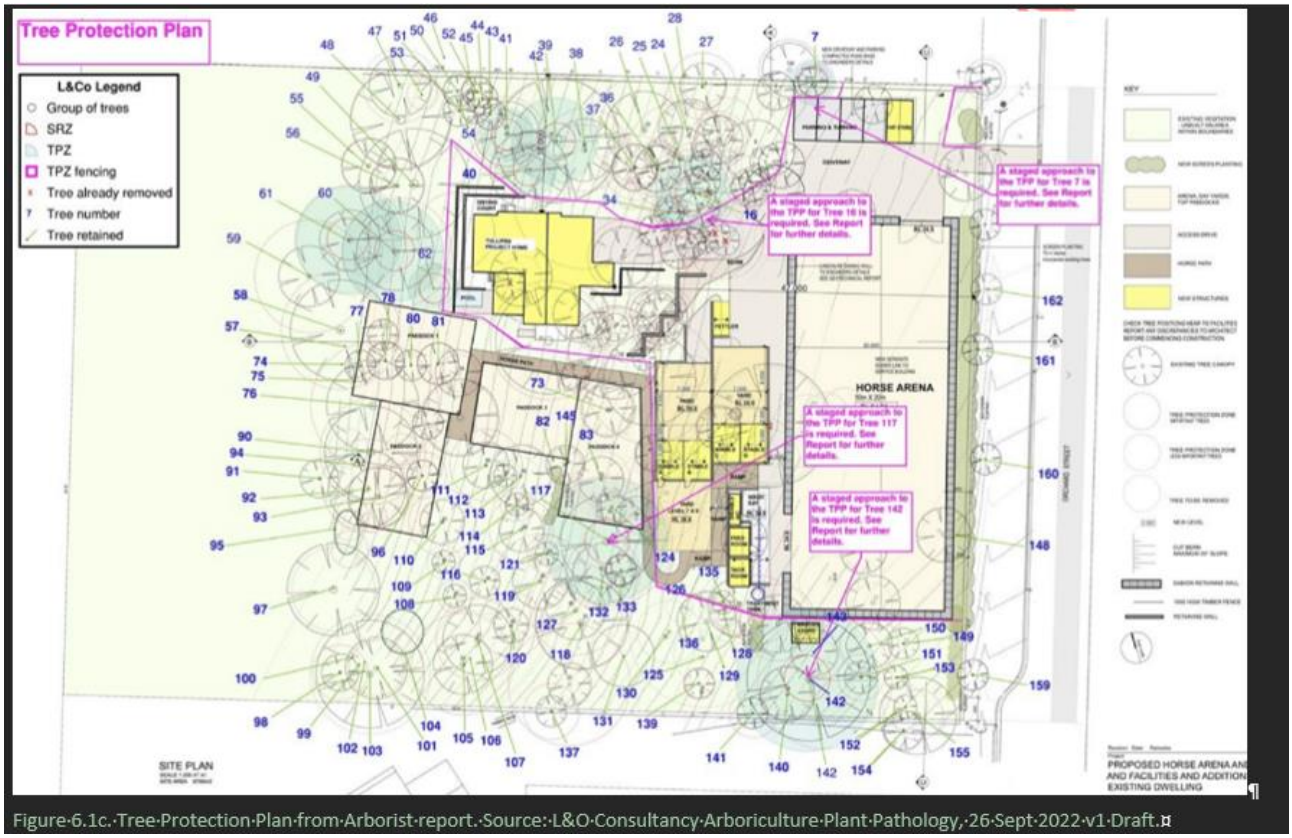


Figure 6.1c. Tree Protection Plan from Arborist report. Source: L&O Consultancy Arboriculture Plant Pathology, 26 Sept 2022 v1 Draft.

Extract from Arborist report summarising impacts on trees, those retained, those potentially impacted and those to be removed. It is noted that tree removals and retentions discussed below are all within the development area (yellow outlines). Those in the APZ area have been assumed in the calculations to be lost completely (outcomes of value of APZ area has been set to zero for after works condition). Tree loss in the APZ, not already covered in the Arborist report, will be determined by the ecologist and bushfire consultant on-site with maximum retention being the aim.

1.3	The supplied plans show no works are proposed within the TPZs of Trees 2, 3, 4, 9, 10, 12, 13, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 34, 36, 37, 38, 39, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 67, 68, 73, 74, 75, 76, 77, 78, 80, 81, 82, 83, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 107, 108, 109, 110, 112, 113, 114, 115, 116, 118, 119, 120, 121, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 135, 136, 137, 139, 140, 141, 144, 145, 149, 150, 151, 152, 153, 154, 155, 159, 160, 161, 162 & 163. However, the tree protection measures outlined in this report should be implemented to avoid indirect impacts.

Source: Arboricultural Impact Assessment & Tree Protection Specification (L&Co 07 April 2023)

Minimise impact – actions needed as per Arborist report are included below. The final approved Arborist plan must be implemented.

1.4	The proposed works represent a *Minor Encroachment* (as defined by AS4970) on Trees 31, 40, 62, 70. However, a minor encroachment is considered acceptable by the standard when it is compensated for elsewhere and contiguous within the TPZ, as in the current cases. Further, the tree protection measures outlined in this report will reduce the likelihood of negative impacts on Trees 40 & 62.
1.5	The proposed engineering works are within the SRZs of Trees 29 & 30. The proposed horse path is within the SRZ of Tree 79. Works within the SRZ represent a *Major Encroachment* (as defined by AS4970). However, negative impacts can be minimised and the trees retained if the tree sensitive construction methods and protection measures outlined in this report are implemented. The proposed works are considered acceptable under the Australian Standard AS4970, Clause 3.3.4.
1.6	The proposed engineering works are within the TPZs of Trees 32 & 69. The proposed parking is within the TPZ of Tree 7. The proposed driveway is within the TPZ of Tree 16. The proposed horse path is within the TPZ of Tree 117 and the proposed manure store and horse rink is within the TPZ of Tree 142. The TPZ encroachment was greater than 10% of the TPZ and represents a *Major Encroachment* (as defined by AS4970). However, negative impacts can be minimised if the tree sensitive construction methods and protection measures outlined in this report are implemented and be acceptable under the Australian Standard AS4970, Clause 3.3.4.

Source: Arboricultural Impact Assessment & Tree Protection Specification (L&Co 07 April 2023)

Mitigate –
Points from the Arborist report below are to be read as *must*, where it has *should*. See the VMP for exclusion areas, restoration and revegetation.

1.9	All trees located within the proposed horse paddocks should have permanent trunk protection installed in the form of wooden fencing to prevent mechanical damage from horse activities.
1.10	The location of the underground services was not detailed in the supplied plans. The installation of underground services should be located outside of the TPZs detailed in this report. Where this is not possible, they should be installed around or below roots (>25mm∅) using either hydrovac or hand excavation and supervised by the Project Arborist.

Source: Arboricultural Impact Assessment & Tree Protection Specification (L&Co 07 April 2023)

6.1.4 Native fauna

Hollows: Avoid and minimise Impact

Hollows occur on site and have been mapped and all trees with hollows can be retained including in the APZ areas with the exception of one growing within the footprint. This tree hollow, shown here, will be relocated on the site. The branch section will be cut and relocated under the supervision of the ecologist.

Other than this one, trees with hollows on-site are being retained in situ.

Hollows: Minimise Impact

Trees with known hollows will have extra protection and signage with protection during development to ensure that the habitat trees are not disturbed. Bunting will be used to demarcate and protect habitat trees not approved for removal (see Arborist report for more on general tree protection). Council's Biodiversity Officer conducted a site inspection (2023 notification) and observed a hollow was being occupied by a native glider. This was within Tree 113. This tree is being retained and protected.

Tree removals will be done with the ecologist present and all trees inspected for habitat. Habitat will be retained on site in alignment with APZ requirements (eg 'large log habitat' can be placed in the western area behind proposed arena.

Any hollows / crevices etc for microbats will be retained in the trees or if found only after felling (eg for small crevices not viable from ground) they will be retained and relocated. Any not able to be relocated (e.g. they are unstable) will be replaced 2 boxes per habitat feature lost. The tree below is in the APZ and will be retained. While it is not certain, from the ground, that hollows are present in this tree it is likely so it will be retained.

Habitat boxes

Habitat boxes are to be from real re-used hollow or from long lasting materials (modified non-toxic plastics, concrete, resins) or marine ply or thick hardwood that has a protective coating such the that the boxes are expected to last at least 15-20 years. Expanding wire (zig-zag) to be used to minimise impact to trees. Boxes not to be nailed to trees. Box sizes to be proportional to those lost.

