Biodiversity Development Assessment Report (BDAR)

for the

Demolition and Construction of a Replacement Dwelling, New Horse Arena, Stables, Paddocks and Associated Works

at

113 Orchard Street, Warriewood

28 February 2025

GIS Environmental Consultants

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Certification under clause 6.15 Biodiversity Conservation Act 2016

I certify that I have prepared this Biodiversity Development Assessment report (BDAR) in accordance with the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the Biodiversity Conservation Act 2016 (BC Act) as at the date below.

Using Biodiversity Assessment Method (BAM 2020) and the online version of the BAM-calculator which were the current versions at the date of finalising the report below. As shown on the BAM-c output in the appendices of this report.

Date: 28 February 2025

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We acknowledge the traditional owners of this land and recognise the continuing connection to lands, waters, and communities. We pay respect to the people, the cultures and the Elders, past, present and emerging.

Executive Summary

This Biodiversity Development Assessment Report (BDAR) accompanies a Development Application (DA) for the demolition and construction of a replacement dwelling, new horse arena, stables and paddocks and associated works at 113 Orchard Street, Warriewood.

This current Application contains some changes that are improvements, such as reduction in the extent of native bushland habitat to be removed and environment protection in the form of: moving the new dwelling away from the biodiversity assets, a clean water diversion mound to prevent clean surface water from entering the paddocks, a bioswale below the paddocks and development, reduction in tree loss and containment of the paddocks within the bushfire APZ. These changes benefit the environment, and the development is substantially the same.
This BDAR report replaces all previous BDAR reports.

Impact Areas, for the location and extent see the maps on Figures 4.1 and 8.1.

Area Summary

Subject Land	Area (ha)	Vegetation Zones	Area (ha)	Management Zone	Area (ha)	Offsetting
Subject Land = Development Footprint + Residual	0.97 ha	VZ1	0.39	VZ1MZ1: Fully Cleared	0.14	**Offset**
				VZ1MZ2: Partly Cleared	0.25	**Offset**
				Conservation Management Area	0.4	
				No Impact Residual	0.18	
Calculations are subject to rounding			0.39		0.97	
Proposed Use				**Impact**		
Conservation	0.4			No Impact (residual and conservation)	0.58	
Urban	0.39	**Offset**		Cleared	0.14	**Offset**
Residual	0.18			Partly Cleared	0.25	**Offset**
	0.97				0.97	

Biodiversity Offsets

Threatened Entity	Credits
3230-Central Coast Escarpment Moist Forest	7
Vespadelus troughtoni / *Eastern Cave Bat*	15
Lathamus discolor / Swift Parrot	15

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1 Preface

GIS Environmental Consultants has been commissioned by the owners Suzy and Anthony Simpson to carry out a biodiversity survey and assessment, then to produce a Biodiversity Development Assessment Report (BDAR) to accompany a Development Application for the demolition and construction of a replacement dwelling, new horse arena, stables and paddocks and associated works at 113 Orchard Street, Warriewood.

This current Development Application contains some changes that are improvements, such as reduction in the extent of native bushland habitat to be removed, environment protection in the form of: a clean water diversion mound, bioswale, reduction in tree loss and containing the paddocks within the bushfire APZ and habitat improvement. The changes are small, and the development is substantially the same.

This BDAR report replaces the previous BDAR report by a different environment consultant that was submitted with the previous Development Application.

This BDAR report describes the results of ecological field investigations at the site, then documents and maps the biodiversity values and constraints that exist. The likely ecological impact of the proposal was then determined, and the impact on biodiversity values were assessed, ways the impact could be avoided and minimised were discussed with the applicant and then the plans and the assessment were finalised. The remaining impact is then quantified, and the corresponding biodiversity offsets were calculated. Recommendations for ameliorative measures to further mitigate impact during construction and the ongoing impacts are documented at the end of this report.

Assessment of the environmental impact of Development Proposals is required by the Environment Planning and Assessment Act 1979, and the Biodiversity Conservation Act requires that developments proposals that trigger the Threshold Test (BC Act Regulation 2017) must have their biodiversity impact assessed by the Biodiversity Assessment Method (BAM 2020) and appropriate offsets retired using the Biodiversity Offset Scheme (BOS).

The Biodiversity Assessment Method outlines the required field survey method, the GIS mapping techniques to be used, provides an online tool for the calculations required and outlines the decisions and justification that need to made by the ecologist. A set of formulae determine the amount of Biodiversity Credits that need to offset the impact of the proposal on Threatened species and ecological communities. Prior to the issue of the Construction Certificate the appropriate number and type of credits will need to be found or purchased and retired.

The ecological constraints of the site, the biodiversity impacts of the proposal and the requirement to Avoid and Minimise impacts, were discussed with the proponent during the planning of the proposal.

A. Aims of this Report

The overall objective of the report is to address the requirements of the Biodiversity Conservation Act 2016 for a Biodiversity Development Assessment Report (BDAR) as specified in the BAM and the associated manuals and guidelines in a document to accompany the submission of the DA (Development Application). The requirement to address the Biodiversity Conservation Act and other ecologically relevant legislation is a requirement of the Environment Planning and Assessment Act 1979.

The specific aims of this Biodiversity Development Assessment Report are to:

- Determine the ecological constraints of the site and provide advice to the applicant on ways the ecological impact can be avoided and minimised before finalising the proposal plans as required by the mitigation hierarchy in the Biodiversity Conservation Act Regulation 2017;
- Define the Construction Footprint, Operational Footprint, Development Site, Direct and Indirect Ecological Impacts.
- Describe the environmental context of the site and locality;
- Apply the Biodiversity Assessment Method (BAM) and record the findings of an ecological survey (flora, fauna, ecological communities and their habitats, and the vegetation integrity) of the area likely to be impacted by the proposal;
- Provide ecological information and assessment of the biodiversity values on the site to the conservation of native flora and fauna;
- Assess if potential Serious and Irreversible Impacts (SAII) may result from the proposal.
- Determine if the proposal will cause a Prescribed or indirect Impact to threatened biota.

- Determine the extent and condition of areas that require offsetting under the Biodiversity Conservation Act and calculate the number of offsetting credits that will be required.
- Recommend ways the ecological impacts can be further ameliorated and prescribe appropriate ecological management actions during construction and for the life of the development.
- Determine if the proposal needs referral to the Federal government for assessment under the EPBC Act.

B. Ecologically Relevant Legislation

I. Biodiversity Conservation Act 2016

The NSW Biodiversity Conservation Act (BC Act) 2016 establishes a legal framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity. Supporting the BC Act are the Biodiversity Conservation Regulation (BC Regulation 2017), the 5-part Test of Significance, the Threshold Test, the Biodiversity Assessment Method (BAM) 2020, the Biodiversity Offset Scheme (BOS), Threatened flora and fauna species lists, and definitions of Endangered Ecological Communities, Areas of Outstanding Biodiversity Values (AOBV), Serious and Irreversible Impacts (SAII) and Prescribed Impacts.

The overarching legislation for biodiversity conservation in New South Wales (NSW) is the Biodiversity Conservation Act 2016 (BC Act) the following documents are triggered or referred to by the BC Act.

One of the main purposes of the BC Act is to ensure that ecological impact is at first Avoided and Minimised, and then any remaining impact is required to be assessed by a **threshold test** (BC Act). If any of the triggers are met, the **Biodiversity Assessment Method (BAM)** must be applied, and the residual impact of the proposal must be offset in accordance with the **Biodiversity Offset Scheme** (BOS) using the Biodiversity Assessment Method (BAM). The threshold test also determines the requirement for a Development Application (DA) to be accompanied by a BAM assessment in the form of a BDAR. If a BDAR report is needed, the DA cannot be approved without being accompanied by a BDAR report prepared by a qualified ecologist.

The threshold test is described in s 7.7 of the BC Act and includes application of a **Test of Significance** (5-Part Test) (s 7.2) which is to be applied for all Threatened species or Ecological Communities that may have suitable habitat impacted by the proposal. The Test of Significance is used to determine if a proposed development or activity is likely to significantly affect Threatened species or Ecological Communities, or their habitats. Section 7.3 (2) of the BC Act provides guidance on the assessment of the Test of Significance in a guideline document (2018). https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/threatened-species-test-significance-guidelines-170634.pdf

The Threshold Test has been applied to this proposal and it has been determined that a BDAR report is required to accompany this DA.

The **Biodiversity calculator** (BAM-c) is applied to determine the offsets required for the loss of native vegetation and the Threatened species habitat that the native vegetation provides. **Assessment of Prescribed Impacts** (impact to habitat that is not native vegetation) is also required and may be require additional credits.

Proposals also need to be assessed to determine if they may cause **Serious And Irreversible Impacts (SAII)**.

Native vegetation' has the same meaning as in Section 60B of the Local Land Services (LLS) Act.

See section 2.3 for the Threshold Test assessment for this DA that determines the need for a BOS/BAM assessment and BDAR report, and section 2.4 for the type of BAM assessment that is appropriate for this proposal. The need for assessment under the BC Act (BOS, BAM, BDAR), for this DA, is determined by the Threshold Test in section 2.3 and the assessment is this BDAR report.

II. Biosecurity Act 2015 - Weeds

The aim of the *Biosecurity Act 2015* is to protect the economy, environment and community from the negative impact of pests, diseases and weeds.

The NSW *Biosecurity Act 2015* includes a General Biosecurity Duty, as set out in Part 3 Section 22, which requires that "*the responsibility of any person who has any dealing with weeds (biosecurity matter), whether they have an infestation on their land, are selling a potentially invasive species, dumping garden rubbish, or supplying contaminated fodder or the like, must prevent, minimise or eliminate the biosecurity risk (as far as is reasonably practicable)*".

Under the Act, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. All landowners or land managers who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. The obligations of landowners or land managers in relation to specific weed species are outlined in regional Weed Management Plans (WMPs).

The regional Weed Management Plans seek to provide guidance on the management of weeds on a local scale in order to comply with the NSW *Biosecurity Act 2015*. Appendix 1.1 of the Regional Weed Management Plan identifies 'State Priority Weeds" and is broken up into the strategic response categories of 'Prevention', 'Eradication', 'Containment' and 'Asset Protection'. Appendix 1.2 outlines the 'Regional Priority Weeds' and is also broken up into these same four strategic responses. Weeds in the 'Prevention' category have not yet been identified in the state, but they pose a large biosecurity risk, so it is important that these are prevented from entering the state. 'Eradication' applies to weeds that are only limited in distribution and abundance, and so, these must be fully removed. 'Containment' is appropriate for weeds that have a wide distribution, hence widescale eradication is not currently possible, but these must be prevented from spreading further. 'Asset Protection' refers to Weeds of National Significance whose spread must be minimised.

For this site the relevant Weed Management Plan is the Greater Sydney Regional Strategic Weed

III. Federal Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Commonwealth Government's main piece of environmental legislation. Two primary aims of the Act are to conserve biodiversity and provide for the protection of the environment, especially in regard to Matters of National Environmental Significance (MNES). There are currently nine MNES: (1) world heritage properties; (2) national heritage places; (3) wetlands of international importance; (4) nationally threatened species and ecological communities; (5) migratory species; (6) Commonwealth marine areas; (7) the Great Barrier Reef Marine Park; (8) nuclear actions (including uranium mining); and (9) a water resource, in relation to coal seam gas development and large coal mining development.

The NSW Biodiversity Offsets Scheme (BOS) has been endorsed by the Australian Government for assessment and offsetting of all projects requiring approval under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). This was achieved via an amendment to an existing Bilateral Agreement with the NSW Government and formal endorsement of the BOS under the Australian Government's EPBC Act Condition Setting Policy. Proponents will need to meet their offset requirement for EPBC listed entities in accordance with clause 6.6A of the Biodiversity Conservation Regulation, by retiring like for like credits, paying into the Biodiversity Conservation Fund or funding a conservation action. This means that NSW proponents who need an EPBC Act approval can use the NSW BOS to assess and meet their biodiversity offset requirements for biota that occur under both Acts.

This report addresses the requirements of this legislation.

None of the components of the Activity will be located within a World Heritage site, a National Heritage place, a wetland of international importance, a Commonwealth marine or land area, or the Great Barrier Reef Marine Park. The Activity also does not involve a nuclear action or coal seam gas development and large coal mining development.

The provisions of the EPBC Act which are relevant to the Activity are those which relate to impacts on habitat for threatened species and ecological communities listed in the EPBC Act. The Activity's impacts on these aspects and the mitigation measures and controls (safeguards) to avoid and minimise impacts on the community and environment are considered in Section 6.

This proposal has been assessed with respect to the EPBC Act and it has been found that the proposal does not require referral to the Federal environment department for assessment.

I. SEPP (Biodiversity and Conservation) 2021 Chapter 4 Koalas

The State Environmental Planning Policy (SEPP) (Biodiversity and Conservation) 2021 consolidates and replaces 11 previously distinct SEPPs including those relating to vegetation in non-rural areas, koala habitat protection, bushland in urban areas, canal estate development, as well as other regionally specific SEPPs. Chapter 4 that requires assessment of Koala Habitat Protection is addressed in this report, other parts of this SEPP are addressed in the accompanying Statement of Environment Effects.

Chapter 4 Koala Habitat Protection 2021 aims '*to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline*'. Part 4.2 states that if an approved Koala Plan of Management (KPOM) applies to the land then, determination of development consent must be consistent with the plan. If there is no approved koala management plan applying to the project site, then the SEPP applies. If the property is greater than 1 hectare (including any adjoining land under the same ownership), Council needs to be satisfied that the project site is not core koala habitat (as defined in Section 4.2 of the SEPP).

The Study Site is in the Northern Beaches LGA which is included in Schedule 2 of the SEPP Chapter 4 Koala Habitat Protection and there is no KPoM for this area. However, the site is less than 1 hectare in size and there is no KPoM, therefore the Chapter 4 of this SEPP does not apply, and a Koala Assessment is not required.
In 1998, the Pittwater Koala population was known to consist of less than 6 individuals. No known populations of Koala have been recorded within the Study Site in the last 5 years, and while some Koala feed trees are present, they are scattered, and no Koalas have been recorded on site. The most recent records for Koala are in Belrose, West Head and elsewhere in Ku-ring-gai National Park which are all distant from the Study Site.

II. Other Environmental Legislation

For assessment of this proposal with respect to other environmental legislation such as EP&A Act, SEPPs and the LEP/DCP, see the Statement of Environment Effects (SEE) that accompanies the Development Application.

C. Definitions and Acronyms

The Biodiversity Conservation Act and the extensive associated documentation include a large number of long technical terms that are abbreviated in the documentation and there is a need for a glossary of abbreviations.

A more comprehensive list of definitions and acronyms occurs in the Glossary of the BAM (2020).

AOBV - An **Area of Outstanding Biodiversity** significance defined in the Biodiversity Conservation Act 2016. Proposals that impact declared AOBVs are required to enter in the BOS.

APZ – **Asset Protection Zone** is the bushfire hazard fuel reduction area around a dwelling, defined in the document 'Planning for Bushfire Protection 2018' by the NSW Rural Fire Service. See Figures 2.4.

Assessment Area - is the 1500m buffer around the subject land as shown by a large red circle on Figures 2.2, 2.3, 3.1 and 5.1.

Avoid - measures taken by a proponent such as careful site selection, or actions taken through the design, planning, construction and operational phases of the development to completely prevent

impacts on biodiversity values, or certain areas of biodiversity. Refer to the BAM for operational guidance. See also Impact Mitigation Hierarchy.

BAM – **Biodiversity Assessment Method** is the document that describes the required content of a BDAR and the ecological survey and assessment techniques that are required to be used for the BOS assessment (including BAM-c calculation for impact to native vegetation) including assessment of Prescribed Impacts and SAII. The BAM is required by the BC Act Regulation and is enacted by s6.7 of the BC Act. The current BAM is dated 2020.

BAR – Biodiversity Assessment Report is a collective noun for the various types of Biodiversity Assessment Reports that the BAM method requires: Biodiversity Development Assessment Report (BDAR), Biodiversity Stewardship Site Assessment Report (BSSAR) and a Biodiversity Certification Assessment Report (BCAR) as described in the BAM and BC Act and Regulation.

BAM-C - Biodiversity Assessment Method Calculator, the online computer program that provides decision support to assessors and proponents applying the BAM. The BAM-C links to biodiversity data from the BioNet Vegetation Classification and the Threatened Biodiversity Data Collection that the assessor is required to use in a BAM assessment. The BAM-C applies the equations used in the BAM, including those to determine the number and class of biodiversity credits required to offset the impacts of a development, or created at a biodiversity stewardship site. It is published by the Department DPE.

BC Act – NSW Biodiversity Conservation Act 2016 establishes a legal framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity. Supporting the BC Act are the Biodiversity Conservation Regulation 2017, the Biodiversity Assessment Method 2020, the Biodiversity Offset Scheme (BOS), threatened flora and fauna species lists, definitions of Endangered Ecological Communities, the 5-part Test of Significance, and definitions of AOBV, SAII and prescribed impacts.

BDAR – Biodiversity Development Assessment Report as outlined in Division 3 of the BC Act. It is prepared by an accredited person in relation to proposed development in the assessment of impacts on threatened species and threatened ecological communities, and their habitats.

Biodiversity Credits – A measurement of the value of a threatened ecological community or threatened species habitat to be impacted. Including Ecosystem credits and Species Credits. Biodiversity credits are used to quantify the loss in biodiversity values at a development site or the gain in biodiversity values at a stewardship site. Credits are calculated using the BAM calculator plus assessment of Prescribed Impacts.

Biodiversity Trust – The NSW Government established the Biodiversity Conservation Trust of New South Wales (BCT) on 25 August 2017 under the Biodiversity Conservation Act 2016 (the Act), as part of its land management and biodiversity conservation reforms. Part 10 of the BC Act establishes the status, powers and functions of the BCT, and sets out its object and principal purpose.

Biota – Flora and fauna of a particular area.

BOS – **Biodiversity Offset Scheme** the system of trading biodiversity offset credits or paying for offsets to the Biodiversity Trust.

Construction Footprint - additional clearing associated with temporary/ancillary construction facilities and infrastructure. Temporary (during construction) and permanent impact (clearing of native vegetation). May include land inside and outside the property e.g. establishment of bushfire asset protection ones (APZ), construction access, site sheds, sediment control, trenching for pipes and utilities etc.

DCCEEW – NSW Department of Climate Change, Energy, the Environment and Water) - DPIE group formerly OEH, NPWS, DEC, DECC, DECCW and EES. The department responsible for the conservation of native flora and fauna in NSW.

DCP – Development Control Plan, a local planning guideline for each Local Government Area.

Development Footprint (includes the Operational Footprint and Construction Footprint) – The area **directly impacted by the construction and use of the DA**, may include land outside the Subject Land with owner's permission. e.g. Access during construction or the road reserve or drainage easement. The combined area of the Construction and the Operational Footprints. May be indicative, temporary during construction e.g. storage of building materials, waste, site office, sediment ponds), access roads, bushfire Asset Protection Zones or areas used to store construction materials. Can be works with

negative and/**or positive** impacts e.g. may include works described in a Biodiversity Management Plan. The negative impact area is used to calculate the impact for offsetting.

DCP – Development Control Plan. A Development Control Plan provides detailed planning and design guidelines to support the planning controls in the Local Environmental Plan developed by a council.

Development Site (Site, Not Development Footprint) - The area that will have **direct or indirect impacts** that occur during **construction or are ongoing**, that will affect vegetation, habitat, ecosystems or individuals can be positive or negative works. **Not** Development Footprint.

The Development Site is larger than the Development Footprint when there is an onsite Biodiversity Management area (i.e. positive impact that is not a formal offset) or when there are indirect impacts beyond the development footprint.

The Development Site includes the development footprint and any area affected by the DA, including; building envelopes (maybe indicative), establishment (and long-term maintenance) of a bushfire hazard reduction APZ area, environment management areas and areas impacted by indirect impacts (weed spread, noise, pollution, light spill, sediment, access roads, bushfire outer protection zones, spreading of disease etc and other impacts that are not part of the DA description (or plans) but may or are likely to occur as a result of the construction or occupation (operation) or change in use as a result of the DA).
The term Development Site is generally used in the stage 1 (planning) part of this BDAR and the term Development Footprint is used in the assessment stage 2 when the constraints of the site have been taken into consideration and the proposal has been designed and there is no Biodiversity Management Area or clear indirect impacts. Direct impacts that do not impact native vegetation are categorised as Prescribed Impacts.

An area of land that is subject to the proposed development under the EP&A Act. The term *development site* is also taken to include clearing site, except where the reference is to a small area development or a major project development. When a BDAR it is also the **Subject Land**.

Direct Impacts – impacts on biodiversity values and threatened species habitat that relate to clearing native vegetation and impacts on biodiversity values prescribed by the BC Regulation. This includes impacts from activities related to the construction or operational phase of the proposal.

DNG (Derived Native Grassland) - Natural grasslands occur in naturally treeless areas. Derived (or secondary) native grasslands can occur in areas where trees have been cleared from the original community (e.g. grassy woodlands). Natural grasslands tend to be of high conservation value, but derived communities can also be of high conservation value in their own right. Derived groundcover should be assessed only against benchmarks for groundcover vegetation within this method (i.e. benchmark value for trees and shrubs are not included in the calculation of vegetation integrity under this method).

DPE – NSW government **Department of Planning and Environment**, was DPIE. The department responsible for the conservation of native flora and fauna.

Ecosystem credits - a measurement of the value of threatened ecological communities, threatened species habitat for species that can be reliably predicted to occur with a PCT, and PCTs generally. Ecosystem credits measure the loss in biodiversity values at a development, activity, clearing or biodiversity certification site and the gain in biodiversity values at a biodiversity stewardship site.

EPA Act (EP&A Act) – NSW Environment Planning and Assessment Act 1979, legislation that controls development in NSW.

EPBC Act – Federal **Environment Protection and Biodiversity Conservation Act** 1999

IBRA region – a bioregion identified under the Interim Biogeographic Regionalisation for Australia (IBRA), which divides Australia into bioregions on the basis of their dominant landscape-scale attributes.

Impact (Biodiversity Impacts) to be assessed
This BDAR assessment report and the BC Act, the BAM, BOS only assess impact to biodiversity.
More general environmental impact is assessed by the EP&A Act, other Acts, SEPPs and the LEP/DCP.

Indirect Impacts – occur when project-related activities affect species or ecological communities in a manner other than direct loss. When a Determining Authority is assessing a DA, consideration must be given to all the likely impacts of the proposed activity or development. Impacts that are not part of the DA description (or plans) but may or are likely to occur as a result of the construction or

occupation (operation) or change in use as a result of the DA). Indirect Impacts may require addition of offset credits as determined by the Determining Authority.

Impacts that occur when the proposal affects native vegetation and threatened species habitat beyond the development footprint or within retained areas (e.g. transporting weeds or pathogens, dumping rubbish). Includes impacts from activities related to the construction or operational phase of the proposal and prescribed impacts. Includes impacts beyond the Development Footprint e.g. nutrients, noise, weed spread etc. Not normally able to be mapped but is described in words. See sections 8.2, 8.4 and 8.6 of the BAM.

LEP – **Local Environment Plan**, local planning instrument providing planning and design controls for each LGA including planning zones.

LLS Act – Local Land Services Act 2013, legislation that controls management of natural resources in NSW.

Native Vegetation – has the same meaning as in section 1.6 of the BC Act and section 60B of the LLS Act, repeated here:

> *(1) For the purposes of this Part, **native vegetation** means any of the following types of plants native to New South Wales:*
>
> (a) *trees (including any sapling or shrub or any scrub),*
>
> (b) *understorey plants,*
>
> (c) *groundcover (being any type of herbaceous vegetation),*
>
> (d) *plants occurring in a wetland.*
>
> *(2) A plant is native to New South Wales if it was established in New South Wales before European settlement. The regulations may authorise conclusive presumptions to be made of the species of plants native to New South Wales by adopting any relevant classification in an official database of plants that is publicly accessible.*
>
> *(3) For the purposes of this Part, native vegetation extends to a plant that is dead or that is not native to New South Wales if:*
>
> (a) *the plant is situated on land that is shown on the native vegetation regulatory map as category 2-vulnerable regulated land, and*
>
> (b) *it would be native vegetation for the purposes of this Part if it were native to New South Wales.*
>
> *(4) For the purposes of this Part, native vegetation does not extend to marine vegetation (being mangroves, seagrasses or any other species of plant that at any time in its life cycle must inhabit water other than fresh water). A declaration under Section 14.7 of the BC Act that specified vegetation is or is not marine vegetation also has effect for the purposes of this Part.*

Operational Footprint – the final proposal footprint for the ongoing use of the development including ongoing APZ maintenance, permanent sediment dams. After construction, typically smaller than the Construction Footprint and may include easements. Ongoing positive and negative works, including; maintenance of bushfire Asset Protection Zone, weed control, Bushland Management (BMP), maintenance of stormwater devices ect..

Test of Significance (5-Part Test) – Assessment under Section 7.3 of the BC Act to determine whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats.

Plant Community Type (PCT) - a NSW plant community type identified using the PCT classification system.

Prescribed Impacts (also called Additional Biodiversity Impacts) – Impacts that are not impacts to native vegetation, such as impacts to rocks, waterbodies, non-native vegetation, human-made structures, karsts, caves, cliffs and connectivity ect. Prescribed Impacts may result in additional biodiversity credits being required to offset the impact of a proposal. See BC Act Reg 6.1

Property – Subject land and adjacent or nearby lot(s) that have the same ownership.

SAII – **Serious And Irreversible Impact** – impacts likely to contribute significantly to the risk of a threatened species or ecological entity becoming extinct (BAM 2020 s9.1). Fits the principles in the "Guideline to Assist a Decision-Maker to Determine a Serious and Irreversible Impact" (OEH 2017).

Subject Land (Development Land, disturbance area) - is the land where the development, activity, and clearing will occur (the disturbance area). It excludes the assessment area which surrounds the subject land (i.e. the area of land in the 1500 m buffer zone around the subject land or 500 m buffer zone for linear proposals).

TBDC – Threatened Biodiversity Data Collection, published online database within Bionet website also available as a excel spreadsheet.

Threatened Species or Ecological Community - refers to those biotas listed in the schedules of the Biodiversity Conservation Act 2016 as "Critically Endangered ", "Endangered" or "Vulnerable".

Vagrant species - refers to occasional records of species in NSW that are outside their normal distribution or habitat, including escaped animals and planted specimens.

Vegetation Zone - a relatively homogeneous area of native vegetation on a development site (land subject to the DA), clearing site, land to be biodiversity certified or biodiversity stewardship site that is the same PCT and has the same broad condition state.

D. Impact Mitigation Hierarchy

The mitigation hierarchy is a fundamental requirement of the BC Act, where the proponent needs to consider, actions to avoid, minimise, mitigate and then offset any remaining impacts. This Hierarchy is described in the Biodiversity Assessment Method (BAM) document and is established by case law.

The Chief Justice of the NSW Land and Environment Court has made the following statement (Preston, B J, Biodiversity offsets: adequacy and efficacy in theory and practice (2016) 33 EPLJ 93 at 95-96)

> *Avoidance and mitigation measures should be the priority strategies for managing the potential adverse impacts of a proposed development. Avoidance and mitigation measures directly reduce the scale and intensity of the potential impacts of the development. Only then are offsets used to address the residual impacts that remain after avoidance and mitigation measures have been put in place. Adherence to the mitigation hierarchy is central to biodiversity offsetting. Without prior application of the mitigation hierarchy, conservation actions would not qualify as offsets.*

Application of the mitigation hierarchy is also described in the LEC cases Bulga Milbrodale Progress Association Inc v Minister for Planning and Infrastructure and Warkworth Mining Limited 2013 NSW LEC 48 (Bulga) at 147 – 153.

E. Assumptions and Limitations

- This report only assesses the impacts of the proposal described in this report and shown on the maps in this report. If there are changes to the plans that increase the ecological impact or remove native vegetation, then updates will be required.
- We assume that the APZ distances and directions provided in the bushfire report are the same for this proposal as the previous proposal.
- This assessment relies on the information provided by the applicant in the plans and documents listed in the table in section 2.2.
- Modifications to an approved Development Application that harm additional native vegetation are required to be reassessed in accordance with the Biodiversity Conservation Act.
- Unexpected impact during construction is to be assessed in accordance with the DPE guidelines.
- There may be flora and/or fauna species present within the study area that may not have been recorded because they are seasonal, cryptic and/or have large home ranges. Some threatened species may only use the study area as habitat at some time. Assessment of habitat potential is used to help address this uncertainty. The conclusions drawn in this report are a result of testing, observation and experience.
- The conclusions in this report rely on the ecological protection, restoration and improvement works described in this report and any accompanying Biodiversity Management Plan being carried out during construction and on-going for the life of the development.

- This report assesses only the current proposal and does not consider the cumulative impact of other developments on this property or on adjacent land or the potential edge effects or impacts caused by the occupation of the land.
- This report should be read in its entirety and no part should be taken out of context.
- No responsibility is accepted for the use of any part of this report in any other context or for any other purpose or by third parties.
- This report describes the habitat and species that occurred on the site at the time of the field survey. Vegetation and habitat changes over time and due to weather. The species of plant an animal that can be observed will change due to seasons, because they have large home ranges or the species is seasonal or cryptic.
- Environmental and planning legislation changes frequently, as does the data this assessment uses, as a consequence this assessment should be lodged within 2 weeks.
- This report makes recommendations for protection of bushland habitat, weed control, re-establishment of the bushland in part of the site, planting local native species and applying erosion and nutrient control measures. The offset credits do not rely on these actions however they are an integrated part of the mitigation hierarchy that is required by the BC Act.
- This assessment assumes the sewerage disposal system and stormwater will function and be maintained so that no nutrients or water leak into downslope habitat or leave the property. There are extensive fines that apply as described in the Protection of the Environment Operations Act 1997 and the National Parks Act.
- Predicting indirect impacts such as the spread of sediment, light spill, noise, keeping of cats and dogs, nutrients or weeds into the adjacent bushland habitat over time is dependent on the management of the site and is difficult to quantify and may not have been accurately assessed.
- This report makes recommendations for mitigation of environmental and ecological impact such as ongoing weed control, re-establishment of the bushland by planting local native species and applying erosion and nutrient control measures. This report assumes these initial and on-going works will be carried out during and on-going for the life of the development.
- The preparation of this report has been in accordance with the brief and plans provided by the Client and the results collected within the time constraints set by the Client. All findings, conclusions or recommendations contained within the report are based only on the aforementioned circumstances.

F. Qualifications and Experience of the Field Ecologist and Authors

Nicholas Skelton's formal qualifications include a Bachelor of Science with Honours (B. Sc. (Hons) in Biology and terrestrial ecology USyd) and a Masters in Applied Science (M. App. Sc. in Vegetation Management UNSW). Nick has been an environmental scientist for 25 years, including a university lecturer, research ecologist, environmental scientist and consultant. His work is focused on the Sydney bioregion and he has published many papers in independently reviewed journals on the ecology of NSW. He has expert knowledge of the local soils, the climate of NSW and the local indigenous plants and animals as a result of over 900 ecological surveys. Nick is a member of the relevant professional organisations including a practising member of the Ecological Consultants Association of NSW and Royal Zoological Society. He is licensed by DPIE and NSW Department of Primary Industries to carry out surveys on threatened plants and animals and he is a qualified Biodiversity Assessor under the BC Act. Nick sits on various government committees and panels including Bushfire management Committees, The State Weed Committee and several Independent Hearing Assessment Panels (IHAP). Nick was the principal ecologist on all field surveys for this report and was responsible for the preparation of maps and report editing. Further details can be found at www.ecology.net.au.

Andreas Bartnitzky holds a Bachelor of Science (Ecology). Andreas has one year of experience in fieldwork and report writing on ecological matters.

G. Document Structure

The heading numbers and names in this report reflect the stages and headings in the BAM (2020). This heading structure is also consistent with Appendices K and L of the BAM 2020. This was done to assist the reader in finding information and to demonstrate compliance with the BAM requirements. At the start of each section the relevant notes from the BAM are given in italic print.

Maps and tables are provided within the relevant part of the text and are also numbered according to the BAM sections headings.

This BDAR also has the same 2 stages as the BAM; Stage 1 Biodiversity Assessment and Stage 2 Impact Assessment.

A table of contents is provided for headings, and a separate tables of contents are provided for tables, figures (maps), photo pages and appendices.

To further assist the determining authority, this document has been made as brief as possible without omitting any of the required content and the site-specific important information is shown in thin outline text boxes.

Stage 1: Biodiversity Assessment

2 Introduction

Chapters 2 and 3 of the BAM 2020, 6.1 BC Act and 6.8 of the Regulations.

2.1 Property and Location

The property, 113 Orchard Street, Warriewood, is rectangular in shape, located on the western side of Orchard Street shown with a blue outline superimposed on an aerial photograph on the map in Figure 2.1.

The site slopes down towards the east and was accessed by a driveway from Orchard Street.

This allotment is currently occupied by single storey dwelling on the lower eastern end. The front yard is predominately a grassed lawn. The rear yard comprises of a steep (20-30degrees) slope with mostly native trees and mixed ground cover vegetation with large sandstone boulders at the western end.

Property	
Address	113 Orchard Street, Warriewood
Postcode	2102
Local Government Area	Northern Beaches Council (Figure 2.3)
Subject Lots Legal Description(s)	Lot 6 DP 749791 (0.97 ha) (Extent shown in yellow on Figure 2.1)
Total Area of Property	0.97 ha (see Figure 2.1 shown in blue)
Subject Land	0.97 ha (see Figure 2.4 shown in red)
Location, geographic co-ordinates	340996 E, 6270894 S Zone 56, GDA 94, MGA (see Figure 2.1)
Assessment Area (1500m buffer)	784 ha (Figure 2.3)

2.1.1

Adjacent Land	
North	Similar low density residential properties on Orchard Street.
East	Medium density residential properties across Orchard Street.
South	Similar low density residential properties on the end of Orchard Street.
West	Heydon Reserve, a Council bushland reserve.

The adjacent land can be seen on the aerial photograph in Figure 2.1 and 2.2, and the maps on Figures 2.3, 3.1-3.6, and 5.1.

2.1.2 Subject Land

Subject Land (development land, disturbance area) - is the land where the development, activity, and clearing will occur including direct and indirect impacts resulting from the proposed development.

For this development proposal the Subject Land is the proposed building footprint, the demolition area, construction and permanent access routes, bushfire protection APZ and landscaping, including any surrounding land that will be impacted. The location and extent of the Subject Land is shown on the map in Figure 2.4.

Legend

113 Orchard St, Warriewood

Property

Subject Lot(s)

Study Site

Aerial Image by: NSW Six Map Spatial Services Portal

Figure 2.1
Site, Aerial Photograph

GIS Environmental Consultants
Ph: (02) 9939 5129, Mobile: 0419 438 672
ecology@ecology.net.au, ecology.net.au

Date: 8/11/2024
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 10 20 m

Legend

113 Orchard St, Warriewood

Study Site

Assessment Area 1500m buffer

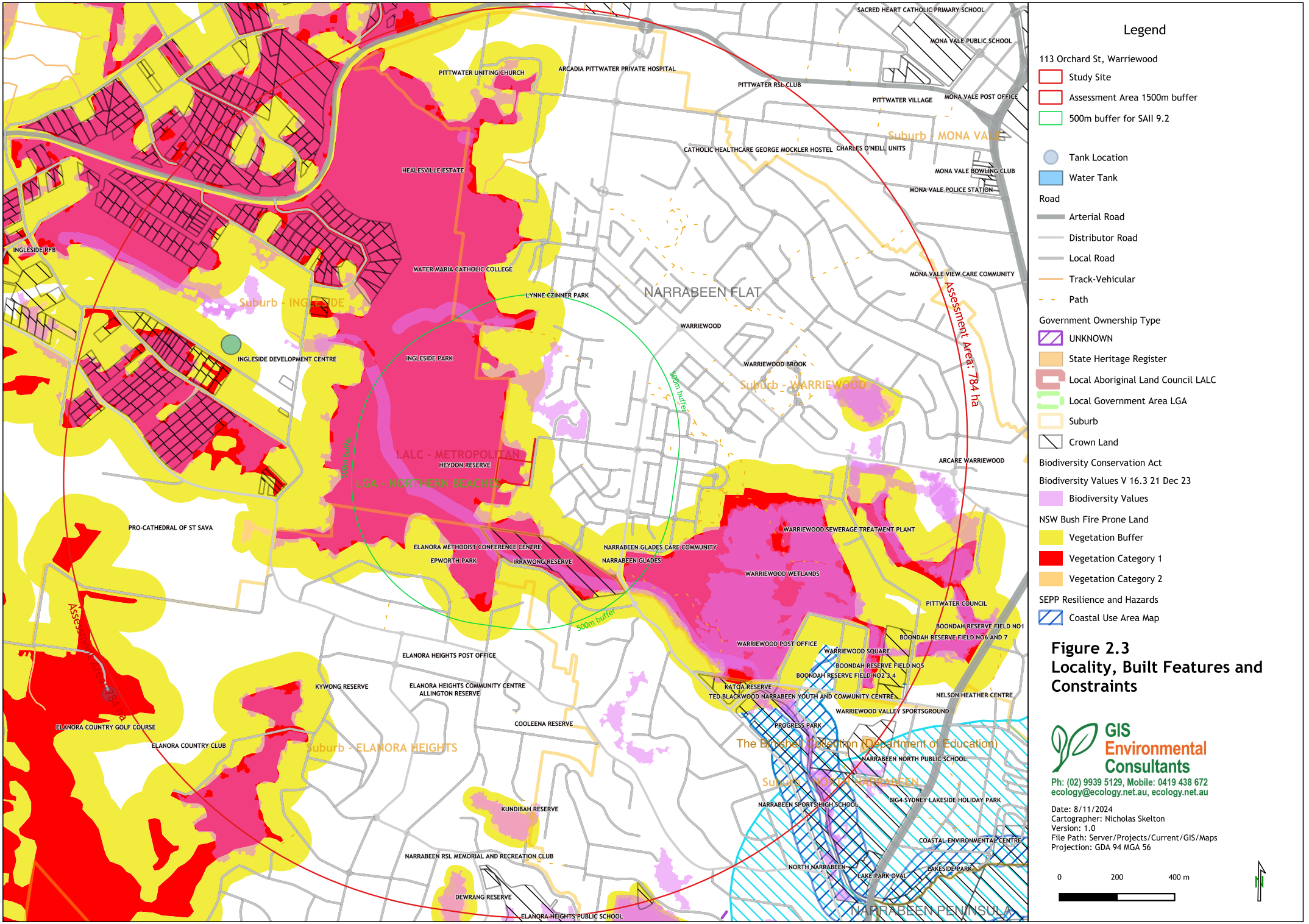
Aerial Image by: NSW Six Map Spatial Services Portal

Figure 2.2
Locality, Aerial Photograph

GIS Environmental Consultants
Ph: (02) 9939 5129, Mobile: 0419 438 672
ecology@ecology.net.au, ecology.net.au

Date: 8/11/2024
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 200 400 m



Legend

113 Orchard St, Warriewood

- Study Site
- Assessment Area 1500m buffer
- 500m buffer for SAII 9.2

- Tank Location
- Water Tank

Road

- Arterial Road
- Distributor Road
- Local Road
- Track-Vehicular
- Path

Government Ownership Type

- UNKNOWN
- State Heritage Register
- Local Aboriginal Land Council LALC
- Local Government Area LGA
- Suburb
- Crown Land

Biodiversity Conservation Act

Biodiversity Values V 16.3 21 Dec 23

- Biodiversity Values

NSW Bush Fire Prone Land

- Vegetation Buffer
- Vegetation Category 1
- Vegetation Category 2

SEPP Resilience and Hazards

- Coastal Use Area Map

Figure 2.3
Locality, Built Features and Constraints

GIS Environmental Consultants
Ph: (02) 9939 5129, Mobile: 0419 438 672
ecology@ecology.net.au, ecology.net.au

Date: 8/11/2024
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 200 400 m

2.2 Proposed Development

Proposal Summary	
Owner	Suzy and Anthony Simpson
Applicant	William Fleming, Boston Blyth Fleming Pty Ltd
Applicant ABN	41 121 577 768
Applicant Address	Suite 1, 9 Narabang Way Belrose NSW 2085
BAM-c Case Number	00055486/BAAS17083/25/00055487/Revision1
BOS Case Party	C-028339, Anthony Simpson
BAM-c Finalised and Submitted	28/02/2025
Type of Proposal	Development that requires consent under Part 4 of the *Environmental Planning & Assessment Act 1979* (EP&A Act)
DA Proposal Title	Demolition of existing house and construction of a replacement dwelling, horse arena, stables, paddocks, landscaping and associated works.
LEP Zoning	RU2 Rural Landscape
Minimum Lot Size LEP	10,000 sqm

2.2.1 Plans and Documents that Describe the Proposed Development

Plan Title	Author	Rev	DWG./Doc. No./Ref.	Date
Site Survey	Axiom Surveying	-	2987	22/02/2018
Site Plan	Tony McLain Architect	-	No. 1826	12/02/2025
Arboricultural Impact Assessment & Tree Protection Specification	Dr Matthew Laurence and Ms Allison Mertin	v4	L&Co22032	16/12/2024
Pre-Development Application Asset Protection Zone/Landscaping Report	Damien Cartwright, CBAA Bushfire Experts	-	DBKL2024-278	11/01/2025
Land Capability and Wastewater Management Options Assessment	Robert Mehaffey, Martens consulting engineers	5	P2108165J R05V04	17/12/2024
Geotechnical Risk Management	Ben White, White Geotechnical Group	-	J1826	21/01/2025
Stormwater Management Plans	Michael Wachjo, NB Consulting Engineering	E	220265	15/01/2025
Biodiversity Management Plan	GIS Environmental Consultants	Final - Update	OWS113BM P051224	28/02/2025

Data sources are listed in section 2.6, and the scientific and general references are in the References section at the end of this document.

2.2.2 Proposal Description

In general, the development application seeks approval for demolition of an existing house and construction of a replacement dwelling house, horse arena, stables, and paddocks with landscaping.

The extent, layout and location of the proposal is shown on the maps in Figure 2.4. Specifically, the proposal is for:

- Demolition of the existing wooden dwelling;
- Earthworks including removal of topsoil, soil and rock, depositing fill to establish 3 levels, a horse arena at RL 24m, horse stables and yard at 28.5m and the new dwelling at 32m.
- Installation of gabion retaining walls;
- Construction of a replacement detached 4 bedroom dwelling house with plunge pool;
- Construction of horse stables, horse arena, facilities and paddocks;
- Driveway;
- Establishment of a fuel reduced bushfire Asset Protection Zone (APZ);
- Maintenance of a Biodiversity Management Area at the western end of the site, managed in accordance with a Biodiversity Management Plan;
- Landscaping including, paths retaining walls and planted screening;
- Environment protection fencing to prevent damage to biodiversity values to be retained;
- Landscaping;
- Establishment and maintenance of an on-site effluent management area; and
- Landscaping.
- Establishment of an on-site effluent management area;
- Offsetting of the ecological impact of the proposal by paying for retirement of biodiversity offset credits in accordance with the Biodiversity Offset Scheme that is part of the Biodiversity Conservation Act.

The proposal is shown on the maps in Figure 2.4.

2.2.3 Proposal Ecological Impact Outline

The likely ecological impacts of the proposal will be:

- Removal of **0.14 ha** of Central Coast Escarpment Moist Forest (PCT 3230) including all trees, shrubs ground cover, leaf litter and topsoil (in the area shown in Red Stripe on Figure 8.1) for the dwelling, driveway, horse arena, stables and associated structures (Management Zone VZ1MZ1Full);
- Partial removal of **0.25 ha** of Central Coast Escarpment Moist Forest (PCT 3230) including reducing the tree canopy to 15% to meet the requirements of PBP 2019 and removal of all shrubs ground cover, leaf litter (in the area shown in Blue Stripe on Figure 8.1) for the bushfire APZ, onsite sewage disposal, and landscaping (Management Zone VZ1MZ2Part);
- Earthworks including cutting an filling;
- The removal of trees;
- Tree protection and retention;
- Removal of tree hollows;
- The offsetting of the ecological impact of the proposal by paying for retirement of biodiversity offset credits in accordance with the Biodiversity Conservation Act;
- Changes to water flows due to retaining walls, diversion mounds and other drainage infrastructure;
- Sedimentation during construction
- Ongoing sedimentation, nutrients leaving the site and weed spread
- Planting of native and/or non-native plant species;
- Installation of permanent bollards to delineate the boundary of the bushfire APZ;
- Front fencing;

- There may be additional unmapped impact due to construction stockpiling, storage, sediment control during construction.
- Additional unmapped impact due to trenching for connection of utilities such as sewage, water and gas.
- Occupation of the new dwelling;
- Temporary construction lasting up to 2 years;

The extent and location of the ecological impact of the proposal is shown on the map in Figure 2.5.

The impact of the proposal is further described and quantified in section 8.2.

2.2.4 Mitigation of Impact During Construction

There are biodiversity values in the area of the proposal that may be impacted during construction. It is difficult to predict all the construction impacts that may occur during construction. This additional impact could be planned to be mitigated by construction site supervision. Measures to mitigate construction impact and ongoing impact are in section and Figure 8.2 of this report and in the arborist report and are shown on Figure 8.3. There is a mechanism in the BAM to allow calculation of unexpected impacts should it be needed. This Development Application is also accompanied by a Biodiversity Management Plan (BMP) by GIS Environmental Consultants dated 28th February 2025.

Proposed Ecological mitigation is:

- Temporary Environment protection fencing during construction;
- Temporary tree protection fencing during construction;
- Temporary sediment fencing during construction;
- Ecological induction of construction workers;
- Installation of 2 nest boxes;
- Ecologically sensitive establishment of the Asset Protection Zone (APZ);
- Fauna rescue during tree removal;
- Permanent tree trunk protection to prevent horses damaging trunks;
- Permanent environment protection bollards to prevent damage to biodiversity values to be retained;
- Clean water diversion mound to prevent clean surface water entering the construction, horse keeping, sewage disposal and landscaped areas;
- Bioswale planted with native plants to filter fine sediment and remove nutrients;
- Maintenance of an on-site effluent management areas;
- Biodiversity Management during construction and for a period of minimum of 5 years of maintenance; and
- Monitoring of environmental works.

2.2.5 Bushfire Hazard Reduction

This site is mapped as bushfire prone on the Bushfire Prone Land Map and therefore requirements of the Rural Fires Act apply including adherence to APZ bushfire protection and construction requirements specified in the guideline Planning for Bushfire Protection 2019[1] and AS 3959-2018 Construction of buildings in bushfire prone areas, as well as any recommendations made in the bushfire report.

The DA has been referred to the RFS who have provided an advice letter specifying the requirement to meet Planning for Bushfire Protection 2019.

[1] NSW Government Rural Fire Service (2019) Planning for Bushfire Protection. https://www.rfs.nsw.gov.au/__data/assets/pdf_file/0005/174272/Planning-for-Bush-Fire-Protection-2019.pdf

The following quotes are taken directly from the Pre-Development Application Asset Protection Zone/Landscaping Report by Damien Cartwright dated 20th July 2024 describing the APZ of the previous proposal:

"From the commencement of building works and in perpetuity, the area around the proposed dwelling as depicted in Section 13, Map 3 of the report prepared by Bush Fire Planning Services (must be managed by as an asset protection zone (inner protection area) in accordance with the following requirements in Appendix 4 of Planning for Bush Fire; 'tree canopy cover should be less than 15% at maturity'"

"In my opinion, based on the plans and documentation provided, it does appear the requirements for APZ can be met as prescribed by the conditions of the Northern Beaches Council, the Bushfire Risk Assessment, the NSW RFS document 'Standards for asset protection zones', and the NSW Rural Fire Service Document Planning for Bush Fire Protection 2019 Appendix 4."

The APZ has been made a Management Zone and in accordance with the NSW government DCCEEW guideline "Assessing partial loss of biodiversity values" 2024 the proposed tree canopy set in the BAM-c to 15% with 0% for shrubs and ground cover as specified in RFS Planning for Bushfire Protection 2019.

2.2.6 Wastewater (Sewage) Disposal

High nutrient wastewater will be produced by the human occupation and mainly by the proposed horses. A new wastewater treatment and disposal system is to be constructed at the site to service a new four-bedroom dwelling and the toilet in the stable. The wastewater system does not treat any wastewater from the horse stables, yards or paddocks, this water is treated by the bioswales and solids removed using a waste removal service.

There is sewer connection nearby, but not directly to the site. Discussions have been held with the owner regarding the connection to the sewer main. The owner is wanting to negotiate an easement with neighbours, if this can be achieved then the onsite sewage system may not be needed and the stables may also be able to connect to the sewer main. I have been told there is also Sydney Water approval for connection of the horse wastewater to the sewer main.

This proposal includes an onsite Aerated Wastewater Treatment System (AWTS) using a surface drip irrigation system 460 sqm to dewater the wastewater as described in the report (Martens Wastewater Report March 2024).

It is required from the Martens Wastewater Report that:

"All upslope stormwater to be diverted around EMA with minimum buffer of 2m from edge of EMA for all stormwater associated infrastructure.

Driplines are to be pressure compensating 13 mm netafim lines installed above ground, pegged in (minimum 150 mm.

The nutrients from the 4 horses will be deposited in the stables, day yards and paddocks. The straw in the stables and the manure in the yards is proposed to be picked up and stored in a manure bin that will be taken offsite.

A horse produced 8 tonnes of wet manure a year which contains 80kg of nitrogen per horse per year and 7.2 kg of phosphorous as soluble salts. Most of this will be picked up and stored in the manure skip bin and removed from the site. Due to the slope of the land, it is likely that some of the nutrients will travel downslope in stormwater and leave the site and flow down local waterways. To reduce this impact there is to be clean water diversion mounds above the paddocks to reduce the amount of watering entering the horse areas, and bioretention swale at the bottom of the paddocks and at the bottom of the site as part of the landscape screen. This will assist in adsorbing nutrients from stormwater. Ideally this problem can be mostly solved by connection to the sewer.

The prevention of horse and human wastewater nutrients leaving the site and contributing to weed quality problems is further discussed below in the stormwater section below.

2.2.7 Stormwater

The house is connected to a 3000L rainwater tank with overflow directed to the sorption bed. Water from the roofs of the house and stables are stored in 1000L tanks. Stormwater from around the property will flow east-south-east to Orchard Street then into Warriewood Wetland then South Creek and then Narrabeen Lagoon. There are biodiversity values down slope and downstream of the proposal that may be impacted. This prescribed and indirect impact is discussed later in this report.

Stormwater runoff of the paddocks, stables, house and yards are to be caught and treated for sediment and nutrients in bioswales.

2.2.8 Development Footprint

The BAM Regulation defines the **Development Footprint** as the area that will be directly positively or negatively impacted either temporarily or permanently due to the DA proposal including any Biodiversity Management Area, access routes, Construction Footprint, Operational Footprint.

The Development Footprint for this proposal is the extent and location shown in **Red** on the map in Figure 2.5 and is 0.57 ha in size.

2.2.9 Operational Footprint

The BAM Regulation defines the *Operational Footprint as the location of the activity including; access roads, bushfire Asset Protection Zones and areas used to store construction materials. Does not include any residual or proposed environment protection area.*

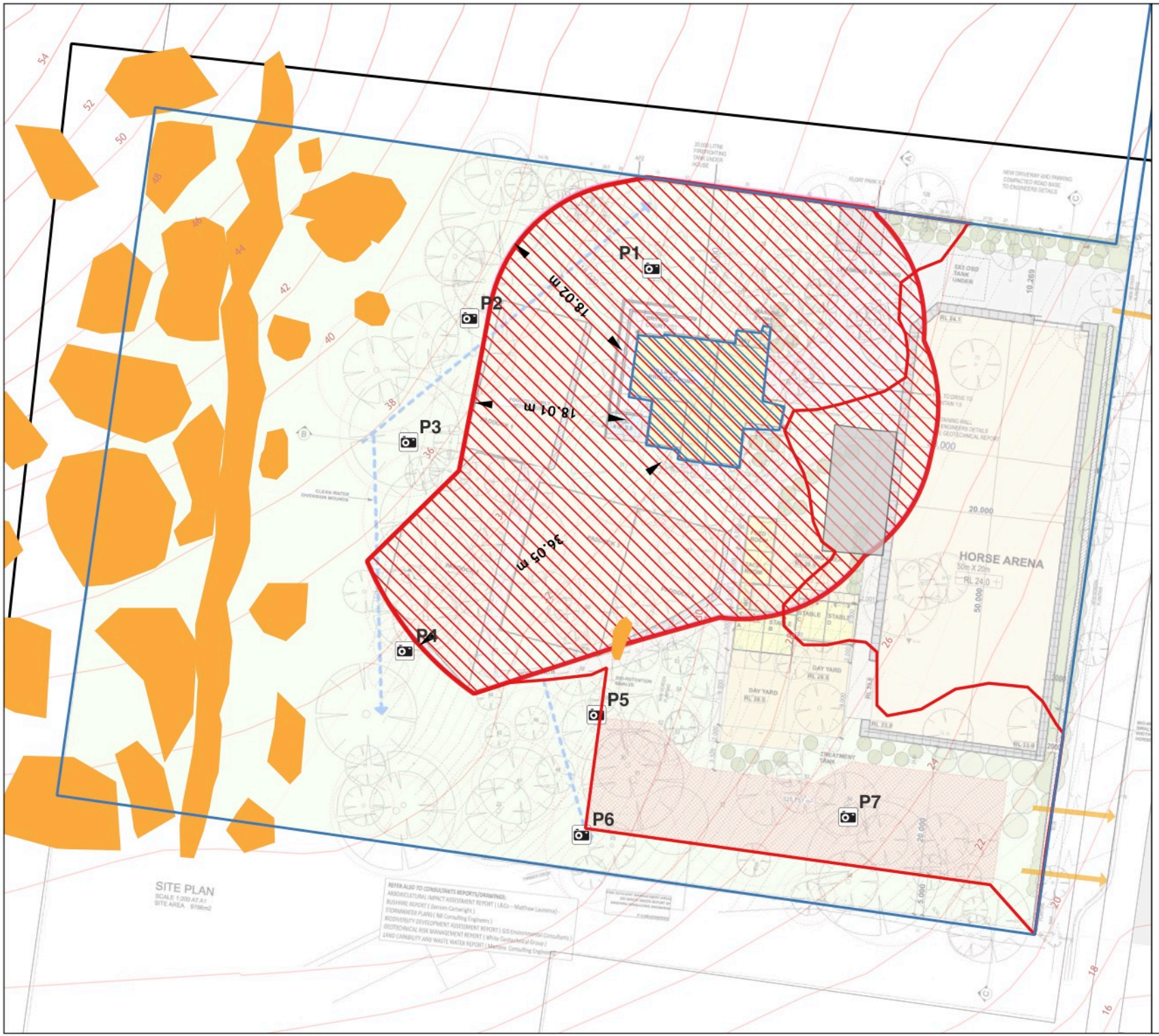
The Operational Footprint for this proposal is the same as the Development Footprint and is shown in **Red** on the maps in Figure 2.4 and is 0.57 ha.

If the recommendations in this report are followed to reduce indirect impact, and the bushland habitat to be retained is managed in the long term, then, the **operational footprint** is not likely to extend further than the development footprint for this development. Indirect impacts on this site may include change in hydrological flows.

2.2.10 Construction Footprint

The BAM Regulation defines the Construction Footprint as (may be indicative, temporary during construction e.g. Storage of building materials, waste, site office, sediment ponds).

The Construction Footprint for this proposal is the same as the Development Footprint and is shown in **Red** on the maps in Figures 2.4 and is 0.57 ha.



Legend

113 Orchard St, Warriewood

- Property
- Subject Land (disturbance area) 0.38 ha
- Rock
- New Dwelling
- Stormwater Leaving Site
- Existing House
- Monitoring Points
- Bushfire APZ Feb 25, 2796 sqm
- Cadastre

Elevation

- Contour 2m

Basemap is the Site Plan
Updated 12/2/2025

Figure 2.4a Proposed Buildings, APZ and Landscaping

GIS Environmental Consultants
Ph: (02) 9939 5129, Mobile: 0419 438 672
ecology@ecology.net.au, ecology.net.au

Date: 22/2/2025
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 10 20 m

Legend

113 Orchard St, Warriewood

- Property
- Subject Land (disturbance area) 0.38 ha
- Rock
- New Dwelling
- Stormwater Leaving Site
- Existing House
- Temporary Construction Environment Protection Fence
- Clean Water Diversion Mound
- Bioswale
- Trunk Protection Permanent
- Permanent Bollards marking Boundary of APZ Area
- Monitoring Points

Tree Impact [168]

- Keep [93]
- Dead [2]

Basemap is the Site Plan
Updated 12/2/2025

Figure 2.4b Environment Protection

GIS Environmental Consultants
Ph: (02) 9939 5129, Mobile: 0419 438 672
ecology@ecology.net.au, ecology.net.au

Date: 22/2/2025
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 10 20 m

Legend

113 Orchard St, Warriewood

- Property
- Subject Land (disturbance area) 0.38 ha
- Rock
- New Dwelling
- Bushfire APZ Feb 25, 2796 sqm

Tree Impact [168]

- Remove [67]
- Dead [2]
- Stormwater Leaving Site

Footprints

- Development, Construction and Operational Footprints 0.55 ha
- No Impact 0.26 ha
- Biodiversity Management Area 0.18 ha

Property - Lots that are within the same ownership and are adjacent or near to the Subject Land.

Subject Land (Development Area) - The land subject of the DA proposal including direct and indirect impacts.

Development Footprint - The area within the Subject Land directly impacted by the DA. The combined area of the Construction and the Operational Footprints. Used to calculate the impact for offsetting.

Construction Footprint (Clearing Footprint) - Temporary (during construction) and permanent impact (clearing of native vegetation). May include land inside and outside the property.

Operational Footprint - After construction, typically smaller than the Construction Footprint and may include easements. Ongoing positive and negative works, including; maintenance of bushfire Asset Protection Zone, weed control, Bushland Management (BMP), maintenance of stormwater devices ect.

Basemap is the Site Plan
Updated 12/2/2025

Figure 2.5 Site, Development Footprint and Impact

GIS Environmental Consultants
Ph: (02) 9939 5129, Mobile: 0419 438 672
ecology@ecology.net.au, ecology.net.au

Date: 22/2/2025
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 10 20 m

2.3 Requirement for a BDAR report, The BOS Threshold Test

The Biodiversity Conservation Act Regulations (2017) requires that the Biodiversity Offset Scheme (BOS) "**threshold test**" (section 7.1 to 7.3) be applied to local developments (development under Part 4 of the *Environmental Planning and Assessment Act 1979*) to determine if the requirement to enter the BOS is triggered. If triggered then the Biodiversity Assessment Method (BAM) needs to be applied and a Biodiversity Development Assessment Report (BDAR) is required to accompany the application.

Section 7.2 of the BC Act states that a development will require assessment (BDAR report with BAM assessment) and offsetting (BOS) if any of the following triggers are met;

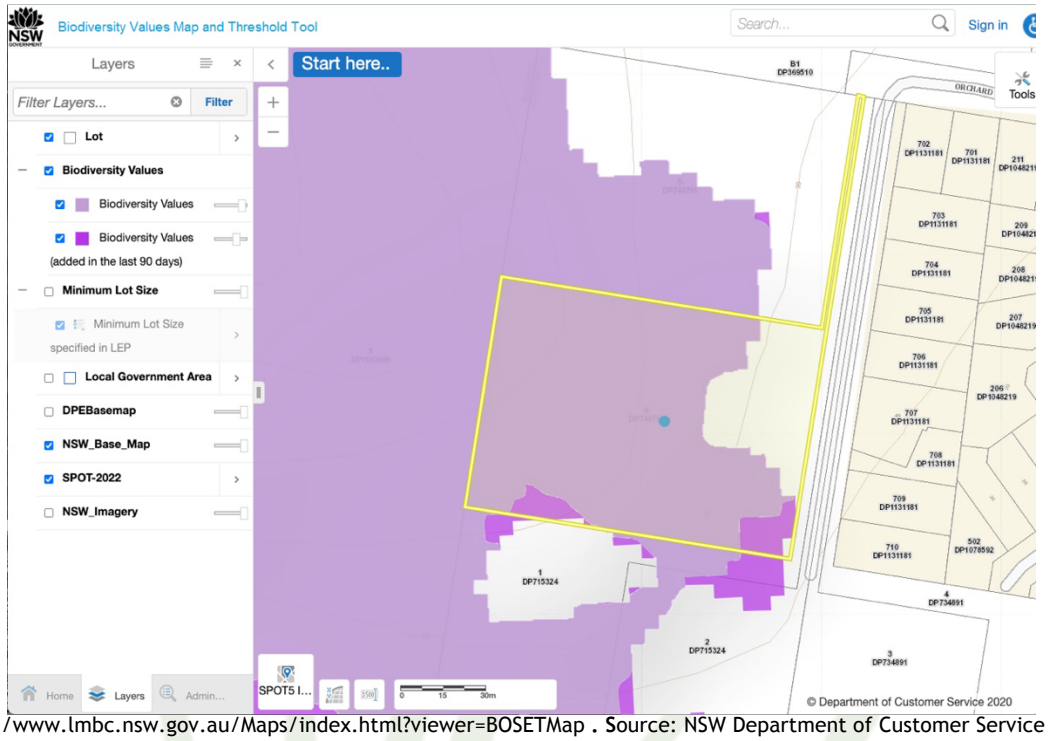
1) The area of **native vegetation** to be disturbed (including bushfire APZ, construction impact, and direct and indirect disturbance) is above the **clearing threshold** area (section 7.2 of the BC Act regulation) for the minimum lot size (defined in the LEP). If there is no LEP minimum lot size then the actual (smallest in the DA) lot size is used. **Native vegetation** is defined in the LLS Act as any plant native to NSW whether tree, shrub or ground cover plant.
   or
2) Any part of the proposal will have a direct or indirect impact on vegetation or other items listed in section 6.1 of the BC Regulation on **Biodiversity Value mapped land**, as shown on the Biodiversity Values Map published by the Chief Executive of the NSW Office of Environment and Heritage **(**See image below and Figure 5.1 of this report) or the web address: https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap
   Biodiversity Values Map is defined in the BAM as the map published in accordance with clause 7.3 of the BC Regulation. The Biodiversity Values Map identifies land with expected high biodiversity value that is particularly sensitive to impacts from development and clearing. This mapping already includes any **Area of Outstanding Biodiversity Value**.
   or
3) The proposal is likely to have a significant impact (**Test of Significance also called a 5 part test,** Section 7.3, BC Act**)** on any Threatened species or Threatened ecological community.

Assessment of "threshold test" triggers;

1) Native vegetation will be removed or disturbed due to the proposal. The LEP minimum lot size in this location is 1ha, therefore the maximum cut off for clearing "Native **vegetation" is 0.5ha. The total amount of disturbance to native vegetation by this proposal is 0.39 ha, which is** below **the threshold limit, therefore, this part of the test is not triggered, and**

2) The site is mapped on the Biodiversity Values Map (BV Map) and there will be impact to native vegetation in the area mapped on the "Biodiversity Values" Map, therefore a BDAR report is triggered,

Biodiversity Values mapping of the property



https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap . Source: NSW Department of Customer Service 2020, DPIE, Accessed: 25 November 2024

and,

3) This proposal is **NOT likely** to have a significant effect (5-part test of significance) on any Threatened species or ecological community or their habitats.

Conclusion: Biodiversity Values Map triggers the threshold test therefore entry under the BOS and preparation of a Biodiversity Development Assessment Report is required for this DA.

2.4 BAM Module Type Used

There are 4 types of BAM assessment that can be used for a BDAR:

- Standard BAM assessment (BAM and Appendix K)
- Streamlined – Small Area (BAM Appendix C and L)
- Streamlined - Scattered Trees (BAM Appendix B) or
- Streamlined - Planted Native Vegetation (BAM Appendix D)

A combination of these is also possible. The streamline modules only apply when specific requirements are met. The situations where each of the streamline modules may be used is described at the beginning of each relevant Appendix in the BAM. The site must not be Core Koala habitat.

Table 2.1 BAM 2020 Table 12

Table 12 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 made 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	

The assessment that is used for this BAM assessment is the:

Streamlined – Small Area (BAM Appendix C and L)

This is because the area clearing threshold for this DA is less than the maximum (ie <1ha on a minimum lot size mapped area of less than 1ha site) specified in Table 12 of the BAM (2020) and the site is not mapped as core koala habitat.

2.5 Requirement of the SEPP and Koala Assessment

Chapter 4 of the Biodiversity and Conservation SEPP (Koala Habitat Protection) applies to this site and subsequently the Koala SEPP 2021 applies. Because native vegetation is being removed, there may be additional and separate compensation beyond what has been identified as required offsetting in the BAM (2020).

2.6 Areas Not Requiring Assessment

The parts of the property that will not be impacted by direct or indirect negative impacts are the Biodiversity Management Area (4000m^2) shown in green on the Map in Figure 2.4a and are not included in the Management Zones and area not assessed.

LEP tree species exemptions and 10/50 code and 25m code clearing allowances do not apply.

The Site does not include any Biocertified Land or impacts that have been previously offset.

2.7 Sources of Information

The sources of the Spatial data are documented on the maps.

Relevant information was collated from printed literature, scientific journals, electronic databases, reports and local knowledge. They are referenced in the text and the references are listed in the General references section, on maps, and below.

Databases consulted include:

BioNet

BAM Calculator

BioNet Vegetation Classification

Biodiversity Values map

BioNet Threatened Biodiversity Data Collection (TBDC)

BioNet Atlas

Directory of Important Wetlands in Australia https://www.environment.gov.au/cgi-bin/wetlands/search.pl?smode=DOIW

Google earth, https://earth.google.com/web/

Six spatial information, https://six.nsw.gov.au

eSPADE https://www.environment.nsw.gov.au/eSpade2Webapp for Geology and soils

Matters of National Environmental Significance (MNES) database EPBC Act

Protected Matters Search Tool

SEED information database https://www.seed.nsw.gov.au/

2.8 Objectives and Guidelines

In general methods used were:

- Collating, assessing and displaying the relevant existing information about the physical and biodiversity that already exists in electronic databases and maps, for the site and nearby, analysed using a Geographic Information System (GIS)
- Identifying the area that will be impacted by the proposal
- Mapping and quantifying the extent of native vegetation on the site
- Classifying the vegetation on the type into Plant Community Types PCTs
- Mapping the location and extent of each Vegetation Type PCT
- Determining if Threatened Ecological Communities occur on the site
- Recording the plants and animals that occur on the site
- Mapping and quantifying the location and extent of Threatened Species habitat
- Locating the ecological features on the site
- Summarising, displaying and analysing the relevant information in accordance with the BAM
- Writing the BDAR report

The objectives of the ecological survey and BDAR are to:

- Describe the physical environment of the Site;
- Meet the requirements of the Biodiversity Assessment Method (BC Act 2016 and Section 5.2 of the BAM 2020) and other survey guidelines;
- Map the extent of native vegetation in the Site and surrounding land;
- Identify and record native and exotic plant species that occur on the Site and adjacent land;

- Determine the Vegetation Types(s) (PCTs) and map their extent;
- Assess and map the level of vegetation and habitat disturbance condition on the Site to determine the Vegetation Zones.
- Identify and record fauna species and their habitats;
- Identify and map targeted Threatened species and their habitats; and
- Determine the extent of the Site of the proposed footprint and the likely direct and indirect impacts.

Specifically, the methods used and the information included in the contents of this BDAR is specified in the following documents, data and websites:

- NSW Biodiversity Assessment Method (BAM) Order 2020 (DPE 2020)
- Biodiversity Conservation Act 2016

  https://legislation.nsw.gov.au/view/html/inforce/current/act-2016-063,
- Biodiversity Conservation Regulation 2017,

  https://legislation.nsw.gov.au/view/html/inforce/current/sl-2017-0432
- Operational Manuals 1 and 2 and Streamlined assessment module – planted native vegetation,

  https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-2020-operational-manual-stage-1-220279.pdf

  https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-operational-manual-stage-2-230164.pdf

  https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/streamlined-assessment-module-planted-native-vegetation-220634.pdf
- Data, Information, tools, forms and guidelines:

  Information about the **Biodiversity Offsets and Agreement Management System** (BOAMS)

  Log into the **NSW Biodiversity Accredited Assessor System** (BAAS)

  Access the standalone **Biodiversity Offset Payment Calculator** (BOP-C)

  Access the standalone **Biodiversity Assessment Method Calculator** (BAM-C)

  Changes implemented in the **Biodiversity Assessment Method Calculator BAM-C release notes**

  BAM Calculator User Guide

  Access the **High Threat Weeds** (also available from the **NSW BioNet resources page**, under BioNet Species Names – Power queries)

  Access the **Native Species by Growth Form** list (also available from the front of the BAM-C) (XLS 2.8MB)

  Information on **NSW BioNet**

  Log into **BioNet Atlas** database

  Log into **BioNet Vegetation Classification** (Veg C) database

  Access **BioNet quick guides, manuals, and datasheets**

  Access the **archived BioMetric and Threatened Species Profiles** datasets (Biobanking data)

  Access the **Spot Price Index** for Biobanking credit trades

  Access the **Methodology Note – Biodiversity Offsets Payment Calculator – BTD** (BAM credits, offset trading groups and discount rate)

  Find out how to **apply for an assessment of reasonable equivalence** for BioBanking credits or a BioBanking credit obligation

  Information about the **total fund deposit and calculator**

  Access the **Vegetation Condition Benchmarks**

To transfer BOS credits use the **Application to transfer biodiversity offsets scheme credits**

To retire BOS credits from the market, use the **Application to retire BOS biodiversity credits**

Resources for **Biodiversity Stewardship Agreements (BSA)**

Guideline for applying Biodiversity Assessment Method at severely burnt sites: Biodiversity Development Assessment Report/Biodiversity Certification Assessment Report

Guide for mapping threatened species for inclusion in the NSW regulatory framework

Determining native vegetation land categorisation for application in the Biodiversity Offsets Scheme

2.8.1 Practice notes

Guidance for assessors and decision makers in applying modified benchmarks to assessments of vegetation integrity: Biodiversity Assessment Method

Manageable high threat weeds - improving gain on offset sites: Biodiversity Assessment Method Practice Note

Offset rules and ecosystem credits

These documents can all be found on the Assessor resource website:

https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/accredited-assessors/assessor-resources

Appendices K and L of the BAM provides a checklist for the contents of the BDAR document. These requirements were followed for the field survey, analysis, assessment and writing of this BDAR.

More details on the site specific methods used are described at the start of each information section, and the location and extent are shown on the maps in the Figures.

2.9 Methods Used

2.9.1 Mapping the Extent of Native Vegetation in the Site

To determine the number and position of the plots needed, the extent of native vegetation on the site and its condition was mapped using aerial photographs and field verification. Further details on the method used and the findings are provided in section 4.1.

The extent of native vegetation on the site is shown on the maps in Figures 2.4 and 4.1 and is described in section 4.1.

2.9.2 Assessment of Threatened Species to Target During Field Survey

Database and spatial information were used to ascertain which threatened species are known to occur in or near the study area and is shown on the map in Figure 5.1 and are assessed in Tables 5.1 and 5.2. Where a species is known from recent nearby records the species is included as a candidate species.

Relevant information was obtained from literature, local knowledge and established sources such as scientific journals, electronic databases and reports. Historic records from electronic databases included BioNet (DPIE EES Atlas of NSW Wildlife records), eBird, iNaturalist, Atlas of Australia, Protected Matters Search Tool (DOEE) and the BAM-c.

These species and the potential candidate species produced by the BAM calculator were then assessed against local knowledge and the habitat conditions within the study area to compile a list of Threatened plant and animal candidate species for specific targeting during the fieldwork and assessment. These assessments are done in Tables 5.4, 5.5 and 5.6.

During the field surveys, all sections of the study area and some of the surrounding lands were traversed on foot. Fauna species were actively searched for by examining rock crevices, searching for tree hollows and looking for animals and/or for signs of use by animals. Elliott, cages or 'harp' traps

were not used to reduce any stress to animals. Hollows were investigated internally using an endoscopic camera attached to a pole where necessary. Field notes are available for scrutiny.

The species-specific Threatened species survey effort is described in section 5 of this report.

2.9.3 Preliminary Field Survey

The preliminary ecological field survey was completed first to understand the development site and surrounding land.

The general field survey method carried out across the Development Site and the adjacent land:

- Traverse the Development Site and surrounding land to locate boundaries, physical characteristics of the Development Site and location of the proposal footprint;
- Assess the habitat suitability within the Development Site;
- Map the extent of native vegetation;
- Classification of the Plant Community Types (PCTs) and their integrity (condition);
- Identify all plant species on the site including native and exotic species;
- Identify fauna on the Site through opportunistic sightings, calls, potential habitat, scats, remains, nests, dreys, bones, feathers, fur, diggings, scratches, tracks, white-wash and food sources etc;
- Examine trees for scratchings, sap-feeding notches and hollows;
- Assess the extent of disturbance and weed invasion; and
- Photograph relevant environmental features and to document the field survey

2.9.4 BAM Plot Survey

A BAM plot survey, as required by the BAM method, was used to determine the integrity (condition) is made up of composition, structure and function in each Vegetation Zone. The transect and plot types used for each Vegetation Zone (VZ) were:

- 50m long transection used to orientate and position the plots, subplots and photos;
- 400 m^2 plot (20x20) used to assess the composition and structure;
- 1000 m^2 (20x50) plot used to assess functional attributes of the site; and
- 1m^2 subplots (x5) nested within the 1000m^2 plot used to assess the average percentage leaf litter cover.

The location of the transect and plot for the dominant Vegetation Zones used in this survey are shown in magenta on the map in Figure 4.3 and a photo along each transect is shown on the Photo Page(s).

Table 2.2 Preliminary and Plot Survey Effort

Survey	Location	Weather	Date
Preliminary Field survey	All of the site	Fine, 26°C Wind 17 km/h	06/11/2024
BAM Plot Survey	VZ1	Fine, 26°C Wind 17 km/h	06/11/2024
Microbat Survey	See Figure 4.1 for locations)	Sunny – rainy weather 6 days of rain 0.4-18.6 mm	06/11-25/11/2024
Infrared Motion Detecting Camera	Throughout the site (See Figure 4.1 for locations)	Sunny – rainy weather 6 days of rain 0.4-18.6 mm	06/11-25/11/2024

2.9.5 Threatened Microbat Passive Ultrasonic Detection

Potential microbat habitat on the site includes an existing house a large, exposed sandstone cliff and trees with hollows and the vegetation. The nearest natural waterbodies are 90-200m southwest (Mullet Creek) and 207m southwest (Irrawong Waterfall).

Bats were surveyed using a passive ultrasonic detector with a total of 19 suitable nights of recordings over the dates 06/11/2024 - 25/11/2024. The recorders were set to record 1 hour before dusk and 1 hour after dawn. A Faunatech Songmeter Mini Bat2 and an ANABAT detector were used with the latest available firmware. The detector was mounted on the top of a star picket, in a gap within the tree canopy. The detector was in four positions. The locations/s and direction/s of the bat detectors (B) are shown on the map in Figure 4.3 using a camera icon and named B1, B2, B3 and B4. The data was recorded in both Full-spectrum (.wav) and zero-crossings (.zc).

The calls were analysed using Anabat Insight and call identifications were made by the experienced Bat Ecologist, Amy Rowles who has been a Microbat Specialist for 7 years, and has almost 30 years' experience as an Ecologist. The Bat Call Analysis Results are provided in Appendix F. The call identification was aided using regional-based guides and call databases provided in the reference section of Appendix F. Confidence of call identification was recorded as either definite (D), probable (Pr), Po (possible), E (one or more).

The summary of the bat call analysis results are:

- No passes of Large-eared Pied Bat were recorded.
- Two potential passes of Southern Myotis were recorded, meaning that the area that the detector was monitoring does not contain roosting or foraging habitat. However, consideration of Southern Myotis roosting and foraging habitat across the whole site should be considered.
- The Eastern Cave Bat was recorded multiple times, and due to the sites proximity to roosting and breeding habitat, further consideration is required.
- High levels of Little Bent-wing Bat activity were recording, suggesting the site contains suitable foraging habitat.
- The Large Bent-wing Bat was possibly recorded, suggesting possible foraging habitat is present on the site.
- Several other non-threatened bat species were recorded in the area (See Appendix F for more detail).

All threated Bats recorded in the Target Species Survey have been included in table 5.4 for assessment as Candidate Species Credit Species. Further information on the site's suitability as foraging and breeding habitat for threatened bats is located in Section 8.1.5, in addition to Tables 5.4, 5.5 and 5.6.

2.10 Targeted Threatened Species Field Survey Effort

Fauna species were actively searched for by examining rock crevices, searching for tree hollows and looking for animals and/or for signs of use by animals. Elliott cages or 'harp' traps were not used to reduce any stress to animals. Hollows were investigated internally using an endoscopic camera attached to a pole where necessary. Field notes are available for scrutiny.

The survey effort is summarised in Table 2.2 - 2.3 and results in Table 5.6. Further details of the survey techniques are described in Appendix A.

Relevant Threatened Species Survey guidelines:

A. Threatened reptiles - Biodiversity Assessment Method survey guide 2022

B. Koala (Phascolarctos cinereus): Biodiversity Assessment Method Survey Guide 2022

C. Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method

D. Flora Species with Specific Survey Requirements (XLS 2.5MB) - also available from front of BAM-C

E. 'Species credit' threatened bats and their habitats 2021

F. NSW Survey Guide for Threatened Frogs

G. Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) 2004

H. Survey guidelines for Australia's threatened birds 2010 – updated 2017

I. Survey guidelines for Australia's threatened mammals EPBC 2011

Table 2.3 Targeted Field Survey Effort

Group	Survey Techniques	Weather	Time effort	Dates
Micro bats and other fauna	Infrared Motion Detecting Camera (A7 Appendix A)	Sunny – rainy weather 6 days of rain 0.4-18.6 mm	**2 x 19 nights**	06/11-25/11/2024
	Ultrasonic (Bats)/Acoustic recording (A11 Appendix A)	Sunny – rainy weather 6 days of rain 0.4-18.6 mm	**2 x 19 nights**	06/11-25/11/2024

3 Landscape - Site Context

Requirements are described in sections 3.1 and 3.2 and Appendix E of the BAM 2020

The following is a result of an initial desktop assessment then field survey.

3.1 Landscape Features in the Locality

The proximity of the site to National Parks, waterbodies, developments and nearby bushland is shown in Figures 2.2 and 2.3.

New South Wales landscapes are classified into Interim Biogeographic Regionalisation of Australia (IBRA) regions. The current version IBRA v7.0[2] identifies 89 bioregions and 419 subregions in New South Wales.

Bioregions are based on common climate, geology, landform, native vegetation and species information. The subregions are more localised and homogenous geomorphological units in each bioregion.

The IBRA bioregion and subregion relevant to the site is required by the BAM and must be entered into the BAM-C algorithm to assist in determining the number of offset credits required for a development.

The IBRA bioregion and subregion are labelled in dark blue writing on the map in Figure 3.3.

This site is not near an IBRA boundary meets the IBRA classification. This site is mapped as the following IBRA Bioregion and Subregion:

Sydney Basin Bioregion – Pittwater Subregion

This subregion covers 1483.9 km^2.

[2] Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Subregions), DCCEEW, NSW Government. https://datasets.seed.nsw.gov.au/dataset/interim-biogeographic-regionalisation-for-australia-ibra-version-7-subregions

Landscape Features	
IBRA Bioregion	Sydney Basin
IBRA Subregion	Pittwater
Mitchell Landscape	Sydney – Newcastle Barriers and Beaches
Geology (Figure 3.2)	Hawkesbury Sandstone & Narrabeen Group
Soils (Figure 3.2)	Watagan & Warriewood

3.2 Mitchell Landscapes

The landscapes of NSW have been classified and mapped. The list of landscapes is provided in the document titled Descriptions for NSW (Mitchell) Landscapes Version 2 (2002) by Dr Peter Mitchell[3], and the current maps v3.1 of their location across NSW are available on the SEED digital database[4].

The classification groups ecosystems into meso-ecosystems representing larger natural entities based on topography and geology. The naming of ecosystems and meso-ecosystems was standardised so that each name provided information on location and a meaningful descriptive landscape term. There are 15 Mitchell Landscapes in the Sydney area.

The Mitchell Landscape that is relevant to this site is required by the BAM and needs to be entered into the BAM-C algorithm to assist in determining the number of offset credits required for a development.

The Mitchell Landscape(s) are labelled (in light purple) and an outline of the boundaries, shown with a light purple outline that occur in the locality of this site, are shown on the map in Figure 3.3.

This site is near a boundary between Mitchell Landscapes as can be seen on the map in Figure 3.3. The site fits the landscape description below. This site is mapped as the following Mitchell Landscape:

SB Belrose Coastal Slopes - Sydney – Newcastle Barriers and Beaches

This Mitchell Landscape is common and occupies 20.6 Ha in the Sydney area.