Food trees/plants

The sites has a high diversity of canopy species and works will ensure all species are retained. In the APZ where there is a choice of trees to prune or remove then habitat will be retained first, hollows etc, then known food trees. Such as Red-bloodwoods and Grass Trees for the Gliders and Forest She-oaks for the Glossy Black Cockatoos.

6.2 Indirect Impacts

The proposal is to ensure any indirect impacts are avoided, minimised, and mitigated through the implementation of mitigation measures.

6.3 Prescribed Impacts

6.3.1 Karst, caves, crevices, cliffs, rocks or other geological features of significance

The subject land contains rocks and rock crevices that form habitat for threatened species. Termite mounds are key for species such as the Rosenberg's Goanna (no mounds on site but within 400m). The proposal does not involve the clearing or modification of rock, or other geological features, on the subject land.

6.3.2 Human-made structures

The existing dwelling does not host any roosting microbats; however, microbats are known to utilise buildings and human-made structures for roosting. No microbats were observed in the existing dwelling in the 2023-2024 survey.

Prior to the demolition of the existing dwelling, a pre-clearance survey is to be done focused on finding any evidence of roosting microbats (i.e., faeces, visual observation).

If roosting microbats are found, a suitability qualified and vaccinated person is to be engaged to relocate the species. For cave dwelling species, a temporary mock cave (e.g., shed) is to be installed on the subject land.

The relocator is to encourage and move bats into the mock cave. When microbats leave the mock cave, the structure may be removed. For hollow dwelling species, microbats are to be relocated into next boxes and the boxes are to be installed in trees to be retained on the subject land.

No other human made structures are being removed.

No dams or water bodies are on site.

6.3.3 Movement Corridors and Planting

The subject land's vegetation forms part of a significant vegetated link which connects Ku-ring-gai and Garigal National Parks with the Irrawong Reserve, Warriewood Wetlands and Narrabeen Lagoon.

Avoid and minimise corridor impacts

The overall development proposal, relative to the 2018 version, has been pulled away for the western bushland boundary. The main corridor impact is tree loss (discussed earlier). In summary the native trees proposed to go from the edge of the corridor will result in local reduction of the extent of habitat.

The extent of the corridor on the subject land will be reduced on-site however this will not remove a specific vegetation community or create gaps in the corridor, extensive development along the eastern boundary (across the road) has resulted in a break in connection from the wetlands to the Escarpment.

Minimisation of impact will be through the longer-term management having areas of the VMP prioritised for conservation this includes excluding horses and generally compaction impacts from priority conservation areas.

Mitigation

Mitigation will be on-site through VMP works and offsite via retirement of one ecosystem credit for PCT 3176.

The VMP provides for seed collection during approved tree removals.

Planting is also required (see VMP). A list of appropriate species for planting has been provided and areas for planting – this includes thickening up plantings around the arenas to assist with nutrient capture and tree planting to mitigate the loss of trees and ensure future trees (very few canopy tree seedlings were observed on site).

Species are provided in the VMP are mostly from the sites and the community, Sydney Enriched Sandstone Moist Forest, and include the following:

Canopy, high and mid-level

Angophora costata (Sydney red gum), *Syncarpia glomulifera* (Turpentine), *Allocasuarina torulosa* (Forest oak), , *Eucalyptus piperita* (Sydney peppermint), *Allocasuarina littoralis* (Black she oak), *Corymbia gummifera* (Red bloodwood), *Eucalyptus resinifera* (Red mahogany), *Angophora floribunda* (Rough barked apple), *Banksia integrifolia* (Coast banksia), *Banksia serrata* (Old man banksia), *Eucalyptus robusta* (Swamp mahogany) and Cabbage Tree Palms *Livistona australis.*

Shrubs

Tall: *Glochidion ferdinandi* (Cheese tree) *Elaeocarpus reticulatus (*Blue berry Ash)

To 2m *Breynia oblongifolia, Hibbertia aspera, Hibbertia dentata, Xanthorrhoea arborea*

Grasses and ground plants

Lomandra longifolia, Entolasia stricta, Microlaena stipoides, Entolasia marginata, Lomandra filiformis, Imperata cylindrica, Oplismenus aemulus, Lomandra obliqua, Themeda australis, Echinopogon caespitosus

Forbs

Dianella caerulea, Xanthosia pilosa, Commelina cyanea, Centella asiatica, Poranthera microphylla

Ferns

Pteridium esculentum, Adiantum aethiopicum, Asplenium flabellifolium, Calochlaena dubia

Vines (including those good for screening)

Eustrephus latifolius, Stephania japonica, Cayratia clematidea, Hibbertia scandens, Glycine clandestina,

6.3.4 Waterways

The site is 160m from Mullet Creek. The capture and treatment of horse poo/effluent will be required for all concentrated sources (such as stables) and periodically from exercise areas such as arenas to ensure a build up of nutrient rich material does not reach Mullet Creek or the depressions and drainage lines leading to it. Reduction of impacts will be via the best practice cleaning routine as well as vegetated areas around areas where horses congregate.

7 Impact assessment

7.1 Tree removal

Table 7.1 identifies the trees proposed for removal. A total of thirty-three (33) native trees are proposed to be removed.

Table 7.1. Trees proposed for removal.

Tree no.	Species	Type
1	*Jacaranda mimosifolia* (Jacaranda)	Exotic
5	*Macadamia integrifolia* (Macadamia)	Macadamia Nut is listed as vulnerable under the EPBC Act. The species occurs from Mt Bauple, near Gympie, to Currumbin Valley in the Gold Coast hinterland, south-east Queensland (Approved Conservation Advice for *Macadamia integrifolia* (Macadamia Nut) 2008). It is not known to occur naturally in the wild in NSW (PlantNET). This species is frequently cultivated for its fruit and is likely a planted species on the subject land.
6	*Callistemon viminalis* (Weeping bottlebrush)	Non-local native, widely cultivated
8, 147, 157	*Glochidion ferdinandi* (Cheese tree)	Local native
14, 15, 18, 88, 33, 66, 85, 86	*Syncarpia glomulifera* (Turpentine)	Local native
17, 84, 89, 122	*Allocasuarina littoralis* (Black she oak)	Local native
35	*Eucalyptus piperita* (Sydney peppermint)	Local native
63	*Banksia serrata* (Old man banksia)	Local native
65, 71	*Eucalyptus umbra* (Broad-leaved white mahogany)	Local native
11, 64, 72, 138, 146, 156	*Angophora floribunda* (Rough barked apple)	Local native
87, 111, 143	*Angophora costata* (Sydney red gum)	Local native
123	Dead	
134	*Melicope elleryana* (Doughwood)	Non-local native
148	*Eucalyptus robusta* (Swamp mahogany)	Local native
158	*Syzygium australe* (Brush cherry lilly pilly)	Local native

7.2 Direct impacts

Table 7.2 documents the impact that will occur on the subject land after steps taken to avoid and minimise impacts. Note the direct impact includes the APZ as if totally cleared – this will not be the case.

Table 7.2. Direct impacts.

Direct impact	BC Act status	EPBC Act status	SAII entity	Project phase	Extent (ha)
Clearing of native vegetation allocated to PCT 3176	Not listed	Not listed	No	Construction	0.37
Clearing of Swift Parrot habitat	Endangered	Critically Endangered	Yes	Construction	0.37
Clearing of Large-eared Pied Bat habitat	Vulnerable	Endangered	Yes	Construction	0.37

7.3 Change in vegetation integrity score

Table 7.3 identifies the change in vegetation integrity for residual direct impacts on native vegetation.

Table 7.3. Impacts to vegetation integrity.

Vegetation zone	PCT ID	Management zone	Area (ha)	Before development				After development				Change in VI score
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	
VZ1	3176	MZ1 – Wholescale clearing	0.36	50.5	44	54.3	49.4	0	0	0	0	-49.4
VZ1	3176	MZ2 – Retained vegetation	0.2	50.5	44	54.3	49.4	50.5	44	54.3	49.4	0
VZ2	3176	MZ1 – Wholescale clearing	0.01	47.7	34.7	54.7	44.9	0	0	0	0	-44.9
VZ2	3176	MZ2 – Retained vegetation	0.25	47.7	34.7	54.7	44.9	47.7	34.7	54.7	44.9	0

7.4 Indirect impacts

The proposal may result in a range of minor indirect impacts affecting threatened species and communities. Table 7.3 provides a summary of potential indirect impacts to biodiversity values on the subject land.

Table 7.4. Indirect impacts.