This landscape is characterised by benched hill slopes and deep valleys of the coastal fall on horizontal Triassic quartz sandstone, lithic sandstone and shales. The landscape includes a high proportion of rock outcrop with discontinuous cliffs to 5m high. Shallow uniform or gradational sands and earthy sands occur on ridges, deeper sands, loamy sands and organic sands occur on wet benches and in hanging swamps, grey or yellow texture-contrast soils occur on shale benches.

General elevation ranges between 0 and 180m, with a local relief of 80m. In deeper soils on ridges, low woodlands consist of Scribbly Gum (Eucalyptus haemastoma), Red Bloodwood (Corymbia gummifera), Yellow-top Ash (Eucalyptus luehmanniana), and Narrow-leaved Apple (Angophora bakeri). Scrub and heath of Scrub She-oak (Allocasuarina distyla) and Heath Banksia (Banksia ericifolia), with other Hakea, Grevillea, and Baeckea sp., occur on ridges and upper benches. In hanging valleys, wet heath and swamps consist of Gahnia sp. and Swamp Banksia (Banksia robur). Coastal forest occurs in sheltered areas on better quality shale soil consisting of Sydney Blue Gum (Eucalyptus saligna), Blackbutt (Eucalyptus pilularis), Turpentine (Syncarpia glomulifera), Grey Ironbark (Eucalyptus paniculata), Spotted Gum (Corymbia maculata), Southern Mahogany (Eucalyptus botryoides), Cabbage-tree Palm (Livistona australis) and Burrawang (Macrozamia sp.). Coastal headlands include scrub of Allocasuarina distyla, Coast Rosemary (Westringia fruticosa), and Dwarf Kangaroo Grass (Themeda triandra).

[3] Mitchell, P. (2002) Descriptions for NSW (Mitchell) Landscapes Version 2, DECC. https://www.environment.nsw.gov.au/resources/conservation/landscapesdescriptions.pdf

[4] Central Resource for Sharing and Enabling Environmental Data in NSW, SEED, NSW Government. https://datasets.seed.nsw.gov.au/dataset/nsw-mitchell-landscapes-version-3-1

3.3 Topography

Sydney lies in a basin of sedimentary rock with the eastern edge eroded by the sea. The basin has been eroded into by the Georges River and Parramatta River to form drowned river valleys of Sydney Harbour, Port Hacking and The Hawkesbury and Pittwater.

Topographical features of the site locality are shown in the map in Figure 3.1.

The site is a lower slope.

The lowest part of the property is the southeastern boundary at 18.98 AHD and the highest is the western boundary at 43.47 AHD.

The slope of the whole site is steep and approximately 21° (23%) ranging from 20-30° with an aspect to the south-east.

The slope of the site is a constraint that has flow on effects for civil engineering, bushfire protection, wastewater, stormwater, and indirect ecological impacts.

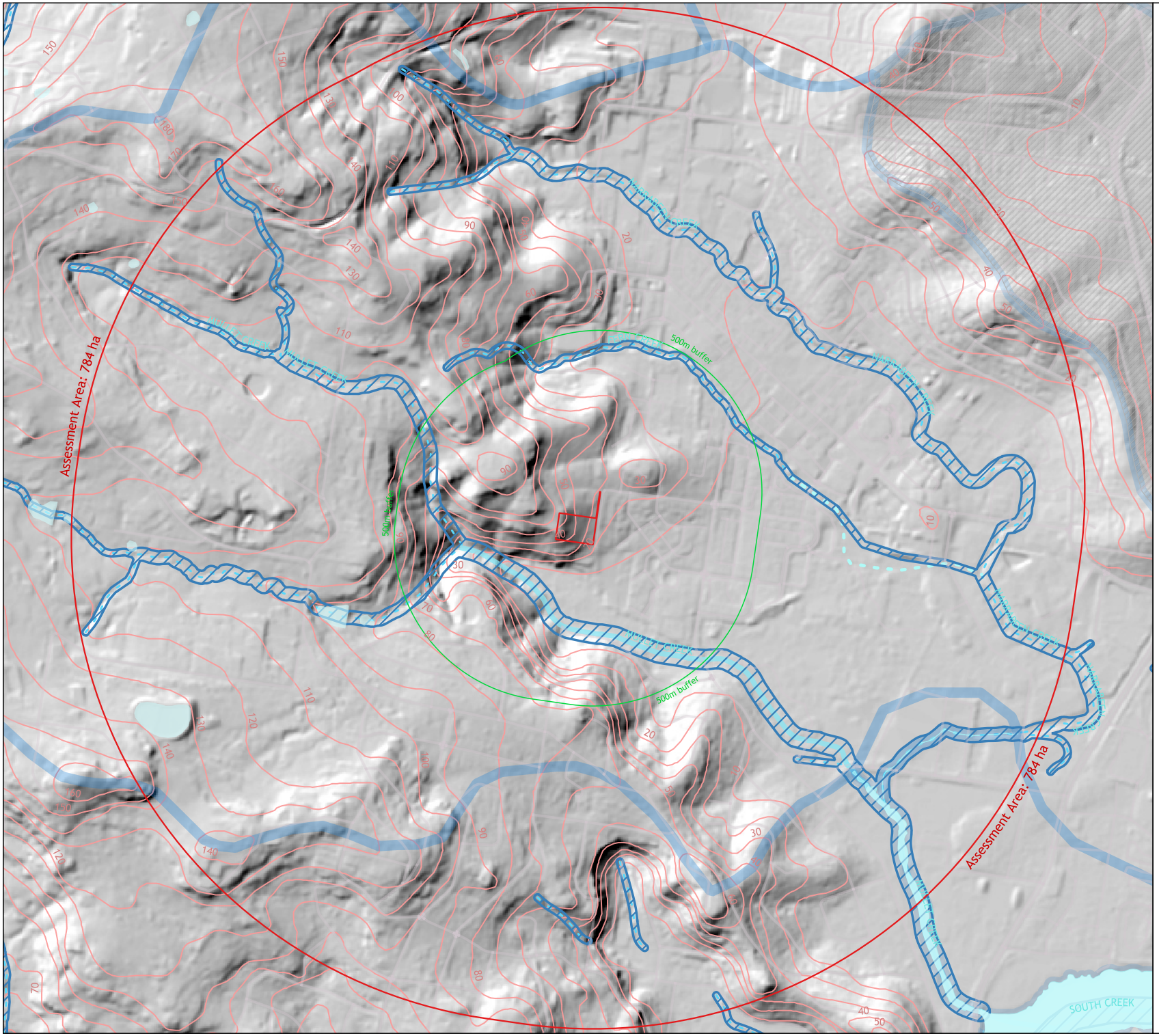
3.4 Hydrology, Drainage, Riparian Land and Groundwater

3.1.3(3-4) BAM 2020

The proximity to all types of Hydrology features is shown on the map in Figure 3.1 and is described in Section 3.3. Drainage in the locality and on the site is shown in light blue on all the Figures.

This site is approximately 150 metres northeast of Mullet Creek which feeds into South Creek and Narrabeen Lagoon. The site is approximately 400 metres south of Fern Creek which feeds into Narrabeen Creek and South Creek. The site is also approximately 207m northeast of Irrawong Waterfall and waterhole, see attached Map A. There is wetland habitat more than 200m to the south and south-east of the site including the protected Warriewood Wetlands area.

No springs or swamps were evident on the site during inspection or are evident from the type of vegetation on the site. No ground water dependent ecosystems occur on this site.



Legend

113 Orchard St, Warriewood

- Study Site
- Assessment Area 1500m buffer
- 500m buffer for SAII 9.2
- Road
- Hydro Area Main
- Hydro Area
- Strahler Buffer Hydrolines

Hydrology Features

Estuary Catchment

- Catchment Boundary
- Catchment Freshwater Boundary
- ESTUARY
- DRAINS TO SEA

Drainage

- Watercourse Perennial
- Watercourse Non Perennial
- Connector Non Perennial

Terrain

Elevation

- Contour 10m

Figure 3.1
Locality, Topography and Hydrology

GIS Environmental Consultants
Ph: (02) 9939 5129, Mobile: 0419 438 672
ecology@ecology.net.au, ecology.net.au

Date: 8/11/2024
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 200 400 m

3.5 Geology and Soils

1.1.3 (BAM sections 7 and 10) BAM 2020

Geology determines the soils, topography, and drainage which in turn governs the levels of nutrients, moisture levels and exposure at a site. These factors then determine which plant and animal species will occur at a site.

In the Sydney basin the geology is dominated by residual Triassic age sedimentary beds with a few scattered intrusions of igneous rock as diatremes and small dykes a few meters wide. There are also areas of marine sediment in embayments along the coast the largest of which is the Botany Lowlands and alluvial sediment on rivers.

In the northern, eastern and southern parts of Sydney basin, there is a residual geomorphology where the sandstone bedrock is typically exposed or very near the surface, and the type of geology is a main influence driving the suitability of the land as habitat for Threatened species at any given site. This in contrast to western Sydney on the Cumberland Plain where the bedrock is buried deep beneath alluvial soils and geology does not influence the overlying ecology.

The geological boundaries on and near this site are shown as the solid colours on Map 3.2.

There are no changes in geology near this site as shown on the map.

The underlying **geology** in the locality of this site has been mapped as:

Hawkesbury Sandstone consisting of medium to coarse-grained quartz sandstone with minor shale and laminite lenses. The sandstone forms benches, small cliffs, overhangs, floaters and steep topography. Exposed Hawkesbury Sandstone on ridgetops are the most common location for Aboriginal rock engravings. It forms a very shallow low phosphorous and nitrogen soil and has a very low water holding capacity leading to low sclerophyll scrub to low open woodland often with patches of impleaded drainage where hanging swamps and heathlands form in small patches. It makes up the majority of the vegetation in National Parks in Sydney including Garigal, Ku-ring-gai Chase and Royal NPs. It is the most common geology occurring in Ku-ring-gai Chase, Garigal, Royal and Blue Mountains NPs, and the shores of Sydney Harbour and Pittwater. It occurs on upper slopes, steep gullies, and thin soils.

The soil at a site will determine the water holding capacity, pH and nutrient levels Nitrogen, phosphorus, potassium and micronutrients that are available for plants. Different plant species are either advantaged or disadvantaged by different soil nutrients. The water holding capacity of different soils will affect the structure of the vegetation, with dry soils sustaining open woodlands and wet soils supporting tall, closed forest.

The erodibility of soils will impact the suitability of the site for construction, suitability for onsite sewage disposal and the likely impact from sedimentation during construction.

In the northern, eastern and southern parts of the Sydney basin, soils are derived directly from the underlying geology while in the Cumberland plain, along drainage lines or in dunes the soils are deep and highly variable in nutrients and pH.

Further description of the geology and soils can be found in the document Soil Landscapes of the Sydney 1:100 000 Sheet.[5]

The soil type and proximity of boundaries that have mapped at or near the locality of the site are shown in Figure 3.2.

The natural **soil landscape** of the site is mapped as:

[5] Chapman G.A. and Murphy C.L. (1989) Soil Landscapes of the Sydney 1:100,000 Sheet report, Soil Conservation Service of NSW, Sydney. https://datasets.seed.nsw.gov.au/dataset/soil-landscapes-of-the-sydney-1-100000-sheet557e2

Watagan Soil Landscape Group

The underlying soil of this site and the surrounding locality have been mapped as Watagan Soil Landscape which is thin and Colluvial (fallen down from above). The Landscape consists of "*rolling to very steep hills on fine-grained Narrabeen Group sediments. Local relief 60-120 m, slopes >25%. Narrow, convex crests and ridges, steep colluvial side slopes, occasional sandstone boulders and benches. Tall eucalypt open-forest with closed-forest (rainforest) in sheltered positions*". The Soils are "*shallow to deep (30-200 cm) Lithosols/Siliceous Sands (Uc1.24) and Yellow Podzolic Soils on sandstones; moderately deep (100-200 cm) Brown Podzolic Soils, Red and Gleyed Podzolic Soils (Dg2.21) on shales*". The limitations associate with the Watagan Soil Landscape Group are "*mass movement hazard, steep slopes, severe soil erosion hazard, occasional rock outcrop*". As such, land on this Soil Landscape Group is generally used for national parks and nature reserves, except for the Northern Beaches peninsular which has been largely cleared for urban residential purposes. This soil type is generally associated with tall eucalypt open-forest (wet sclerophyll) on drier and more exposed slopes and crests, and close-forest (rainforest) on sheltered slopes.

The geological classification was confirmed by observation during the site field survey.

The site inspection of the western part of the site contains characteristic Hawksbury sandstone. The soil is shallower towards the east of the site revealing some scattered sandstone boulders. The eastern end of the site includes Narrabeen group geology, and the very end consists of an alluvial deposit geology.

Based on field observation, soil depth on this site is shallow, ranging from 0-2metres.

No soil hazard features were identified at the site.

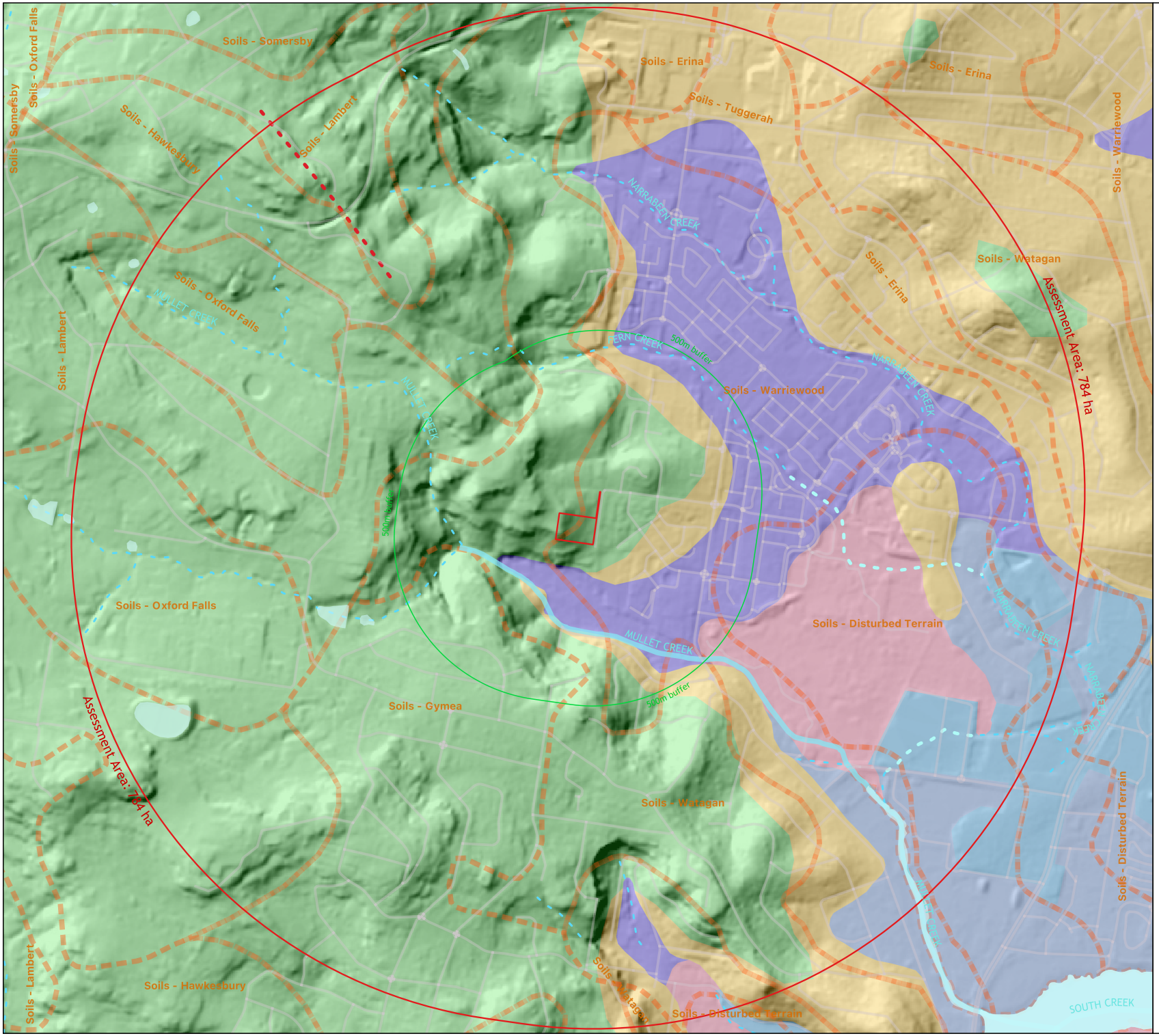
3.5.1 Areas of Geological Significance

The western side of the property is comprised of large sandstone outcroppings.

There are several sandstone boulders throughout the site.

There are no karsts, caves, crevices, cliffs or areas of geological significance on or adjacent to the site.

The impact to features of specific geological significance are assessed in the Prescribed Impact section of this report in Table 8.3.



Legend

113 Orchard St, Warriewood

- Study Site
- Assessment Area 1500m buffer
- 500m buffer for SAII 9.2
- Road
- Hydro Area Main
- Hydro Area

Drainage

- Watercourse Perennial
- Watercourse Non Perennial
- Connector Non Perennial

Geology and Soils

- Soil Landscapes of Syd Chapman, et,al., 2009 Ed.
- Geology Sydney100k Dykes

Geology 2.0 DPIE

- Alluvial deposits
- Coastal deposits
- Estuarine deposits
- Hawkesbury Sandstone
- Narrabeen Group
- Unnamed Anthropogenic deposits

Figure 3.2
Locality, Geology and Soils

GIS Environmental Consultants
Ph: (02) 9939 5129, Mobile: 0419 438 672
ecology@ecology.net.au, ecology.net.au

Date: 8/11/2024
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 200 400 m

3.6 Connectivity Features

3.1.3(5-6) and 3.2 BAM 2020

The patch size, shown in magenta outline, and the habitat connectivity, shown in blue outline, in Figure 3.6, for the site does not form part of an important wildlife corridor.

The proposed loss of habitat would not fragment the habitat as can be seen on the maps in Figures 2.2, 3.3, 3.5 and 3.6.

The Site is part of a wildlife corridor that is made of native trees, and good quality native habitat on the western side which connects to Heydon Reserve and Ingleside Park. Approximately 190 metres to the southwest is Mullet Creek which feeds into South Creek and Narrabeen Lagoon.

At a locality scale, the site is on the edge of a large patch of native bushland, in which the loss of trees would not fragment the habitat area.

The site does not form part of an important wildlife corridor but is the side of a large area of habitat.

The proximity to National Parks, Reserves, and remnant vegetation in the locality is shown on the maps in Figures 2.2, 3.3, 3.5 and 3.6.

3.7 Native Vegetation Cover in the Locality

The percentage cover of native woody and non-woody vegetation within the 1.5km buffer area around the site was determined and is shown on the map in Figure 3.6. The percent native vegetation cover is classified by using the most up to date native vegetation mapping in combination with interpretation of recent aerial photograph imagery.

Native vegetation cover is defined as the percentage of native vegetation cover on the Assessment Area (1500m buffer). Cover estimates are based on the cover of native woody and non-woody vegetation. Native vegetation cover includes regrowth, derived native grasslands and plantations that are comprised of plants native to New South Wales.

The maps on Figures 3.4 to 3.5 shows the vegetation types (ecological communities) in the locality that have been mapped at the regional scale. The Figure legend lists the vegetation types and their PCTs and the map shows their distribution in the locality and in relation to the site.

Extent of native vegetation in the Assessment Area (Figure 3.6)	
Assessment Area (ha)	784 ha
Area of mapped native vegetation (ha)	194 ha
% of area	24.75% (10-30%)
Class	b. 10-30%

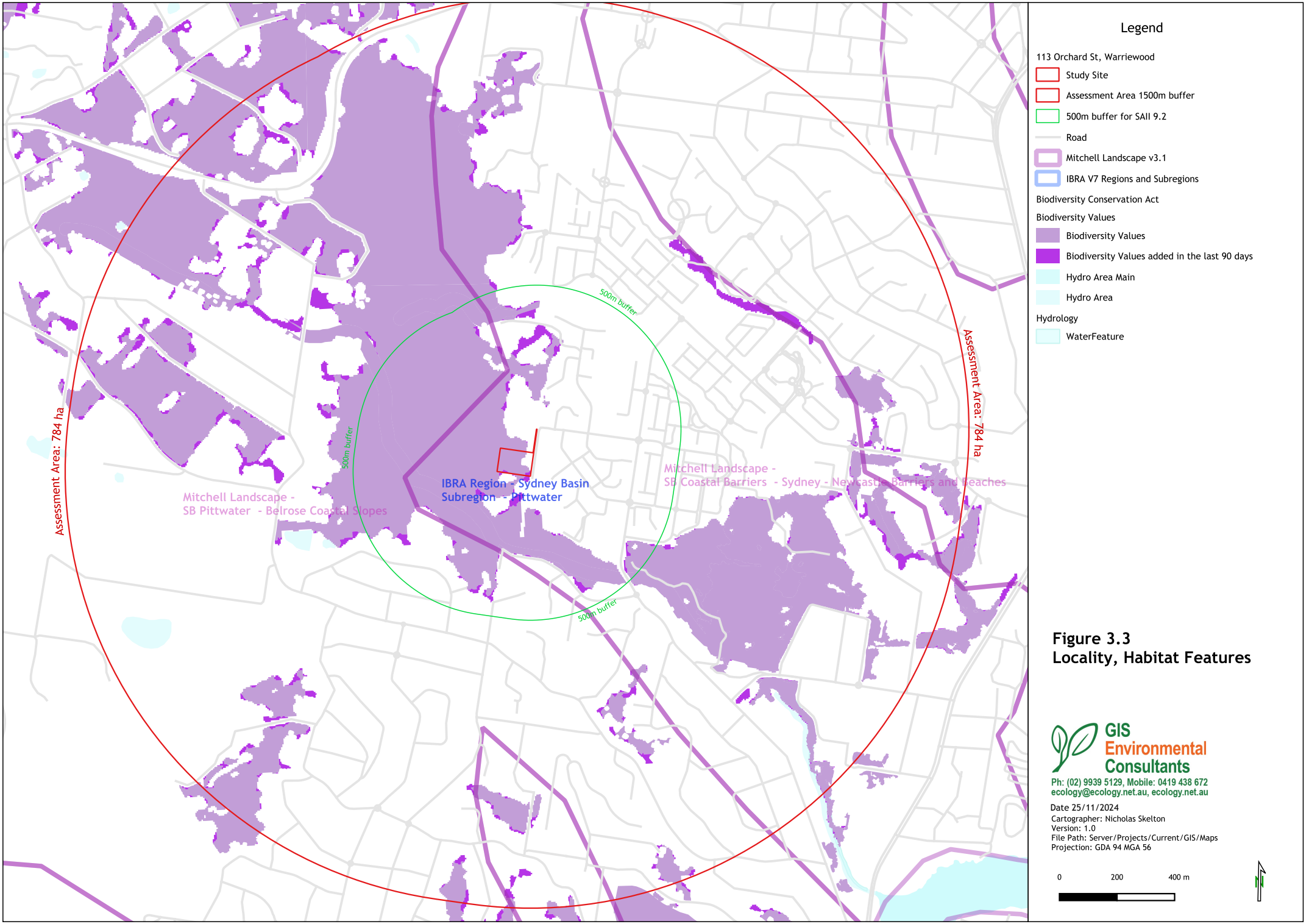
3.8 Areas of Outstanding Biodiversity Value

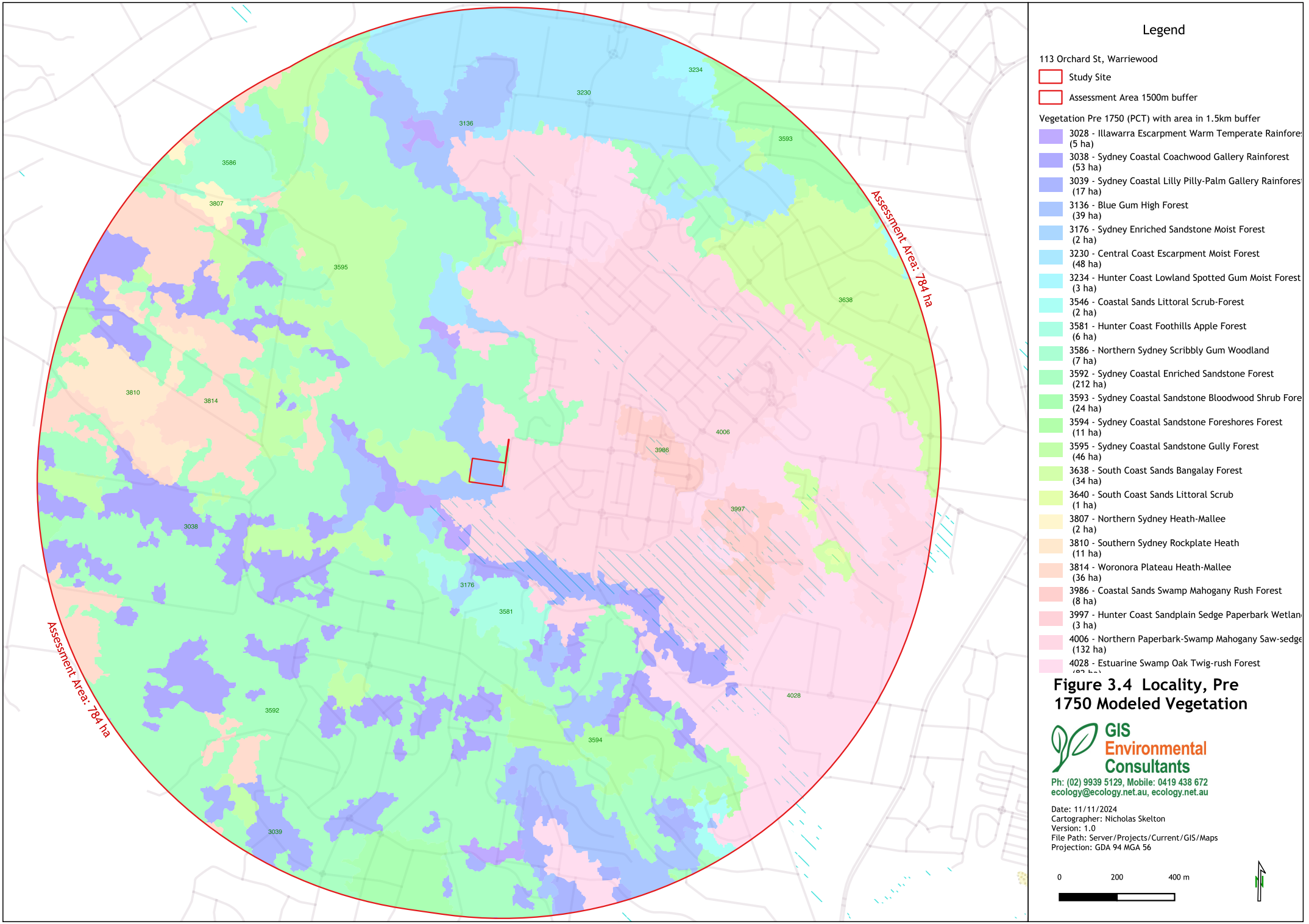
As described in 3.1.3(8-9) BAM 2020.

There are no areas of AOBV in this vicinity.

3.9 SEPP Resilience and Hazards SEPP 2021 Assessment

The site is not mapped as containing 'Littoral Rainforest', 'Coastal Wetland', 'Coastal Environment Area' and 'Coastal Use Area.


Legend
113 Orchard St, Warriewood
Study Site
Assessment Area 1500m buffer
500m buffer for SAII 9.2
Road
Mitchell Landscape v3.1
IBRA V7 Regions and Subregions
Biodiversity Conservation Act
Biodiversity Values
Biodiversity Values
Biodiversity Values added in the last 90 days
Hydro Area Main
Hydro Area
Hydrology
WaterFeature
Assessment Area: 784 ha
Assessment Area: 784 ha
500m buffer
500m buffer
500m buffer
IBRA Region - Sydney Basin
Subregion - - Pittwater
Mitchell Landscape -
SB Pittwater - Belrose Coastal Slopes
Mitchell Landscape -
SB Coastal Barriers - Sydney - Newcastle Barriers and Beaches
Figure 3.3
Locality, Habitat Features
GIS
Environmental
Consultants
Ph: (02) 9939 5129, Mobile: 0419 438 672
ecology@ecology.net.au, ecology.net.au
Date 25/11/2024
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56
0
200
400 m



Legend

113 Orchard St, Warriewood

- Study Site
- Assessment Area 1500m buffer

Vegetation Pre 1750 (PCT) with area in 1.5km buffer

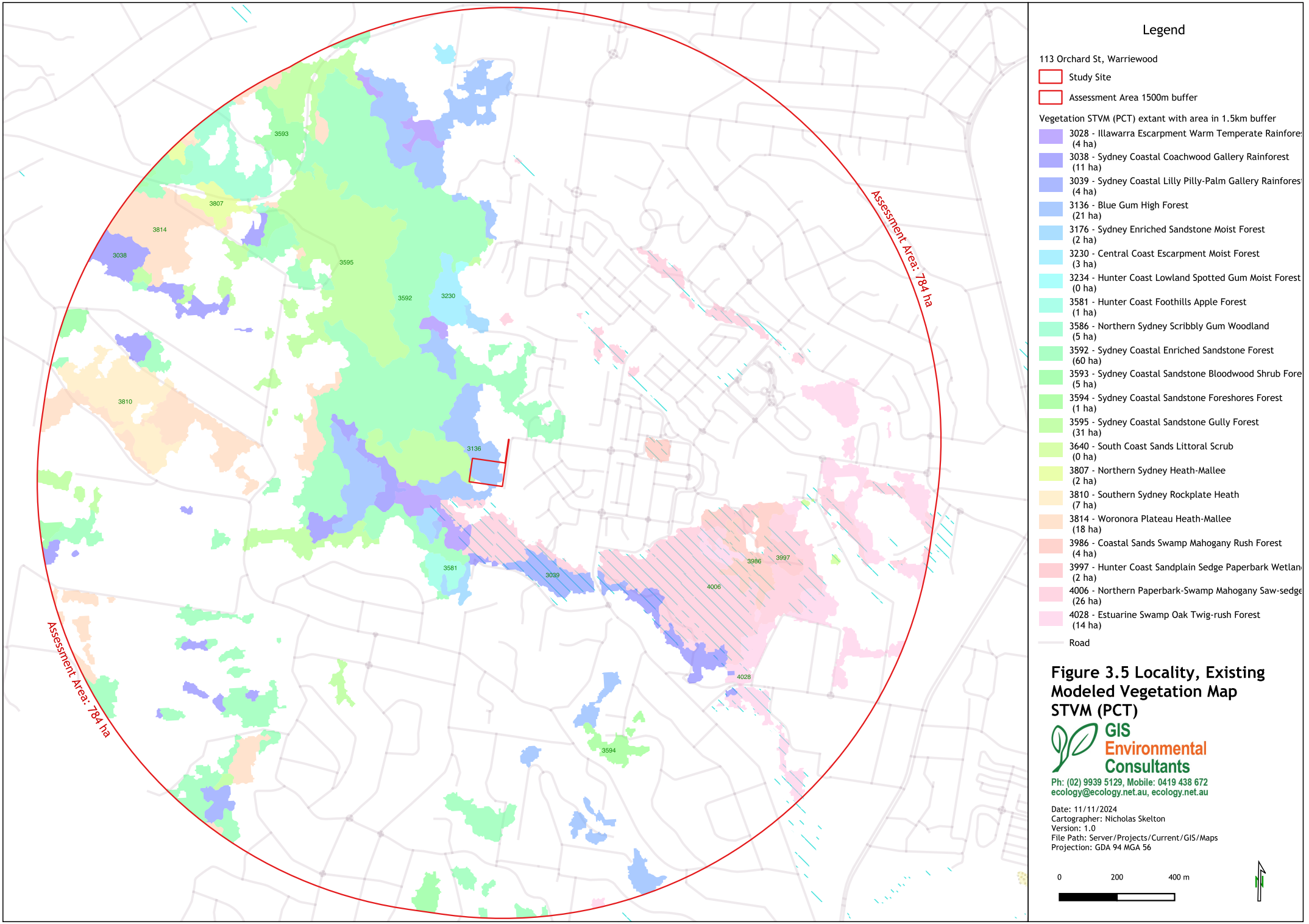
- 3028 - Illawarra Escarpment Warm Temperate Rainfores (5 ha)
- 3038 - Sydney Coastal Coachwood Gallery Rainforest (53 ha)
- 3039 - Sydney Coastal Lilly Pilly-Palm Gallery Rainfores (17 ha)
- 3136 - Blue Gum High Forest (39 ha)
- 3176 - Sydney Enriched Sandstone Moist Forest (2 ha)
- 3230 - Central Coast Escarpment Moist Forest (48 ha)
- 3234 - Hunter Coast Lowland Spotted Gum Moist Forest (3 ha)
- 3546 - Coastal Sands Littoral Scrub-Forest (2 ha)
- 3581 - Hunter Coast Foothills Apple Forest (6 ha)
- 3586 - Northern Sydney Scribbly Gum Woodland (7 ha)
- 3592 - Sydney Coastal Enriched Sandstone Forest (212 ha)
- 3593 - Sydney Coastal Sandstone Bloodwood Shrub Fore (24 ha)
- 3594 - Sydney Coastal Sandstone Foreshores Forest (11 ha)
- 3595 - Sydney Coastal Sandstone Gully Forest (46 ha)
- 3638 - South Coast Sands Bangalay Forest (34 ha)
- 3640 - South Coast Sands Littoral Scrub (1 ha)
- 3807 - Northern Sydney Heath-Mallee (2 ha)
- 3810 - Southern Sydney Rockplate Heath (11 ha)
- 3814 - Woronora Plateau Heath-Mallee (36 ha)
- 3986 - Coastal Sands Swamp Mahogany Rush Forest (8 ha)
- 3997 - Hunter Coast Sandplain Sedge Paperbark Wetlan (3 ha)
- 4006 - Northern Paperbark-Swamp Mahogany Saw-sedge (132 ha)
- 4028 - Estuarine Swamp Oak Twig-rush Forest

Figure 3.4 Locality, Pre 1750 Modeled Vegetation

GIS Environmental Consultants
Ph: (02) 9939 5129, Mobile: 0419 438 672
ecology@ecology.net.au, ecology.net.au

Date: 11/11/2024
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 200 400 m



Legend

113 Orchard St, Warriewood

- Study Site
- Assessment Area 1500m buffer

Vegetation STVM (PCT) extant with area in 1.5km buffer

- 3028 - Illawarra Escarpment Warm Temperate Rainfores (4 ha)
- 3038 - Sydney Coastal Coachwood Gallery Rainforest (11 ha)
- 3039 - Sydney Coastal Lilly Pilly-Palm Gallery Rainfores (4 ha)
- 3136 - Blue Gum High Forest (21 ha)
- 3176 - Sydney Enriched Sandstone Moist Forest (2 ha)
- 3230 - Central Coast Escarpment Moist Forest (3 ha)
- 3234 - Hunter Coast Lowland Spotted Gum Moist Forest (0 ha)
- 3581 - Hunter Coast Foothills Apple Forest (1 ha)
- 3586 - Northern Sydney Scribbly Gum Woodland (5 ha)
- 3592 - Sydney Coastal Enriched Sandstone Forest (60 ha)
- 3593 - Sydney Coastal Sandstone Bloodwood Shrub Fore (5 ha)
- 3594 - Sydney Coastal Sandstone Foreshores Forest (1 ha)
- 3595 - Sydney Coastal Sandstone Gully Forest (31 ha)
- 3640 - South Coast Sands Littoral Scrub (0 ha)
- 3807 - Northern Sydney Heath-Mallee (2 ha)
- 3810 - Southern Sydney Rockplate Heath (7 ha)
- 3814 - Woronora Plateau Heath-Mallee (18 ha)
- 3986 - Coastal Sands Swamp Mahogany Rush Forest (4 ha)
- 3997 - Hunter Coast Sandplain Sedge Paperbark Wetlan (2 ha)
- 4006 - Northern Paperbark-Swamp Mahogany Saw-sedge (26 ha)
- 4028 - Estuarine Swamp Oak Twig-rush Forest (14 ha)

Road

Figure 3.5 Locality, Existing Modeled Vegetation Map STVM (PCT)

GIS Environmental Consultants
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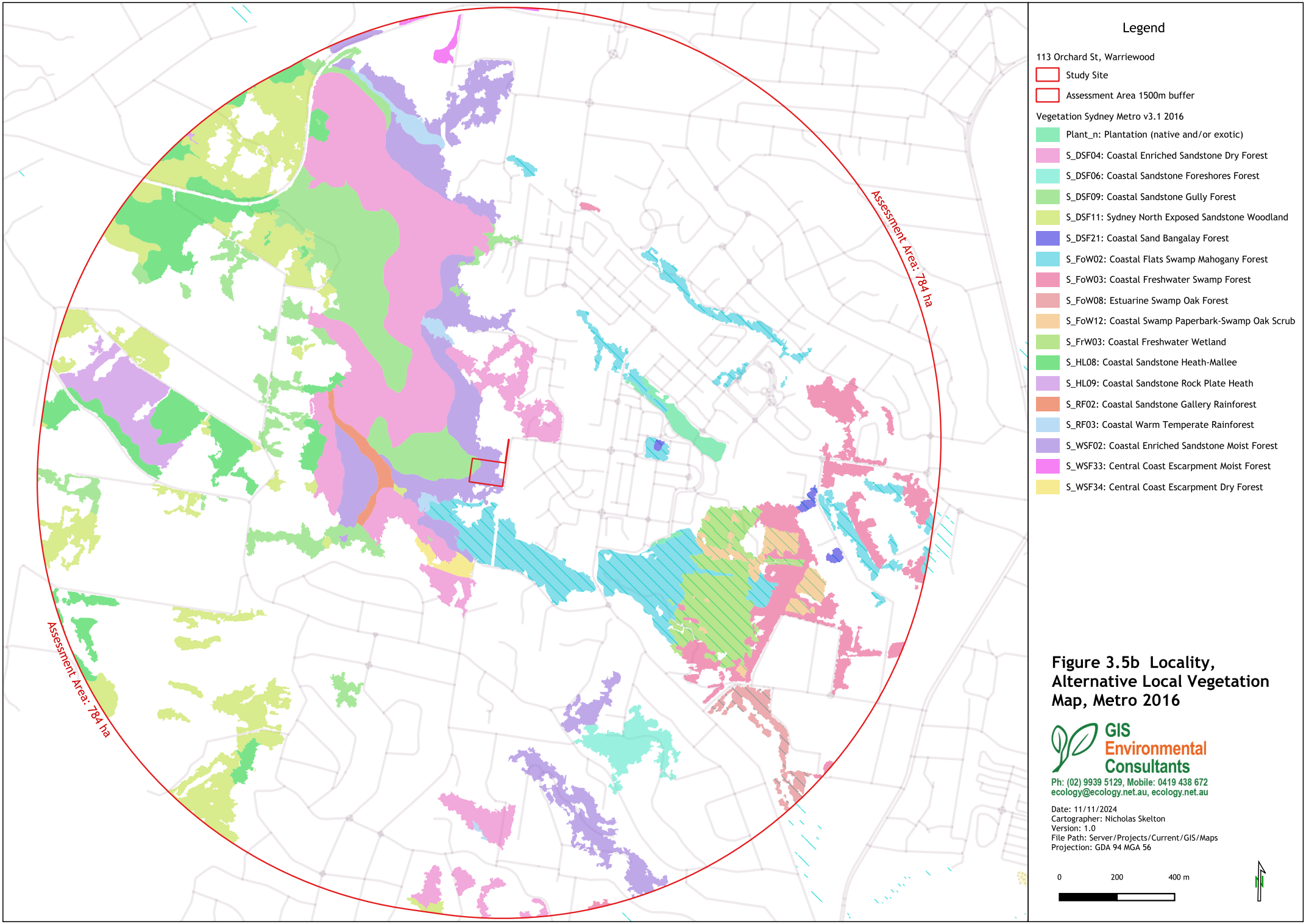
ecology@ecology.net.au, ecology.net.au

Date: 11/11/2024
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 200 400 m



Legend

113 Orchard St, Warriewood

- Study Site
- Assessment Area 1500m buffer

Vegetation Sydney Metro v3.1 2016

- Plant_n: Plantation (native and/or exotic)
- S_DSF04: Coastal Enriched Sandstone Dry Forest
- S_DSF06: Coastal Sandstone Foreshores Forest
- S_DSF09: Coastal Sandstone Gully Forest
- S_DSF11: Sydney North Exposed Sandstone Woodland
- S_DSF21: Coastal Sand Bangalay Forest
- S_FoW02: Coastal Flats Swamp Mahogany Forest
- S_FoW03: Coastal Freshwater Swamp Forest
- S_FoW08: Estuarine Swamp Oak Forest
- S_FoW12: Coastal Swamp Paperbark-Swamp Oak Scrub
- S_FrW03: Coastal Freshwater Wetland
- S_HL08: Coastal Sandstone Heath-Mallee
- S_HL09: Coastal Sandstone Rock Plate Heath
- S_RF02: Coastal Sandstone Gallery Rainforest
- S_RF03: Coastal Warm Temperate Rainforest
- S_WSF02: Coastal Enriched Sandstone Moist Forest
- S_WSF33: Central Coast Escarpment Moist Forest
- S_WSF34: Central Coast Escarpment Dry Forest

Figure 3.5b Locality, Alternative Local Vegetation Map, Metro 2016

GIS Environmental Consultants
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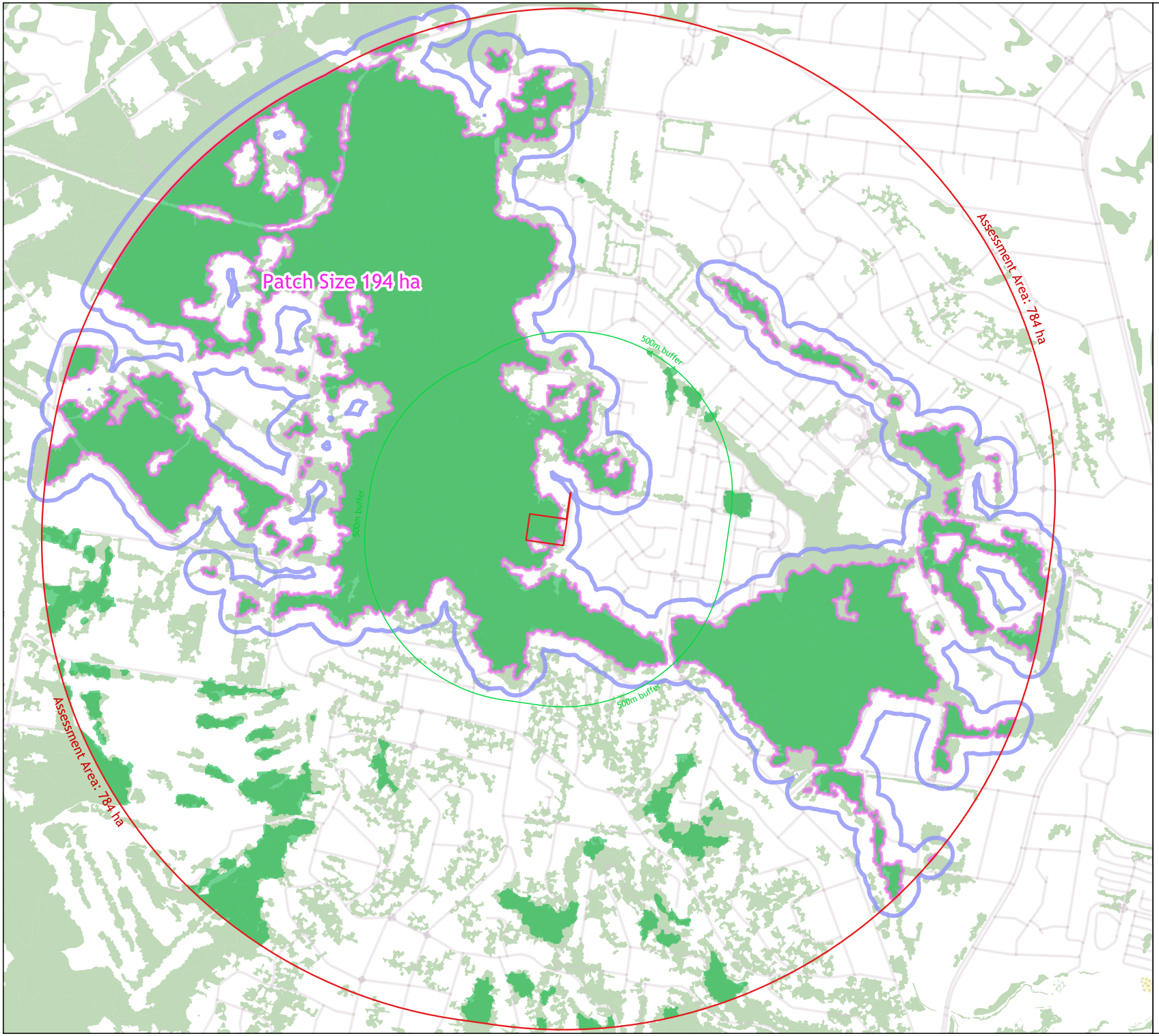
ecology@ecology.net.au, ecology.net.au

Date: 11/11/2024
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 200 400 m



Legend

113 Orchard St, Warriewood

- Study Site
- 500m buffer for SAII 9.2
- Assessment Area 1500m buffer
- Habitat Patch
- Habitat Connectivity STVM
- Native Vegetation in Assessment Area STVM
- Road

Hydrology Features

Reefs and Mangroves

- Sand

Esturine Features Islands

- Sand

Esturine Features

- Sand
- Other Vegetation Habitat

Figure 3.6 Locality, Habitat Connectivity and Patch Size

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Date: 11/11/2024
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 200 400 m

4 Native Vegetation

As described in Chapter 4 and Appendices A and H of the BAM 2020.

4.1 Native Vegetation Extent on the Site

The aerial photograph and polygons on Figure 2.4(a) show the location and extent of native vegetation and PCT in and adjacent to the site.

4.2 Disturbance History

Clearing

Clearing on this property is of 3 types:

1. There is no evidence of disturbance in the western end of the property that is mapped as PCT 3032. The location and extent of this area is shown on the map in Figure 4.2.
2. The central part of the site that is mapped as VZ1 in the map in Figure 4.2 has had minor disturbance by slashing of the shrub layer for bushfire protection.
3. The lower part of the site where the existing house, exotic mown lawn, planted exotic and native trees and driveway is nearly totally cleared of native vegetation.

4.2.1 Fire History

This site shows signs of not having been burnt within the last approximately 30 years. Fire history records from NPWS were checked and they do not show any fires on this site.

Photo Page 1 – Site Features

Photo 1. General site view, southwestern side looking east

Photo 2. General site view, northeastern side looking southeast

Photo 3. Western side of site, looking west. Sandstone boulders

Photo 4. Large fallen log on site

Photo 5. Sugar Glider in tree hollow (PP3, Photo 1)

Photo 6. Sugar Glider on tree observed entering hollow

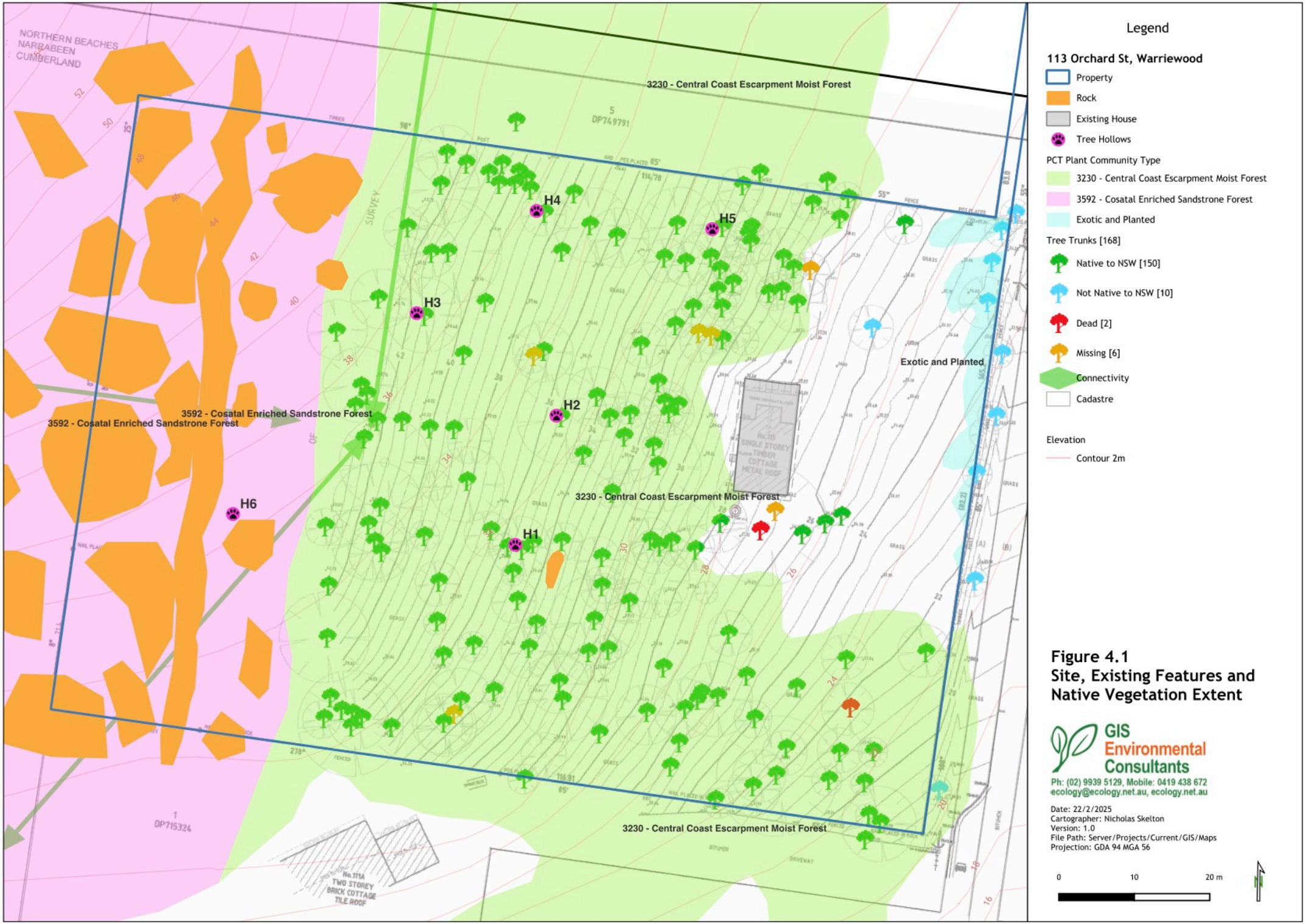

Figure 4.1
Site, Existing Features and Native Vegetation Extent

GIS Environmental Consultants
Ph: (02) 9939 5129, Mobile: 0419 438 672
ecology@ecology.net.au, ecology.net.au

Date: 22/2/2025
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 10 20 m

4.3 Plant Species (Floristics)

The plant species (native and non-native) that occur on a site is fundamental in determining the vegetation type (PCT) and in combination with condition determines the habitat value of each part of the site.

Table 4.1 lists the plant species that were recorded in the study site along with their:

- scientific name (Genus and Species);
- common name;
- family;
- Growth Form;
- Legal status;
- Projected foliage cover (native and in the plot only) and
- location in the study site.

The species are listed in alphabetical order by genus and species, and are grouped according to where they occur within the site.

The composition (Species Richness, Floristics) is summarised in Table 4.1b, for each plot and growth form.

The native vegetation structure is summarised for each plot Table 4.1c by growth form.

Table 4.1a summarises plants found on the site classified by status into the following categories:

- **BC Act Threatened** – determined as Vulnerable, Endangered, Critically Endangered and Presumed Extinct under the BC Act 2016
- **Native to NSW (non-Threatened)** – as per Flora of NSW
- **Planted Native** – as per the BAM Appendix D
- **Planted Non-native** – Landscape or horticultural plants
- **Weed Other** – Non-native plants that are not Priority Weeds or Planted*
- **Weed Regional Syd Priority** – Greater Sydney Regional Strategic Weed Management Plan 2023-2027
- **Weed Reg Syd & State Priority** – see both categories above*
- **Weed State Priority** – Biosecurity Act 2015 or Biosecurity Regulation 2017*

* May contain High Threat Weeds BC Act, only relevant for BSAR assessments.

During the field survey, there were 55 plants species identified in Plot 1, 46 of these are native species, 1 is a planted non-native species, none are Priority Weeds (Biosecurity Act 2015), and 8 are other weeds. There was an additional 6 native and 2 weed species recorded elsewhere on the site. This high number of native species and relatively low number of weeds reflects the low disturbance history and disturbance of the site. There is no shrub layer across most of the site. Most native plants are forb or tree species. There is an unusually high number (11) of tree species within the 400sqm plot. There are no obvious changes to soil nutrients or moisture levels and the soil is the original soil.

Table 4.1. Plant Species List

with summaries of Status, Floristics (Composition) and Cover (Structure, Relative Abundan

113 Orchard St, Warriewood

6 November 2024

Botanist, Nicholas Skelton, GIS Environmental Consultants

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Table 4.1a. Ecological Status (legal, conservation) Species Summary

Number of Plant Species in each Plot, summariseed by legal status and conservation importance

	BC Act Threatened	Native to NSW (non Threatened)	Planted Non Native	Weed Other	Weed Regional Syd Priority	Weed State Priority	Total
VZ1 Plot 1		46	1	8			55
Additonal Outside Plots		6	0	1	1		8
Total	0	52	1	9	1	0	63

Table 4.1b. Native Plant Species Composition (Species Richness, Floristics) Summary

Native Species Richness in each Vegetation Zone, inside and outside plots, summarised by Growth Form

	Fern (EG)	Grass & Grass Like (GG)	Forb (FG)	Shrub (SG)	Tree (TG)	Other (OG)	Total
VZ1 Plot 1	2	4	17	2	11	10	46
Additonal Outside Plots	2	0	2	0	2	2	8
Total	4	4	19	2	13	12	54

Table 4.1c. Native Vegetation Structure Summary (Projected Foliage Cover)

Projected Native Foliage Cover % in each Vegetation Zone, in plots, summarised by Growth Form

	Fern (EG)	Grass & Grass Like (GG)	Forb (FG)	Shrub (SG)	Tree (TG)	Other (OG)
VZ1 Plot 1	0.15	3.9	4.6	0.5	90.2	1.5

Table 4.1d. Non-Native (Weeds, Exotics) Composition (Species Richness, Floristics) Summary

Weed Species Richness in each Vegetation Zone, inside and outside plots, summarised by Growth Form

	Fern (EG)	Grass & Grass Like (GG)	Forb (FG)	Shrub (SG)	Tree (TG)	Other (OG)	Total
VZ1 Plot 1		2	3	3			8
Additonal Outside Plots			1		1		2
Total	0	2	4	3	1	0	10

Table 4.1e. Plant Species List

Part of Site	% PFC	Genus and Species	Family	Common Name	Growth Form	Status
Plot 1 VZ1	0.1	Adiantum aethiopicum	ADIANTACEAE	Maidenhair Fern	Fern	Native to NSW
Plot 1 VZ1	2	Allocasuarina torulosa	CASUARINACEAE	Forest She-oak	Tree	Native to NSW
Plot 1 VZ1	6	Angophora bakeri	MYRTACEAE	Rough-barked Angophora	Tree	Native to NSW
Plot 1 VZ1	4	Angophora costata	MYRTACEAE	Smooth-barked Apple	Tree	Native to NSW
Plot 1 VZ1	0.05	Banksia integrifolia subsp. integrifolia	PROTEACEAE	Coastal Banksia	Tree	Native to NSW
Plot 1 VZ1	0.2	Billardiera scandens	PITTOSPORACEAE	Apple Berry, Dumplings	Vine	Native to NSW
Plot 1 VZ1	0.3	Breynia oblongifolia	EUPHORBIACEAE	Breynia	Shrub	Native to NSW
Plot 1 VZ1	0.2	Cayratia clematidea	VITACEAE	Slender Grape	Vine	Native to NSW
Plot 1 VZ1	1	Corymbia gummifera	MYRTACEAE	Bloodwood	Tree	Native to NSW
Plot 1 VZ1	0.3	Dianella caerulea var. producta	PHORMIACEAE	Blue Flax Lily (Taller)	Herb	Native to NSW
Plot 1 VZ1	0.05	Dipodium punctatum	ORCHIDACEAE	Hyacinth Orchid	Herb	Native to NSW
Plot 1 VZ1	0.2	Dodonaea triquetra	SAPINDACEAE	Hop Bush	Shrub	Native to NSW
Plot 1 VZ1	0.1	Entolasia stricta	POACEAE	Wiry Panic	Grass	Native to NSW
Plot 1 VZ1	7	Eucalyptus botryoides	MYRTACEAE	Bangalay	Tree	Native to NSW
Plot 1 VZ1	28	Eucalyptus piperita	MYRTACEAE	Sydney Peppermint	Tree	Native to NSW
Plot 1 VZ1	0.1	Eustrephus latifolius	LUZURIAGACEAE	Wombat Berry	Vine	Native to NSW
Plot 1 VZ1	0.1	Geitonoplesium cymosum	LUZURIAGACEAE	Scrambling Lily	Vine	Native to NSW
Plot 1 VZ1	0.05	Glochidion ferdinandi var. ferdinandi	EUPHORBIACEAE	Cheese Tree	Tree	Native to NSW
Plot 1 VZ1	0.1	Glycine tabacina	FABACEAE	Love Creeper	Vine	Native to NSW
Plot 1 VZ1	0.1	Hibbertia scandens	DILLENIACEAE	Golden Guinea Flower	Vine	Native to NSW
Plot 1 VZ1	2	Hydrocotyle peduncularis	APIACEAE		Herb	Native to NSW
Plot 1 VZ1	3	Imperata cylindrica	POACEAE	Blady Grass	Grass	Native to NSW

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Plot 1 VZ1	1	Corymbia gummifera	MYRTACEAE	Bloodwood	Tree	Native to NSW
Plot 1 VZ1	0.2	Kennedia rubicunda	FABACEAE	Dusky Coral-pea	Vine	Native to NSW
Plot 1 VZ1	0.1	Lomandra gracilis	LOMANDRACEAE	Mat-rush	Herb	Native to NSW
Plot 1 VZ1	0.5	Lomandra longifolia	LOMANDRACEAE	Spiny-headed Mat-rush	Herb	Native to NSW
Plot 1 VZ1	0.05	Micrantheum hexandrum	EUPHORBIACEAE	Micrantheum	Herb	Native to NSW
Plot 1 VZ1	0.05	Olearia tomentosa	ASTERACEAE	Daisy-bush	Herb	Native to NSW
Plot 1 VZ1	0.3	Oplismenus aemulus	POACEAE	Basket Grass	Grass	Native to NSW
Plot 1 VZ1	0.1	Ozothamnus diosmifolius	ASTERACEAE		Herb	Native to NSW
Plot 1 VZ1	0.05	Pandorea pandorana	BIGNONIACEAE	Wonga Wonga Vine	Vine	Native to NSW
Plot 1 VZ1	0.1	Pomax umbellata	RUBIACEAE	Pomax	Herb	Native to NSW
Plot 1 VZ1	0.05	Poranthera microphylla	EUPHORBIACEAE		Herb	Native to NSW
Plot 1 VZ1	0.05	Pratia purpurascens	LOBELIACEAE	White Root	Herb	Native to NSW
Plot 1 VZ1	0.05	Pseuderanthemum variabile	ACANTHACEAE	Pastel Flower	Herb	Native to NSW
Plot 1 VZ1	0.05	Pteridium esculentum	DENNSTAEDTIACEAE	Bracken	Fern	Native to NSW
Plot 1 VZ1	0.05	Rapanea howittiana	MYRSINACEAE	Brush Muttonwood	Tree	Native to NSW
Plot 1 VZ1	0.7	Schelhammera undulata	UVULARIACEAE	Lilac Lily	Herb	Native to NSW
Plot 1 VZ1	0.05	Sigesbeckia orientalis	ASTERACEAE		Herb	Native to NSW
Plot 1 VZ1	0.4	Stephania japonica var. discolor	VITACEAE	Slender Grape	Vine	Native to NSW
Plot 1 VZ1	42	Syncarpia glomulifera	MYRTACEAE	Turpentine	Tree	Native to NSW
Plot 1 VZ1	0.5	Themeda triandra	POACEAE	Kangaroo Grass	Grass	Native to NSW
Plot 1 VZ1	0.05	Thysanotus tuberosus	ANTHERICACEAE		Herb	Native to NSW
Plot 1 VZ1	0.4	Viola hederacea	VIOLACEAE	Native Violet	Herb	Native to NSW
Plot 1 VZ1	0.05	Xanthosia tridentata	APIACEAE	Rock Xanthosia	Herb	Native to NSW
Plot 1 VZ1	0.05	Cordyline australis	LILIACEAE	New Zealand Cordyline	Tree	Native to NSW
Plot 1 VZ1	0.05	Livistona australis	ARECACEAE	Cabbage Tree Palm	Palm	Native to NSW
Plot 1 VZ1	0.05	Synoum glandulosum	MELIACEAE	Scentless Rosewood	Tree	Native to NSW
Plot 1 VZ1		Bidens pilosa	ASTERACEAE	Cobbler's Pegs, Pitchforks	Herb	Weed
Plot 1 VZ1		Briza maxima	POACEAE	Quaking Grass	Grass	Weed
Plot 1 VZ1		Conyza bonariensis	ASTERACEAE	Fleabane	Shrub	Weed
Plot 1 VZ1		Lilium formosanum	LILIACEAE	Formosan Lily	Herb	Weed
Plot 1 VZ1		Ochna serrulata	OCHNACEAE	Ochna, Mickey Mouse Plant	Shrub	Weed
Plot 1 VZ1		Setaria palmifolia	POACEAE	Palm Grass	Grass	Weed
Plot 1 VZ1		Solanum mauritianum	SOLANACEAE	Wild Tabacco Tree	Shrub	Weed
Plot 1 VZ1		Taraxacum officinale	ASTERACEAE	Dandelion	Herb	Weed
Rest of Site		Asplenium australasicum	ASPLENIACEAE	Birds Nest Fern	Fern	Native to NSW
Rest of Site		Calochlaena dubia	DICKSONIACEAE	Soft Bracken	Fern	Native to NSW
Rest of Site		Parsonsia straminea	APOCYNACEAE	Monkey Rope	Vine	Native to NSW
Rest of Site		Stellaria flaccida	CARYOPHYLLACEAE		Herb	Native to NSW
Rest of Site		Xanthorrhoea australis	XANTHORRHOEACEAE	Grass Tree	Grass Tree	Native to NSW
Rest of Site		Eucalyptus umbra	MYRTACEAE	Bastard Mahogany	Tree	Native to NSW
Rest of Site		Senna coluteoides var. glabrata	FABACEAE	Senna	Tree	Weed
Rest of Site		Ageratina adenophora	ASTERACEAE	Crofton Weed	Herb	Weed W3

4.3.1 Native Plants on the Study Site

There are an estimated 24,000 native terrestrial plant species in Australia, and 4677 species in NSW. Of the 4677 native NSW terrestrial plant species, 658 have been declared Threatened plant species by the Threatened Species Scientific Committee and these are listed in Schedule 1 of the Biodiversity Conservation Act 2016. The native and naturalised plants in NSW are classified and described by the Royal Botanic Gardens of NSW and are provided as the website PlantNET (https://plantnet.rbgsyd.nsw.gov.au/floraonline.htm) which also provides a key for identification of species. This database is regularly kept up to date with the BAM-C.

The species richness of the native species found on site is summarised by growth forms in Table 4.1b. The native species on the site reflect the moderate nutrient soil levels and high rainfall in the locality. The main native vegetation on the site are the native tree species, dominated by *Syncarpia glomulifera* and *Eucalyptus piperita*, with several *Eucalyptus botryoides, Angophora costata* and *Angophora bakeri* trees present. Many species of native forbs were also present across the site. Trees provide foraging and roosting habitat for native birds and habitat for arboreal native animals, such as microbats and gliders, and are potential foraging habitat for several Threatened species.

4.3.2 Weeds and Planted Species

The word 'weed' is a general term for plants growing where they are not wanted. Under the *Biosecurity Act 2015*,[6] the definition of 'weed' is a plant that is a pest, and the definition of a 'pest' is a plant or animal (other than a human) that has an adverse effect on, or is suspected of having an adverse effect on, the environment, the economy or the community.

At the Commonwealth level, Weeds of National Significance (WoNS) are agreed by Australian governments. They are recognised as priority current and future biosecurity threats as they are causing major economic, environmental and/or social impacts. The Australian Weeds Strategy (AWS) 2017-2027 developed by the Invasive Plants and Animals Committee (IPAC)[7] describes the national management approach to weeds, including WoNS. In the past, 32 weeds have been identified as WoNS. However, a new list of WoNS is being developed. When this list is released, these species will require consideration and are likely to be already included in the State Priority Weeds. The WONS/WINS will be selected using the National Established Weed Priorities (NEWP) framework.[8]

Many Councils also identify environmental weeds that reduce the value of biodiversity and habitat. Weeds produce allergenic substances, some of which are toxic to people or stock, and are known to cause rashes, allergies, hay fever, asthma, hives or poisoning. The sight of weeds also decreases the perception of a property's value. Landowners are required by the Biosecurity Act to control weeds on their land.

The weeds on this site are listed in Table 2 along with their status. Priority Weeds on this site and the required management (Biosecurity Act, and Greater Sydney Regional Strategic Weed Management Plan) are described in the Table 3 in Section 6.3.3.

The species richness of the weed species found on site is summarised by growth forms in Table 4.1b. The low number of weeds reflects the history of shrub clearing and use on this site.

[6] NSW Parliament, Biosecurity Act 2015 https://legislation.nsw.gov.au/view/html/inforce/current/act-2015-024

[7] Invasive Plants and Animals Committee (2016) Australian Weeds Strategy 2017-2027, Australian Government https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/pests-diseases-weeds/consultation/aws-final.pdf

[8] Weeds Working Group of the Environment and Invasives Committee (2023) National Established Weed Priorities Framework https://www.agriculture.gov.au/sites/default/files/documents/newp-framework.pdf

4.3.3 Priority Weeds

The 'Greater Sydney Regional Strategic Weed Management Plan 2023-2027' (GSRSWMP)[9] lists State Priority Weeds and Regional Priority Weeds in the Sydney Metropolitan area. The GSRSWMP groups Priority Weeds into the following categories:

- State Priority weeds
  - Prevention
  - Eradication
  - Eradication and/or Containment
  - Containment and/or Asset Protection

- Regional Priority weeds
  - Prevention
  - Eradication
  - Containment
  - Asset Protection

There is also a Local Priority Weed Management Plan 2021-2026 by Northern Beaches Council[10] which lists Local Priority Weeds.

Priority weed species are divided into three categories:

1. State priority weeds
2. Regional priority weeds
3. Local priority weeds

State priority weeds pose a high biosecurity risk to the entire state. Mandatory measures for their management are identified in the Biosecurity Act 2015 and Biosecurity Regulation 2017. Regional priority weeds pose a high biosecurity risk to a particular part of NSW. These are identified in the regional strategic weed management plan. Regional priority weed species for Greater Sydney are listed in Appendix 1 of the GSRSWMP. Local priority weeds pose a biosecurity risk in some situations and have been identified for management by a local council.

All land managers have a General Biosecurity Duty to appropriately manage weeds. Refer to Section 1.3.4 of this report for further detail.

The Priority Weeds listed in Table 4.2 below were found on this site.

Table 4.2 Priority Weeds

NSW State Priority Weeds and Greater Sydney Regional Priority Weeds occurring on the Site and require management

Common Name	Scientific Name	Biosecurity Act Requirements
Greater Sydney Regional Priority Weeds - Containment and/or Asset Protection		
Asparagus Weeds	*Asparagus aethiopicus*, *A. africanus*, *A. asparagoides* including the Western Cape form, *A. densiflorus*, *A. plumosus*, and *A. scandens*	Mandatory Measure: A person must not import into the State or sell. As a Weed of National Significance, their further spread through trade should be minimised to protect priority assets.

4.3.4 High Threat Exotic Weeds

High threat weed species only need to be considered in the case of a Stewardship Site.

[9] Greater Sydney Regional Weed Committee (2022) Greater Sydney Regional Strategic Weed Management Plan 2023-2027, Local Land Services, NSW Government. https://www.lls.nsw.gov.au/help-and-advice/weeds-and-plant-diseases/regional-strategic-weed-management-plans

[10] Northern Beaches Council (2021) Local Priority Weed Management Plan 2021-2026. https://files-preprod-d9.northernbeaches.nsw.gov.au/nbc-prod-files/documents/general-information/weed-management/northernbeachescouncillocalpriorityweedmanagementplan.PDF?1710732250

4.4 Identification of Plant Community Types PCT and EECs

Plant Community Types (PCT) are widely used to support biodiversity assessment, conservation planning and land management activities. It is important to distinguish PCTs from Endangered Ecological Communities that are defined by the BC Act Scientific Committee in the Schedules of the Biodiversity Conservation Act and are the legally identified threatened entity. PCT are groupings that are generated by a multi-factorial analysis (PCA Principal Component Analysis) of plot-based plant species data that are linked to broad environmental landscape characteristics such as temperature, rainfall and altitude. PCTs are dynamic and reassessed on an annual basis as new data becomes available, there are currently approximately 1,800 PCTs that each has a unique name and number. Plant community types (PCTs) are the finest level in the **NSW vegetation classification hierarchy**. PCTs are described (characterised) by the frequently co-occurring plant species. Plant community types play a central role in the NSW Biodiversity Offsets Scheme. Assessments of biodiversity values hinge on the identification of PCTs when using the Biodiversity Assessment Method.

The State Vegetation Type Map uses the PCT classification to identify polygons that appear to be the same vegetation by a combination of computer and human image analysis. The PCT system often does not relate well to historic traditional vegetation classifications and mapping.

There is a degree of correlation (Association) between the vegetation description systems, however, the relationship is sometimes many to one or one to many or only parts of some PCT.

Plant community types are defined and mapped across New South Wales.

The vegetation types (Endangered Ecological Community and Plant Community Type PCT) that occur on the site were determined by using a combination of techniques including the:

- Considering the physical characteristics of the site such as geology, soils, topography, Hydrology (moisture) that are determine the species and abundance of plant that occur and the type of habitat
- Vegetation characteristics such as structure and floristics
- Vegetation Information System (VIS) online tool,
- Plot2PCT online tool,
- BioNet PCT descriptions,
- State Vegetation Type Map (SVTM) mapping,
- historic regional scale mapping,
- Final Determinations of Threatened Ecological Communities (from the schedules of the BC Act),
- historic vegetation classifications and
- expert ecologist experience and knowledge of the vegetation in the Sydney region over the past 30 years.

The following 5-step process was used was used, by the experienced Principal Botanist Nicholas Skelton, to determine the best fit Plant Community Types (PCTs) that occur on the Site. The method created a list of candidate Plant Community Types then narrowed the list to determine the best fit PCT and if any Endangered Ecological Community occurs on the site.

based on a wide range of characteristics and determinants including:.

4.4.1 Method Used

Step 1. Application of the DPIE/EES Vegetation Information System (VIS)

https://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx

Classification using IBRA region, Keith (2004) vegetation formation and/or class, vegetative structure and dominant species to contribute to a short list and provide an indication of the more likely of the candidates.

Step 2. Application of the Plot to PCT Assignment Tool

Further candidates and indications of likelihood were provided by floristics data from the site surveys was collated and uploaded to the Eastern NSW Plot to PCT Assignment Tool.[11] The tool uses standard floristic survey methods (Plot) data that was collected during the field survey. Centroid matching determines how floristically related each uploaded plot data is to the set of reference quantitative

[11] DCCEW & UNSW 2024, Eastern NSW Plot to PCT Assignment Tool https://bionet.shinyapps.io/vegplot/

PCTs, based on the species present and their cover-abundance scores. The PCA distance scores of the closest PCTs are summarised below.

Step 3. Spatial (GIS) analysis

The maps in Figures 3.3, 3.4 and 3.5 show the location and abundance of vegetation communities that have been mapped at a regional scale. The BAM requires spatial analysis using the best available mapped data including, but not limited to, vegetation mapping, topography, hydraulic features and soils. Environmental habitat features that drive vegetation patterns such as soil type, topography, and drainage are shown on the map in Figure 3.1 and 3.2. Vegetation mapping has inherent errors such as classification accuracy which is limited due to the amount of field verification that was carried out when they were made, the spatial accuracy of the mapping, and how old the mapping is. There are often different classification interpretations and the newest is not necessarily the best. These maps are based on aerial photography and normally little local field verification. These regional scale vegetation maps do not provide a sufficient level of spatial accuracy for the assessment of the impact at the scale of this proposal but are useful in contributing candidate PCTs and ecological communities for consideration. Fieldwork is necessary to verify vegetation mapping.

Step 4. Classification using published references

Classification using positive diagnostic plant species, description of the environmental requirements and the recognised distribution from published studies.

Step 5. Correlation and Comparison to EEC determinations

There is no direct correlation between PCTs and listed (BC Act) Threatened Ecological Communities (Endangered or Critically Endangered). The NSW BC Act lists Threatened Ecological Communities (TECs) that are likely to become extinct in nature unless the circumstances and factors threatening their survival cease to operate. The similarity of the floristics on the site to the description of the Threatened Ecological Communities (TEC) in the Final Determinations (BC Act schedules) were assessed by correlation of the species found on the site with the listed characteristic species and comparison to the environmental descriptors in the relevant clauses determinations. Not all the sections of the determinations need to apply to the Study Area. The earlier clauses are more important and should be given more weight (Preston and Adams).

4.4.2 Assessment Results

The results of the 5-step process to determine the Plant (vegetation) Community Types (PCT) is described below.

Step 1. Application of the DPIE/EES Plot 2 PCT tool

Classification using IBRA region, Keith (2004) vegetation formation and/or class, vegetative structure and dominant species to make a candidate list.

Step 2. Application of the Plot to PCT Assignment Tool

The first 5 PCT outputs and their scores from the 'PCT Matching Results – Centroid Matches' and 'Characteristics Species Method' are listed in Table 4.3 and are evaluated against the information from the other steps of the assessment method.

Table 4.3 Candidate Ecological Communities For Vegetation Zone VZ1

PCT / Code	PCT Score / mapping location	PCT Name	Associated TEC if any	Match to site assessment
Plot2PCT Tool Matching Results - Centroid Matches				

3155	0.674	Illawarra North-Pittwater Bangalay Moist Forest	none	Good
3230	0.675	Central Coast Escarpment Moist Forest	none	Very Good
3234	0.68	Hunter Coast Lowland Spotted Gum Moist Forest	10634 - Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	Poor
3250	0.684	Northern Foothills Blackbutt Grassy Forest	none	Poor
3125	0.688	Illawarra Seacliff Banksia-Bangalay Forest	none	Poor
Plot2PCT Tool Characteristic Species Method Match Results				
3407	75	Central Headland Grassland	20042 - Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	Poor
3230	73	Central Coast Escarpment Moist Forest	none	Very Good
3250	71	Northern Foothills Blackbutt Grassy Forest	none	Poor
3620	70	Sydney Hinterland Turpentine Sheltered Forest	none	Poor
3155	69	Illawarra North-Pittwater Bangalay Moist Forest	none	Good
SVTM (PCT) Mapping				
3136	on site	Blue Gum High Forest	10094 -Blue Gum High Forest in the Sydney Basin Bioregion 10424 - Hygrocybeae Community of Lane Cove Bushland Park in the Sydney Basin Bioregion	Poor
3595	on site	Sydney Coastal Sandstone Gully Forest	none	Poor
3592	near site	Sydney Coastal Enriched Sandstone Forest		Good
4006	near site	Northern Paperbark-Swamp Mahogany Saw-sedge	10786 - Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Poor
3028	near site	Illawarra Escarpment Warm Temperate Rainforest	none	Poor
Metro 2016 Vegetation Mapping				
S_WSF02	on site	Coastal Enriched Sandstone Moist Forest	n/a	Good
S_DSF09	on site	Coastal Sandstone Gully Forest	n/a	n/a

S_DSF06	near site	Coastal Sandstone Foreshores Forest	n/a	n/a
S_DSF04	near site	Coastal Enriched Sandstone Dry Forest	n/a	n/a

Step 3. Spatial (GIS) analysis

The map in Figures 3.3 to 3.5 show the distribution and the amount of the vegetation types that have been mapped in the locality by previous regional studies. Environmental habitat features such as soil type, topography, and drainage are also shown on the maps in Figure 3.1 and 3.2.

Best Available Regional Scale Mapping Used

NSW State Vegetation Type Map (Pre-clearing) which shows the pre-1750 modelled vegetation. The extent and location of this native vegetation in relation to the site is shown on the map in Figure 3.4.

State Vegetation Type Map (SVTM) C2.0 M2.1 (2024). The extent and location of this native vegetation in relation to the site is shown on the map in Figure 3.5.

Native Vegetation of the Sydney Metropolitan Area V 3.1 (OEH 2016). The extent and location of this native vegetation in relation to the site is shown on the map in Figure 3.6.

Step 4. Classification using published references

The plant species and their relative abundances that were recorded in the plots are listed and summarised in table 4.1.

The Plot to PCT classification system is the main published classification system used.

The vegetation on the site is heavily disturbed, and comparing to a classification is likely to have a high level of uncertainty.

Negative Diagnostic Test NVSMA 2016 Classification the total number of native species are less than the required 42.

Step 5. Correlation and Comparison to EEC determinations

No TECs are similar to the vegetation on the site.

4.4.3 Description of the vegetation and its condition in the Development Area

The vegetation within the development area is predominantly an open forest with no shrub layer and a grass-dominated groundcover with some ferns and forbs. There is a mix of native and non-native ground cover species, no mid-story species, and mostly native tree cover. The mix of native tree species is difficult to fit to one PCT. The western end of the site is a different PCT, has little to no

disturbance, and contains large sandstone boulders and outcroppings. Several sandstone floaters and fallen logs exist throughout the middle area of the site.

4.4.4 Conclusion Regarding the Plant Community Types (PCT)

The best fit for the vegetation on the central part site is:

Central Coast Escarpment Moist Forest - PCT 3020 as described in the Eastern NSW PCT Classification version C2.0[12]. It sits on the middle and lower end of a steep slope facing east. The canopy is dominated by *Syncarpia glomulifera* and *Eucalyptus piperita*, with several *Eucalyptus botryoides*, *Angophora costata* and *Angophora bakeri* trees present. The soil is sandy and mostly shallow (0-2m) with sandstone floaters present across the site. The groundcover is dominated by native grass and sedge species, with ferns *Adiantum aethiopicum* (Maidanhair fern), *Pteridium esculentum* (Bracken) and *Calochlaena dubia* (Soft bracken) also present throughout the site.

Illawarra North-Pittwater Bangalay Moist Forest – PCT 3155 is the next best fit to this area of the site. Several characteristics share similarity, but forest height and confidence level in the PCT Assignment output lowered its suitability.

Sydney Enriched Sandstone Moist Forest – PCT 3176 was previously identified to be on this site and was also used in the assessment. Some characteristics share similarity but tree height, absence of *Eucalyptus piluarius*, and absence from any mapping or PCT Assignment output were some of the factors that lowered its suitability.

The very western side of the site outside the impact area and on higher land is Coastal Enriched Sandstone Forest, PCT 3592. It contains large sandstone boulders and outcroppings, and a different vegetation composition dominated by *Aongophora coastata*, *Corrymbia hummifera*, and *Eucalyptus pipertia* trees.

The vegetation on the site is mostly moderately-heavily disturbed. Most of the site has been cleared of all shrubs. Classifying the vegetation is likely to have a moderate level of uncertainty.

The BAM method requires that a PCT is allocated, and in heavily disturbed areas previous vegetation types are to be estimated in highly disturbed sites.

The location and extent of the Vegetation Community Types in the locality are shown on the maps in Figures 3.4 to 3.5b.