Impact	Project Phase	Nature	Extent	Frequency	Duration	Timing	Consequence on biodiversity values
Noise	Construction and operation	Construction and operational noise disturbing fauna activity within the subject land and adjacent vegetation	Subject land and adjacent vegetation	Daily, during construction and operation	Construction and operational phase of the project	Potential long-term impact	The proposal is unlikely to increase noise levels above that which already exists. Short-term increased noise is expected during the construction phase of the project. Construction works are to be undertaken during standard working hours.
Light	Operation	Light spill disturbing fauna within the subject land and adjacent vegetation	Subject land and adjacent vegetation	Nightly	Operational phase of the project	Potential long-term impact	Light spill (light that goes into non-target areas) can cause disturbance to sensitive species such as microbats. Dark Sky lighting will be used to focus light on areas where needed whilst reducing light spill into surrounding environmentally sensitive areas. This form of light provides the required 'safe lighting' of areas whilst greatly reducing upward escaping light. Any lighting to be used will be shielded.

Impact	Project Phase	Nature	Extent	Frequency	Duration	Timing	Consequence on biodiversity values
Transport of weeds and pathogens from the site to adjacent vegetation	Construction and operation	Spread of weeds and pathogens from machinery, tools, equipment and clothing	Subject land and potential to spread to adjacent vegetation	Daily	Construction and operational phase of the project	Potential long-term impact	Construction activities may introduce weeds and pathogens to the subject land on machinery, tools, equipment and clothing (e.g., boots). The condition of retained and adjacent vegetation could be decreased. Providing that weeds are continually managed and bushland hygiene protocols are followed during construction and operational phases of the project the risk of weed and pathogen infestation is low.

8 Serious and Irreversible Impacts

8.1 Identification of entities at risk of an SAII

Table 8.1 identifies threatened entities identified to be at risk of serious and irreversible impacts (SAII).

The information in the following sections is provided to assist the consent authority to evaluate the nature of an impact on a potential entity at risk of an SAII (in accordance with BAM Sections 9.1.1 and 9.1.2).

Table 8.1. Entities at risk of an SAII.

Common name	Scientific name	Reason for inclusion in assessment
Swift parrot	*Lathamus discolor*	Identified on the current list of entities at risk of an SAII and is likely to be impacted by the proposal
Large-eared Pied Bat	*Chalinolobus dwyeri*	Identified on the current list of entities at risk of an SAII and is likely to be impacted by the proposal

8.2 Threatened species at risk of an SAII (Swift Parrot)

Lathamus discolor (Swift Parrot) is assessed in this section as it is an SAII threatened species. In accordance with BAM Section 9.1.2 the following information is provided to assist the consent authority in determining whether or not the proposal represents a serious and irreversible impact on this threatened species.

8.2.1 Measures taken to avoid the direct and indirect impacts on the species at risk of an SAII

Approximately 0.37ha of native vegetation will be impacted by the proposal; however, the proposal avoids the removal of favoured foraging trees *Corymbia gummifera* on-site. No other favoured foraging trees occur on-site.

Favoured foraging trees for the Swift Parrot include winter flowering species such as *Eucalyptus robusta*, *Corymbia maculata*, *C. gummifera, E. tereticornis*, *E. sideroxylon*, and *E. albens* (which are absent from the subject land except for *C. gummifera*; however, this tree species is being retained). Commonly used lerp infested trees include *E. microcarpa*, *E. moluccana*, *E. pilularis*, and *E. melliodora* (which are absent from the subject land).

8.2.2 Current status

Table 8.2. Current status – *Lathamus discolor* (Swift Parrot).

Criteria	Data / Information	Data Sources	Details of data, deficiency, assumptions, reasons for low confidence in information
Evidence of rapid decline (Principle 1)			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	The Swift Parrot population was estimated to be 2,000 individuals in 2010 (Garnett *et al.*, 2011). More recent estimates, predict the population of this species to be 750 with a maximum of 1,000 (M Webb, D Stijanovic, R Heinsohn unpublished). Studies have predicted that population viability is likely to decrease by 79-95% over 12-18 years (Heinsohn *et al.*, 2015). Other studies have predicted a	TBDC	N/A

	further 6% (Heinshon *et al.*, 2019). These projected declines are consistent with findings of annual assessments of over 1,000 breeding sites across the breeding range. These assessments track variation and abundance across the range. Habitat loss and habitat degradation are significant threats impacting breeding (nesting and foraging) habitat.		
Evidence of small population size (Principle 2)			
Current population size in NSW	The Swift Parrot breeds in Tasmania, where the breeding population has declined from in excess of 10,000 pairs to less than 1,000 pairs (Forshaw 1993, Garnett 1993, Brereton 1998). Numbers in New South Wales are considerably less than this.	NSW Scientific Committee – final determination (Page last updated 9 June 2021)	N/A
Decline in species' population size in 3 years or one generation	Population reduction >80% in 10 years of 3 generations	TBDC	N/A
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	2,000	Threatened Species Strategy – Year 3 Priority Species Scorecard (2018)	Information derived from the Conservation Advice (Threatened Species Scientific Committee 2016), with some amendments made by contributing experts based on new information.
Evidence of limited geographic distribution (Principle 3)			
Extent of occurrence (ha)	The full extent of occurrence (EOO) for this species was estimated at 57,000 km^2 in the Action Plan for Australian Birds 2010 (Garnett *et al.*, 2011), which is not considered limited.	Threatened Species Scientific Committee (2016). Conservation Advice *Lathamus discolor* Swift Parrot.	
Area of occupancy (ha)	Area of occupancy appears to have declined significantly since European settlement, as can be inferred from the extent of habitat loss. For example, 70% percent of box-ironbark habitat (the principal wintering habitat of the swift parrot on the mainland) has been cleared in NSW. White box-yellow gum-Blakely's red gum woodland, another important habitat in NSW, has been reduced to less than 4 percent of its pre-European extent on the south-western slopes and southern tablelands of NSW. Area of Occupancy: 1,400 km^2	Threatened Species Strategy – Year 3 Priority Species Scorecard (2018)	
Number of threat-defined location	The majority of Swift Parrot foraging sites in NSW, Queensland and South Australia occur outside conservation reserves and		No threat defined locations are listed in the TBDC.

	therefore continue to be vulnerable to loss, fragmentation or disturbance.		
Whether the species' population is likely to undergo extreme fluctuations	Projected that Swift Parrots will undergo substantial declines within three generations.	Threatened Species Strategy – Year 3 Priority Species Scorecard (2018)	Population Viability Analysis (Heinsohn et al. 2015) (based on modelled scenarios that considered impacts of sugar glider predation).

8.2.3 Impact assessment

Table 8.3. Impact assessment – *Lathamus discolor* (Swift Parrot).

Impact	Data / Information	Data Sources	Details of data, deficiency, assumptions, reasons for low confidence in information
Number of individuals (mature and immature) present in the subpopulation on the subject land	NSW BioNet Atlas was used to investigate records of the Swift Parrot within or near the subject land. The site is centred within a 10 km x 10 km square (investigation area). There are 27 records of the Swift Parrot. None of the records were within the site. The closest record is approximately 600 m from the subject land.	NSW BioNet Atlas	N/A
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	N/A The Swift Parrot occurs as a single, migratory population.	Threatened Species Strategy – Year 3 Priority Species Scorecard (2018)	N/A
Area of habitat to be impacted (ha) (for species measured by area only)	Approximately 0.37 ha of mapped important habitat will be impacted. No preferred foraging habitat trees will be impacted.	BAM Swift Parrot Important Habitat Map	Extent of mapped habitat impacted calculated in QGIS v3.28.10
Area of the species' geographic range to be impacted by the proposal (ha)			
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)	0.0002% of occupancy		Extent of mapped habitat impacted calculated in QGIS v3.28.10
Individuals impacted	No individuals will be directly impact.		
Viability of a fragmented population	The species areas of mapped important habitat will not become fragmented.		The Swift Parrot is an extremely mobile migratory bird. The proposal will almost certainly not cause fragmentation for the species

8.3 Species at risk of SAII (Large-eared Pied Bat and Eastern Cave Bat)

Chalinolobus dwyeri (Large-eared Pied Bat) is assessed in this section as they are SAII threatened species. In accordance with BAM Section 9.1.2 the following information is provided to assist the consent authority in determining whether or not the proposal represents a serious and irreversible impact on this species.

This species is a species credit species because they cannot be reliably predicted to occur on a site based on vegetation and other landscape features (either foraging or breeding).

Any impacts on breeding habitat used by the species could be considered potentially serious and irreversible. Potential breeding habitat associated with the species includes rocky areas containing caves, overhangs, escarpments, outcrops, or crevices.

8.3.1 Measures taken to avoid the direct and indirect impacts on the species at risk of an SAII

Rocky areas containing caves, overhangs, escarpments, outcrops, or crevices are not present on the subject land and thus, the proposal would not impact on breeding habitat for this species.

This species forages for small, flying insects below the forest canopy. Hence, timbered areas within the subject land that are subject to clearing have been conservatively entered into the BAM-C and an offset obligation incurred. The offset obligation calculated by the BAM-C may not be required should the species not be detected in future compliant surveys.

8.3.2 Current status

Table 8.4. Current status – Large-eared Pied Bat.

Criteria	Data	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Species that is unlikely to respond to management and is therefore irreplaceable (Principle 4)			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal)	The Large-eared pied bat and Eastern cave bat are known to be reliant on caves for breeding.	Conservation Advice for *Chalinolobus dwyeri* (Large-eared Pied Bat) (Department of Agriculture, Water and the Environment 2021)	
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems)	The Large-eared pied bat requires specific caves for breeding i.e., arch caves with dome roofs, height and depth to allow juvenile bats to learn to fly inside, indentations in the roof of the cave, etc. These physical characteristics are uncommon in the landscape and their scarcity poses a limiting factor in the distribution of the species.	Conservation Advice for *Chalinolobus dwyeri* (Large-eared Pied Bat) (Department of Agriculture, Water and the Environment 2021)	

Life history traits and/or ecology is known but the ability to control key threatening processes is currently negligible (e.g. frogs severely impacted by chytrid fungus)	The Large-eared pied bat is known to be reliant on caves for breeding.	Conservation Advice for Chalinolobus dwyeri (Large-eared Pied Bat) (Department of Agriculture, Water and the Environment 2021)	

8.3.3 Impact assessment

Table 8.5. Impact assessment – Large-eared Pied Bat and Eastern Cave Bat.

Criteria	Data / information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information
Number of individuals (mature and immature) present in the subpopulation on the subject land	The NSW BioNet Atlas was used to investigate records of the Large-eared Pied Bat and Eastern Cave Bat within or near the subject land. The subject land is centred within the 10 km x 10 km square (investigation area). There are 9 records of the Large-eared Pied Bat. None of the records were within the subject land.	NSW BioNet Atlas	n.a.
Area of habitat to be impacted (ha) (for species measured by area only)	Approximately 0.37ha of foraging habitat would be impacted.	n.a.	n.a.
Individuals impacted	No individuals would be directly impacted.	n.a.	n.a.

9 Impact Summary

9.1 Offset requirement for impacts

9.1.1 Impacts on native vegetation (ecosystem credits)

Table 9.1 identifies impacts that require an offset (as per BAM Subsection 9.2.1(1.)).

Table 9.1. Impacts that require an offset – ecosystem credits.

Vegetation zone	PCT name	TEC	Impact area (ha)	Current VI score	Future Vi score	Change in VI score	Biodiversity risk weighting	No. ecosystem credits required
1	3176-Sydney Enriched Sandstone Moist Forest	No	0.36	49.4	0	-49.4	1.5	7
2	3176-Sydney Enriched Sandstone Moist Forest	No	0.01	44.9	0	-44.9	1.5	1
							Total credits	8

9.1.2 Impacts on threatened species and their habitat (species credits)

Table 9.2 identifies impacts on threatened species that require an offset (as per BAM Subsection 9.2.2(2.))

Table 9.2. Impacts that require an offset – species credits.

Scientific name	Common name	BC Act status	EPBC Act status	Loss of habitat (ha)	Biodiversity risk weighting	No. species credits required
Lathamus discolor	Swift parrot	Endangered	Critically Endangered	0.37	3	10
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Endangered	0.37	3	10
					Total credits	20

9.2 Impacts that do not need further assessment

Areas within the subject land that do not contain native vegetation do not need to be assessed for ecosystem credits as per BAM Section 9.3(1-2.) as these areas do not provide habitat for threatened species such as mown exotic lawn.

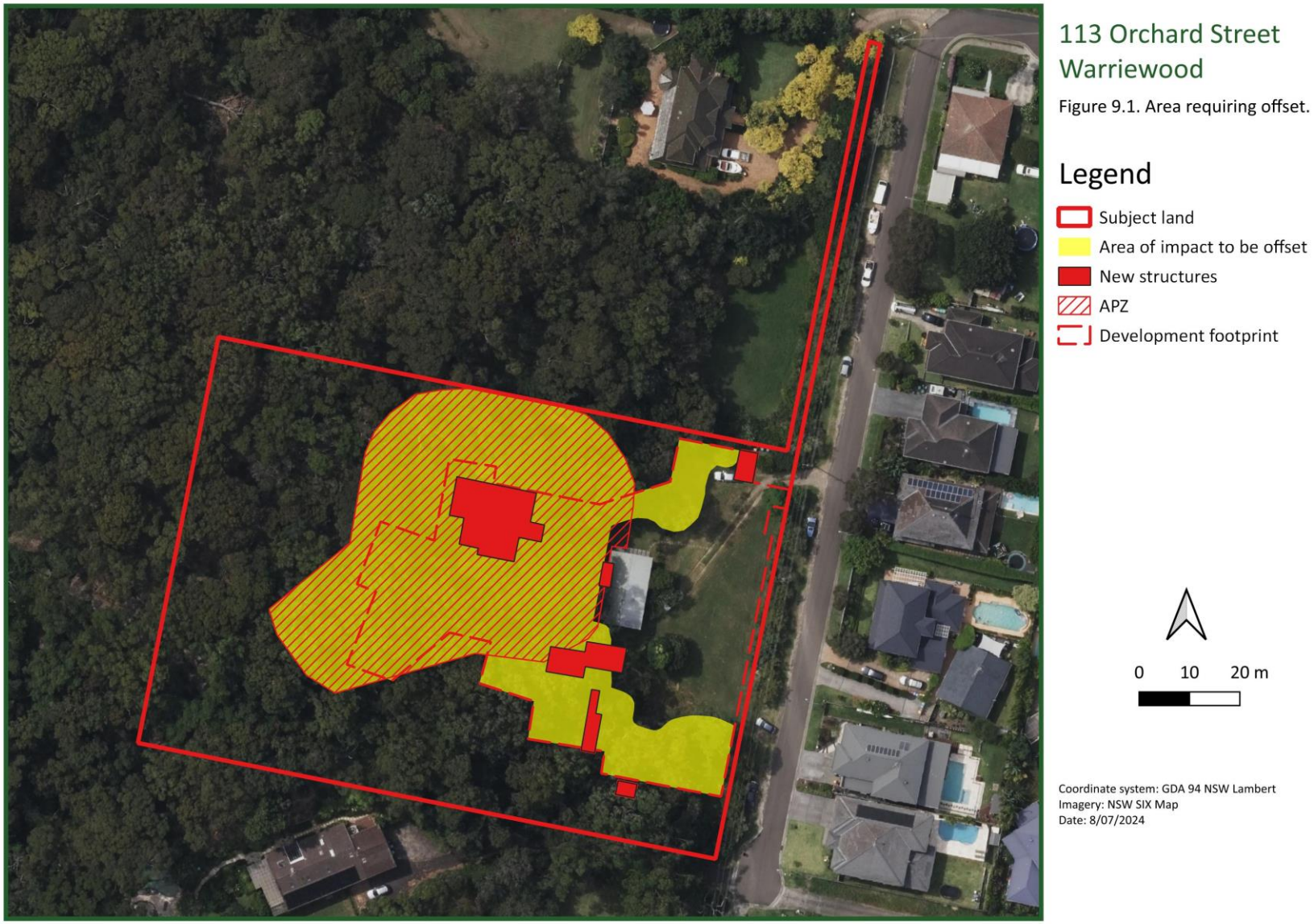


Figure 9.1. Area requiring offset.

10 Mitigation measures

The impacts of the proposal are to be mitigated through the implementation of the following mitigation measures.

10.1.1 Delineation of work areas

During the development, impacts to the site and the vegetation to be retained should be minimised by the delineation of work areas. Access to the site would be best restricted to the development footprint only. An exclusion zone will be established for the vegetation outside the work areas.

10.1.2 Vegetation clearing protocols

Prior to removing any vegetation or other habitat that has been approved for removal, the applicant must engage a qualified and experienced Ecologist to:

- undertake a pre-clearing survey to delineate, map, and mark habitat-bearing trees and shrubs to be retained/removed and other fauna habitat features and determine the presence of any resident native fauna using nests, dreys, hollows, logs, etc.,
- supervise the clearance of trees and shrubs (native and exotic) and other habitat to capture, treat and/or relocate any displaced native fauna to an appropriate nearby location,
- remove sections of a tree containing a hollow or habitat prior to clearing and felling the tree.