On this Development Footprint it is most likely that the vegetation on the site now, and in the past, is most correctly classified as
Central Coast Escarpment Moist Forest - PCT 3230

PCT ID: 3230
PCT Name: Central Coast Escarpment Moist Forest
Classification Confidence Level: High
Number of Primary Replicates: 62
Number of Secondary Replicates: 6

Vegetation Description: A tall to very tall sclerophyll open forest with a sparse mixed mesophyll and sclerophyll mid-stratum and a ground layer of ferns and grasses. This PCT occurs on Narrabeen sandstone slopes and escarpments of the lower Hawkesbury, Pittwater, Brisbane Waters and Watagan Ranges, Central Coast region. The tree canopy is variable in composition and no set of eucalypt species

[12] DCCEW, 2024, Eastern NSW Plot to PCT Assignment Tool https://bionet.shinyapps.io/vegplot/

is consistently recorded with a high cover. Angophora floribunda and Syncarpia glomulifera are common, however maybe a member of the upper canopy or as a small tree, sometimes both. There are a range of canopy species that also have high cover, however each occur no more than occasionally or rarely across the distribution of the PCT. These include Eucalyptus pilularis, Eucalyptus piperita, Eucalyptus saligna or Eucalyptus deanei, Eucalyptus paniculata, Angophora costata, Eucalyptus umbra or Eucalyptus punctata. A layer of small trees is almost always present and dominated by Allocasuarina torulosa, with a lower shrub layer very frequently including Persoonia linearis, commonly Breynia oblongifolia, occasionally with Platysace lanceolatus, Myrsine variabilis and Synoum glandulosum subsp. glandulosum. Occasionally there is a sparse cover of Livistona australis, typically with no more than one or two individuals. The ground layer is characterised by a high cover of ferns with Pteridium esculentum almost always present, commonly with a higher cover of Calochlaena dubia and occasionally Blechnum cartilagineum. Small mesic climbers are both diverse and very frequent including Eustrephus latifolius. Grasses also comprise a high proportion of the cover, very frequently including Imperata cylindrica and Entolasia stricta, commonly with Microlaena stipoides. Graminoids almost always include Dianella caerulea and very frequently Lomandra longifolia. This PCT is primarily found at low elevation Narrabeen escarpments and hills, commonly on lower slopes above the flooded Hawkesbury and Pittwater valleys. It occurs typically on sheltered to intermediate easterly aspects or rarely on crests of the main range east of Gosford and in the Watagan Range, both identified as residual Hawkesbury Sandstone, however this may only be a thin layer above the Narrabeen stratum. A geological outlier occurs on a volcanic dyke at West Head in Kuring-Gai National Park. On Narrabeen shales in the Central Coast-Pittwater districts it is replaced by moist forest PCT 3234 on sheltered aspects or dry grassy forest PCT 3437 on drier aspects.

Vegetation Formation: Wet Sclerophyll Forests (Grassy sub-formation)
Vegetation Class: Northern Hinterland Wet Sclerophyll Forests
IBRA Subregion(s): Pittwater; Wyong; Yengo

Minimum Elevation (m): 15.8
Maximum Elevation (m): 432.6
Median Elevation (m): 88.2
Minimum Annual Rainfall (mm): 907
Maximum Annual Rainfall (mm): 1353
Median Annual Rainfall (mm): 1197
Minimum Annual Mean Temperature (deg.C): 15.14
Maximum Annual Mean Temperature (deg.C): 17.33
Median Annual Mean Temperature (deg.C): 16.53
TEC Assessed: No associated TEC

4.4.5 Identification of All Threatened Ecological Communities TEC

As described in section 4.2.2 of the BAM 2020. Not just the dominant community.

There are no Threatened Ecological Communities present on this site.

4.4.6 Comparison to NSW Scientific Committee determination for Threatened Ecological Communities

There are no Threatened Ecological Communities present on this site.

4.4.7 Conclusion regarding presence of TEC in the Disturbance Area

There are no Threatened Ecological Communities present on this site.

4.4.8 Area of Each Vegetation Type PCT

This assessment is a Streamline – Small Area Assessment (See section 2.4) and therefore only the dominant vegetation type needs to be considered in the assessment unless there is a TEC. All TEC's need to be assessed and offset along with the dominant PCT in Small Area Assessments VIS Classification.

4.5 Vegetation Zones and Vegetation Integrity (vegetation condition)

The area of each PCT in the site is required to be divided into a Vegetation Zone where the vegetation is of different broad condition states such as disturbance to growth form groups tree, shrub and ground cover or density of exotics. Each Vegetation Zone must be assessed and documented by a BAM plot.

Justification of Vegetation Zones:

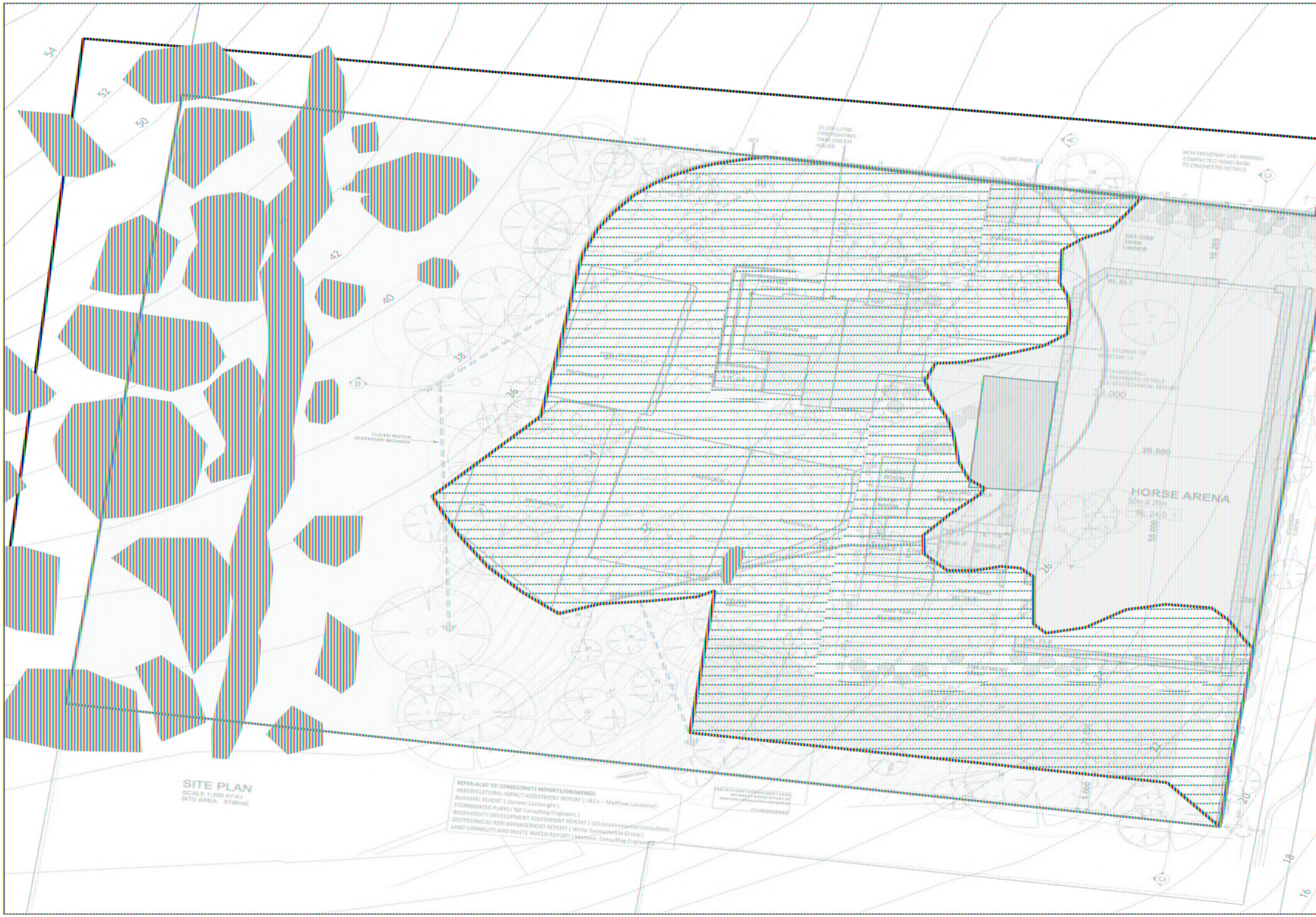
Disturbance on this property is of 3 types:

1. There is no evidence of disturbance in the western end of the property that is mapped as PCT 3032. The location and extent of this area is shown on the map in Figure 4.2.

2. The central part of the site that is mapped as VZ1 in the map in Figure 4.2 has had minor disturbance by slashing of the shrub layer for bushfire protection.

3. The lower part of the site where the existing house, exotic mown lawn, planted exotic and native trees and driveway is nearly totally cleared of native vegetation.

A qualified and experienced ecologist (Nicholas Skelton) determined the vegetation condition states during the field survey.


SITE PLAN
HORSE ARENA

4.6 Patch Size

In accordance with Section 4.3.2 of the BAM 2020.

Patch size is defined as an area of native vegetation that:

- occurs on the development site and beyond.
- includes native vegetation that has a gap of less than 100 m (50m buffer from each) from the next area of native vegetation (or ≤30 m for non-woody ecosystems, e.g. grassland, swamp, saltmarsh, etc.)

Patch size extends onto adjoining land that is beyond the development site.

Patch Size Summary	
Patch Size	194 ha
Class	d. >100ha

The habitat connectivity (100m between native vegetation patches i.e. 50m buffers shown in purple on the map in Figure 3.6) and native vegetation within the assessment area (Dark Green polygons) used to determine the Patch Size (magenta) are shown on the map in Figure 3.6.

4.7 Vegetation Integrity Assessment

In a Streamline-Small Area BDAR, the method of assessment of vegetation integrity is less formal. However, in this BDAR, GIS Environmental Consultants have followed the standard BAM integrity assessment method using a 20x50m plot.

The area of the dominant native vegetation type within the development site fits into 1 broad condition state (Vegetation Zone) labelled as VZ1.

The location and extent of the Vegetation Zone is shown on the map in Figure 8.1.

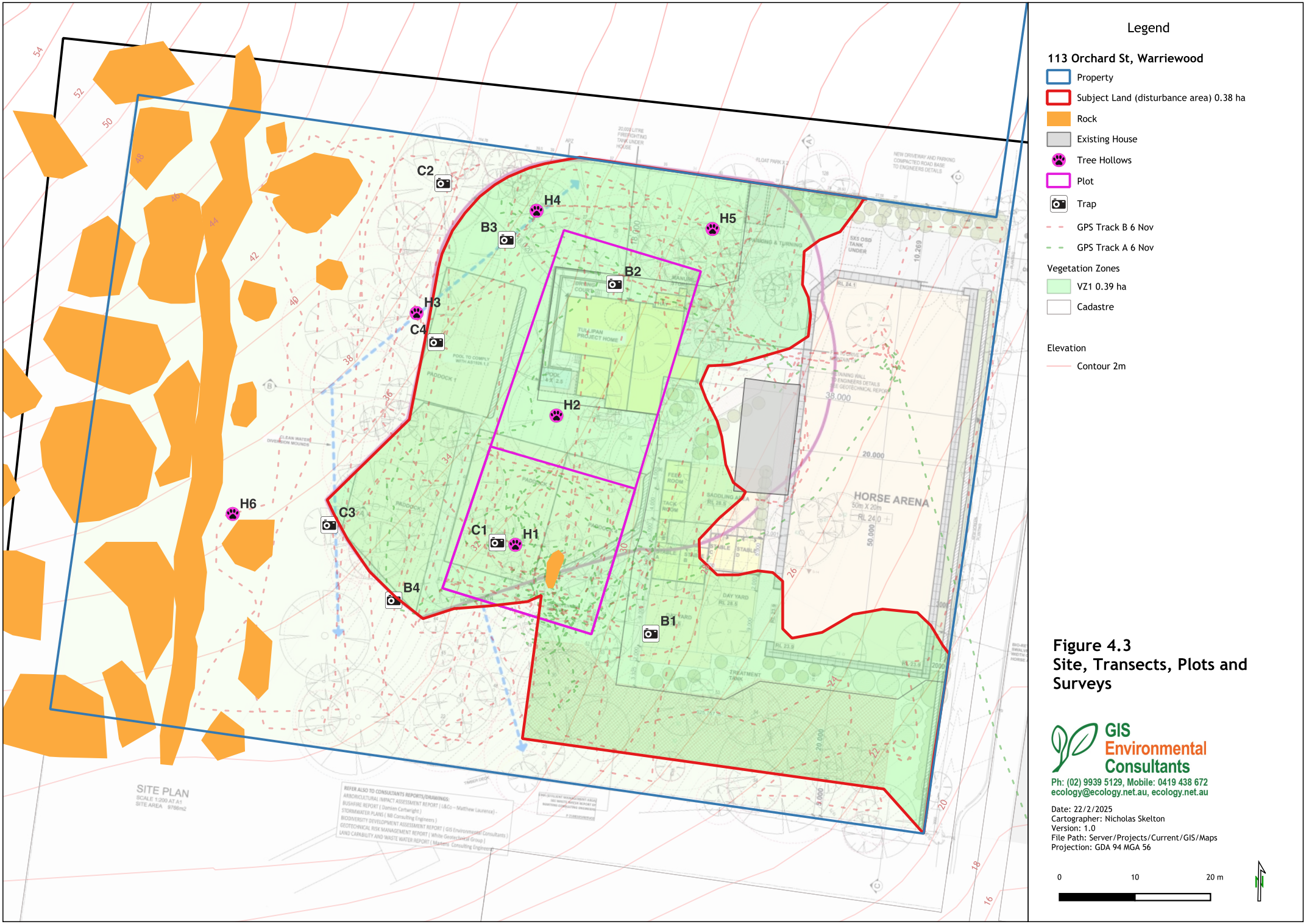
Table 4.4 Vegetation Zones in the Subject Land

PCT	Vegetation Zone Name	Area of Zone in Development Footprint (ha)	Number of BAM Plots required
3230	VZ1Mod	0.39	1

4.7.1 Transect/plot Origin Coordinates

Vegetation Zone	Plot Number	Geographic Zone	Easting*	Northing*	Transect Bearing
VZ	1	56	340995	6270872	12°

*Coordinates are in MGA zone 56 Datum GDA94.



Legend

113 Orchard St, Warriewood

- Property
- Subject Land (disturbance area) 0.38 ha
- Rock
- Existing House
- Tree Hollows
- Plot
- Trap
- GPS Track B 6 Nov
- GPS Track A 6 Nov

Vegetation Zones

- VZ1 0.39 ha
- Cadastre

Elevation

- Contour 2m

Figure 4.3
Site, Transects, Plots and Surveys

GIS Environmental Consultants
Ph: (02) 9939 5129, Mobile: 0419 438 672
ecology@ecology.net.au, ecology.net.au

Date: 22/2/2025
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 10 20 m

4.7.2 Plot Composition (Floristics)

A total of 55 plant species were recorded within the standard 400sqm plot. This is comprised of 46 native species and 9 planted or weed species.

The species richness and the relative abundances of each species in each plot are recorded in Table 4.1. A summary of the floristics of the whole site is in section 4.5.

4.7.2.1 Floristics in Vegetation Zone 1

46 native species were recorded in Plot 1, 11 are tree species, 2 are fern species, 2 are shrub species, 4 are grasses & grass like species, 17 are forb species and 10 are species of other growth forms.

4.7.3 Plot Structure

The structure of the vegetation on the site is a forest with no shrub layer and a dense mesic ground cover dominated by native grasses and forbs.

4.7.3.1 Structure in Vegetation Zone 1

The tree canopy in VZ1 is mostly native and has a cover of 90.2%. There is no native shrub cover. The native fern cover is 0.15%, grasses and grass like 3.9%, forbs 4.6% and other 1.5%.

4.7.4 Function-Habitat Value

The results for tree width diversity, log length, and ground cover for the 1000m^2 (20m x 50m) plot are recorded in the table below.

Table 4.5 Existing Species Composition and Structure Summary

		Plot 1 VZ1
Existing Species Richness (Composition)	Tree	11
	Shrub	2
	Grass & grass like	4
	Forb	16
	Fern	2
	Other	10
Existing % Foliage Cover (Structure)	Tree	90.2
	Shrub	0.5
	Grass & grass like	3.9
	Forb	4.6
	Fern	0.15
	Other	1.5

Table 4.6 Existing Habitat Function Summary

		Plot 1 VZ1
Tree Stem Size Width Class (cm)	<5 (regeneration)	Present
	5 to 9	Present
	10 to 19	Present
	20 to 29	Present
	30 to 49	Present
	50 to 79	Present
	Large Tree	Present

Number of large trees	2
Hollow bearing trees	2
Av Leaf Litter % Cover	73.8
Log Length Total (m)	0
High Threat Weed % Cover	1

Table 4.7 Existing Vegetation Integrity Scores (Vegetation Zones)

Vegetation Zone	Area	Composition Condition Score	Structure Condition Score	Function Condition Score	Current Vegetation Integrity Score
VZ1	0.39	65	46.2	65.1	**58**

Table 4.8 Future (Predicted) Habitat Composition, Structure & Function (Management Zones)

		VZ1MZ1Full	VZ1MZ2Part
Predicted Species Richness (Composition)	Tree	0	11
	Shrub	0	0
	Grass & grass like	0	0
	Forb	0	0
	Fern	0	0
	Other	0	0
Predicted % Foliage Cover (Structure)	Tree	0	15
	Shrub	0	0
	Grass & grass like	0	0
	Forb	0	0
	Fern	0	0
	Other	0	0
Number of large trees		0	1
Tree Stem Classes	<5 (regeneration)	0	0
Av Leaf Litter % Cover ($1m^2$ plots)		0	0
Log Length Total (m)		0	0
High Threat Weed % Cover		0	0

Table 4.9 Future and Change in Integrity Scores (Management Zones)

Vegetation Zone	Future Composition Score	Future Structure Score	Future Function Score	Future Integrity Score	Change in Integrity Score	Average VI Loss
VZ1M1Full	0	0	0	0	**-58**	**-50.9**
VZ1MZ2Part	5.9	5.6	41	11.1	**-47**	

4.8 Use of Benchmark Data

As described in section 4.3.3(5), 1.4.2 and Appendix A.

No Benchmark data is used.

4.9 Existing Fauna Habitat

The location of the native vegetation and habitat features is shown on the map on Figure 4.1.

There is a high diversity of native trees on the site containing suitable habitat for native birds and arboreal mammals, including some trees with hollows.

A Sugar Glider *(Petaurus brevicep)* family observed in a tree hollow (H1) of a *Eucalyptus resinifera* (T113) and it was also seen during a motion detecting camera survey (see Photo Page 1).

The western end of the site contains large sandstone boulders and rock crevices on a steep hill. The vegetation and natural rock features on the hill provide very good habitat for native reptiles, mammals, birds and invertebrates in the form of foraging, roosting, breeding and shelter including habitat for several Threatened flora and fauna species.

There are numerous hollow ground logs around the site, including a significantly large one (Photo Page 1, Photo 4), which provide habitat for a range of species, including Rosenberg's Goannas and Echidnas. It is highly unlikely that the proposal will impact the western end of the site, however habitat features such as hollow ground logs should be retained throughout the site.

Trees provide foraging and roosting habitat for native birds and habitat for arboreal native animals, such as microbats and gliders, and are potential foraging habitat for several Threatened species.

There was no roosting habitat for microbats found as part of the existing structures.

The development site is likely to be part of a large foraging home range for common and Threatened birds, small reptiles, mammals, and microbats, but does not contain any specific or important habitat for Threatened species.

The habitat features on this site are shown on the map in Figure 4.1, and the photos on Photo Page 1, Photo Page 2 and Photo Page 3.

4.9.1 Tree Hollows

There were 6 hollow-bearing trees identified on site which are shown on the map in Figure 4.1. It is possible that more hollows occur out of view.

A detailed summary of each hollow, its height off the ground, dimensions, evidence of occupation, suitability for Threatened Species and impact is shown in Table 8.2 in Section 8.1 of this report.

Photo Page 2 – Transects and Plots

Photo 1. Plot transect origin

Photo 2. Southeastern corner, looking northwest

Photo 3. Northeastern corner, looking southwest

Photo 4. Northwestern corner, looking southeast

Photo 5. Southwestern corner, looking northeast

Photo 6. Tree canopy from centre of 20x20 plot

4.10 Fauna Species

During the field survey, the fauna species in Table 4.10 below were found using the Study Site:

Table 4.10 Summary of Fauna Recorded on the Site

Common Name	Scientific Name	Evidence
Birds		
Australian Brush-turkey	*Alectura lathami*	O,C
Australian Magpie	*Cracticus tibicen*	O
Laughing Kookaburra	*Dacelo novaeguineae*	O
Noisy Miner	*Manorina melanocephala*	O
Pied Currawong	*Strepera graculina*	O
Rainbow Lorikeet	*Trichoglossus moluccanus*	O
Sulphur-crested Cockatoo	*Cacatua galerita*	O
Mammals		
Common Brushtail Possum	*Trichosurus vulpecula*	A
Common Ringtail Possum	*Pseudocheirus peregrinus*	A
Dog	*Canis lupus familiaris*	O
European Rabbit	*Oryctolagus cuniculus*	P, T
Swamp Wallaby	*Wallabia bicolor*	O
Sugar Glider	*Petaurus breviceps*	O, S, C
Reptiles		
Diamond Python	*Morelia spilota*	A
Water Dragon	*Intellagama lesueurii*	A

Fauna in **bold** indicates a Threatened Species.

Key

*Introduced species, +Listed as Threatened Species under the NSW Biodiversity Conservation Act 2016, ?Species presence uncertain

Observation Types: Observed (O), Heard call (W), Scat (P), Nest/roost (E), Tracks or scratchings (T), Burrow (B), Crushed Cones (G), Hair (H), Feathers or skin (F), Dead (K), Camera (C), In scat (X), Bone or teeth or shell (Y), In raptor/owl pellet (Z), Ultrasonic bat detector (U), Anecdotal (A)

4.11 Wildlife Corridors

As can be seen in Figures 2.2 & 3.6, the site is located on the eastern border of a large habitat patch approximately 194 hectares in size. The western boundary of the site backs onto a 70-hectare Council reserve; Ingleside Chase Reserve, that is comprised of Sydney Coastal Dry Sclerophyll Forest species, such as *Angophora costata* and *Eucalyptus piperita*.

The site's canopy connects Garigal and Ku-ring-gai National Parks with Irrawong Reserve to the west, and Warriewood Wetlands and Narrabeen Lagoon to the east.

There is an east-west and a north-south wildlife corridor for animals through the site and back into Ingleside Chase Reserve to the west, or neighbouring properties to the north and south. The tree canopy on the site is part of an extensive tree canopy connecting to large habitat patches and fragmented pockets of bushland throughout Warriewood. The connectivity of the site can be seen in the locality aerial photograph on Figure 2.1, and the regional maps in Figures 2.2 and 3.6.

As can be seen in Figure 5.1, there are a range of threatened species, such as Powerful Owls (*Ninox strenua)* and Large Bent-Winged Bats (*Miniopterus orianae oceanensis*), that have been recorded using the wildlife corridor between Ingleside Chase Reserve and Warriewood Wetlands. The site is located on an eastern edge of a relatively large wildlife corridor for the Northern Beaches, and it is unlikely that the volume and location of the proposed tree clearing will have a significant impact on the integrity of the wildlife corridor.

5 Threatened Species Habitat Suitability

The BAM-C predicts the Threatened (ecosystem and species) species that may occur on a site using IBRA subregion, geographic limitations, PCT, percent native vegetation cover and patch size. Any of these species that are "High Sensitivity to Gain" were automatically kept to the assessment Ecosystem credit species list. Any SAII Species Credit Species were also retained in the in the list. In addition to these species an assessment of historic Threatened Species Records from the NSW Wildlife Atlas as candidate threatened species was carried out. These species and their proximity to the site are shown on the map in Figure 5.1.

When the Wildlife Atlas database of historic records was queried, the threatened species that have been recorded near the Development Site were assessed in Tables 5.1 and 5.2 and consequently added as potential candidate species in Tables 5.4, 5.5 and 5.6.

5.1 Requirement for Assessment of Ecosystem and Species Credit Species

As described in section 5.1.1 of the BAM 2020.

5.2 Ecosystem Candidate Species Assessment & Justification

The BAM-c predicts 23 Ecosystem Species for this site, these are listed in Table 5.3. 20 of these species were retained as confirmed predicted species as they were not vagrant and had no habitat constraints or geographic limitations. 20 ecosystem species were assessed as confirmed to have suitable habitat within the development sites vegetation zone. The White-bellied Sea-Eagle (*Haliaeetus leucogaster*), Eastern Osprey (Pandion cristatus), and Black Bittern (*Ixobrychus flavicollis*) were both excluded as ecosystem species as their habitat constraints, of proximity to waterways, were not present on or near the site.

5.3 Threatened Ecosystem Credit Species and Species Credit Species (State and Commonwealth) Summary of Records within 5km

The number of BioNet Atlas records of Threatened species recorded within the last 5 years, 5-20 years ago and pre-2000 are summarised in Table 5.1 and Table 5.2.

Within 5km, there are 4339 Threatened species records which reflects the high density of ecological surveys in this part of the state.

The number of surveys and Threatened species records has greatly increased in the last 5 years compared to previous years. This can be attributed to an increased level of development, subsequent surveys and tightening up of requirements to submit data to the atlas.

The species that have a large number of records within the last 5 years are highlighted in the table in green. Most of these are birds which are often recorded by bird enthusiasts and are easily spotted.

The information that can be gathered from this table includes:

- There is a large number of Powerful Owl (Ninox strenua) records within 5km of the site, especially within the last 10 years.
- The list contains a large number of marine species, such as Shearwaters and Turtles, due to the close proximity of the site to Pittwater and the Tasman Sea, but these are not relevant to the habitat on the site.
- There is a large number of Grey-headed Flying Fox (Pteropus poliocephalus) records as there is along most of coastal NSW.
- The large number of microbat records (Little Bent-winged Bat and Large Bent-winged Bat) is reassuring and is only of concern if there is potential roosting or breeding habitat at the site.
- There has been 3 Koala records within 5km of the site recorded in the last 20 years. The majority of the records within 5km of the site were recorded pre-2000s and there is no existing Koala population near the site.

Table 5.1 Summary of Threatened Species BioNet Atlas Historic Records within 5km

113 Orchard St, Warriewood

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Summary of the threatened species records within 5km of the site, to assist in the assessment of the likelihood of a viable local population of each species. More information on the habitat connectivity in regards to this site is provided on Maps 4 and 5. The 50 closest records are listed in the next table.

Assessment by Nicholas Skelton, GIS Environmental Consultants

Threatened species are listed on the Schedules of both the NSW (Biodiversity Conservation Act 2016) and Commonwealth (EPBC Act 1999). Species that have many records are highlighted in shades of green. The distribution of historic Threatened species records and habitat connectivity to this site are shown on Maps 4 and 5. Atlas data is only an indication of which species have historically been present in an area and absence does not necessarily mean a species is not present. Some sensitive species that are at risk of disturbance/exploitation/disease or other threats have not been included. Source: BioNet Atlas of NSW Wildlife data (DCCEEW) who in turn source data from the Australian Museum, NSW Royal Botanic Gardens Herbarium, Australian Bird and Bat Banding Scheme, Forests NSW, National Parks and Wildlife Service, ecological consultants and research scientists.

Species: Scientific Name (Common Name)	Records within 5 yrs	Records 5-20 yrs ago	Records pre-2000	Total Records in 5km	Likelihood of Occurrence: Assessment is based on the number of records, the currency of records, field assessment of habitat suitability, environmental data from the maps in Figures 4a and 5 and the TBDC.
Apus pacificus (Fork-tailed Swift)		1	1	2	
Ardenna pacifica (Wedge-tailed Shearwater)	3	3	1	7	
Ardenna tenuirostris (Short-tailed Shearwater)	4	15	4	23	No suitable habitat on site
Artamus cyanopterus cyanopterus (Dusky Woodswallow)		1	2	3	
Burhinus grallarius (Bush Stone-curlew)		5	2	7	
Calidris acuminata (Sharp-tailed Sandpiper)		2		2	
Callistemon linearifolius (Netted Bottle Brush)		1	3	4	
Callocephalon fimbriatum (Gang-gang Cockatoo)		2	1	3	
Calyptorhynchus lathami lathami (South-eastern Glossy Black-Cockatoo)	16	82	13	111	BAM predicted Ecosystem species, see Table 5.3
Caretta caretta (Loggerhead Turtle)	4	4		8	
Cercartetus nanus (Eastern Pygmy-possum)	128	362	1	491	Add as a Candidate Species, to Table 5.4
Chalinolobus dwyeri (Large-eared Pied Bat)		16		16	Also a BAM predicted Candidate species, see Table 5.4
Chamaesyce psammogeton (Sand Spurge)	4	10	2	16	
Chelonia mydas (Green Turtle)	2	8		10	
Climacteris picumnus victoriae (Brown Treecreeper (eastern subspecies))		1		1	
Daphoenositta chrysoptera (Varied Sittella)		22		22	BAM predicted Ecosystem species, see Table 5.3
Dasyurus maculatus (Spotted-tailed Quoll)		7	8	15	
Dermochelys coriacea (Leatherback Turtle)		2		2	
Diomedea exulans (Wandering Albatross)			1	1	
Epacris purpurascens var. purpurascens ()		1	2	3	
Eucalyptus camfieldii (Camfield's Stringybark)	40	12	2	54	No suitable habitat on site
Eucalyptus nicholii (Narrow-leaved Black Peppermint)		3		3	
Falsistrellus tasmaniensis (Eastern False Pipistrelle)		1	2	3	
Gallinago hardwickii (Latham's Snipe)		3		3	
Genoplesium baueri (Bauer's Midge Orchid)		1	1	2	Also a BAM predicted Candidate species, see Table 5.4
Glossopsitta pusilla (Little Lorikeet)		14	2	16	
Grevillea caleyi (Caley's Grevillea)	955	446	39	1440	No suitable habitat on site
Haematopus fuliginosus (Sooty Oystercatcher)		6	2	8	
Haliaeetus leucogaster (White-bellied Sea-Eagle)	8	47	2	57	BAM predicted Ecosystem species, see Table 5.3
Heleioporus australiacus (Giant Burrowing Frog)	10	36	6	52	No suitable habitat on site
Hieraaetus morphnoides (Little Eagle)		14	1	15	
Hirundapus caudacutus (White-throated Needletail)	2	34	3	39	BAM predicted Ecosystem species, see Table 5.3
Hydroprogne caspia (Caspian Tern)	1	7	4	12	
Isoodon obesulus obesulus (Southern Brown Bandicoot (eastern))		10	3	13	
Ixobrychus flavicollis (Black Bittern)	1	22	5	28	BAM predicted Ecosystem species, see Table 5.3
Lasiopetalum joyceae ()	1	1		2	
Lathamus discolor (Swift Parrot)	8	14	3	25	Also a BAM predicted Candidate species, see Table 5.4
Limosa lapponica (Bar-tailed Godwit)		6		6	
Lophoictinia isura (Square-tailed Kite)	1	7		8	
Micronomus norfolkensis (Eastern Coastal Free-tailed Bat)	2	20	2	24	BAM predicted Ecosystem species, see Table 5.3
Microtis angusii (Angus's Onion Orchid)		164	2	166	No suitable habitat on site
Miniopterus australis (Little Bent-winged Bat)	14	51		65	Also a BAM predicted Candidate species, see Table 5.4
Miniopterus orianae oceanensis (Large Bent-winged Bat)	6	102	7	115	Also a BAM predicted Candidate species, see Table 5.4
Myotis macropus (Southern Myotis)	6	53	2	61	No suitable habitat on site
Ninox connivens (Barking Owl)		38		38	Add as a Candidate Species, to Table 5.4
Ninox strenua (Powerful Owl)	89	648	14	751	Add as a Candidate Species, to Table 5.4
Pandion cristatus (Eastern Osprey)	12	34	4	50	No suitable habitat on site
Petroica boodang (Scarlet Robin)		1		1	
Phascolarctos cinereus (Koala)	2	1	26	29	No local population
Pimelea curviflora var. curviflora ()		4	3	7	
Pluvialis squatarola (Grey Plover)	5	3		8	
Pseudomys novaehollandiae (New Holland Mouse)	1	1		2	
Pseudophryne australis (Red-crowned Toadlet)	66	49	4	119	No suitable habitat on site
Pteropus poliocephalus (Grey-headed Flying-fox)	41	123	10	174	Flying fox camp not located on site
Ptilinopus regina (Rose-crowned Fruit-Dove)		3		3	
Ptilinopus superbus (Superb Fruit-Dove)	2	3		5	
Saccolaimus flaviventris (Yellow-bellied Sheathtail-bat)	3	1	1	5	
Scoteanax rueppellii (Greater Broad-nosed Bat)	2	5	3	10	
Syzygium paniculatum (Magenta Lilly Pilly)	5	6		11	
Tetratheca glandulosa ()	2	50	16	68	Add as a Candidate Species, to Table 5.4
Thalassarche cauta (Shy Albatross)	1		3	4	
Thalasseus bergii (Crested Tern)		12	3	15	No suitable habitat on site
Tyto novaehollandiae (Masked Owl)		4	2	6	
Varanus rosenbergi (Rosenberg's Goanna)	3	62	4	69	BAM predicted Ecosystem species, see Table 5.3

Table 5.2 Closest Threatened Species Historic Records Assessment

113 Orchard St, Warriewood

Assessment of likelihood of occurrence based on the 50 closest historic BioNet Threatened species records to determine the likelihood of occurrence and the need for targeted searching and further assessment

Assessment by Nicholas Skelton, GIS Environmental Consultants

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This table lists the 50 nearest BioNet Atlas Threatened Species records listed on the Schedules of both the NSW (Biodiversity Conservation Act 2016) and Commonwealth (EPBC Act 1999). Records that were recorded near to the site and recent records the distance or dates are highlighted in green. The distribution of historic Threatened species records and habitat connectivity to this site are shown on Maps 4 and 5. A summary of the records wityhin 5km of the site is the previous table. Please note the location of records is often inaccurate, especially with older records. Licencing restrictions prevent the direction or more precise distances being shown on this table. Atlas data is only an indication of which species have historically been present in an area and absence does not necessarily mean a species is not present. Some sensitive species that are at risk of disturbance/exploitation/disease or other threats have not been included. Source: BioNet Atlas of NSW Wildlife data (DCCEEW) who in turn source data from the Australian Museum, NSW Royal Botanic Gardens Herbarium, Australian Bird and Bat Banding Scheme, Forests NSW, National Parks and Wildlife Service, ecological consultants and research scientists.

Distance from Site (nearest km)	Species: Scientific Name (Common Name)	NSW Status	Common wealth Status	Record Year	Likelihood of Occurrence based on field survey for habitat suitability, environmental data shown in the maps in this report and information from published literature and the TBDC.
0	Ninox strenua (Powerful Owl)	V,P,3		2017	Add as a Candidate Species, to Table 5.4
0	Ninox strenua (Powerful Owl)	V,P,3		2018	
0	Ninox strenua (Powerful Owl)	V,P,3		2017	
0	Ninox strenua (Powerful Owl)	V,P,3		2017	
0	Ninox strenua (Powerful Owl)	V,P,3		2018	
0	Ninox strenua (Powerful Owl)	V,P,3		2016	
0	Ninox strenua (Powerful Owl)	V,P,3		2016	
0	Ninox strenua (Powerful Owl)	V,P,3		2018	
0	Myotis macropus (Southern Myotis)	V,P		2008	No suitable habitat on site
0	Miniopterus orianae oceanensis (Large Bent-winged Bat)	V,P		2008	Also a BAM predicted Candidate species, see Table 5.4
0	Ninox connivens (Barking Owl)	V,P,3		2019	Add as a Candidate Species, to Table 5.4
0	Hirundapus caudacutus (White-throated Needletail)	V,P	V,C,J,K	2016	BAM predicted Ecosystem species, see Table 5.3
0	Hirundapus caudacutus (White-throated Needletail)	V,P	V,C,J,K	2015	
0	Daphoenositta chrysoptera (Varied Sittella)	V,P		2014	BAM predicted Ecosystem species, see Table 5.3
0	Ninox strenua (Powerful Owl)	V,P,3		2008	
0	Ninox connivens (Barking Owl)	V,P,3		2019	
0	Ninox connivens (Barking Owl)	V,P,3		2019	
0	Ninox connivens (Barking Owl)	V,P,3		2019	
0	Micronomus norfolkensis (Eastern Coastal Free-tailed Bat)	V,P		2012	BAM predicted Ecosystem species, see Table 5.3
0	Miniopterus australis (Little Bent-winged Bat)	V,P		2012	Also a BAM predicted Candidate species, see Table 5.4
0	Miniopterus orianae oceanensis (Large Bent-winged Bat)	V,P		2012	Also a BAM predicted Candidate species, see Table 5.4
0	Ninox strenua (Powerful Owl)	V,P,3		2007	
0	Myotis macropus (Southern Myotis)	V,P		2007	
0	Ninox strenua (Powerful Owl)	V,P,3		2018	
0	Ninox strenua (Powerful Owl)	V,P,3		2018	
0	Ninox strenua (Powerful Owl)	V,P,3		2018	
0	Ninox strenua (Powerful Owl)	V,P,3		2018	
0	Ninox strenua (Powerful Owl)	V,P,3		2016	
0	Ninox strenua (Powerful Owl)	V,P,3		2018	
0	Ninox strenua (Powerful Owl)	V,P,3		2019	
0	Ninox strenua (Powerful Owl)	V,P,3		2013	
0	Ninox strenua (Powerful Owl)	V,P,3		2016	
0	Ninox strenua (Powerful Owl)	V,P,3		2012	
0	Petroica boodang (Scarlet Robin)	V,P		2019	BAM predicted Ecosystem species, see Table 5.3
0	Ninox strenua (Powerful Owl)	V,P,3		2013	
0	Ninox strenua (Powerful Owl)	V,P,3		2013	
0	Ptilinopus superbus (Superb Fruit-Dove)	V,P		2013	Add as an Ecosystem species, see Table 5.3
0	Ixobrychus flavicollis (Black Bittern)	V,P		2012	BAM predicted Ecosystem species, see Table 5.3
0	Ninox strenua (Powerful Owl)	V,P,3		2008	
0	Ninox strenua (Powerful Owl)	V,P,3		2014	
0	Ninox strenua (Powerful Owl)	V,P,3		2014	
0	Ninox strenua (Powerful Owl)	V,P,3		2013	
0	Miniopterus australis (Little Bent-winged Bat)	V,P		2015	
0	Miniopterus orianae oceanensis (Large Bent-winged Bat)	V,P		2014	
0	Ninox strenua (Powerful Owl)	V,P,3		2017	
0	Ninox strenua (Powerful Owl)	V,P,3		2017	
0	Callocephalon fimbriatum (Gang-gang Cockatoo)	E1,P,3	E	2016	BAM predicted Ecosystem species, see Table 5.3
0	Myotis macropus (Southern Myotis)	V,P		2017	
0	Miniopterus australis (Little Bent-winged Bat)	V,P		2017	
0	Miniopterus orianae oceanensis (Large Bent-winged Bat)	V,P		2017	

Key for Table 5.2

Biodiversity Conservation Act 2016, Fisheries Management Act 1994, EPBC 1999 and the Sensitive Species Data Policy.

Note: Some sensitive species that are at risk of disturbance, exploitation, disease or other threats have not been includes.

Key for BC Act Status

Code	Description	Status Notes
P	Protected Animal	Fauna not listed in Schedule 11 of the NPW Act 1974. Only shown for species that are listed in the other Acts.
P 13	Protected Native Plants	Flora listed in Schedule 13 of the NPW Act 1974.
V	Vulnerable	Schedule 1, part 3, BC Act 2016, Likely to become endangered unless the circumstances & factors threatening its survival or evolutionary development cease to operate.
E1	Endangered	Schedule 1, part 2, BC Act 1995, Likely to become extinct in nature in NSW unless the circumstances and factors threatening its survival or evolutionary stop, in immediate danger of extinction
E2	Endangered Population	Schedule 1, part 2, division 4, BC Act 2016, Population where, numbers have been reduced to such a critical level, or its habitat has been so drastically reduced, that it is in immediate danger of extinction
E4	Extinct	Schedule 1, part 4, TSC Act 1995, Species that have not been located in nature during the preceding 50 years despite searching of known and likely habitats
E4A	Critically Endangered Species	Schedule 1a, part 1, TSC Act 1995, Species that is facing an extremely high risk of extinction in New South Wales in the immediate future
2	Category 2 sensitive species	Species are classed as highly sensitive, and provision of precise locations would subject the species to high risk from threats such as disturbance and collection.
3	Category 3 sensitive species	Species are classed as of medium sensitivity, and provision of precise locations would subject the species to medium risk from threats such as collection/deliberate damage.

Key for EPBC Act Status

Code	Description	Definition under the EPBC Act 1999, and Migratory Birds agreement.
C	CAMBA	China-Australia Migratory Bird Agreement: Refers to species listed in the Bilateral Agreement between the Government of Australia and the Government of the People's Republic of China for the protection of Migratory Birds and their Environment (Subdivision A of Division 1 of Part 5, Commonwealth EPBC Act 1999).
J	JAMBA	Japan-Australia Migratory Bird Agreement: Refers to species listed in the Bilateral Agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (Subdivision A of Division 1 of Part 5, Commonwealth EPBC Act 1999).
K	ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement: Refers to species listed in the Bilateral Agreement between the Government of Australia and the Government of the Republic of Korea for the protection of Migratory Birds and their Environment (Subdivision A of Division 1 of Part 5, Commonwealth EPBC Act 1999).
V	Vulnerable	Refers to a native species is eligible to be included in the vulnerable category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria (Subdivision A of Division 1 of Part 13, Commonwealth EPBC Act 1999).
E	Endangered	Refers to a native species is eligible to be included in the endangered category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria (Subdivision A of Division 2 of Part 13, Commonwealth EPBC Act 1999).
CE	Critically Endangered	Refers to a native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria (Subdivision A of Division 1 of Part 13, Commonwealth EPBC Act 1999).
X	Extinct	Refers to a native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died (Subdivision A of Division 1 of Part 13, Commonwealth EPBC Act 1999).
XW	Extinct in the Wild	Refers to a native species is eligible to be included in the extinct in the wild category at a particular time if, at that time: (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form (Subdivision A of Division 1 of Part 13, Commonwealth EPBC Act 1999).
KTP	Key Threatening Process	Refers to a key process that threatens or may threaten the survival, abundance or evolutionary development of a native species or ecological community (Subdivision A of Division 1 of Part 13, Commonwealth EPBC Act 1999).

Table 5.3 Ecosystem Species Assessment

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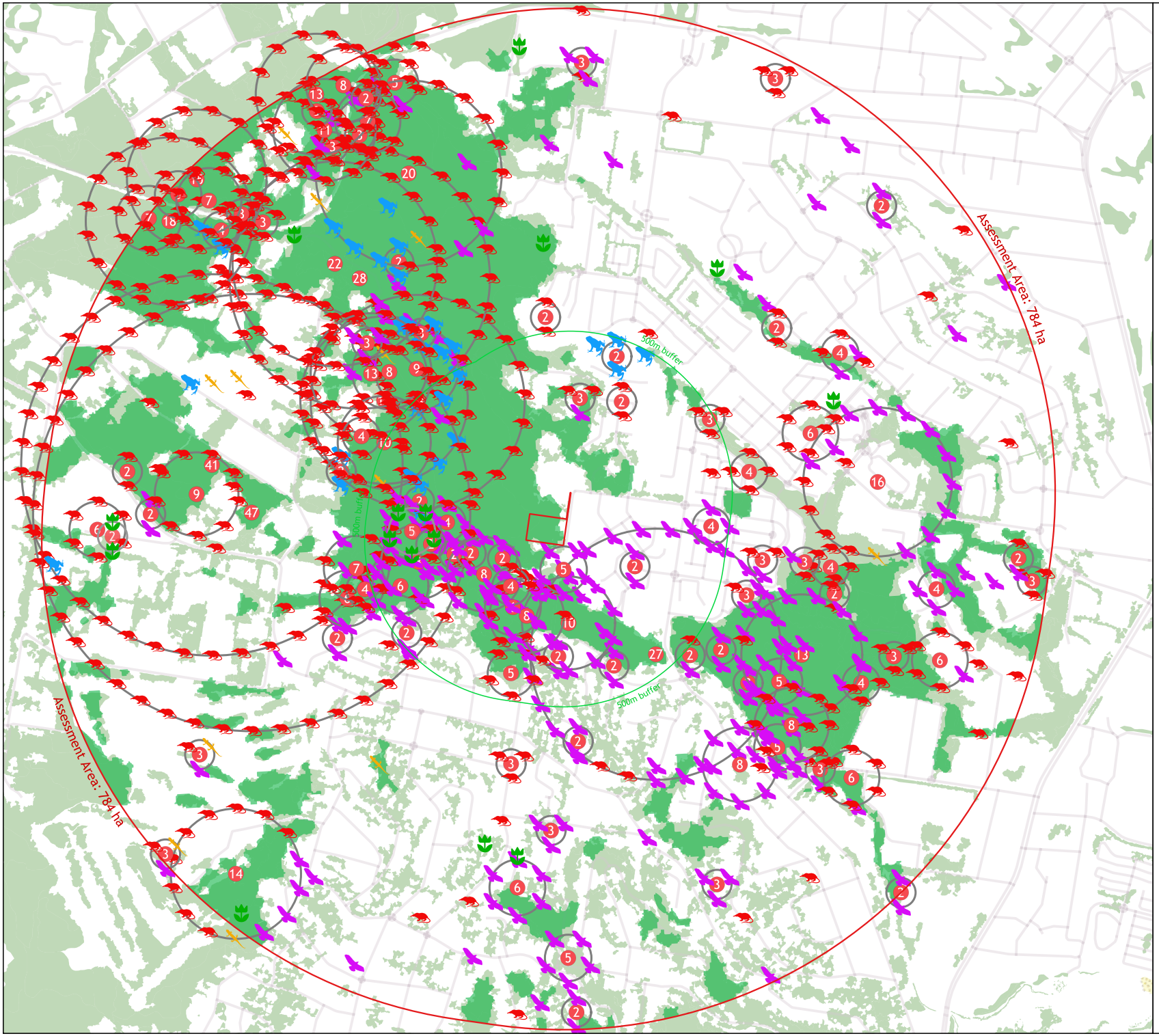
Site: 113 Orchard Street, Warriewood

Assessed by the Principal Ecologist: Nicholas Skelton GIS Environmental Consultants

Sources: BAM-c generated list, TBDC, Historic Records and Field Survey

Scientific Name	Common Name	Assessment and Justification
Anthochaera phrygia	Regent Honeyeater	**Retained**
Artamus cyanopterus cyanopterus	Dusky Woodswallow	**Retained**
Callocephalon fimbriatum	Gang-gang Cockatoo	**Retained**
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	**Retained**
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	**Retained**
Daphoenositta chrysoptera	Varied Sittella	**Retained**
Dasyurus maculatus	Spotted-tailed Quoll	**Retained**
Glossopsitta pusilla	Little Lorikeet	**Retained**
Haliaeetus leucogaster	White-bellied Sea-Eagle	**Excluded (Habitat constraints)**
Hirundapus caudacutus	White-throated Needletail	**Retained**
Ixobrychus flavicollis	Black Bittern	**Excluded (Habitat constraints)**
Lathamus discolor	Swift Parrot	**Retained**
Lophoictinia isura	Square-tailed Kite	**Retained**
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	**Retained**
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	**Retained**
Miniopterus australis	Little Bent-winged Bat	**Retained**
Miniopterus orianae oceanensis	Large Bent-winged Bat	**Retained**
Pandion cristatus	Eastern Osprey	**Excluded (Habitat constraints)**
Petroica phoenicea	Flame Robin	**Retained**
Pteropus poliocephalus	Grey-headed Flying-fox	**Retained**
Ptilinopus superbus	Superb Fruit-Dove	**Retained**
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	**Retained**
Varanus rosenbergi	Rosenberg's Goanna	**Retained**



Legend

113 Orchard St, Warriewood

- Study Site
- 500m buffer for SAII 9.2
- Assessment Area 1500m buffer

Historic Threatened Flora Records within 1500m

- Flora

Historic Threatened Fauna Records within 1500m

- Amphibia
- Aves
- Mammalia
- Reptilia

- Native Vegetation in Assessment Area STVM
- Road

Hydrology Features

Reefs and Mangroves

- Sand

Esturine Features Islands

- Sand

Esturine Features

- Sand
- Other Vegetation Habitat

Historic Threatened Species records are sourced from the BioNet database. http://www.bionet.nsw.gov.au Many species locations cannot be shown due to restrictions. Tables 5.1 and 5.2 provides more information of the species and age of the records within 5km of this site.

Figure 5.1
Locality, Threatened Species Historic Records

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Date: 11/11/2024
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 200 400 m

5.4 Species Candidate Assessment & Justification

In a Streamline-Small Area BAM assessment, Candidate Species Credit Species do not need to be assessed as long as they are not found on the site incidentally and they are not potential SAII entities.

The potential SAII species were assessed to determine if they are Candidates. The habitat of any SAII Candidate Species Credit species was assessed. If potential habitat was found, a survey was conducted for those Threatened species.

The list of Species Credits Species and the assessment justification are provided in Tables 5.4, 5.5, 5.6.

The BAM-c identified 9 Potential Candidate species.

Historical records from BioNet Atlas revealed that 4 additional species have been recorded near the site recently (Table 5.1 & Table 5.2, and as shown on the map in Figure 5.1);

Cercartetus nasus **(Eastern Pymgy-possum),**

Barking Owl,

Powerful Owl, and

Tetratheca glandulosa.

These were added as candidate species.

In addition, two threatened Candidate species were also added to the BAM-c analysis due to the Ultrasonic Bat Survey (Appendix E);

Myotis macroparus **(Southern Myotis)** potentially recorded, and

Vespadelus troughtoni **(Eastern Cave Bat**)

Due to habitat suitability, geographic limits and disturbance factors assessed in Table 5.4 and 5.5, it was deemed that all of the above species could not occur on the site, except for the Eastern Cave Bat which has been offset (Table 5.6)

After assessment in Table 5.5. of the likelihood of suitable habitat, the following 7 candidate species were targeted for field survey or offsetting;

Asterolasia elegans,

Chalinolobus dwyeri **(Large-eared Pied Bat),**

Lathamus discolor **(Swift Parrot),**

Rhodamnia rubescens **(Scrub Turpentine),**

Tetratheca glandulosa, and

Vespadelus troughtoni **(Eastern Cave Bat).**

See Tables 5.4, 5.5 and 5.6 for assessment and justifications.

5.4.1 Existing Fauna Habitat at the Development Site

The fauna habitat features, including native vegetation area, are shown on the maps in Figures 4.1 and 5.2. The location of trees is shown on the site survey Figure 2.4(a). The fauna observed on the site during the field survey and incidentally are recorded in Table 4.10.

The site contains high quality habitat for Threatened fauna species, especially at the western end of the property. Six hollows were found onsite during the tree hollow survey. Habitat features include the trees (arboreal habitat), shrubs, groundcover, log debris, leaf litter and rock features.

Tree 113 has a hollow (H1) that contains a family of sugar gliders (*Petaurus breviceps*) which have both been observed in the field survey as well as through camera trap footage of this tree.

There are extensive areas of exposed sandstone and rock features along the western part of the property that are excellent habitat for reptiles and there is anecdotal evidence of reptiles regularly using the site. These rock features will not be impacted by the proposal.

These rock features do contain overhangs, outcrops and crevices suitable for *Chalinolobus dwyeri* (Large-eared Pied Bat) and *Vespadelus troughtoni* (Eastern Cave Bat) roosting and breeding. As previously stated, these rock features will not be impacted by the proposal.

There were no caves, abandoned mines or culverts suitable for cave dwelling microbats such as *Miniopterus orianae oceanensis* (Large bent-winged Bat), *Miniopterus australis* (Little bent-winged Bat) or *Myotis macroparus* (Southern Myotis) observed during the field survey.

The eastern part of the Study Site around the existing house contains an exotic lawn with an open woodland comprised of a diverse range of native trees. The tree canopy contains a range of native trees, including Turpentines (*Syncarpia glomulifera),* Sydney Red Gum (*Angophora costata*) and Sydney Peppermint (*Eucalyptus piperita)*. The vegetation around the existing house does not have an understorey due to being mowed regularly. The east of the Study Site is a house containing a dirt driveway, and landscaping with a mixture of planted vegetation, weeds and remnant native trees.

5.5 Candidate Species Presence

Step 5 of Section 6.4 determines if each species is present (or assumed present) on the site. A map of the location or a count of the number of individuals is also given. See Table 5.6.

Table 5.4 Candidate Species Assessment, Habitat Constraints

BAM s5.2.1 and s5.2.2 Steps 1 and 2

Site: 113 Orchard Street, Warriewood

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Assessed by the Principal Ecologist: Nicholas Skelton GIS Environmental Consultants

		Identification of Candidate Species and Locality Habitat Constraints, BAM Section 5.1, 5.2 Steps 1 and 2				
		BAM-C Habitat Constraints (Tick Boxes)				Conclusion
		If all tick boxes in each section are unchecked then species is excluded. -ve determining factor				
Derived (Predicted) Potential Candidate Species	**Reason for species being included**	**Habitat Constraints (locality) includes BOAMS Important Habitat Maps (BAM-C tick box)**	**Habitat (locality) Degraded (e.g. Constraints and Threats TBDC) (BAM-C tick box)**	**Geographic Limitations (BAM-C tick box)**	**Species is Vagrant e.g. E. nicolii, Macadamia etc. (BAM-C tick box)**	**Retention for further Assessment**
Anthochaera phrygia Regent Honeyeater ***(Breeding only)*** Dual credit type NSW: Critically Endangered FED: Critically Endangered (**SAII** Principle 1 and 4)	Candidate from BAM-C	**NO** The development site does not fall within the Important Habitat Map areas.	N/A	The development site does not fall within the two known breeding areas.	N/A	**NO** No further assessment needed. The site is not within the Important Habitat Map.
Asterolasia elegans Asterolasia elegans *NSW: Endangered* *FED: Endangered*	Candidate from BAM-C	None in BAM-C	The development site is not too disturbed for this species to occur	None in BAM-C	N/A	**YES** Further assessment needed. See Table 5.3.
Cercartetus nanus Eastern Pygmy-possum NSW: Vulnerable FED: Not listed	Added due to Bionet Atlas historical records data. Assessed in Tables 5.1 and 5.2	None in BAM-C	The development site is not too disturbed for this species to occur	None in BAM-C	N/A	**YES** Further assessment needed. See Table 5.5

Chalinolobus dwyeri Large-eared Pied Bat NSW: Endangered FED: Endangered (**SAII** Principle 4)	Candidate from BAM-C AND Added due to Bionet Atlas historical records data. Assessed in Tables 5.1 and 5.2	**YES** The development site is within 100m of rocky areas including the western slope of the property. Suitable foraging habitat occurs on the development site as it is within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels. As a Streamline SAII species breeding habitat is present on the site and is also present within 100m of the development site i.e. rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings.	The development site is not too disturbed for foraging species to occur.	None in BAM-C	N/A	**YES** Breeding habitat is present within 100m of the Development Site as per the threshold for SAII Principle 4 (See TBDC and clause 6.7 of the BC Reg.) Further assessment needed. See Table 5.3.
Grevillea shiressii Grevillea shiressii NSW: Vulnerable FED: Vulnerable	Candidate from BAM-C	None in BAM-C	The development site is not too disturbed for foraging species to occur.	The site is not within this species restricted distribution, Central Coast LGA.	N/A	**NO** No further assessment needed. The development site does not occur within known distribution.
Lathamus discolor Swift Parrot (Important Habitat Map) Dual credit type NSW: Endangered FED: Critically Endangered (**SAII** Principle 1)	Candidate from BAM-C AND Added due to Bionet Atlas historical records data. Assessed in Tables 5.1 and 5.2	**YES** The development site is located within the Important Habitat Map areas.	N/A	The development site is within the area indicated by the Important Habitat Map.	N/A	**YES** Further assessment needed. See Table 5.5 The site is located within the Important Habitat Map.
Miniopterus australis Little Bent-winged Bat **(Breeding only)** NSW: Vulnerable FED: Not listed (**SAII** Principle 4)	Candidate from BAM-C AND Added due to Bionet Atlas historical records data. Assessed in Tables 5.1 and 5.2	**NO** No suitable breeding habitat on site, no caves, tunnel, mine, culvert or other structure known or suspected to be used for breeding (including species records with microhabitat code IC - in cave). No nest-roosts present (where numbers of individuals >500).	The development site is not too disturbed for foraging species to occur.	None in BAM-C	N/A	**NO** No further assessment needed. Breding habitat not present on development site.

Miniopterus orianae oceanensis Large Bent-winged Bat **(Breeding only)** NSW: Vulnerable FED: Not listed (**SAII** Principle 4)	Candidate from BAM-C AND Added due to Bionet Atlas historical records data. Assessed in Tables 5.1 and 5.2	**NO** No suitable breeding habitat on site, no caves, tunnel, mine, culvert or other structure known or suspected to be used for breeding (including species records with microhabitat code IC - in cave). No nest-roosts present (where numbers of individuals >500).	The development site is not too disturbed for foraging species to occur.	None in BAM-C	N/A	**NO** No further assessment needed. Breding habitat not present on development site.
Myotis macropus Southern Myotis NSW: Vulnerable FED: Not listed	Acoustic survey indicates species found on site	**NO** Water bodies do not occur on the site or within 200m of development site. Waterbodies with permanent pools/stretches 3m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200m of the site. However there is a highly suitable waterbody 207m to the South-West of the site as shown on Map A. Also to the south west is Mullet Creek however this is perrenial and is not a permanent water body that is 3m or wider. Thus the development site does not contain suitable habitat for the Southern Myotis as defined in the TBDC and the Bat Survey Guidelines, 2021.	The development site is not too disturbed for this species to occur	None in BAM-C	N/A	**NO** No further assessment needed. Habitat not present on site.
Ninox connivens Barking Owl **(Breeding only)** NSW: Vulnerable FED: Not listed (not SAII listed)	Added due to Bionet Atlas historical records data. Assessed in Tables 5.1 and 5.2	**NO** No living or dead hollow bearing trees on site with diameter >20 cm that occurs >4 metres above the ground.	The development site is not too disturbed for this species to occur	None in BAM-C	N/A	**NO** No further assessment needed. Breding habitat not present on development site.
Ninox strenua Powerful Owl **(Breeding only)** NSW: Vulnerable FED: Not listed (not SAII listed)	Added due to Bionet Atlas historical records data. Assessed in Tables 5.1 and 5.2	**NO** There are no hollow bearing trees present on site that meet species requirements. Living or dead tree with a hollow greater than 20 cm diameter greater than 4m above the ground.	The development site is not too disturbed for this species to occur	None in BAM-C	N/A	**NO** No further assessment needed. Breding habitat not present on development site.

Rhizanthella slateri Eastern Australian Underground Orchid NSW: Vulnerable FED: Endangered (**SAII** Principle 2)	Candidate from BAM-C	None in BAM-C	Habitat is disturbed and degraded	None in BAM-C	N/A	**YES** Further assessment needed. See Table 5.3.
Rhodamnia rubescens Scrub Turpentine NSW: Critically Endangered FED: Critically Endangered **(SAII** Principle 1 and 4**)**	Candidate from BAM-C	None in BAM-C	Habitat is disturbed and degraded	None in BAM-C	N/A	**YES** Further assessment needed. See Table 5.3.
Tetratheca glandulosa Glandular Pink Bell *NSW: Vulnerable* *FED: Not listed* *(not SAII listed)*	Added due to Bionet Atlas historical records data. Assessed in Tables 5.1 and 5.2	None in BAM-C	The development site is not too disturbed for this species to occur	None in BAM-C	N/A	**YES** Further assessment needed. See Table 5.3.
Vespadelus troughtoni Eastern Cave Bat NSW: Vulnerable FED: Not listed **(SAII** Principle 4**)**	Acoustic survey indicates species found on site	**YES** The development site is within 100m of rocky areas including the western slope of the property. Suitable foraging habitat occurs on the development site as it is within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels. As a Streamline SAII species breeding habitat is present on the site and is also present within 100m of the development site i.e. rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings.	The development site is not too disturbed for foraging species to occur.	None in BAM-C	N/A	**YES** Breeding habitat is present within 100m of the Development Site as per the threshold for SAII Principle 4 (See TBDC and clause 6.7 of the BC Reg.) Further assessment needed. See Table 5.3.

Table 5.5 Target Species Assessment, On-site Habitat Suitability Presence and Location

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BAM s5.2 Step 3

Site: 113 Orchard Street, Warriewood

Assessed by the Principal Ecologist: Nicholas Skelton GIS Environmental Consultants

		Further Assessment and Justification After Field Survey BAM Section 5.2, Step 3			
		Habitat Suitability on the Site			Conclusion
		Determining Factor -ve and also can be a Determining +ve Factor		-ve Determining Factor	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences from DPE, Species Profile, Threatened Biodiversity Data Collection (TBDC) and Literature**	**Habitat Requirements (TBDC, microhabitats, non BAM-C, or known areas) within the Development Site See Map in Fig 2.4**	**Micro Habitat Preferences within Development Site**	**Disturbance to Habitat Requirements and Micro Habitat Degradation Existing within Development Site**	**Candidate Species Conclusion & Justification**
Asterolasia elegans Asterolasia elegans *NSW: Endangered* *FED: Endangered*	**Habitat Requirements:** Occurs on Hawkesbury sandstone. Found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest. **Habitat Preferences:** The canopy at known sites includes Turpentine (Syncarpia glomulifera subsp. glomulifera), Smooth-barked Apple (Angophora costata), Sydney Peppermint (Eucalyptus piperita), Forest Oak (Allocasuarina torulosa) and Christmas Bush (Ceratopetalum gummiferum). **Disturbance Factors:** Fire sensitive and reliant on seed germination after disturbance to maintain populations. **Survey:** Sep-Oct	Hawkesbury sandstone geology and sloping habitat occurs on the development site.	Canopy species are present on the development site	The development site is not too disturbed for this species to occur	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Cercartetus nanus Eastern Pygmy-possum NSW: Vulnerable FED: Not listed	**Habitat Requirements:** Nesting sites. **Habitat Preferences:** Found in dense rainforests, wet and dry sclerophyll forests, woodlands, mallee scrub and coastal heathlands, but in most areas woodlands and heath appear to be preferred. Large foraging range and feeds largely on nectar and pollen collected from Banksias, Eucalypts and Bottlebrushes. Can be difficult to detect. **Disturbance Factors:** Disturbance to the midstorey. **Breeding:** Tree hollows are favoured for nesting but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. Most births occur between late spring and early autumn. **Survey:** Oct-Mar	No suitable nesting habitat occurs on the development site	No suitable nesting and feeding habitat occurs on the development site.	The midstorey vegetation of the development site is too disturbed for this species to occur	Not a Candidate Species: No suitable nesting or foraging habitat occurs on this site and the species is unlikely to occur. No further assessment is required for this species.

Chalinolobus dwyeri Large-eared Pied Bat NSW: Endangered FED: Endangered (**SAII** Principle 4)	**Habitat Requirements:** (Foraging) within 2km of Cliffs, rocky areas containing caves, overhangs, escarpments, outcrops, crevices and old mines or tunnels. (Breeding) Cliffs, caves, overhangs crevices tunnels within the site. The species is a full species credit because it can not 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 this species could be considered potentially serious and irreversible. Potential breeding habitat is **PCTs associated with the species** within 100m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings. Surveys must be undertaken as per the Threatened Bat Survey Guide to confirm breeding habitat. **Habitat Preferences:** It is generally rare with a very patchy distribution in NSW. Found in **well-timbered areas containing gullies**. Probably forages for small, flying insects below the forest canopy. **Disturbance Factors:** Habitat loss and inappropriate fire regimes. **Survey:** Nov-Jan **SAII assessment:** Only Breeding pairs and breeding habitat is considered potential SAII this species only needs to be considered SAII if within 100m of breeding habitat as described above (Principle 4 The impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity, and therefore its members are not replaceable.- foraging habitat is not a limiting factor). Due to this circular argument, the BAM-C and logic this species is BAM assessed but not SAII assessed. (See TBDC and clause 6.7 of the BC Reg.)	The development site does contain potential breeding habitat with rocky areas, overhangs and steep incline towards the back west end of the property.	Suitable foraging habitat occurs on the development site.	The development site is not too disturbed for this species to occur	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Lathamus discolor Swift Parrot (Important Habitat Map) Dual credit type NSW: Endangered FED: Critically Endangered (**SAII** Principle 1)	**Habitat Requirements:** As per Important Habitat Map. **Habitat Preferences:** On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany Eucalyptus robusta, Spotted Gum Corymbia maculata, Red Bloodwood C. gummifera, Mugga Ironbark E. sideroxylon, and White Box E. albens. **Disturbance Factors**: Loss of winter flowering feed trees. **Breeding:** Mostly breeds in Tasmania. **Survey**: No survey required. This species is assessed for species credits via the Important Habitat Map in BOAMS. The species is a dual credit species, assessed for species credits (important habitat map) and ecosystem credits (all other areas the species is likely to occur). No survey is required if the subject land is on an important habitat map for a species unless the species profile in the TBDC states otherwise. The species is considered present and the part of the subject land that is within the important habitat map forms the species polygon used to generate species credits (BAM section 5.2.5 Box 2). Any remaining habitat on the subject land, e.g. unmapped locations used by these species is assessed for ecosystem credits. (TBDC, Ecological Data Tab)	The development site is within the area indicated by the Important Habitat Map.	The development site is within the area indicated by the Important Habitat Map.	The development site is not too disturbed for this species to occur	**Yes a Candidate species credit species:** This species is mapped as Important Habitat on this site, tus it must be retained and this species can be assumed to occur.
Rhizanthella slateri Eastern Australian Underground Orchid NSW: Vulnerable FED: Endangered (**SAII** Principle 2)	**Habitat Requirements:** Occurs from south-east Queensland to south-east NSW. In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. **Habitat Preferences:** Occurs mostly in coastal areas. Poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. **Disturbance Factors:** Habitat degredation, loss of soil moisture and weed invasion. **Survey:** Sep - Nov **(flowering time**). Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore usually located only when the soil is disturbed.	The development site does not fall within the known 10 areas listed. No nearby records in proximity to site. The closest record is over 10km away northwest in Berowra.	Development site contains schelrophyll forest.	The development site is not too disturbed for this species to occur	**Not a Candidate species credit species:** This species is not known to occur in general location, no suitable habitat occurs on the disturbed site and the species is unlikely to occur. No further assessment is required for this species.
Rhodamnia rubescens Scrub Turpentine NSW: Critically Endangered FED: Critically Endangered **(SAII** Principle 1 and 4**)**	**Habitat Requirements:** Occurs north of Batemans Bay. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest. Extremely susceptible to infection from Myrtle Rust **Habitat Preference:** usually found on volcanic and sedimentary soils. Occurs mostly in coastal areas. **Disturbance Factors:** Myrtle rust, degradation of habitat and competition from transformer weed species. **Survey:** All year	Development site contains an area of remnant wet sclerophyll forest	Suitable habitat of sedimentary soils on site.	The development site is not too disturbed for this species to occur	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur

Tetratheca glandulosa Glandular Pink Bell *NSW: Vulnerable* *FED: Not listed* *(not SAII listed)*	**Habitat Requirements:** Restricted to the following Local Government Areas: Baulkham Hills, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Pittwater, Ryde, Warringah, and Wyong. **Habitat Preferences:** Found in Sydney Sandstone Ridge top Woodland in sandy or rocky heath scrub. Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge. Resprouts from a woody root following fire. Flowers July to November. Seasonal and cryptic. **Disturbance Factors:** None documented. **Survey:** Aug-Nov	Development site contains suitable habitat.	Suitable habitat on the site.	The development site is not too disturbed for this species to occur	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Vespadelus troughtoni Eastern Cave Bat NSW: Vulnerable FED: Not listed **(SAII** Principle 4)	**Habitat Requirements:** Caves are breeding habitat. Foraging habitat is within 2km of roosts that are rocky areas containing cave, overhangs, escarpment, outcrops, crevices, boulder piles, or old mines, tunnels old buildings or sheds. The species is a full species credit because it cannot reliably be predicted to occur on a site based on the vegetation and other landscape features (for breeding or foraging). Any impacts on breeding habitat used by this species could be considered potentially serious and irreversible. Potential breeding habitat is PCTs associated with the species within 100m of rocky areas, caves, overhangs crevices, cliffs and escarpments, or old mines or tunnels, old buildings and sheds within the potential habitat. When the species is present on the subject land and the proposed impact is not a potential SAII, standard species credits will be generated. **Habitat Preferences:** North from Sydney. Occasionally found along cliff-lines in wet eucalypt forest and rainforest. A little known species. Very little is known about the biology of this uncommon species.A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals.Occasionally found along cliff-lines in wet eucalypt forest and rainforest. Little is understood of its feeding or breeding requirements or behaviour. **Disturbance Factors:** Habitat loss of roosting, maternity and foraging sites. **Survey:** Nov - Jan SAII assessment: Only Breeding pairs and breeding habitat is considered potential SAII this species only needs to be considered SAII if within 100m of breeding habitat as described above (Principle 4 The impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity, and therefore its members are not replaceable.- foraging habitat is not a limiting factor). Due to this circular argument, the BAM-C and logic this species is BAM assessed but not SAII assessed. (See TBDC and clause 6.7 of the BC Reg.) "	The development site does contain potential breeding habitat with rocky areas, overhangs and steep incline towards the back west end of the property.	Suitable foraging habitat occurs on the development site.	The development site is not too disturbed for this species to occur	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur

Table 5.6 Offset Species Assessment, Survey, Presence and Location

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BAM s5.2 Steps 4, 5 and 6

Site: 113 Orchard Street, Warriewood

Assessed by the Principal Ecologist: Nicholas Skelton GIS Environmental Consultants

	Species Presence and location and condition of habitat within site, BAM Section 5.2, Step 4, 5 and 6			
	Survey			Conclusion
Derived (Predicted) Potential Candidate Species	**Month Specified for Survey in TBDC**	**Suitability of the Time of Year Surveyed and Justification**	**Targeted Survey Method Used** See Table 2.2 and Appendix A for details of survey date and methods used	**Presence On Site and Justification** Area of Habitat or Count, VZ(s) and integrity scores see Table 10.2
Asterolasia elegans Asterolasia elegans *NSW: Endangered* *FED: Endangered*	**Sep - Oct**	Not within time frame specified. Survey efforts are adequate as the site was thouroughly searched due to the site being a small area and the species is obvious to identify outside of flowering and fruiting periods.	Targeted daytime habitat searches by experienced Ecologist November 2024 including BAM Plot Plant Survey, Targeted Plant Survey and Random Meander (A1 - Appendix A)	**NO** This species and important habitat were surveyed for and determined absent from this site. No further assessment required.
Chalinolobus dwyeri Large-eared Pied Bat NSW: Endangered FED: Endangered (**SAII** Principle 4)	**Nov-Jan**	**YES** Within time frame specified	Ultrasonic Call Detector (from 06/11/2024-25/11/2024) - Passive acoustic detection (4 nights minimum 16hrs total effort per ≤50 hectares of potential habitat) (A11 - Appendix A)	**NO** This species and important habitat were surveyed for and determined absent from this site. No further assessment required.
Lathamus discolor Swift Parrot (Important Habitat Map) Dual credit type NSW: Endangered FED: Critically Endangered (**SAII** Principle 1)	**No survey required** (Impotant Habitat Map)	**N/A**	No survey required. The species is assessed for species credits via the Important Habitat Map in BOAMS. (TBDC, Ecological Data Tab)	**YES** This species requires a Species Polygon and Offsetting. Species polygon is shown on the map in Figure 5.2 and the method for determining the Species Polygon is described in s5.7. The Area or count, change in Integrity score and credits are provided in Table 10.2.

Rhodamnia rubescens Scrub Turpentine NSW: Critically Endangered FED: Critically Endangered **(SAII** Principle 1 and 4**)**	**All Year**	**YES** Within time frame specified	Targeted daytime habitat searches by experienced Ecologist November 2024 including BAM Plot Plant Survey, Targeted Plant Survey and Random Meander (A1 - Appendix A)	NO This species and important habitat were surveyed for and determined absent from this site. No further assessment required.
Tetratheca glandulosa Glandular Pink Bell *NSW: Vulnerable* *FED: Not listed* *(not SAII listed)*	**Aug-Nov**	**YES** Within time frame specified	Targeted daytime habitat searches by experienced Ecologist November 2024 including BAM Plot Plant Survey, Targeted Plant Survey and Random Meander (A1 - Appendix A)	NO This species and important habitat were surveyed for and determined absent from this site. No further assessment required.
Vespadelus troughtoni Eastern Cave Bat NSW: Vulnerable FED: Not listed **(SAII** Principle 4**)**	**Nov-Jan**	**YES** Within time frame specified	Ultrasonic Call Detector (from 06/11/2024-25/11/2024) - Passive acoustic detection (4 nights minimum 16hrs total effort per ≤50 hectares of potential habitat) (A11 - Appendix A)	**YES** Target species is detected, breeding must be assumed, and all potential breeding habitat mapped as breeding habitat. This species requires a Species Polygon and Offsetting. Species polygon is shown on the map in Figure 5.2 and the method for determining the Species Polygon is described in s5.7. The Area or count, change in Integrity score and credits are provided in Table 10.2. Current Bat Guidelines Information: may need two polygons depending on type of BDAR 1. Potential habitat (full BDAR): All areas with the PCTs associated with the species (as per the TBDC) on the subject land where the subject land is within 2 kilometres of caves, scarps, cliffs, rock overhangs and disused mines. Polygon features = map potential roost habitat features such as caves, scarps, cliffs, rock overhangs or disused mines within 2 kilometres of the subject land. species polygon boundary should align with all PCTs on the subject land that are within 2 kilometres of identified potential roost habitat features, and with which the species is associated (as listed in the TBDC). 2. Potential breeding habitat (SAII or Streamline BDAR): All potential habitat on the subject land where the subject land is within 100 metres of caves, scarps, cliffs, rock overhangs and disused mines. Polygon features = include all breeding habitat on or within 100 metres of the subject land (disturbance). The polygon must incorporate the habitat feature and a buffer of at least 100 metres wide (or 100 metres radius for point locations such as caves) with the breeding habitat features (may be multiple) as the centroid. Artificial structures should be inspected and included if the species is using these features for breeding. Note: Any breeding habitat identified for this species is a potential serious and irreversible impact. ('Species credit' threatened bats and their habitats NSW guide for the Biodiversity Assessment Method, 2021)

5.6 Threatened Species Credit Species Polygons

Threatened species credit species that require offsetting as a result of the assessment in Tables 5.4, 5.5 and 5.6 are:

Table 5.7: Threatened Species Polygons

Species	Unit of Measure	BOAMS Important Habitat Map	Species Polygon Area
Vespadelus troughtoni **Eastern Cave Bat**	Area, for Species Polygon size and locations, see the map on Figure 5.2	No	0.39
Lathamus discolor Swift Parrot	Area, for Species Polygon size and locations, see the map on Figure 5.2	Yes	0.39
Vespadelus troughtoni **Eastern Cave Bat** ***(Breeding Habitat)***	Area for Species Polygon size and locations, see the map on Figure 5.2	No	No Breeding Habitat within 100m of the site

5.6.1 Method Used for Species Polygon Calculation

The method used to make the Species Polygon was in accordance with section 2.2.5 of the BAM 2020 and section 4.4.5 of the BAM Operational Manual Stage 1. The area of impact and the change in condition determines the amount of Species Credits required to offset the impact. The location and extent of the Species Polygons for these species are shown on the map in Figure 5.2. The count and/or the area of habitat in the Species Polygon are summarised in Table 10.2

If the species that has "Count" unit of measure, then a 30m buffer was placed around the individuals in and near the site.

Where the unit of measure is "Area" the TBDC (Ecological Data, General Notes) and associated guidelines including the Microbat Survey guideline "'Species credit' threatened bats and their habitats NSW guide for the Biodiversity Assessment Method" was used.

If there is an area mapped as "Important Habitat" then this area within the Subject Land (Development Footprint) was used.

If there are no species-specific requirements, then the Operational Manual s5.2.5 was used and the "area supporting the habitat constraints relevant to the species in the vegetation zone(s)" or if there are no habitat constraints the entire Vegetation Zone the species is predicted to occur within, was used and confined within the Subject Land (Development Footprint).

The BAM requires descriptions of the species and any habitat constraints or microhabitats associated with the species that were used to make the Species Polygons as per BAM s5.2.5.8 and Operational Manual Stage 1 s4.4.5.

Eastern Cave Bat (Vespadelus troughtoni)

The unit of measure for this species is 'area of suitable habitat' and the 'Species Credit' Threatened Bats and their Habitats NSW Guide for the Biodiversity Assessment Method (DPIE 2021) states:

"The species polygon boundary should align with all PCTs on the subject land that are within 2 kilometres of identified potential roost habitat features, and with which the species is associated (as listed in the TBDC). Where breeding habitat is also present, an additional species polygon for the breeding habitat must include all breeding habitat on or within 100 metres of the subject land. The polygon must incorporate the habitat feature and a buffer of at least 100 metres wide (or 100 metres radius for point locations such as caves) with the breeding habitat features (may be multiple) as the centroid. Artificial structures should be inspected and included if the species is using these features for breeding."

Eastern Cave Bat: Breeding Habitat (Vespadelus troughtoni)

The TBDC General Notes for this species breeding habitat are:

*"All breeding habitat on or within 100m of the subject land and the area immediately surrounding the feature must be mapped. Artificial structures should be inspected and included on the map **if** the species is using these features for breeding. All habitat for this species should also be mapped if present. Species mapping polygon for breeding habitat must use high resolution aerial imagery and topographic maps to identify features on the subject land (caves, scarps, cliffs etc). Polygon boundaries must be at least 100m wide (or 50m radius for point locations such as caves) with the breeding habitat features (may be multiple) as the centroid (see Threatened Bat Survey Guide)."*

Swift Parrot (Lathamus discolor)

The constraints on the site are mapped in the Important Habitat Map area. Seen in Figure 5.2.

The TBDC General Notes for this species are:

"The species is a dual credit species, assessed for species credits (important habitat map) and ecosystem credits (all other areas the species is likely to occur). No survey is required if the subject land is on an important habitat map for a species unless the species profile in the TBDC states otherwise. The species is considered present and the part of the subject land that is within the important habitat map forms the species polygon used to generate species credits (BAM section 5.2.5 Box 2). Any remaining habitat on the subject land, e.g. unmapped locations used by these species is assessed for ecosystem credits. If the species is at risk of a serious and irreversible impact (SAII), the area mapped as important habitat is the area identified as a potential SAII and section 9.1 of the BAM must be addressed." (TBDC, Ecological Data Tab)

In summary, the map in Figure 5.2 contains 3 polygons. The Swift Parrot and Eastern Cave Bat species polygons cover the entirety of the subject land, therefore totalling 0.39ha in size (see Section 8.1.5 for justification). However, the level of impact to the subject land is split across management zones, with 0.14ha of the subject lands native vegetation being fully removed and 0.25ha of the subject lands native vegetation being partially removed (Figure 8.1). Therefore, the polygons for these species have been split, to reflect to difference in vegetation integrity score these zones will possess post construction

Eastern Cave Bat Breeding habitat is a separate entity, requiring a separate polygon with 100m boundaries from breeding habitat features. Since the length of the site from the western boundary with contains the crucial breeding habitat and the eastern boundary is greater than 100m (114.78m on northern boundary and 116.81 on southern boundary) see Figure 5.2.

6 Prescribed Impacts

As described in Chapter 6 of the BAM 2020.

See section 8.3 for identification and assessment of prescribed impacts.

Legend

113 Orchard St, Warriewood

- Property
- Subject Land (disturbance area) 0.38 ha
- Rock
- ECB Vt Species Habitat Polygon 0.39 ha

Aerial Image by: NSW Six Map Spatial Services Portal

- Swift Parrot Important Habitat Map

This is a Streamline Small Area BDAR assessment.
Habitat occurs for potential SAII Threatened Species (identified in Table 5.6).
No Potential SAII Threatened Ecological Community occurs.
Species Habitat Polygons are provided for:

Vespadelus troughtoni (Eastern Cave Bat) 0.36 ha
and
Lathamus discolor (Swift Parrot) as identified on the Important Habitat Map shown in purple, 0.36 ha.

Basemap is a aerial photo as required by BAM 5.2.5 and Operational Manual 1 4.4.5

Figure 5.2
Site, Threatened Credit Species Habitat Polygons

GIS Environmental Consultants
Ph: (02) 9939 5129, Mobile: 0419 438 672
ecology@ecology.net.au, ecology.net.au

Date: 22/2/2025
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 10 20 m

Stage 2: Impact Assessment

7 Avoidance and Minimisation of Impacts to Biodiversity Values

The Biodiversity Conservation Act (2017) requires that all Part 4 developments demonstrate how the proposal "Avoids" then "Minimises" impacts to Biodiversity Values. Chapter 7 of the BAM requires that the measures that were taken to Avoid and Minimise are documented in the BDAR report.

The BC Act (s 7.13(6)) allows the Consent Authority discretion over what measures are required in relation to avoiding and minimising impacts to Biodiversity Values. There is extensive caselaw on what is sufficient Avoidance and Minimisation and how it is to be documented.

Once impact minimisation and avoidance has been undertaken, then offsetting can be used as part of the mitigation of the residual impacts of the proposal on the environment. This report describes ecological constraints on this site these were provided to the owner and architect for their use in planning a development that avoids and minimises ecological biodiversity impacts on this sensitive site.

The BAM defines avoid as "measures taken by a proponent such as careful site selection, or actions taken through the design, planning, construction and operational phases of the development to completely prevent impacts on biodiversity values, or certain areas of biodiversity."