10.1.3 Erosion and sediment controls

Where required, sediment controls will be put in place. These will include but are not limited to sediment fencing, jute mating, crushed sandstone, and coir logs. Sediment controls will be revised during the site inspection and/or after significant rainfall (more than 10 mm in 24 hours resulting in site runoff). Sediment and erosion control measures must ensure that no settlement of sediment or silt is to occur within areas of vegetation to be retained. All sediment fences should be retained for as long as practical. If removed, then monitoring is required to ensure flows do not concentrate and cause further erosion. If concentrated flows do occur and/or erosion gullies develop then coir logs baffles are required.

10.1.4 Tree protection

Tree protection as per the Arboricultural Impact Assessment.

10.1.5 Tree replacement ratio

Any trees removed should be replaced at a ratio greater than 1:1 (for trees not covered by a biodiversity offset) and consider that a tree replacement ratio of 2:1 is preferable to enhance habitat.

10.1.6 Weed management

Weeds are present on site and must be appropriately managed to ensure they do not spread. There must be continuous maintenance of the vegetation on site otherwise increased weed growth may result, exacerbated by the high abundance of weeds present pre-works. Weeds will colonize and pioneer on any cleared grounds, therefore must be managed during works as well as ongoing post-works.

All bush regeneration activities requiring the use of chemicals must be performed in accordance with the NSW Pesticides Act 1999. Herbicides must not be applied whilst exotic plants are setting seed. The weed removal program aims to be broad in approach and sustained in application to provide the best possible conditions for natural regeneration and to control weeds within the site.

Although soil-borne pathogens have not been identified as a Key Threatening Process, the accidental spread of pathogens can occur at any time. Hydrological conditions may promote the spread of Phytophthora (a group of fungus-like diseases affecting plants) due to moist soil and proximity to water. It is recommended that Bushland Hygiene Protocols be followed closely.

10.1.7 Nest boxes

Nest boxes designed for microbats (x2) and gliders (x1) (hard-wood or marine-ply with stainless steel fixtures) will be installed on-site to increase habitat opportunities for native fauna within the subject land. Boxes are to be secured by hanging and not rely on nailing into trees. Boxes to be installed in trees to be retained and at least 3 m above ground.

10.1.8 Pathogen prevention

The site is considered to be an area that may promote the spread of Phytophthora (a group of fungus-like diseases affecting plants) due to its moist soil and proximity to the drainage channel. It is recommended that bushland hygiene protocols outlined in the BMP be followed closely.

Phytophthora infected vegetation. (Image by Rasbak, licensed under the Creative Commons Attribution-Share Alike 3.0 Unported, 2.5 Generic, 2.0 Generic and 1.0 Generic license.)

Myrtle Rust generally infects new leaf growth. (Image by John Tann, licensed under the Creative Commons Attribution 2.0 Generic license.)

Table 10.1. Measures to be implemented before, during and after construction to avoid and minimise impacts of the proposal.

Action	Stage	Timing	Responsibility	Outcome
Delineate site access routes and environmental exclusion zones	Before construction	Installed before construction and retained during construction	Project Manager to organise fencing to delineate works area from areas of vegetation to be retained	Protect native vegetation and fauna habitat
Vegetation clearing controls	Before and during tree felling	Once	Arborist and Ecologist	Fauna protection
Fencing and tree protection	Before construction	Installed before construction and retained during construction	Arborist	Tree protection
Revegetation	Before, during or after construction	Ongoing	Ecologist to prepare a BMP detailing revegetation within the subject land Revegetation undertaken by Bush Regenerators	Habitat enhancement (birds, micro-bats)
Native species landscaping	Before, during or after construction	Ongoing	Landscape Architect	Habitat enhancement (birds, micro-bats)
Tree replacement	Before, during or after construction	Ongoing	Landscape Architect	Offset tree removal/habitat enhancement (birds, micro-bats)
Erosion and sediment controls	Before construction	Installed before construction and maintained during construction	Project Manager	Native vegetation/creek protection
Weed management	Before, during and after construction	Ongoing	Bush Regenerator	Protect and enhance native vegetation and fauna habitat
Nest box installation	Before construction	Installed once and replaced every 5 years	Arborist and Ecologist	Habitat enhancement (micro-bats)

Reuse of removed trees and hollows	During tree felling	Once	Arborist and Ecologist	Habitat enhancement (reptiles)
Pathogen prevention	Before, during and after construction	Ongoing	All personnel	Habitat protection

11 Appendices

11.1 Appendix I – BAM Plot Data

Survey name:	113 Orchard St	**Date:**	15/12/2023 revised 7/07/2024
Zone ID:	1	**Plot no:**	1

Easting:	**Northing:**	**Bearing:**	**Zone:**
341016	6270881	283	56

400m^2 plot

Composition:	**Tree**	**Shrub**	**Grass**	**Forb**	**Fern**	**Other**
Count:	4	1	5	4	2	7

Structure:	**Tree**	**Shrub**	**Grass**	**Forb**	**Fern**	**Other**
Cover:	24	5	4.5	4	2	10.5

HTW cover: 0

1,000m^2 plot

Stem size class: (cm)	**<5**	**5-9**	**10-19**	**20-29**	**30-49**	**50-79**	**No. large trees (>80cm DBH)**
Present:	✓		✓	✓	✓	✓	1

No. HBTs:	**Length of logs (m):**
1	0

50m transect

Subplot:	**5m**	**15m**	**25m**	**35m**	**45m**	**Average**
Litter cover:	80	80	100	100	100	92

Survey name:	113 Orchard St	**Date:**	15/12/2023 revised 7/07/2024
Zone ID:	1	**Plot no:**	1

GF code	Scientific name	N, E or HTW	Cover
TG	*Syncarpia glomulifera*	N	5
TG	*Allocasuarina torulosa*	N	3
TG	*Eucalyptus botryoides*	N	15
TG	*Angophora floribunda*	N	1
SG	*Breynia oblongifolia*	N	5
GG	*Echinopogon caespitosus*	N	1
GG	*Microlaena stipoides*	N	1
GG	*Themeda australis*	N	1
GG	*Imperata cylindrica*	N	1
GG	*Entolasia marginata*	N	0.5
FG	*Hydrocotyle peduncularis*	N	1
FG	*Commelina cyanea*	N	1
FG	*Dianella caerulea*	N	1
FG	*Pratia purpurascens*	N	1
EG	*Adiantum aethiopicum*	N	1
EG	*Calochlaena dubia*	N	1
OG	*Livistona australis*	N	5
OG	*Cayratia clematidea*	N	1
OG	*Stephania japonica*	N	1
OG	*Eustrephus latifolius*	N	1
OG	*Hibbertia scandens*	N	1
OG	*Glycine clandestina*	N	1
OG	*Hardenbergia violacea*	N	0.5

Survey name:	113 Orchard St	**Date:**	7/07/2024
Zone ID:	1	**Plot no:**	2

400m^2 plot

Composition:	Tree	Shrub	Grass	Forb	Fern	Other
Count:	11	2	6	6	0	4

Structure:	Tree	Shrub	Grass	Forb	Fern	Other
Cover:	62	1.5	11	5.5	0	5

HTW cover: 5

1,000m^2 plot

Stem size class: (cm)	<5	5-9	10-19	20-29	30-49	50-79	No. large trees (>80cm DBH)
Present:	✓		✓	✓	✓	✓	0

No. HBTs:	Length of logs (m):
1	3.4

50m transect

Subplot:	5m	15m	25m	35m	45m	Average
Litter cover:	90	85	75	40	20	62

Survey name:	113 Orchard St	**Date:**	7/07/2024
Zone ID:	1	**Plot no:**	2

GF code	Scientific name	N, E or HTW	Cover
TG	*Corymbia gummifera*	N	2
TG	*Syncarpia glomulifera*	N	30
TG	*Angophora costata*	N	3
TG	*Allocasuarina torulosa*	N	3
TG	*Eucalyptus botryoides*	N	10
TG	*Angophora floribunda*	N	6
TG	*Eucalyptus resinifera*	N	2
TG	*Eucalyptus piperita*	N	2
TG	*Allocasuarina littoralis*	N	2
TG	*Glochidion ferdinandi*	N	1
TG	*Clerodendrum tomentosum*	N	1
SG	*Notelaea ovata*	N	0.5
SG	*Elaeocarpus reticulatus*	N	1
GG	*Microlaena stipoides*	N	2
GG	*Imperata cylindrica*	N	1
GG	*Oplismenus aemulus*	N	1
GG	*Themeda australis*	N	5
GG	*Entolasia stricta*	N	1
GG	*Lomandra longifolia*	N	1
FG	*Dianella caerulea*	N	1
FG	*Pratia purpurascens*	N	1
FG	*Hydrocotyle hirta*	N	1
FG	*Dichondra repens*	N	1
FG	*Oxalis sp*	N	0.5
FG	Unidentified forb	N	1
OG	*Xanthorrhoea arborea*	N	1
OG	*Stephania japonica*	N	3
OG	*Parsonsia straminea*	N	0.5
OG	*Smilax glyciphylla*	N	0.5
	Pseuderanthemum variable	N	0.5
	Ehrharta erecta	HTW	5
	Buffalo grass	E	1

Survey name:	113 Orchard St	**Date:**	15/12/2023 revised 7/07/2024
Zone ID:	2	**Plot no:**	3

Easting:	**Northing:**	**Bearing:**	**Zone:**
340960	6270910	17	56

400m^2 plot

Composition:	**Tree**	**Shrub**	**Grass**	**Forb**	**Fern**	**Other**
Count:	7	5	6	2	4	3

Structure:	**Tree**	**Shrub**	**Grass**	**Forb**	**Fern**	**Other**
Cover:	28	5	11	2	5	12

HTW cover: 0

1,000m^2 plot

Stem size class: (cm)	**<5**	**5-9**	**10-19**	**20-29**	**30-49**	**50-79**	**No. large trees (>80cm DBH)**
Present:	✓	✓	✓	✓	✓	✓	1

No. HBTs:	**Length of logs (m):**
1	0

50m transect

Subplot:	**5m**	**15m**	**25m**	**35m**	**45m**	**Average**
Litter cover:	90	70	80	100	80	84

Survey name:	113 Orchard St	**Date:**	15/12/2023 revised 7/07/2024
Zone ID:	2	**Plot no:**	3

GF code	Scientific name	N, E or HTW	Cover
TG	*Angophora costata*	N	10
TG	*Allocasuarina torulosa*	N	5
TG	*Eucalyptus piperita*	N	5
TG	*Angophora floribunda*	N	5
TG	*Corymbia gummifera*	N	1
TG	*Notelaea longifolia*	N	1
TG	*Banksia serrata*	N	1
SG	*Acacia brownii*	N	1
SG	*Hibbertia aspera*	N	1
SG	*Elaeocarpus reticulatus*	N	1
SG	*Correa reflexa*	N	1
SG	*Persoonia linearis*	N	1
GG	*Lomandra longifolia*	N	1
GG	*Lomandra obliqua*	N	1
GG	*Themeda australis*	N	5
GG	*Imperata cylindrica*	N	2
GG	*Gahnia sp*	N	1
GG	*Entolaisa marginata*	N	1
FG	*Poranthera microphylla*	N	1
FG	*Dianella caerulea*	N	1
EG	*Asplenium nidus*	N	1
EG	*Adiantum aethiopicum*	N	2
EG	*Asplenium flabellifolium*	N	1
EG	*Pteridium esculentum*	N	1
OG	*Smilax glyciphylla*	N	1
OG	*Hibbertia scandens*	N	1
OG	*Xanthorrhoea arborea*	N	10

11.2 Appendix II – BAM-C Credit Reports

11.3 Appendix III – EPBC Act Considerations

11.3.1 Overview

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's central piece of environmental legislation. The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places—defined in the EPBC Act as matters of national environmental significance.

For matters of national environmental significance under the EPBC Act, significance assessments have been completed in accordance with the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of Environment, 2013).

Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment that is affected, and upon the intensity, duration, magnitude and geographic extent of the impacts (Department of Environment, 2013). Importantly, for a 'significant impact' to be 'likely', it is not necessary for a significant impact to have a greater than 50% chance of happening; it is sufficient if a significant impact on the environment is a real or not remote chance or possibility (Department of Environment, 2013).

What are matters of national environmental significance?

The matters of national environmental significance are:

- world heritage properties
- national heritage places
- wetlands of international importance (often called 'Ramsar' wetlands after the international treaty under which such wetlands are listed)
- nationally threatened species and ecological communities
- migratory species
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mining)
- a water resource, in relation to coal seam gas development and large coal mining development.

Source: Matters of National Environmental Significance Significant impact guidelines 1.1
https://www.dcceew.gov.au/sites/default/files/documents/nes-guidelines_1.pdf

11.3.2 Relevant matters

A search of the Protected Matters Search Tool (PMST) revealed that 1 national heritage place, 109 threatened species, 61 migratory species (and/or their habitats) and 8 threatened ecological communities listed in the EPBC Act are predicted to occur within a 5 km radius of the subject land.

No EPBC Act listed national heritage places occur on the subject land.

Threatened species listed under the EPBC Act relevant to the subject land include the Swift Parrot, Large-eared Pied Bat, and Grey-headed Flying-Fox.

No EPBC Act listed migratory species were recorded on the subject land nor does the subject land contain habitat for migratory species.

No EPBC Act listed threatened ecological communities were recorded on the subject land and no other EPBC Act matters are relevant to the biodiversity of the subject land.

11.3.3 Significant Impact Assessment

The Swift Parrot, Large-eared Pied Bat, and Grey-headed Flying-Fox have been considered in accordance with the 'significant impact criteria' for 'vulnerable' and 'endangered' species in the *Matters of National Environmental Significance Significant Impact Guidelines 1.1* (DoE 2013).

When taking into consideration all stages and components of the proposal, there is the potential for impacts, including indirect impacts, on matters of national environmental significance, being mainly loss of a potential foraging habitat for mobile threatened fauna species, including birds, bats and mammals. However, it is unlikely that any of the species would be adversely impacted by the proposal, given:

- Breeding habitat for the Swift Parrot is not present on the subject land. This species breeds in Tasmania and migrates to mainland Australia to forage. Foraging habitat for the species is present on the subject land in the form of *C. gummifera* (Red bloodwood) trees. The proposal does not require the clearing of foraging habitat of the Swift Parrot. The proposal is not expected to impact the Swift Parrot.
- Optimal breeding habitat for the Large-eared Pied Bat is not present on the subject land. The species primarily roosts in caves. Foraging habitat for the species is present on the subject land in the form of canopy cover and insect abundance. The proposal requires the clearing of 35 trees of potential foraging habitat for the species. The affected area of foraging habitat would represent a small percentage of the total extent of foraging vegetation types present within the locality. Given the relatively widespread nature of similar vegetation and abundance of higher quality foraging habitat within the locality, the proposal is not expected to significantly affect the life cycle of the species.
- No flying-fox camps occur on the subject land and the proposal would not impact on any camp. As such, the impacts of the proposal to the Grey-headed Flying-fox would be limited to the loss of foraging habitat caused by direct clearing of trees during the construction phase. The proposal would remove 35 trees of potential foraging habitat. The affected area of foraging habitat would represent a small percentage of the total extent of foraging vegetation types present within the locality. Given the relatively widespread nature of similar vegetation and abundance of higher quality foraging habitat within the locality, the proposal is not expected to significantly affect the life cycle of the species.

With reference to the criteria for vulnerable and endangered species, the proposal is not likely to:

- lead to a long-term decrease in the size of a population
- reduce the area of occupancy of the species
- fragment an existing population into two or more populations
- adversely affect habitat critical to the survival of a species
- disrupt the breeding cycle of a population
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species are likely to decline
- result in invasive species that are harmful to a critically endangered or endangered species becoming
- established in the endangered or critically endangered species' habitat
- introduce disease that may cause the species to decline, or
- interfere with the recovery of the species.

11.3.4 Conclusion

It is not likely that the proposal would have a significant impact on any matters of national environmental significance listed under the EPBC Act. Referral of the development application to the Commonwealth Department of Climate Change, Energy, the Environment and Water is not warranted.

11.4 Appendix IV – APZ Requirements

A4.1.1 Inner Protection Areas (IPAs)

The IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defendable space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous.

In practical terms the IPA is typically the curtilage around the building, consisting of a mown lawn and well maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

Trees

- tree canopy cover should be less than 15% at maturity;
- trees at maturity should not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above the ground;
- tree canopies should be separated by 2 to 5m; and
- preference should be given to smooth barked and evergreen trees.

Shrubs

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;
- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Grass

- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed.

A4.1.2 Outer Protection Areas (OPAs)

An OPA is located between the IPA and the unmanaged vegetation. It is an area where there is maintenance of the understorey and some separation in the canopy. The reduction of fuel in this area aims to decrease the intensity of an approaching fire and restricts the potential for fire spread from crowns; reducing the level of direct flame, radiant heat and ember attack on the IPA.

Because of the nature of an OPA, they are only applicable in forest vegetation.

When establishing and maintaining an OPA the following requirements apply:

Trees

- tree canopy cover should be less than 30%; and
- canopies should be separated by 2 to 5m.