7.1.1 Ecological Constraints on the Property

Prior to finalising the proposal plans, the site was inspected to determine the presence of ecological constraints including Endangered Ecological Communities and Threatened species.

Ecological constraints were discussed with the proponent, architect and other expert consultants. The first 6 sections (Stage 1) including the maps of this report has been brought to the attention of the proponent and the other expert consultants.

The main ecological constraints that have been identified at the site are:

Main Biodiversity Values

- Central Coast Escarpment Moist Forest (PCT 3230)
- Native trees
- Hollow-bearing trees
- Dead wood and dead trees
- Ground logs
- Exposed sandstone boulders

The location and extent of these constraints are shown on the maps in Figures 2.4 and 5.2 and described in sections 2 to 6 of this report.

7.2 Avoidance of Impacts to Biodiversity Values

Avoidance of impact is the total removal of some type of impact.

As described in Chapter 7 of the BAM.

- *Assess alternative modes and technologies that were used to avoid and minimise impact.*
- *Assess alternative locations outside of the property*
- *Assess alternative locations inside of the property*
- *Identify alternative designs explored.*
- *Identify site constraints*

7.2.1 Alternative Permissible Footprint Locations Considered

The location of the house and buildings are limited by the physical constraints: steep slope of the land, setbacks and requirements for bushfire protection.

The alternative permissible footprint locations that were considered in previous DAs and in discussions with the owner are labelled Options 1-5 in Appendix D. They differ in the;

- Distance from the front boundary to the house;
- The APZ location;
- The design of the horse areas and

The amount of overlap of the APZ and other uses

Alternative permissible footprint locations are considered to impact the least amount of biodiversity for the given proposal. The limited opportunities for relocation of the buildings' footprints are described and assessed in Table 7.1 and shown in the Maps in Appendix D.

7.2.2 Comparison of Permissible Alternative and This Proposal

The proposal gathers and overlaps the footprints of APZ for the new dwelling, horse stables, yards, horse arena. The buildings are restricted to the eastern end of the site, closer to the road, due to the high biodiversity values in the western side of the property. The habitat features, such as large sandstone boulders and intact native forest, in the western part of the site are avoided. Discussions were held with the applicant to adjust the house location to minimise impact to native vegetation. See Appendix D to see the location of the alternative options considered and Table 7.1 for a comparison of the options.

7.2.3 Avoiding Fragmentation and Isolation

There is contiguous vegetation/habitat to the north, west and south as shown on the maps on Figures 2.2 and 3.6. The proposal will not fragment or isolate any areas of habitat.

7.2.4 Avoidance of Ecological Impact Summary

The proposal avoids ecological impact in the following ways:

- Design - modest house, reduced size arena,
- APZ reduced by improving the building standard for fire resistance BAL
- Placement location – clustering and overlapping APZ and compatible structures
- Technology – Wastewater dewatering is above ground
- The proposal (Option 3a) retains the most native vegetation habitat out of the options considered.
- The proposal (Option 3a) retains and manages 0.4 ha in accordance with a Biodiversity Management Plan.
- The proposal (Option 3a) takes advantage of the existing clearing and is consequentially in the location that maintains the highest level of habitat connectivity of the options considered.
- The proposal will not fragment or isolate habitat
- The proposal utilises the APZ for paddocks and stables

7.3 Minimising Impacts to Biodiversity Values

This section describes how the process of planning and the selection of the type of proposal, considers ways the proposal minimises ecological impact in the following ways as shown on the map in Figure 8.2:

- The proposal (Option 3a) has the smallest area of Biodiversity impact by reducing the least amount of native vegetation, including trees, compared to Options 1-5.
- A 0.4 ha Biodiversity Management Area at the western side of the site will be retained and protected during construction in accordance with the Biodiversity Management Plan (GIS Environmental Consultants).
- Environment Protection Fencing is to be installed around the Biodiversity Management Area.
- Tree protection fencing is to be installed and maintained as advised by the Arborist Report.
- Metal bollards are to be installed to permanently delineate the boundary of the Biodiversity Management Area
- Construction will be supervised by a Site Ecologist to minimise impact where possible.

Table 7.1 Avoid & Minimise Assessment of Development Options

113 Orchard St, Warriewood

To be read in conjunction with Maps showing options in Appendix D

Column1	Description	Ecological Considerations
Option 5	Large house at top of the property 100+m from road. Takes full advantage of the topography and LEP zoning of the property • Sea views • Sea breeze • Privacy • Full size paddocks • Full size arena • Will require and extensive driveway • Fire APZ boundary to boundary due to BAL • Extensive cut and fill • Onsite manure composting	• Removal of nearly all the trees on the property • Removal of nearly all the native vegetation/habitat on the property • Visual Impact from Warriewood • Largest Biodiversity Impact
Option 1	Previous DA house in central location 50m from front boundary • Large House • Reduced Views • Reduced breeze • Reduced paddock size • Reduced Driveway • Fire better fire resistance • Full Size arena • Onsite manure composting • Onsite sewer disposal	• Removal of most of the trees on the property • Removal of most the native vegeation/habitat on the property • Visual Impact from Warriewood • Large Biodiversity Impact
Option 2	House 40m from front boundary • Reduced Views • Reduced breeze • Reduced paddock size • Reduced Driveway • Fire better fire resistance • Full Size arena • Onsite manure composting • Onsite sewer disposal	• Removal most of the trees on the property • Removal of most the native vegeation/habitat on the property Removal of all the native vegeation/habitat on the property • Large Biodiversity Impact
Option 3a	Option proposed in s35 review application, house 38m from front boundary • Fire resistant building smaller APZ • Reduced Views • Reduced breeze • Reduced paddock area • Reduced size arena • Shorter driveway	• Reduced footprint • Least removal of native trees • Least removal of native vegetation habitat • Takes advantage of existing clearing • Utilises APZ for paddocks and stables • Manure removed offsite • Smallest area Biodiversity Impact
Option 3b	Same as option 3a with connection to sewer for both human and horse wastewater. Easment being negotiated but will take time. Likely future modification. • Sewage connection to sewer • Add horse washdown area to side of stable • Remove the wastewater EMA disposal area	Same as option 3a with. • Reduced footprint due to EMA • No smell or possibility of wastewater entering Council stormwater system • No ongoing costs • Smallest area of Biodiversity Impact
Option 4	House is within the front setback, stable to resemble a house. • Presents as a suburban houses similar to houses opposite. • Loss of privacy • Needs a second driveway for access	• Small area of Biodiversity Impact

7.3.1 Minimising Loss of Native Trees

Trees to be retained will be protected by fencing during construction in accordance with the arborist report. To see a map of all trees to be retained and removed, refer to Figure 2.4 and 2.5 and the Tree Removal Plan Appendix G.

The tree removal assessed varies from the Arborist report in the following ways, Trees 41, 42, 49, 58, 60, 91, 95, 97, 119 and 120 are considered not to be impacted by the low narrow 200x200m clean water diversion mount as there is no digging and there is no other impact to these trees and these trees are retained.

Bushfire APZ requires removal of trees 25, 36, 37, 38, 39, 40, 43, 72, 80, 92, 94, 112, 113 to meet the tree canopy limit within the APZ.

Not all the trees on the site have been surveyed, with trees along the western boundary being excluded as they are not close enough to the site to be impacted in any way. This means that while the retention rate of surveyed native trees sits at 88 of 150 (59%), this retention rate will increase due to the inclusion of unsurveyed trees, minimising the total percentage of native tree loss across the entire property.

Trees in the edge of the Biodiversity Management Area that are not a threat to life or are directly in the excavation area will not be removed unless they die. This may allow additional trees to be retained, even if they are currently scheduled for removal.

Appendix G is a Tree Removal Plan that shows the trees to be removed and the trees to be kept due to this proposal.

Appendix H is a Tree Canopy retention within the APZ plan that shows how the APZ tree canopy maximum will be achieved.

7.3.2 Minimising Extent of Loss of Habitat

The extent of the proposed native vegetation disturbance is 0.39 ha as shown on the map in Figure 8.1 of which 0.25 ha will have 15% of the tree canopy retained.

The extent of the APZ is the minimum required by PBP and the RFS letter and the fire report.

The intensity of the clearing for the APZ is the minimum required by PBP and the RFS letter and the fire report.

A 0.4 ha Biodiversity Management Area will be established and maintained to protect habitat from encroachment and accidental impacts.

Metal bollards are to be installed to permanently delineate the boundary of the Biodiversity Management Area.

Ground logs provide habitat for a range of threatened species and are recommended to be retained and spread around the property outside of the development footprint.

Retention of Hollow bearing trees has been prioritised, with 5 of the 6 hollow bearing trees set to be retained and protected (Table 8.2).

The location on the site and the extent (size) of vegetation impact is shown on the maps in Figure 2.4, and the amount of impact (Construction Footprint) of each type (Management Zone) is shown on the map in Figure 8.1 and summarised in section 10.1.

7.4 Mitigation of Impacts to Biodiversity Values Proposed in this DA

7.4.1 Sediment Control

- The Soil Conservation Act discourages the removal of vegetation including trees on slopes greater than 18 degrees may not be removed (or pruned more than 25% of the original canopy) except in accordance with conditions identified in a Geotechnical Engineer Assessment Report undertaken for that purpose.
- Landowners have a duty of care in the appropriate management of soil erosion and landslip risks when clearing trees and vegetation. Landowners who clear trees and vegetation under a DA approval or for bushfire protection are not exempt from liability. It is the responsibility of landowners to seek expert advice in relation to these matters. The requirements below have been recommended to assist landowners in the management of vegetation on their land operating in accordance with these conditions does not absolve the landowner from their responsibility for landslip and erosion issues. To manage soil erosion and landslip risks on land with a slope greater than 18º:
    - there is to be no disturbance of the soil,
    - vegetation must not be removed below the soil surface
    - all topsoil must remain on the soil surface,
    - retain a protective ground cover on the soil surface, and
    - the use of graders, ploughs, bulldozers (or other types of heavy machinery that are designed to break the soil surface such as excavators) to establish or maintain an APZ is not permitted.
- The Blue Book (Landcom) standards for sediment control are to be used to prevent sedimentation of the stormwater flowing from the construction site into the downslope Warriewood Wetlands.
- Landowners have a duty of care to avoid cruelty and harm to native, introduced or domestic animals when clearing trees and vegetation. Landowners who clear trees and vegetation are not exempt from prosecution under the *National Parks and Wildlife Act 1974* for harm to protected fauna, or for deliberate cruelty to animals under the *Prevention of Cruelty to Animals Act 1979*. A DA approval does not absolve the landowner from their responsibility for avoiding harm to protected fauna or deliberate cruelty to animals. Note: 'protected fauna' is as defined in the *National Parks and Wildlife Act 1974*. If you witness any displaced, orphaned or injured wildlife you should contact the Office of Environment and Heritage, or licensed fauna rehabilitation group for assistance. Visit the Office of Environment and Heritage for further advice and the full list of licensed providers.

7.4.2 Tree Hollow Management

The proposed removal of a hollow-bearing tree from the site should be done in accordance with the following best practice guidelines:

- Artificial tree hollows are to be installed prior to any clearing commencing under the supervision of a suitably experienced ecologist.
- The hollow replacement with nest boxes is specified in the Biodiversity Management plan.
- Hollow bearing tree (T65) to be removed should be sectionally dismantled and soft felled (location in Appendix G, information in Table 8.2).
- Where tree hollows cannot be retained due to the proposed works, artificial hollows are to be provided using existing tree limbs, supplemented by other materials as necessary. These artificial hollows should be located away from construction activity in areas likely to provide habitat for arboreal mammals and installed prior to any works commencing.
- Additional artificial hollows should be provided in compensation at a rate of two artificial hollows for every natural tree hollow removed.
- The design, construction, and installation of artificial hollows should be carried out in accordance with best practice protocols.

7.4.3 Landscape and Tree Protection

- Tree protectipon during and after construction is specified in the Arborist report.

- The location of the Temporary Constriction Environment Protection Fence and the permanent APZ delineation bollards are shown on the maps in Figures 2.4b and 8.3
- These environmental no-go zones are to be maintained throughout the construction and demolition periods. Particular areas of concern in this regard are to the west of the construction footprint. Tree protection signage should be attached to each tree protection zone and displayed in a prominent position.
- Vegetation clearing must not occur within the designated no-go zones. Any toolbox or site induction for the project should include reference to these no-go zones to avoid harm being caused to these patches of existing vegetation. Vegetation clearing outside of the designated no-go zones should be limited to the trees granted Council consent for removal, groundcover removal, and the removal or management of Weeds of National Significance and NSW Priority Weeds. If any damage occurs to vegetation outside of the immediate works area, the Project Manager should be notified so that appropriate remediation strategies can be developed.

7.4.4 Environment Protection Fence During Construction

The proposal requires that during construction there is to be a temporary 1.8m panel Environment Protection Fence, with A4 size water proof signage every 4 metres describing the prohibition of access (except for surveying and ecological conservation and monitoring works) in the location shown on the map in Figure 2.5.

7.4.5 Fauna Rescue

A qualified ecologist should be present on-site prior to and during vegetation removal activities to ensure works are in line industry best-practice techniques and to ensure steps are taken to minimise harm to protected and threated fauna. These steps include:

- The vegetation to be cleared should be surveyed by the ecologist immediately prior to clearing works to identify the presence of any fauna.
- The ecologist should have ready a cage to hold and transport any injured wildlife to WIRES or a local veterinary practice, blankets or hessian sacks to assist in capture, heavy-duty gloves to prevent scratches and bites, and a warm water bottle to provide warmth to any captured fauna if need be.
- Each tree containing fauna or hollows should be carefully shaken by suitable construction machinery prior to felling or sectionally dismantled by chainsaw (depending on method of felling). If fauna appear at this point, it should be allowed to relocate of its own accord or captured in the case of injury.
- Each tree felled should be inspected for hollows. Any hollows identified will be thoroughly checked for residing fauna.
- After a tree is felled, if fauna appear, attempt to capture with a blanket or sack and place in cage. Otherwise retreat and allow fauna to relocate of its own accord.
- Assess condition of captured fauna and relocate if healthy. If fauna is injured or appear distressed, cover cage with a blanket, inform WIRES and/or local veterinary practice and transport as soon as practicable. Keep injured wildlife warm and in quiet environment to lower stress levels.
- If any fauna species, or a nest or roost are located during clearing, then works should cease until safe relocation can be advised.
- If microbats appear, capture and place in hessian sack to be relocated in dark environment safe from predators and release after dusk that evening.
  Should fauna approach the work site, cease clearing works until fauna relocate. Avoid making loud noises to encourage relocation.

7.4.6 Weed Management

- The site contains several NSW State Priority Weeds. These are listed in Table 4.1 and 4.2 along with the General Biosecurity Duty of land managers (including landowners) under the *Biosecurity Act 2015* and the parts of the plant which pose a risk of dispersing the weed species.
- Areas within the immediate works area containing State Priority Weeds must be managed and suppressed using current best practice guidelines and protocols under the *Biosecurity Act 2015*. The site demolition and vegetation removal phases of the project provide the ideal opportunity for the removal of many of these weeds and their propagules.
- Following weed removal activities, all weeds and topsoil material likely to be infested with weeds must be bagged, removed from site within a week, and disposed of at a licensed waste disposal

facility. To minimise spread of weeds from one site to another it is important to ensure that footwear, tools, and vehicles are always clean on arrival and departure. Follow up treatment is likely to be required to suppress the regeneration of these weeds from remnant propagules.

7.4.7 Erosion and Sediment Control

It is recommended that an Erosion and Sediment Control Plan be developed to limit any erosion during construction or demolition works for the development. This plan should detail specific measures to control sediment, nutrients, and weeds being spread into the surrounding bushland by runoff.

8 Assessment of Impacts

As described in section 8.1 and 8.2 of the BAM 2020 and section 6.12(b) of the BC Act.

8.1 Direct Impacts

8.1.1 Proposal Description

In general, the development application seeks approval for demolition of an existing house and construction of a replacement dwelling house, horse arena, stables, and paddocks with landscaping. The extent, layout and location of the proposal is shown on the maps in Figure 2.4. Specifically, the proposal is for:

- Demolition of the existing wooden dwelling;
- Earthworks including removal of topsoil, soil and rock, depositing fill to establish 3 levels, a horse arena at RL 24m, horse stables and yard at 28.5m and the new dwelling at 32m.
- Installation of gabion retaining walls;
- Construction of a replacement detached 4 bedroom dwelling house with plunge pool;
- Construction of horse stables, horse arena, facilities and paddocks;
- Driveway;
- Establishment of a fuel reduced bushfire Asset Protection Zone (APZ);
- Maintenance of a Biodiversity Management Area at the western end of the site, managed in accordance with a Biodiversity Management Plan;
- Landscaping including, paths retaining walls and planted screening;
- Environment protection fencing to prevent damage to biodiversity values to be retained;
- Landscaping;
- Establishment and maintenance of an on-site effluent management area; and
- Landscaping.
- Establishment of an on-site effluent management area;
- Offsetting of the ecological impact of the proposal by paying for retirement of biodiversity offset credits in accordance with the Biodiversity Offset Scheme that is part of the Biodiversity Conservation Act.

The proposal is shown on the maps in Figure 2.4.

8.1.2 Proposal Ecological Impact Outline

The likely ecological impacts of the proposal will be:

- Removal of **0.14 ha** of Central Coast Escarpment Moist Forest (PCT 3230) including all trees, shrubs ground cover, leaf litter and topsoil (in the area shown in Red Stripe on Figure 8.1) for the dwelling, driveway, horse arena, stables and associated structures (Management Zone VZ1MZ1Full);
- Partial removal of **0.25 ha** of Central Coast Escarpment Moist Forest (PCT 3230) including reducing the tree canopy to 15% to meet the requirements of PBP 2019 and removal of all

shrubs ground cover, leaf litter (in the area shown in Blue Stripe on Figure 8.1) for the bushfire APZ, onsite sewage disposal, and landscaping (Management Zone VZ1MZ2Part);

- Earthworks including cutting an filling;
- The removal of trees;
- Tree protection and retention;
- Removal of tree hollows;
- The offsetting of the ecological impact of the proposal by paying for retirement of biodiversity offset credits in accordance with the Biodiversity Conservation Act;
- Changes to water flows due to retaining walls, diversion mounds and other drainage infrastructure;
- Sedimentation during construction
- Ongoing sedimentation, nutrients leaving the site and weed spread
- Planting of native and/or non-native plant species;
- Installation of permanent bollards to delineate the boundary of the bushfire APZ;
- Front fencing;
- There may be additional unmapped impact due to construction stockpiling, storage, sediment control during construction.
- Additional unmapped impact due to trenching for connection of utilities such as sewage, water and gas.
- Occupation of the new dwelling;
- Temporary construction lasting up to 2 years;

The extent and location of the ecological impact of the proposal is shown on the map in Figure 2.5.

The impact of the proposal is further described and quantified in section 8.2.

8.1.3 Mitigation of Impact During Construction

There are biodiversity values in the area of the proposal that may be impacted during construction. It is difficult to predict all the construction impacts that may occur during construction. This additional impact could be planned to be mitigated by construction site supervision. Measures to mitigate construction impact and ongoing impact are in section and Figure 8.2 of this report and in the arborist report and are shown on Figure 8.3. There is a mechanism in the BAM to allow calculation of unexpected impacts should it be needed. This Development Application is also accompanied by a Biodiversity Management Plan (BMP) by GIS Environmental Consultants dated 28th February 2025.

Proposed Ecological mitigation is:

- Temporary Environment protection fencing during construction;
- Temporary tree protection fencing during construction;
- Temporary sediment fencing during construction;
- Ecological induction of construction workers;
- Installation of 2 nest boxes;
- Ecologically sensitive establishment of the Asset Protection Zone (APZ);
- Fauna rescue during tree removal;
- Permanent tree trunk protection to prevent horses damaging trunks;
- Permanent environment protection bollards to prevent damage to biodiversity values to be retained;
- Clean water diversion mound to prevent clean surface water entering the construction, horse keeping, sewage disposal and landscaped areas;
- Bioswale planted with native plants to filter fine sediment and remove nutrients;
- Maintenance of an on-site effluent management areas;

- Biodiversity Management during construction and for a period of minimum of 5 years of maintenance; and
- Monitoring of environmental works.

8.1.4 Vegetation Loss

The area of vegetation to be removed is shown and quantified on Figure 8.1 and summarised in section 10.1.

The proposal footprint will disturb 0.39 hectares of native vegetation from the whole property (0.97 ha) for the construction of the new house, horse stables, arena, paddock areas and wastewater disposal. This area is shown as VZ1MZ1Full on the map on Figure 8.1.

VZ1MZ2 will be thinning of native canopy from 90% to 15% to meet APZ requirements for bushfire protection.

The footprint of the proposal including construction of new dwelling, stables, horse arena and driveway will disturb 3900m^2 of PCT 3230 (See Figure 2.5). The proposal is likely to completely remove 1400 m^2 of the Central Coast Escarpment Moist Forest (PCT 3230) from the site and disturb an additional 2500m^2 within the development footprint.

This impact assessment and the calculation of offsetting credits assumes the Asset Protection Zone will be managed in accordance with *Standards for Asset Protection Zones*.

The remaining vegetation on the site, including the Biodiversity Management Area, is not likely to be impacted by the proposed plans.

8.1.5 Tree Loss

The arboricultural impact assessment by Matthew Laurence and Allison Mertin of L&Co assessed 163 trees on the site. The proposal will remove 62 trees from the development footprint.

The locations of tree trunks are shown on the map in Figure 4.1 and Appendix F. The native (native to NSW) trees are shown using green tree symbols, non-native trees shown using blue tree symbols and any dead or missing trees are also shown. The tree numbering in the table below is based on the numbering used in the arborist report, and an additional figure showing location of all trees surveyed within the site with their associated number can be found in Appendix F. The map in Appendix F also shows trees to be removed denoted by a black cross (**X**), and trees to be kept are shown with a green circle.

This report assumes that all recommendations in the arborist report will be followed and that these measures will prevent harm to these trees and the trees will continue to be part of the ecological community and provide habitat.

This plan varies from the Arborist report in the following ways, Trees 41, 42, 49, 58, 60, 91, 95, 97, 119 and 120 are considered not to be impacted by the low narrow 200x200m clean water diversion mount as there is no digging and there is no other impact to these trees and these trees are retained.

Bushfire APZ requires removal of trees 25, 36, 37, 38, 39, 40, 43, 72, 80, 92, 94, 112, 113 to meet the tree canopy limit within the APZ.

In this report the canopy cover will be calculated to be reduced from 90% to 15% in the VZ1MZ2 area (0.25 ha), and reduced to 0 in VZ1MZ1 area (0.14 ha) as shown in Appendix G.

Table 8.1 Tree Removal Summary

Impact Reason	Native to NSW	Non-native	Dead/Missing	Total
Keep, Retain and Protect	7, 9, 10, 24, 26, 28, 41, 42, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 73, 74, 75, 76, 77, 78, 82, 90, 91, 93, 95, 97, 98, 99, 100, 101, 102, 103, 104, 105, 107, 108, 109, 111, 113, 114, 116, 118, 119, 120, 121, 122, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 145, 147, 149, 150, 151, 152, 153, 154, 155	2, 3, 160, 162, 163, 106		
Remove - due to Construction as per arborist report and various plans. Impact Requires Assessment if Native	5, 8, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 43, 64, 65, 66, 67, 68, 69, 70, 71, 72, 79, 80, 81, 83, 84, 85, 86, 87, 88, 89, 92, 94, 96, 110, 112, 115, 117, 124, 146, 148, 156, 157, 158	1, 4, 6, 159, 161	123, 144, 106	
Total	**150**	**10**	**3**	**164**

Definitions for table above and figure

***Weeds** = non-native that is either a Priority Weed on the Regional Weed Plan, WONS, high-threat weed (HTW) or an environmental weed. See Weeds section.

Keep, Retain and Protect – trees to be retained and protected during construction and for the life of the development. These trees will need to be certified as being present and healthy prior to the issue of the Occupation Certificate. This ecological impact assessment report relies on these trees not being impacted.

Proposed to be Pruned - as per arborist report. Partial Impact Assessed. The proportion of the canopy that will be removed need to be assessed.

Remove - Exempt from DA assessment due to hazard to existing building as per arborist report. Impact Assessed by separate application – trees that the arborist considers dangerous to the current occupants of the existing house. An application to remove such trees needs to be lodged before DA submission and approval will need to be attached to this report. This tree impact is not included in the BAM assessment.

Remove for Bushfire Protection (APZ) as per bushfire report. Impact Requires Assessment – trees that are required to be removed for bushfire protection as required by the bushfire report that is part of the DA.

Remove due to Construction as per arborist report and various plans. Impact Requires Assessment – trees to be removed to accommodate the proposed development and as part of construction as described by the arborist report and shown other DA plans. LEP/DCPs sometimes exclude some tree species from requiring assessment. These are weedy species. If they are native trees, they still require assessment under the BAM 2020.

8.1.5.1 Hollows and other habitat trees

As defined by the BAM:

Hollow bearing tree: *a living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. solid wood cannot be seen beyond the entrance);*

and (d) the hollow is at least 1 m above the ground. Trees must be examined from all angles.

Tree # 113 has a hollow that contains a family of sugar gliders (*Petaurus breviceps*) which have both been observed in the field survey as well as through camera trap footage of this tree. This tree must not be removed as it would impact the breeding habitat of this protected species. Thus, it is proposed to retain this hollow as current plans propose it is situated within a horse paddock.

A total of 6 hollow bearing trees were observed during the field survey (seen on the map in Figure 4.1). Table 8.2 below shows a summary of hollows with tree number, whether they are staying or going, their dimensions and height off ground, and their ecological significance. It is recommended that these trees be retained if possible.

It is assumed there are likely many more hollows present across the site that are not visible from ground level.

If any other hollows that are not currently proposed to be removed, become planned for removal then the impact to Threatened fauna in this report will need to be reassessed.

Table 8.2 Tree Hollow Summary

Tree & Hollow Number	Height off the Ground (m)	Dimensions (mm diameter)	Evidence of Occupation	Suitable for Target Threatened Species	To be Kept or Removed
113, H1	1m	73 x 55	Yes	Yes, small birds and gliders	Keep
65, H2	4m	70 x 70	No	Yes, small birds and gliders	Remove
60, H3	5m	approx. 90 x 100	No	Unclear	Keep
41, H4	9m	approx. 100 x 100	No	Unclear	Keep
24, H5	1m	80 x 80	No	Unclear	Keep
n/a, H6	5m	approx. 130 x 100	No	Unclear	Keep

The proposal involves the removal of at least one hollow-bearing trees, T65, which contains one hollow suitable for small birds and gliders. A minimum of 1 microbat and 1 small mammal nest box are to be installed on the site. The next boxes must be installed in Zone A and the Project Ecologist is to choose which trees they are installed to. The trees should be large, of a good size and rough-barked for ease of climbing. The two new artificial nest boxes should be similar size to the hollow being removed (70mm x 70mm).
Further detail can be found in the Biodiversity Management Plan (BMP by GIS Environmental Consultants dated 28th February 2025.

Photo Page 3 - Tree Hollows

Photo 1. Sugar glider hollow within plot

Photo 2. Hollow bearing tree within plot

Photo 3. Hollow bearing tree outside plot

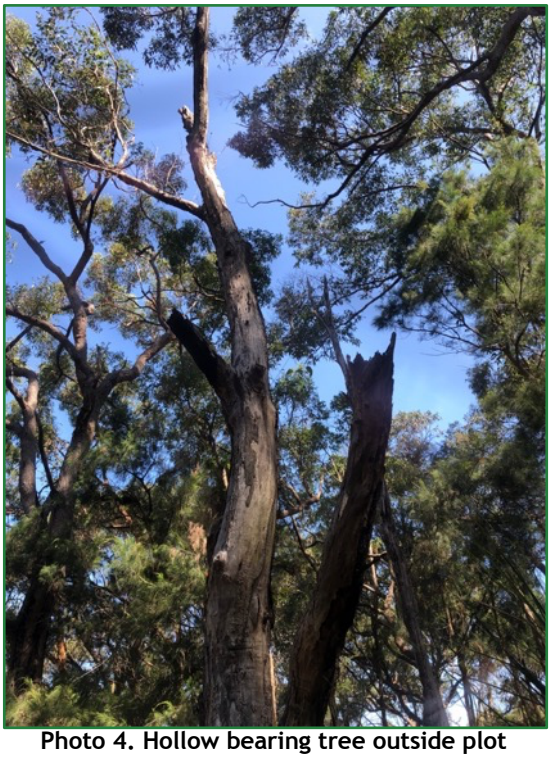


Photo 4. Hollow bearing tree outside plot

8.1.6 Impact to Threatened Species and Their Habitat

Most of the area being impacted contains a tree canopy cover, restricted to Vegetation Zone 1, and an abundance of native grasses and forbs in both Vegetation Zone 1 and Vegetation Zone 2. These areas contain habitats possibly suitable for foraging, feeding and as a breeding habitat for threatened fauna and flora species. The Ecosystem Credits species and Species Credit Species (flora and fauna) are listed in Tables 5.3, 5.4, 5.5 and 5.6. The Impacts to the candidate Threatened Species that are likely to occur at the site are described in Table 5.4.

8.1.6.1 Loss of Rock Features

The site contains some reptile habitat with rock ledges, caves, overhangs and crevices. The proposed development involves the removal of some bush rock and sandstone features within the development boundary which will result in partial removal of this habitat. Where possible, sandstone floaters are to be retained and moved to an area outside the development footprint. These are also very good in permanently removing bushfire fuel loads.

8.1.6.2 Large-eared Pied Bat (Chalinolobus dwyeri)

A Target Species Survey for Large-eared Pied Bat was conducted after 16 historical BioNet records, in combination with its status as a BAM candidate species, suggested its presence on the site. While this bat was previously assumed present, this survey recorded the Large-eared Pied Bat as not present, hence its exclusion from credit calculations or species polygons, further justification can be found in table 5.6.

As no Large-eared Pied Bats occur onsite, the development site does not contain suitable foraging habitat or breeding habitat for the Large-eared Pied Bats and the development will have no impact on this species.

8.1.6.3 Miniopterus orianae oceanensis (Large bent-winged Bat) and Miniopterus australis (Little bent-winged Bat)

Despite their presence in the Target Species Survey, no breeding habitat was present on the site for *Miniopterus orianae oceanensis* (Large bent-winged Bat) and *Miniopterus australis* (Little bent-winged Bat). While this excludes them as a species credit species, they will still be included as an ecosystem credit species (Table 5.3).

While this development will impact the foraging habitat of *Miniopterus orianae oceanensis* (Large bent-winged Bat) and *Miniopterus australis* (Little bent-winged Bat), with the full removal of 0.14ha and partial removal 0.25ha of foraging habitat for this species, impacting a total of 0.39ha, it has no impact on their breeding habitat, and they will not be counted as Species Credits.

8.1.6.4 Southern Myotis (Myotis macroparcus)

Southern Myotis was potentially recorded using the site as foraging habitat in the Bat Survey Recordings, and per the recommendations made in Appendix F, further analysis of the sites subtility for Southern Myotis was considered. The conclusion being that suitable foraging habitat for Southern Myotis was not located on the site.

Foraging habitat which is suitable for Southern Myotis is defined by a 200m buffer around a 3m wide permanent water body. Two potential waterbodies occur adjacent to the site, being Mullet Creek and Irrawong Waterfall.

Mullet creek runs approximately 190-200m southwest of the site, however its perennial nature means it is not a permanent waterbody 3m or wider and does not qualify as Myotis habitat. Irrawong Waterfall and the connected waterhole is highly suitable habitat, but it occurs 207m southwest of the development site (Refer to Map A), just outside the recommended buffer.

Additionally, while site contains hollow bearing trees, it does not contain caves or mines, so no potential breeding habitat is within the property or impacted area.

Therefore, the development site does not contain suitable foraging habitat or breeding habitat for the Southern Myotis as defined by the TBDC and the Bat Guidelines 2021. Regardless, considerations will be made to minimise the developments impact on foraging habitat within the property's conservation zone, as per the BMP, to mitigate any potential harm to this species.

8.1.6.5 Eastern Cave Bat (Vespadelus troughtoni)

The Eastern Cave Bat has been confirmed utilising the site during the Bat Survey recordings. The site contains suitable foraging habitat for this species which will be impacted by the removal of trees and

construction within the development footprint. The western end property contains sandstone escarpment with rock overhangs and cliffs, providing roosting and breeding habitat. In addition to this, there are potentially many sandstone and rock formations within 2km of the site, such as Irrawong Waterfall, which meet the definition of Eastern Cave Bat roosting habitat.

As the Eastern Cave Bat is associated with the PCTs 3230 and 3592 which occur onsite, and the site occurs within 2km of roosting habitat features (As per the TBDC), The proposal may impact this species and this species is assessed in the BAM-C calculation.

The proposal will fully remove 0.14ha and partially remove 0.25ha of foraging habitat for this species, impacting a total of 0.39ha.

As the Eastern Cave Bats breeding habitat is an SAII, it requires a secondary polygon and separate considerations.

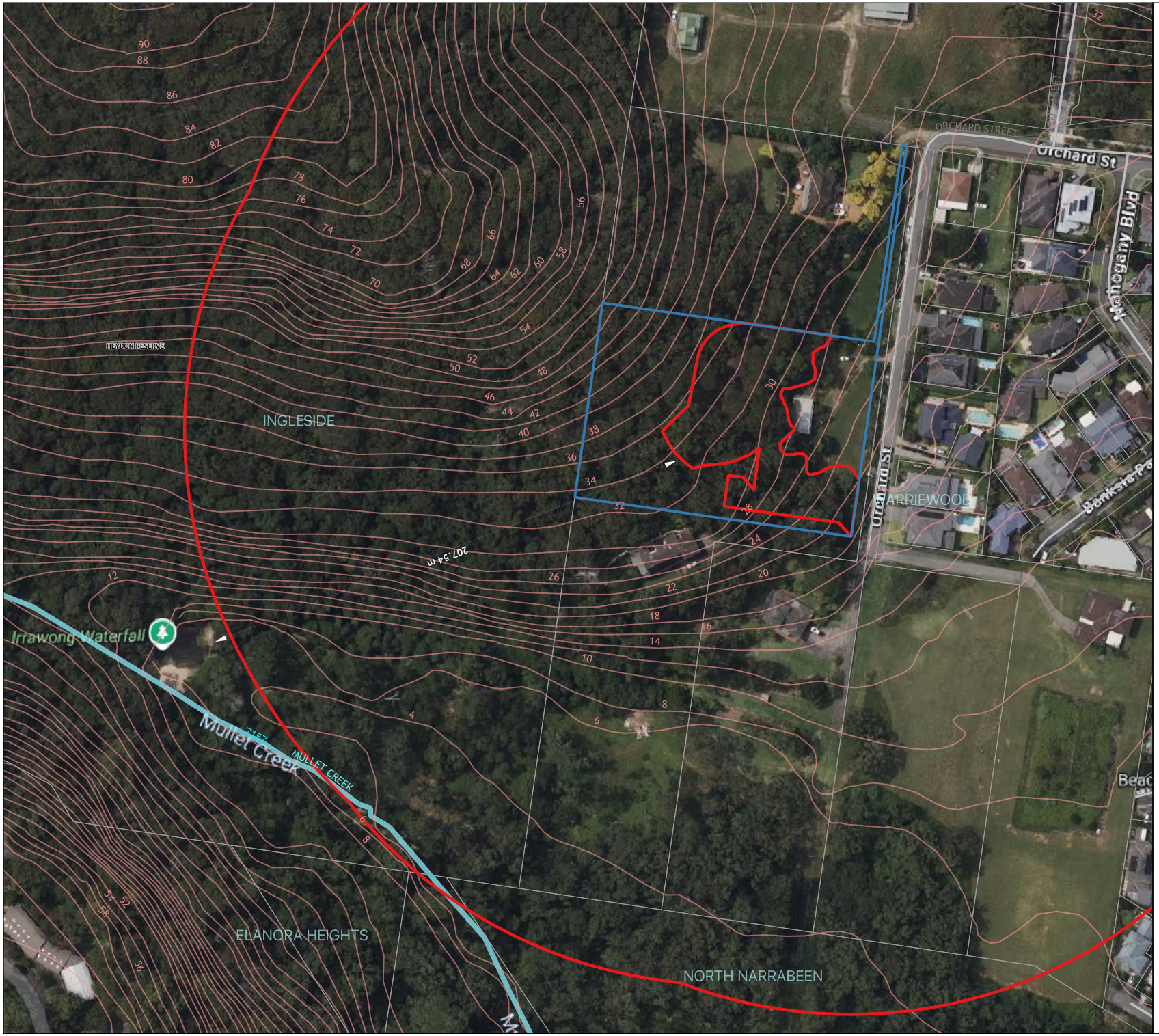
The sandstone escarpment at the western end of the property will not be impacted in during this development. This key landscape feature will be protected through the construction process and the surrounding vegetation will be managed and maintained in accordance with the BMP.

8.1.6.6 Swift Parrot (Lathamus discolor)

The site contains native trees and habitat that is suitable habitat for the Threatened species, Swift Parrot. Swift Parrots breed in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW, Swift Parrots mostly occur on the coast and southwest slopes.

No Swift Parrots were observed during the surveys; however, the site is located inside the Swift Parrot Important Habitat Map see the map in Figure 5.2. No survey is required if the subject land is on an important habitat map for a species unless the species profile in the TBDC states otherwise. The species is considered present and the part of the subject land that is within the important habitat map forms the species polygon used to generate species credits

See a summary of offset credits in Section 8.2 below.



Legend

Distance to Waterhole

113 Orchard St, Warriewood

- Property
- 200m buffer Subject Land
- Subject Land (Disturbance to Native Vegetation) 0.37
- Cadastre

Elevation

- Contour 2m

Road

- Local Road

Drainage

- Watercourse Perennial

Google Labels

Aerial Image by: NSW Six Map Spatial Services Portal

Map A
Distance to Irrawong Waterhole

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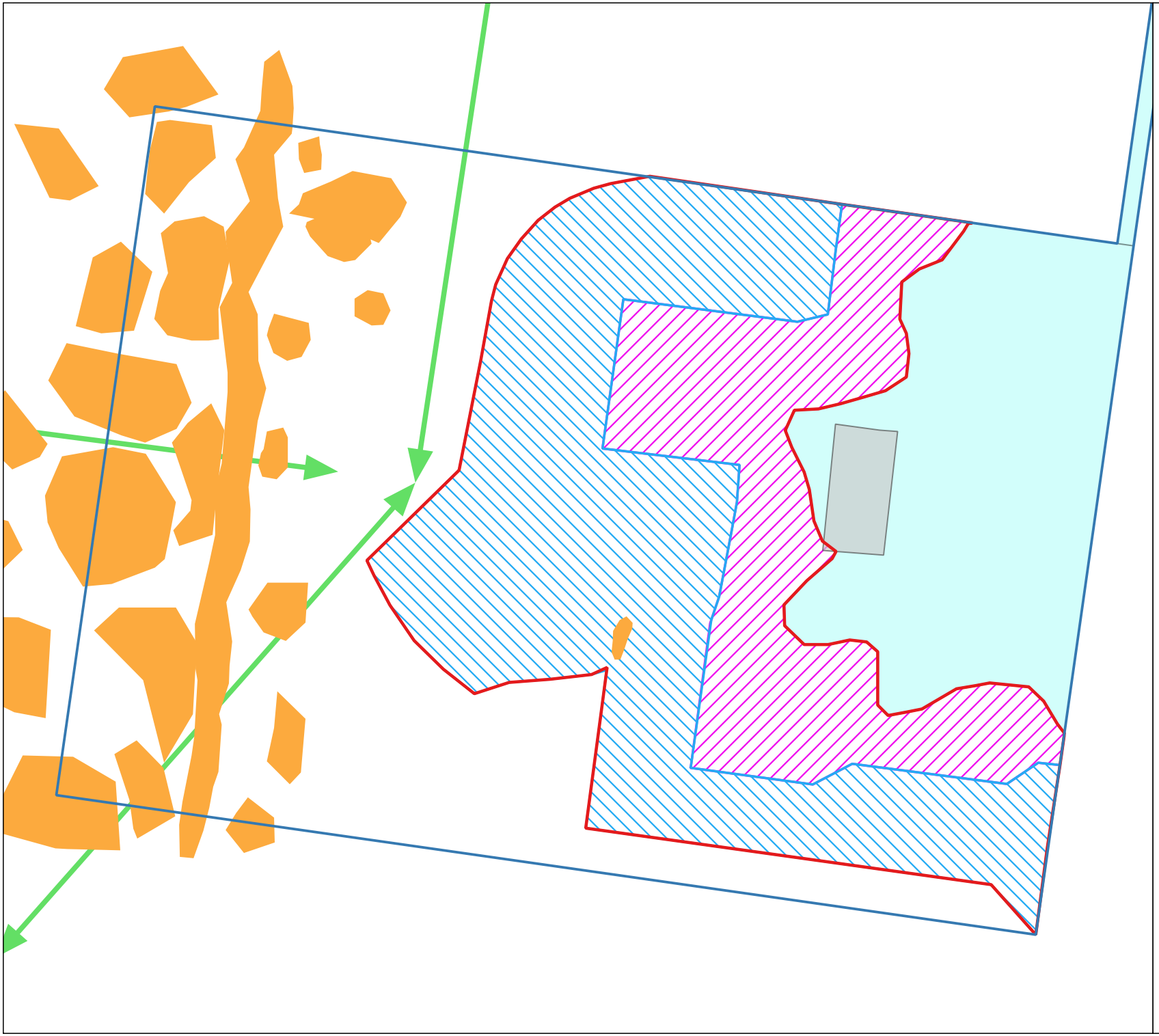
Date: 21/2/2025
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 30 60 m



Legend

113 Orchard St, Warriewood

- Property
- Subject Land (disturbance area) 0.38 ha
- Rock
- Existing House
- Connectivity

Management Zones

- VZ1MZ1Full 0.14 ha
- VZ1MZ2Part 0.25 ha
- Not Native 0.18 ha

The following Prescribed Impacts (BAM Sections 6 and 8, see Table 8.3) occur at or adjacent to this site:
- Rocks and outcrops
- Existing Human-made structures
- Non-native vegetation
- Water bodies, water quality
- Habitat connectivity

The following Prescribed Impacts do not occur on this Site:
- Wind farm developments
- Vehicle strikes
- Hydrological processes
- Karst, caves, crevices, cliffs, rocks and other geological features of significance

Figure 8.1
Impacts to be Offset (Management Zones) and Perscribed Impact Features

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Date: 22/2/2025
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 10 20 m

8.2 Indirect Impacts

Indirect Impacts listed in Section 8.2 of the BAM 2020 and Section 2.4 of the Operational Manual (Stage 2) have been assessed in Table 8.4 and the location of potential indirect impacts are assessed in table shown on the map on Figure 8.2.