Shrubs

- shrubs should not form a continuous canopy; and
- shrubs should form no more than 20% of ground cover.

Grass

- grass should be kept mown to a height of less than 100mm; and
- leaf and other debris should be removed.

An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance of the IPA and OPA as described above should be undertaken regularly, particularly in advance of the bush fire season.

Source: Planning for Bushfire Protection 2019. NSW Rural Fire Service.

11.5 Appendix V – Compliance with Minimum Information Requirements for the BDAR

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area

Report section	BAM ref.	Information	Maps & tables (in document)	Data (to be supplied)	BDAR ref.
Introduction	Chapters 2 and 3	**INFORMATION** Introduction to the biodiversity assessment including: ☐ brief description of proposed development ☐ identification of subject land boundary, including: ☐ operational footprint ☐ construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure ☐ general description of the subject land ☐ Sources of information used in the assessment, including reports and spatial data ☐ Identification of assessment method applied (i.e. linear or site-based)			Section 1
			MAPS and TABLES (in document) ☐ 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)		Section 1
				DATA (to be supplied) – N/A	
Landscape	Section 3.1 and 3.2, Appendix E	**INFORMATION** Identification of site context components and landscape features at the proposed site, including: ☐ general description of subject land topographic and hydrological setting, geology and soils ☐ percent native vegetation cover in the assessment area (as described in BAM Subsection 3.2 (4 .) ☐ IBRA bioregions and subregions (as described in BAM Subsection 3.1.3 (2 .)) Other relevant landscape features which may include:			Section 2

		☐ rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3 (3 –4.) and Appendix E) ☐ wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3 (4 .)) ☐ connectivity of different areas of habitat (as described in BAM Subsection 3.1.3 (5 –6 .)) ☐ areas of geological significance and soil hazard features (as described in BAM Subsections 3.1.3 (7.) and 3.1.3 (10 .) ☐ areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3 (8 –9 .))	
		MAPS and TABLES (in document) ☐ Site Map ☐ boundary of subject land ☐ cadastre of subject land ☐ landscape features identified in BAM Subsection 3.1.3 ☐ areas of outstanding biodiversity value within the subject land ☐ Location Map ☐ digital aerial photography at 1:1,000 scale or finer ☐ boundary of subject land ☐ 1500 m buffer area *or* 500 m buffer for linear development ☐ landscape features identified in BAM Subsection 3.1.3 ☐ additional detail (e.g. local government area boundaries) relevant at this scale ☐ areas of outstanding biodiversity value within the assessment area 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	Section 2

		☐ connectivity of different areas of habitat ☐ areas of geological significance and soil hazard features	
		DATA (to be supplied) ☐ All report maps as separate jpeg files Individual digital shape files of: ☐ subject land boundary ☐ assessment area (i.e. buffer area) boundary ☐ cadastral boundary of subject land ☐ areas of native vegetation cover ☐ areas of habitat connectivity	Uploaded to BOAMs
Native vegetation, TECs and vegetation integrity	Chapter 4	**INFORMATION** ☐ Patch size (in accordance with BAM Subsection 4.3.2) ☐ Identification of the dominant PCT on the subject land and extent (ha) with justification of method used (existing information or plot-based survey data) ☐ Identification of any TEC associated with the PCT (BAM Subsection 4.2.2) ☐ Estimate of percent cleared value of dominant PCT (BAM Subsection 4.2.1 (5 .) ☐ Identification of any TEC on site that is not associated with the dominant PCT (Note: This TEC is required to be assessed and offset.) ☐ Equivalence with mapping units of previous vegetation maps reviewed as part of the assessment (i.e. equivalent mapping units) ☐ Vegetation integrity of the PCT(s) on the subject land as individual vegetation zones ☐ ☐ Justification for how this was determined (i.e. qualitatively by observing values for the condition attributes set out in Table 2 of the BAM or quantitatively by collecting field data for the condition attributes at a plot in accordance with BAM Subsection 4.3.4) ☐ Use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsections 4.3.3 (5 .))	Section 3

		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	
		MAPS and TABLES (in document) ☐ Map of native vegetation extent for the subject land (as described in BAM Section 3.1) ☐ Map of PCT/vegetation zones within the subject land (as described in BAM Section 4.2 (1 .) ☐ Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries ☐ Map of TEC distribution on the subject land ☐ Patch size of native vegetation (as described in BAM Subsection 4.3.2) Table of current vegetation integrity scores for vegetation zone within the site including: ☐ composition condition score ☐ structure condition score ☐ function condition score ☐ Report from BAM-C (Small area module) including vegetation integrity scores (BAM Section 4.4)	Section 3
		DATA (to be supplied) ☐ All report maps as separate jpeg files ☐ Plot field data (MS Excel format) ☐ Digital shape files for all maps and spatial data ☐ Field data sheets (if relevant) for determining vegetation integrity (BAM Subsection 4.3.4)	Uploaded to BOAMs Appendix I

Habitat suitability for threatened species	Chapter 5 and Section 9.1	**INFORMATION** ☐ Describe the review of existing information and any field survey undertaken to assess habitat constraints and microhabitats for threatened species within the subject land ☐ Determination of the suite of threatened species likely to occur on or use the proposed site according to Steps 1 and 2 in BAM Section 5.2 including species to be assessed for ecosystem credits and the list of species to be assessed for species credits ☐ List of ecosystem credit species derived from the TBDC (as described in BAM Subsections 5.2.1 and 5.2.2) with justification for the exclusion of any ecosystem credit species based on habitat constraints (as described in BAM Subsection 5.2.2) ☐ Identification of candidate species credit species that are at risk of an SAII and therefore, must be further assessed (BAM Section 9.1) Note: Candidate species credit species that are not at risk of an SAII and not incidentally recorded on the subject land do not require further assessment. For candidate species credit species that are at risk of an SAII, a description of the species, any habitat constraints or microhabitats associated with the species on the subject land and information used to create the species polygon/s in accordance with Steps 3 to 5 of BAM Section 5.2 including: ☐ justification for determining that a candidate species credit species at risk of an SAII is unlikely to have suitable habitat on the subject land or specific vegetation zone (based on a field assessment of the subject land and published literature or an expert report prepared in accordance with Box 3 of the BAM) ☐ determination of the presence of remaining candidate species credit species at risk of an SAII (by assuming presence, conducting a threatened species survey or an expert report). Note: If the subject land is mapped on an important habitat map for a species, or for a component of its habitat, the subject land is considered to have suitable habitat for the species to be present. ☐ species polygons identifying the location and area of suitable habitat for each candidate threatened species at risk of an SAII that is recorded on the subject land and is measured by area, OR ☐ species polygons identifying the area of suitable habitat and targeted surveys identifying the count and location of individuals on the subject land for each candidate threatened flora species at risk of an SAII that is recorded on the subject land and is measured by count	Section 4

		☐ species polygons for each threatened species identified on the subject land that is not at risk of an SAII (i.e. incidentally observed during site visit) ☐ Determination of habitat condition within species polygon/s for each threatened species (measured by area) at risk of an SAII or incidentally observed during the site visit (Step 6 of BAM Section 5.2) ☐ For flora species credit species at risk of an SAII or incidentally observed during site visit, provide a count, or an estimation, of the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5 (4 .))	
		MAPS and TABLES (in document) ☐ Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1 , and: ☐ identifying any ecosystem credit species removed from the list of species on the basis of further assessment in accordance with BAM Subsections 5.2.2 and 5.2.3 ☐ identifying the sensitivity to gain class of each species (BAM Section 5.4) ☐ Table detailing species credit species within the subject land at risk of an SAII (BAM Section 9.1) or incidentally observed during the site visit including any associated habitat feature/components and its abundance (flora)/extent of habitat (flora and fauna) and biodiversity risk weighting (BAM Sections 5.2 –5.4) ☐ Map of species credit species records within the subject land and species polygons for flora and fauna species at risk of an SAII or incidentally observed during the site visit (as described in BAM Subsection 5.2.5 (1 –7 .))	Section 4
		DATA (to be supplied) ☐ Digital shape files of species polygons ☐ Species polygon map in jpeg format ☐ Expert reports and any supporting data used to support conclusions of the expert report ☐ Field data sheets (if relevant) for threatened species surveys	Uploaded to BOAMs
Prescribed impacts	Chapter 6	**INFORMATION** ☐ Any prescribed impacts from the small area proposal must be set out in the BDAR consistent with Appendix K	Section 5
		MAPS AND TABLES (in document)	Section 5

		☐ If relevant, maps showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.)	
		DATA (to be supplied) ☐ If relevant, digital shape files of prescribed impact feature locations ☐ Prescribed impact features map in jpeg format	Uploaded to BOAMs
Avoid and minimise impacts	Chapter 7	**INFORMATION** Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative: ☐ modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology ☐ 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 ☐ 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 ☐ Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Subsection 7.2.1 (3 .)	Section 6
		MAPS and TABLES (in document) ☐ Table of measures to be implemented before, during and after construction to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility ☐ Map of final proposal footprint, including construction and operation ☐ Maps demonstrating indirect impact zones where applicable	Section 10
		DATA (to be supplied) Digital shape files of: ☐ final proposal footprint	Uploaded to BOAMs

		☐ direct and indirect impact zones ☐ Maps in jpeg format	
Assessment of impacts	Chapter 8, Section 8.1 and 8.2	**INFORMATION** Determine the impacts on native vegetation and threatened species habitat, including: ☐ description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Sections 8.1) ☐ description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal (as described in BAM Subsection 8.2 ☐ Any prescribed impacts from the small area proposal must be set out in the BDAR consistent with Appendix K	Section 7
		MAPS and TABLES (in document) ☐ Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Section 7
		DATA (to be supplied) – N/A	
Mitigation and management of impacts	Chapter 8, Section 8.4 and 8.5	**INFORMATION** Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Subsections 8.4.1 and 8.4.2, including (as described in BAM Subsection 8.4.1(2.): ☐ techniques, timing, frequency and responsibility ☐ identify measures for which there is risk of failure ☐ evaluate the risk and consequence of any residual impacts ☐ document any adaptive management strategy proposed Identification of measures for mitigating impacts related to: ☐ displacement of resident fauna (as described in BAM Subsection 8.4.1) ☐ indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1 (3 .)) ☐ mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2)	Section 10

		☐ Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	
		MAPS and TABLES (in document) ☐ Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	Section 10
		DATA (to be supplied) – N/A	
Thresholds for assessing and offsetting impacts of the proposal	Chapter 9	**INFORMATION** ☐ Information from the TBDC and/or other sources to report on the current status of threatened species, threatened populations at risk of an SAII and TEC/s for the proposal, and ☐ Report on impacts of the proposal on TEC/s in accordance with BAM Subsection 9.2.1 ☐ Report on impacts of the proposal on threatened species and/or threatened populations at risk of an SAII in accordance with BAM Section 9.1 ☐ Identification of impacts requiring offset in accordance with BAM Section 9.2 ☐ Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1 (3 .) ☐ Identification of areas not requiring assessment in accordance with BAM Section 9.3	Section 9
		MAPS and TABLES (in document) ☐ Map showing the extent of TECs at risk of an SAII within the subject land ☐ Map showing the location of threatened species at risk of an SAII within the subject land Map showing location of: ☐ impacts requiring offset ☐ impacts not requiring offset ☐ areas not requiring assessment	Section 4 and 9
		DATA (to be supplied) Digital shape files of: ☐ extent of TECs at risk of an SAII within the subject land	Uploaded to BOAMS

		☐ threatened species at risk of an SAII within the subject land ☐ boundary of impacts requiring offset ☐ boundary of impacts not requiring offset ☐ boundary of areas not requiring assessment ☐ Maps in jpeg format	
Applying the no net less standard	Chapter 10	**INFORMATION** ☐ Description of the impact on PCTs/TECs ☐ Description of the impact on threatened species at risk of an SAII or incidentally observed via site visit ☐ Number of ecosystem credits required for impacts on biodiversity values according to BAM Subsection 9 ☐ Number of species credits required for impacts on biodiversity values according to BAM Subsection 10.1.3, including any species credit species that has been incidentally observed on the subject land Note: Species credits for any species at risk of an SAII are calculated in the event that the decision-maker forms the opinion that the proposed impact is unlikely to be serious and irreversible and therefore can be offset. ☐ Identification of credit class for ecosystem credits and species credits according to BAM Section 10.2 (this can be generated from BAM-C)	Section 9
		MAPS and TABLES (in document) ☐ Table showing biodiversity risk weightings ☐ Table of BC Act listing status for PCTs and threatened species requiring offset ☐ Table of PCTs requiring offset and number of ecosystem credits required (Subsection 10.2.1) ☐ Table of species at risk of an SAII or incidentally observed on site assessed for species credits and the number of credits required ☐ BAM-C credit report	Section 9 Appendix II
		DATA (to be supplied) – N/A	

12 Expertise of Authors

With over 25 years wetland and urban ecology experience, a great passion for what she does, and extensive technical and on-ground knowledge make Geraldene a valuable contribution to any project.

Geraldene has over 8 years local government experience as manager of environment and education for Pittwater Council. Geraldene presented papers on the topic at the NSW Coastal Conference, Sydney CMA and Hawkesbury Nepean forums. Geraldene is a Technical Advisor Sydney Olympic Park Wetland Education and Training (WET) panel.

Geraldene has up to date knowledge of environmental policies and frequently provides input to such works. Geraldene was a key contributor to the recent set of Guidelines commissioned by Southeast Queensland Healthy Waterways Water Sensitive Urban Design Guidelines. Geraldene's role included significant contributions and review of the Guideline for Maintaining WSUD Assets and the Guideline for Rectifying WSUD Assets.

Geraldene is a frequent contributor to many community and professional workshops on ecological matters particularly relating to environmental management. She is an excellent Project Manager.

Geraldene is a joint author on the popular book Burnum Burnum's Wildthings published by Sainty and Associates. Author of the Saltmarsh Restoration Chapter Estuary Plants of East Coast Australia published by Sainty and Associates (2013). Geraldene's early work included 5 years with Wetland Expert Geoff Sainty of Sainty and Associates. Geraldene is an expert in creating and enhancing urban biodiversity habitat and linking People with Place.

Geraldene Dalby-Ball
DIRECTOR

SPECIALISATIONS

- Urban Ecology – and habitat rehabilitation and re-creation.
- Urban waterway management – assessing, designing and supervising rehabilitation works
- Saltmarsh and Wetland re-creation and restoration – assessment, design and monitoring
- Engaging others in the area of environmental care and connection
- Technical Advisor – environmental design, guidelines and policies
- Sound knowledge and practical application of experimental design and statistics
- Project management and supervision
- Grant writing and grant assessment
- Budget estimates and tender selection
- Expert witness in the Land and Environment Court

CAREER SUMMARY

- **Director and Ecologist**, Ecological Consultants Australia. 2014-*present*
- **Director and Ecologist**, Dragonfly Environmental. 1998-*present*
- **Manager** Natural Resources and Education, Pittwater Council 2002-2010
- **Wetland Ecologist** Sainty and Associates 1995-2002

QUALIFICATIONS AND MEMBERSHIPS

- **Bachelor of Science with 1st Class Honors**, Sydney University
- WorkCover WHS General Induction of Construction Industry NSW White Card.
- Senior First Aid Certificate.
- **Practicing member and vice president** Ecological Consultants Association of NSW

Brooke is a passionate and dedicated ecologist with valuable on ground experience working on bush regeneration projects throughout the Sydney Region. She has worked with various stakeholders across both public and private sectors to deliver sustainable and achievable environmental outcomes. She has worked on major construction contractors as well as smaller contractors to deliver tailored environmental solutions on time and within budget.

Brooke completed her Bachelor of Science at the University of Wollongong and is currently expanding her skills and knowledge undertaking Cert III in Conservation and Ecosystem Management at TAFE.

Brooke has experience conducting fieldwork and preparing a range of reports including the Flora and Fauna Assessment, Vegetation Management Plan (VMP), Biodiversity Development Assessment Report (BDAR), Certification Certification, Construction Environmental Management Plan (CEMP), Review of Environmental Factors (REF), and Environmental Impact Assessment (EIA).

Brooke has exceptional communication and customer service skills and can deliver professional ecological assessments.

Key Projects:

- Threatened species surveys.
- Flora and fauna surveys.
- Fauna spotter and handler.
- Aquatic fauna relocation.

Brooke Thompson
ECOLOGIST

SPECIALISATIONS

- GIS mapping
- Fauna spotting
- Aquatic fauna relocation and handling
- Habitat tree assessment, marking and mapping
- Floristic plot surveys
- Flora and fauna field surveys

CAREER SUMMARY

- **Ecologist**, Ecological Consultants Australia. June 2022-*present*
- **Natural Area Specialist**, Dragonfly Environmental. January 2022-*present*
- **Volunteer**, Microplastic Surveying, University of Wollongong 2021
- **Volunteer**, Frog Surveying, Chad Beranek B EnvSc (Hons) UTS 2016

QUALIFICATIONS AND MEMBERSHIPS

- **BSc Conservation Biology**, University of Wollongong.
- Currently undertaking Cert III Conservation and Ecosystem Management.
- WHS General Induction of Construction Industry NSW White Card.