The western end of the site is proposed to be a Biodiversity Management Area (0.4ha) that will be managed in accordance with the accompanying Biodiversity Management Plan. The proposed urban area is downslope of the bushland. Any flow of weed propagules or nutrients or change in hydrology will not flow into the bushland to be retained.

Nutrients leaving the site

Nutrients from the site may flow from the site downstream into Warriewood Wetlands and Narrabeen Lagoon causing eutrophication in the waterways leading to algal blooms, which effects the ability of a range of piscivorous species to feed themselves.

The nutrient poor sandstone soil of the locality accommodates native plants that have evolved to be highly sensitive to elevated levels of Nitrogen and Phosphorous. Increases in these nutrients is likely to kill native plants and create a soil environment for weeds to proliferate in.

The proposal now includes Clean Water diversion mound, bioswale. These are shown on the maps in Figure 2.4b and 8.3.

Due to the site's close proximity to Mullet Creek (Figure 3.1), any unintentional sediment runoff or other construction related pollution during a heavy rainfall event could inadvertently negatively impact the quality of this perennial waterway and have additional downstream effects.

Inadvertent impacts on adjacent habitat or vegetation

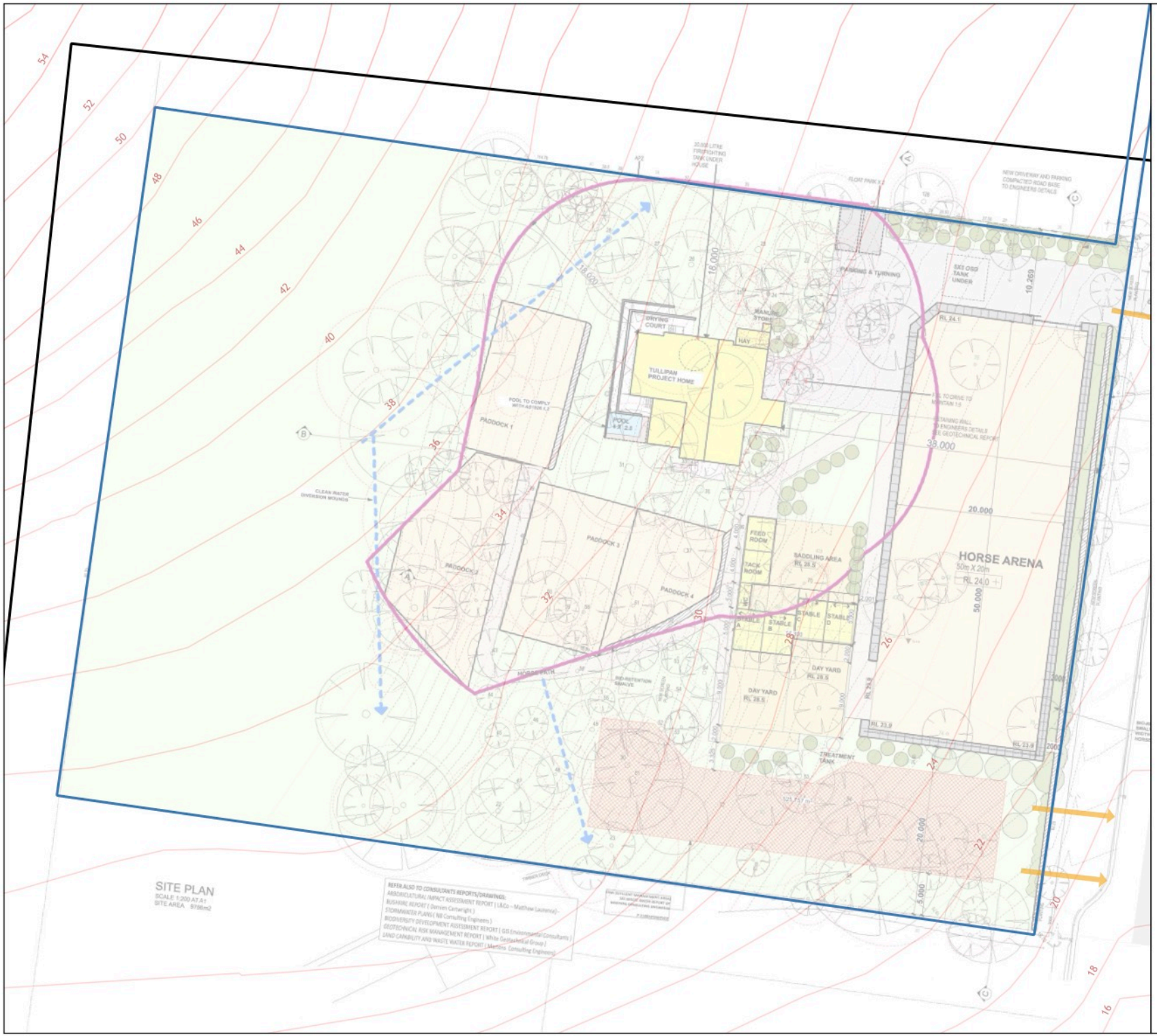
The proximity of the development footprint to native trees proposed to be retained poses a risk from encroachment and accidental impact. The arborist report provides tree protection fencing information and instructions to safely retain trees. The vegetation to be protected is above the development site and it is unlikely that it will be impacted.

Tree trunk protection and permanent APZ delineation bollards to avoid indirect impacts. These are shown on the maps in Figure 2.4b and 8.3.

Reduced viability of adjacent habitat due to noise, dust or light spill

Impact by noise, dust and light during construction is unlikely to be important due to restrictions on construction timing.

See Table 8.3 for further information on the potential for indirect impacts.



Legend

113 Orchard St, Warriewood

Property

Stormwater Leaving Site

Elevation

Contour 2m

The habitat to be retained on the site is upslope of the Development Footprint which will reduce indirect impacts during construction and ongoing edge effects.

There may be downslope impacts due to sediment and nutrients in stormwater runoff from the horse areas that are on a steep slope.

Table 8.4 details and then assesses the indirect impacts in accordance with section 8.2 of the BAM.

Basemap is the Site Plan

Figure 8.2
Site, Indirect Impacts

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Date: 22/2/2025
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 10 20 m

Table 8.3 Identification and Assessment of Prescribed Impacts

113 Orchard Street, Warriewood

by GIS Environmental Consultants

This table addresses division 6.1 of the Biodiversity Conservation Regulation 2017, section 8.3 of the Biodiversity Assessment Method and the Biodiversity Assessment Method Operational Manual

The TBDC and other sources were used to assess the impact of this proposal on the Threatened species (BC Act).

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Potential Prescribed Impact from BAM s6 & 8	Prescribed Impact Feature Location on this Site	Threatened Species Potentially using this Habitat	Importance of the habitat present	Nature, Extent and Duration of Impacts	Prediction of Consequences of Impact	Conclusion and Recommendation regarding Prescribed Impact
Impact to Karst, caves, crevices, cliffs, rock platform or other geologically significant features	There are no crevices and small cliffs or overhangs in the Development Footprint. There are no proposed impact to rock features. See Figure 8.1	Microbats, Broad-headed Snake	None	No impact proposed	No impact proposed	This proposal will not result in this Prescribed Impact. No additional credits are recommended for this Prescribed Impact. Recommendations to ameliorate impacts are made.
Rocks; Impact to Scattered Rocks and Rock Outcrops	There is exposed rock and benches on the porperty but not in the development footprint. Possible some proposed impact to rock one sandstone floater. See Figure 8.1	Microbats, Heath Monitor, Broad Headed Snake	None	No impact proposed	No impact proposed	This proposal will likely not result in this Prescribed Impact. The impact is not in the development footprint. No additional credits are recommended for this Prescribed Impact. Recommendations to ameliorate impacts are made.
Impact to Human-made structures	The existing house will be demolished.	None	None	Permanent removal of structure	No impact proposed	This proposal will likely not result in this Prescribed Impact. The existing house has no habitat value, and a replacement dwelling will be constructed. No additional credits are recommended for this Prescribed Impact.
Impact to Non-native vegetation	Little exotic vegetation occurs through out the site. Most plantings are near the front of the site. The site contains a lawn of exotic grass as the front with no ecoloigcal value.	None	None	No significant impact proposed	No significant impact proposed	This proposal will likely not result in this Prescribed Impact. The exisitng exotic vegetation holds little to no ecological value. No additional credits are recommended for this Prescribed Impact.
Changes to Hydrological processes sustaining/interacting with rivers, streams or wetlands	No hydrological features occur on the site.	None	None	No impact proposed	No impact proposed	This proposal will not result in this Prescribed Impact. No additional credits are recommended for this Prescribed Impact. Recommendations to ameliorate impacts are made.
Impact to Water bodies and water quality	The development includes facilities for up to four horses to be kept on the property. The horse manure produced will result in an ongoing increase in nutrients in the adjacent soil which will harm native vegetation and promote growth of weeds. A horse produces an average of 40kg of nitrogen and 7.2 kg of phosporous per year.	Myotis, Eastern Osprey & Owls	Could impact protected habitat in Warriewood wetlands, as well as South Creek, Irrawong Waterfall and Narrabeen Lagoon	Likely to be permanent as long as horses remain on the site. The Land Capaility and Wastewater Management Options Assessment states "We are advised that all horse washdown will be completed outside of the stables and that all horse urine will be absorbed by stable bedding. As such, no additional wastewater load will be generated by these elements."	The proposal is likely to add nutrients and may lead to increase in nutrient flow into South Creek and Narrabeen Lagoon via Mullet Creek.	Potential to have impact on water quality down stream - flowing into South Creek and Narrabeen Lagoon. Piscivorous threatened species may be impacted by feeding in polluted water bodies. An increase in weed growth from excess nutrients can change habitat quality. However, no additional Credits recommended. A boiswale is reccommended to remove nutrients and sediment. Clean water diversion. Catch drains at the end of paddocks and stables to go into a bioswale is reccommended. Requires a clean water diversion to prevent water entering the sweage system.
Impact to Connectivity	There is likely very minor reduction to habita connectivity from North-South across the site.	Mammals	Some importance	Reduction permanent after consturction	Little impact proposed	This proposal will likely not result in this Prescribed Impact. The reduction in habitat connectivity will not be of significant extent. No additional credits are recommended for this Prescribed Impact.
Movement of Threatened Species that maintains their life cycle e.g. Migration Interruption	None	N/A	N/A	N/A	N/A	This proposal will not result in this Prescribed Impact. No additional credits are recommended for this Prescribed Impact. Recommendations to ameliorate impacts are made.
Wind farm development	N/A	N/A	N/A	N/A	N/A	This proposal will not result in this Prescribed Impact. No additional credits are recommended for this Prescribed Impact. Recommendations to ameliorate impacts are made.
Vehicle strikes (Road Proposals)	N/A	N/A	N/A	N/A	N/A	This proposal will not result in this Prescribed Impact. No additional credits are recommended for this Prescribed Impact. Recommendations to ameliorate impacts are made.
Other						**- There are no other Prescribed Impacts that are considered relevant to this site or proposal.**

8.3 Prescribed Biodiversity Impacts

Prescribed Biodiversity Impacts are described in section 6.7 and 8.2.1.1 of the BAM and Division 6.1 2(b) of the Biodiversity Conservation Regulations. Prescribed Biodiversity Impacts include, but are not limited to, impacts to cliffs, Karsts, caves, rocks, humanmade structures, non-native vegetation, waterbodies & hydrological processes, connectivity features, wind turbine strikes, vehicle strikes and other impacts. The impact to Prescribed Impacts is assessed in Table 8.3.

Corridors can be seen in the map on Figure 3.7 and the locality aerial photograph map on Figure 2.2.

8.4 SEPP Biodiversity Conservation Chapter 5 Koala Assessment

A Koala Assessment under the Biodiversity Conservation SEPP 2021 is not needed as the site the less than 1 hectare in size.

Despite the majority of the trees proposed for removal being listed as Koala use tree species in Schedule 3 of the SEPP (Biodiversity and Conservation) 2021 and the evidence of Koala use from the threatened species records, Koalas are locally extinct from the area. Therefore, the site does not currently classify as core koala habitat as defined in Section 4.2 of the SEPP and Council may provide development consent under Section 4.10 of the SEPP.

In 1998, the Pittwater Koala population was known to consist of less than 6 individuals. No known populations of Koala have been recorded within the Study Site in the last 5 years, and while some Koala feed trees are present, they are scattered, and no Koalas have been recorded on site. The most recent records for Koala are in Belrose, West Head and elsewhere in Ku-ring-gai National Park.

Table 8.4 Identification and Assessment of Indirect Impacts

113 Orchard Street, Warriewood

by GIS Environmental Consultants

This table addresses section 8.2 of the Biodiversity Assessment Method and section 2.4 of the Biodiversity Assessment Method Operational Manual

The TBDC and other sources were used to assess the impact of this proposal on the Threatened species (BC Act).

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Potential Indirect Impact from BAM s8.2(2.b)	Nature, Extent, Frequency, Duration and Timing of Indirect Impacts BAM s8.2(1.a)	Native Vegetation, Threatened Species, TECs and Habitats Likely to be Affected BAM s8.2.3.b	Limitations to Knowledge, Assumptions and Predictions about Impact BAM s8.2.1.c	Conclusion of Consequences of Indirect Impact on Biodiversity Values BAM s8.2.1.b and if additional credits should be applied
Inadvertent impacts on adjacent habitat or vegetation	Potential harm to adjacent habitat by sediment and nutrients from horses. During construction impact prevented by recommendations in arborist report and the temporary environment protection fence described in the Biodiversity Management Plan.	The close proximity of the remaining trees to the construction area, Warriewood Wetland, Irrawong Waterfall, South Creek and Narrabeen Lagoon.	It is assumed that the recommended tree protection fences and environmental protection fences will prevent accidental impact.	The Arborist report shows Tree Protection Fencing to protect the trees to be retained during construction. The vegetation to be protected is above the development site and is unlikely to be impacted by sediment. There is also a Biodiversity Management Plan which will manage this vegetation on the site. If the recommendations are implemented and sucessful then there will be no inadvertant indirect impact on adjacent habitat or vegetation.
Reduced viability of adjacent habitat due to edge effects	During construction impact prevented by recommendations in arborist report. Potential of ongoing impacts not likely to change as a result of this	Native vegetation adjacent to the site.	n/a	No impact likely
Reduced viability of adjacent habitat due to noise, dust or light spill	An increase of noise and dust during construction.	Most Threatened fauna.	This impact is not well researched or documented.	No impact likely
Transport of weeds and pathogens from the site to adjacent vegetation	Recommendations are made in this report and the BMP to reduce the risk of weed and pathogen spread.	Native vegetation on and adjacent to the site.	Whether recommendations will be followed.	No Impact likely if recommendations and BMP are followed.
Increased risk of starvation or exposure, and loss of shade or shelter	The development is unlikely to increase risk of starvation or exposure, and loss of shade or shelter.	n/a	n/a	No Impact likely
Loss of breeding habitat	The development will likely remove four hollow-bearing trees.	These are potential breeding habitat for small threatened mammal and bird species.	n/a	Impact will not be significant enough to warrant additional Credits.
Trampling of threatened flora species	No Threatened flora species occur on this site.	n/a	n/a	No Impact likely
Inhibition of nitrogen fixation and increased soil salinity	n/a	n/a	n/a	No Impact likely
Fertiliser drift	It is unlikely that there will be an increase in fertiliser drift due to the development	n/a	n/a	No Impact likely
Rubbish dumping	The site is well maintained, the development will not increase rubbish dumbing	n/a	n/a	No Impact likely
Wood collection	The site is well maintained, the development will not increase wood collection	n/a	n/a	No Impact likely
Removal and disturbance of rocks, including bush rock	The rock outcrop will not be harmed by the proposal.	n/a	n/a	No Impact likely
Increase in predators	n/a	n/a	n/a	No Impact likely
Increase in pest animal populations	n/a	n/a	n/a	No Impact likely
Changed fire regimes	There will likely be no change in the fire regime of the site due to the development.	n/a	n/a	No Impact likely
Disturbance to specialist breeding and foraging habitat (e.g. beach nesting for shorebirds)	n/a	n/a	n/a	No Impact likely
Other	n/a	n/a	n/a	No Impact likely

8.5 Additional Recommended Mitigation and Management of non-offset credit Impacts

Ameliorative Conditions and Recommendations

As required by sections 8.4 and 8.5 of the BAM 2020.

8.5.1 Proposal Impact Mitigation Summary

This Development Application is also accompanied by a Biodiversity Management Plan (BMP) by GIS Environmental Consultants dated 28th February 2025.

Recommendations to Mitigate Impacts Outline:

- Offsetting of the ecological impact of the proposal by paying for retirement of biodiversity offset credits in accordance with the Biodiversity Offset Scheme that is part of the Biodiversity Conservation Act;
- Temporary Environment protection fencing during construction;
- Temporary tree protection fencing during construction;
- Temporary sediment fencing during construction;
- Weed control prior to and during construction to prevent the dispersal of weeds;
- Ecological induction of construction workers;
- Installation of 2 nest boxes;
- Ecologically sensitive establishment of the Asset Protection Zone (APZ);
- Fauna rescue during tree removal;
- Supervision of trenching near trees and pruning;
- Installation of permanent stormwater structures;
- Permanent tree trunk protection to prevent horses damaging trunks;
- Permanent Paddock Fencing to protect biodiversity values in the long term;
- Permanent environment protection bollards to prevent damage to biodiversity values to be retained;
- Clean water diversion mound to prevent clean surface water entering the construction, horse keeping, sewage disposal and landscaped areas;
- Installation of catch drains and a bioswale to prevent horse effluent from entering waterways;
- Bioswale planted with native plants to filter fine sediment and remove nutrients;
- Maintenance of an on-site effluent management areas;
- Planting of local indigenous plant species as part of landscaping;
- Biodiversity Management during construction and for a period of minimum of 5 years of maintenance; and
- Monitoring of environmental works.

The location of tree protection fencing is described in the Arborist Report.

8.5.2 During Construction Impact Mitigation Management

The additional (non-offset credits) measures to mitigate and manage impacts during construction are:

- Timing of the works
- Adaptive management triggers and measures to allow for modification for; unusual weather, bushfire and other unexpected changes
- Tree removal supervision to reduce additional damage
- Pre-clearance fauna surveys
- Clearing protocols

- Sediment control
- Hygiene protocols
- Worker site ecological induction
- Relocation of fauna habitat (logs etc.)
- Fauna rescue
- Weed control
- Supervision by a Site Ecologist
- Ecological Monitoring
- Risk of failure analysis

These measures are described in the accompanying Biodiversity Management Plan (BMP) that details the site-specific management actions to improve and maintain the biodiversity values to be retained.

8.5.3 Prior to Construction Recommendations

Technique	Outcome	Timing / Frequency	Responsibility
It is recommended that clean stormwater be diverted around the construction site and the horse areas to reduce spreading of the nutrients from horses offsite and into waterways and Warriewood wetland. See Figure 8.2.	To maintain threatened frog species habitat downstream in Warriewood Wetlands and Narrabeen Lagoon.	To be incorporated into the plans and implemented for the life of the development.	Architect/Builder
Sediment controls are to be installed, monitored and only removed when the area has been stabilised	Reduce sediment run off during construction	Installed prior to construction and maintained during construction	Project manager, builder
Mark location of hollow bearing trees to be retained	Ensure hollow bearing trees that are not impacted by the proposal are retained	Prior to tree removal	Site Ecologist
Trees that are to be retained are to be protected by panel fencing and signage. Soil levels are to be maintained under the extent of their canopy.	To protect trees to be retained	Prior to earthworks	Builder with assistance from the Ecologist
A Biodiversity Management Plan (BMP) is recommended to appropriately manage the PCT 3230 on the property and regeneration of habitat	BMP to include weed control, mulching, bush regeneration, etc.	Prior to Construction Certificate	Ecologist
Logs from trees to be removed in the development area are to be cut into lengths that are manageable by hand and are to be translocated to provide fauna habitat around the property. The quantity and locations are to be determined by the site ecologist.	To provide fauna habitat	During construction	Builder, to be monitored by the Ecologist

Minimal to no disturbance of the native plant species in the ground cover	Avoid increased erosion on the Development Site. Reduce impact to native vegetation and habitat within the Development Site	During Construction	Everyone entering the site

8.5.4 During Construction Recommendations

Technique	Outcome	Timing / Frequency	Responsibility
Sediment control measures, monitored and only removed when the area has been stabilised	Reduce sediment run off during construction	Installed prior to construction and maintained during construction	Project manager/ owner with assistance from the Ecologist
Minimal to no disturbance of the native plant species in the ground cover	Avoid increased erosion on the Development Site. Reduce impact to native vegetation and habitat within the Development Site	During Construction	Everyone entering the site
Site Ecologist to Supervise the removal of hollow bearing trees	To rescue any displaced fauna	During tree removal	Site Ecologist, tree lopper
No soil is to be left bare during and after construction to reduce soil erosion and establishment of weeds	to reduce soil erosion and establishment of weeds	During construction and after construction	Project manager
All High Threat Weeds are to be removed from the site. There is to be ongoing weed control every 6-months during construction.	Weeds reduce habitat value and can cause health problems for humans. There are currently not many weeds at the site. Disturbances can cause weeds to spread. Regular weed control ensures that weeds do not spread in the long-term. Weed control to achieve a percentage foliage cover of less than 5% in the ground layer and 0% in the shrub and tree layers	During construction	Owner and Bush regeneration contractor
Any other environmental conditions of the consent that are required to be carried during construction	Protect threatened species, their habitat and native vegetation during construction	At times required by consent	Builder, with assistance from Ecologist as needed
Implementation of recommended Biodiversity Management Plan	To appropriately manage the PCT 3230 on the property and regeneration of natural habitat	During construction	Project Ecologist and Bush regenerators

Establishment of the APZ is to remove weeds and exotics first. Hollow bearing trees, logs and rocks are to be retained within the APZ. Excavated rock from the development can be retained onsite as fuel reduced habitat.	To maintain habitat value in the APZ	During construction and after construction	Owner with assistance from the Ecologist
There is to be no earthworks during wet weather	Reduce erosion and sediment runoff	During construction	Builder
There is to be no machinery access or dumping fill outside beyond the paddock fences	Protect adjacent habitat values during construction	During construction	Builder
All material brought on site must be certified weed and disease free.	To protect the adjacent bushland and creek against Phytophora infection	During construction	Project manager and builder

8.5.5 Post Construction (operational) Impact Mitigation Management

Ongoing maintenance weed control is recommended to stop weed reestablishment after the development disturbance.

A Biodiversity Management Plan should be followed for a minimum of 5 years.

Technique	Outcome	Timing / Frequency	Responsibility
Bollards to delineate the extent of the APZ	Define the extent of the APZ vegetation management area	To be maintained and repaired in perpetuity	Owner with assistance from bush regenerators and Ecologist as needed
Any other environmental conditions of consent that are ongoing	Maintain habitat for Threatened species and native vegetation	As required in perpetuity	Owner with assistance from bush regenerators and Ecologist as needed
Minimum maintain bushfire APZ as required	To maintain the APZ with the least ecological impact	As required in perpetuity	Owner
All High Threat Weeds are to be removed from the site as required by the Biosecurity Act.	Weeds reduce habitat value and can cause health problems for humans. Disturbances can cause weeds to spread. Regular weed control ensures that weeds do not spread in the long-term. achieve a percentage foliage cover of less than 5% in the ground layer and 0% in the shrub and tree layers	As required in perpetuity	Owner

8.6 Adaptive Management for Uncertain Biodiversity Impacts

As required by sections 8.5 of the BAM 2020.

Rare and unforeseen events such as fire, flood, diseases may occur at times and are beyond the capacity of this report to predict. To adapt the management of the ecological values of this site during these events it is recommended that an ecologist be consulted.

Biodiversity Management Plan that describes the required actions	A Biodiversity Management Plan is Recommended to appropriately manage and improve the remaining native vegetation on the Site.

8.6.1 Reducing Indirect Impacts to vegetation and Habitat

As per section 8.4.1(3) of the BAM 2020.

Discussions have been had with the owner about the different options of the proposed plans to reduce impact to vegetation and habitat. Recommendations have been made to reduce impact to the native vegetation on the site. See Appendix D.

8.6.2 Mitigating Prescribed Impacts

As per section 8.4.2 of the BAM.

These have been addressed in section 8.4.

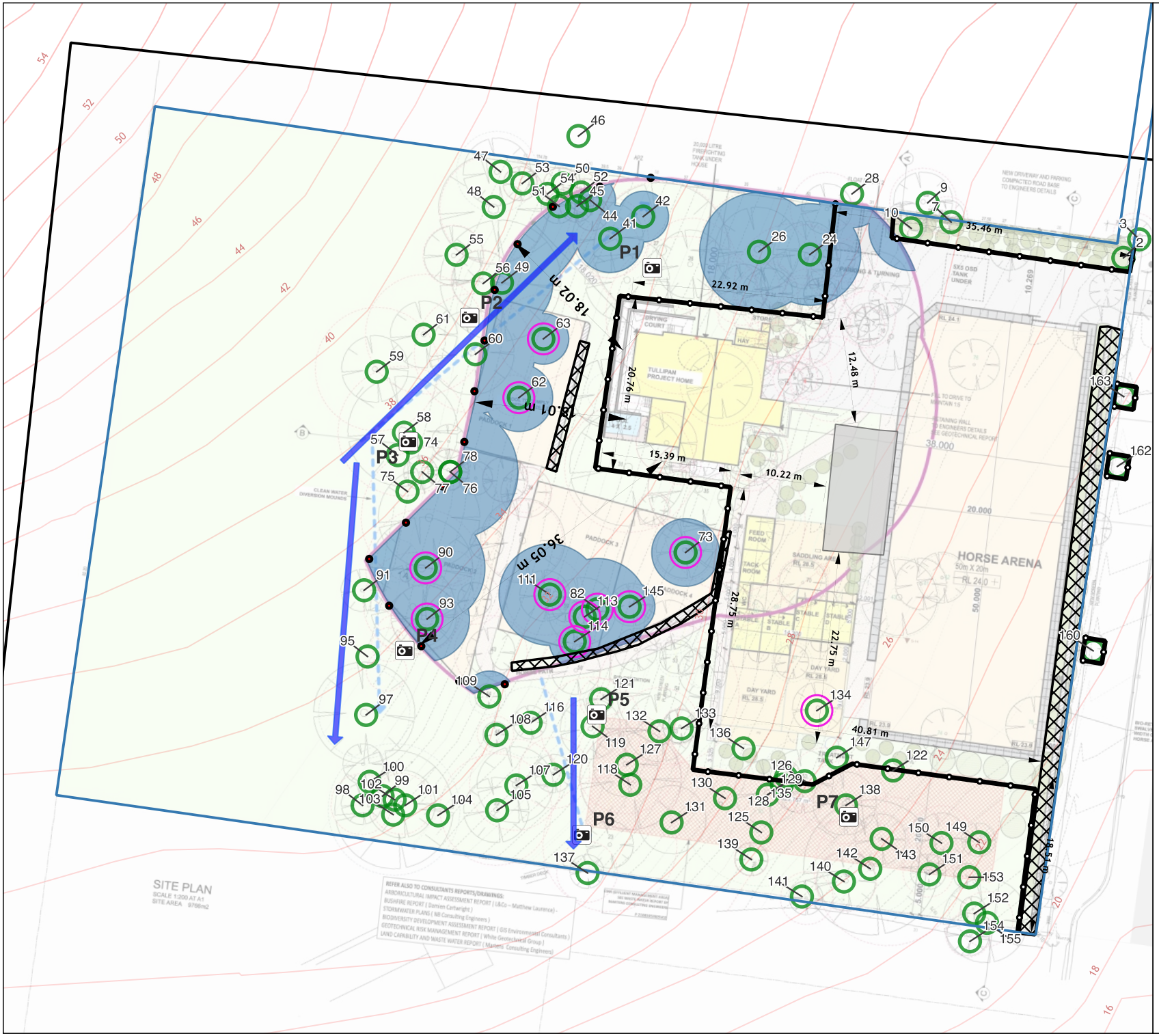
8.7 Potential of Addition of Credits for Indirect or Prescribed Impacts

As per section 8.6 of the BAM.

No addition of credits for indirect or prescribed impacts are recommended.

8.7.1 Techniques with a Risk of Failure

Weed control can be difficult to achieve without specialised training, the use of qualified bush regenerators to control nutrients and weeds is recommended.



Legend

113 Orchard St, Warriewood

- Property
- Existing House
- Temporary Construction Environment Protection Fence
- Clean Water Diversion Mound
- Bioswale
- Trunk Protection Permanent
- Permanent Bollards marking Boundary of APZ Area
- Monitoring Points

Tree Impact [168]

- Keep [93]
- Tree Canopy Keep in APZ

Impact will be minimised by:
• Environment Protection Fence to protect the Endangered Ecological Community to be Retained and Protected during construction.
• Positioning of the development down hill of the high biodiversity area
• This plan takes priority over any landscape plan

To be managed in accordance with the Arborist report, Stormwater Plan Wastewater Plan and Biodiversity Management Plan BMP, including; bushrgeneration, weed control, temporary fence during construction and permanent fencing and signage to delineate the APZ extent. The mangement will be adaptive to unforseen events.

Basemap is the Site Plan

Figure 8.3
Mitigation of Impacts and Conservation

GIS Environmental Consultants
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Date: 22/2/2025
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 10 20 m

9 Thresholds for Assessing and Offsetting Impacts SAII

As described in Chapter 9 of the BAM 2020.

The previous parts of this BDAR report describe the site context, native vegetation, Threatened Ecological Communities, habitat suitability for Threatened Species (all in Stage 1) then Chapter 7 describes the measures take to avoid and minimise impacts and Chapter 8 describes the remaining direct and indirect impacts to biodiversity, prescribed impacts and ways impacts can be mitigated.

Chapter 9 sets out the additional impact assessment provisions for communities and species at risk of SAII (Section 9.1.1 and Section 9.1.2 of the BAM) relevant to the proposal.

An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species (including endangered populations) or ecological community becoming extinct based on the following 4 principles:

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

These principles are set out in clause 6.7 of the Biodiversity Conservation Regulation 2017.

Table 9.1 Entities at risk of an SAII

Common name	Scientific name	Reason for inclusion in assessment
Swift Parrot	*Lathamus discolor*	Included in current list of entities at risk of an SAII and is likely to be impacted by the proposal: https://www2.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/clear-and-develop-land/serious-irreversible-impacts
Eastern Cave Bat	*Vespadelus troughtoni*	Breeding habitat is included in the current list of entities at risk of an SAII and is likely to be impacted by the proposal: https://www2.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/clear-and-develop-land/serious-irreversible-impacts

9.1 Assessment of SAII for TECs Only

Clause 6.7 BC Regulation and BAM 2020 9.1

The assessor is required to provide further information regarding the impacts on each TEC at risk of an SAII. This must include the action and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAII. Where these have been addressed elsewhere the assessor can refer to the relevant sections of the BDAR and BCAR.

The assessor must consult the Threatened Biodiversity Data Collection (TBDC) and/or other sources to report on the current status of the TEC.

The Threatened Ecological Communities that are regarded as having potential Serious And Irreversible Impact can be found here:

https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/local-government-and-other-decision-makers/serious-and-irreversible-impacts-of-development

There are no Threatened Ecological Communities that are listed as being at risk of SAII at the site

9.2 Assessment of SAII to Species

Clause 6.7 BC Regulation and BAM 2020 9.1.2

The assessor is required to provide further information in the BDAR or BCAR for any species at risk of an SAII, including the action and measures taken to avoid the direct and indirect impact on the species at risk of an SAII. Where these have been addressed elsewhere the assessor can refer to the relevant sections of the BDAR or BCAR.

The assessor must consult the TBDC and/or other sources to report on the current population of the species

9.2.1 Additional impact assessment provisions for threatened species at risk of an SAII

Table 9.2 Species that are list as at risk of SAII and Principles that Apply

	Principles that Apply According to the TBDC			
Species	Principle 1	Principle 2	Principle 3	Principle 4
Swift Parrot (*Lathamus discolor*)	✓			
Eastern Cave Bat *(Vespadelus troughtoni)*				✓

9.1.2.1 Swift Parrot (*Lathamus discolor*)

1. Actions to avoid and minimise direct and indirect impacts: refer to Chapter 7 of this BDAR

Table 9.3 Current Status of Swift Parrot (*Lathamus discolor*)

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
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 TBDC states that the population has declined by more than 80% in 10 years or 3 generations and therefore the Swift Parrot is at risk of Principle 1	TBDC	None
Evidence of small population size (Principle 2)			
Current population size in NSW	300-1000 (estimated at 750) mature individuals in all of Australia	The Action Plan for Australian Birds 2020	The data is not specific to NSW. A request for this information has been requested from the BOS Helpdesk and GIS Environmental Consultants are awaiting a response.
Decline in species' population size in 3 years or one generation	Generation time 5.4 years, but decline in one generation or 3 years is unknown	Threatened Species Scientific Committee Conservation Advice	TBDC is deficient. A request for this information has been requested from the BOS

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
		Lathamus discolor Swift Parrot 2016	Helpdesk and GIS Environmental Consultants are awaiting a response.
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	100%	BirdLife International Data Zone – sources are from 2008 and 2014	None
Evidence of limited geographic range (Principle 3)			
Extent of occurrence (ha)	2.15ha (breeding/resident) 204ha (non-breading)	BirdLife International Data Zone – sources are from 2008 and 2014	The data is likely 10 or more years old. The database says the data quality is "medium". A request for this information has been requested from the BOS Helpdesk and GIS Environmental Consultants are awaiting a response.
Area of occupancy (ha)	The Area of Occupancy is not stated in the TBDC. However, the Threatened Species Scientific Committee states that "Area of occupancy appears to have declined significantly since European settlement, as can be inferred from the extent of habitat loss … White box-yellow gum-Blakely's red gum woodland, another important habitat in New South Wales, has been reduced to less than 4 percent of its pre-European extent on the south-western slopes and southern tablelands of New South Wales (Saunders 2003)" and estimates show "the area of occupancy for swift parrots ranged from 18.5 km^2 to 355 km^2 between 2009 and 2014."	Threatened Species Scientific Committee Conservation Advice *Lathamus discolor* Swift Parrot 2016	TBDC is deficient. A request for this information has been requested from the BOS Helpdesk and GIS Environmental Consultants are awaiting a response.
Number of threat-defined locations	11-100	BirdLife International Data Zone – sources are from 2008 and 2014	The data is likely 10 or more years old. A request for this information has been

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
			requested from the BOS Helpdesk and GIS Environmental Consultants are awaiting a response.
Whether the species' population is likely to undergo extreme fluctuations	Unknown	TBDC	TBDC is deficient. A request for this information has been requested from the BOS Helpdesk and GIS Environmental Consultants are awaiting a response.
Evidence that the species is unlikely to respond to management (Principle 4)			
Reproductive characteristics limit the ability to increase the existing population, or occupy new habitat	Only breeds in south-eastern Tasmania.	BirdLife International Data Zone	None
Species is reliant on abiotic habitats which cannot be restored or replaced	No information read about the Swift Parrot suggests that it relies on abiotic habitats	TBDC BirdLife International Data Zone Swift Parrot Population Analysis and Trends 2009-2022 Threatened Species Scientific Committee Conservation Advice *Lathamus discolor* Swift Parrot 2016	None
Life history traits and/or ecology is known, but the ability to control key threatening processes is currently negligible	The introduced Sugar Glider *Petaurus breviceps* in the Swift Parrot's breeding range are thought to be the main cause of the Swift Parrot's decline, with habitat loss and alterations, wildfire, collision mortality, and Psittacine Beak and Feather Disease also contributing to declines.	BirdLife International Data Zone Threatened Species Scientific Committee Conservation Advice *Lathamus discolor* Swift Parrot 2016	None

3. Impact assessment

Impact	Data / information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Impact on the species' population (Principles 1 and 2)			

Impact	Data / information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	The number of individuals is not known.	-	This information is unknown.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	The number of individuals is not known.	-	This information is unknown.
Number of individuals (mature and immature) to be impacted by the proposal	The number of individuals is not known. However, the proposal is unlikely to cause the death of individuals. The proposal will impact 0.39ha of native vegetation	-	This information is unknown.
Individuals (mature and immature) to be impacted by the proposal as a percentage of total NSW population (%)	The number of individuals is not known.	-	This information is unknown.
Area of habitat to be impacted (ha) (for species measured by area only)	0.39ha of native vegetation habitat will be impacted.	GIS analysis by GIS Environmental Consultants	If there are any changes to the plans, this area will change.
Impact on geographic range (Principles 1 and 3)			
Area of the species' geographic range to be impacted by the proposal (ha)	The species geographic range includes all of Tasmania, Victoria and ACT, coastal and western slopes of NSW, the southeastern edges of SA and Queensland. The proposal will impact 0.39ha of habitat.	Australian Museum	The area of the species geographic range is not known
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)	0.39ha / 204ha = 0.002%	The extent of occupancy was used as the total area is not known	The area of the species geographic range is not known
Individuals impacted	Some individuals of subpopulation and habitat will be impacted	-	The Swift Parrot does not have any subpopulations, so the entire population is assumed to be the "subpopulation"
Determine if the subpopulation that is fragmented will remain viable, estimate the habitat area required to support the remaining population, and habitat available within dispersal distance, distance over which genetic exchange can occur, and pollination distance.	The proposal is unlikely to cause fragmentation of the subpopulation.	-	None

Impact	Data / information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Determine if changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors	Refer to Sections 8.2 (Indirect Impacts) and 8.3 (Prescribed Impacts)	-	None

9.1.2.2 Eastern Cave Bat *(Vespadelus troughtoni)*

1. Actions to avoid and minimise direct and indirect impacts: refer to Chapter 7 of this BDAR

Table 9.4 Current Status of Eastern Cave Bat *(Vespadelus troughtoni)*

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
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 TBDC states that the population has declined by more than 80% in 10 years or 3 generations and therefore the Swift Parrot is at risk of Principle 1	TBDC	None
Evidence of small population size (Principle 2)			
Current population size in NSW	300-1000 (estimated at 750) mature individuals in all of Australia	The Action Plan for Australian Birds 2020	The data is not specific to NSW. A request for this information has been requested from the BOS Helpdesk and GIS Environmental Consultants are awaiting a response.
Decline in species' population size in 3 years or one generation	Generation time 5.4 years, but decline in one generation or 3 years is unknown	Threatened Species Scientific Committee Conservation Advice *Lathamus discolor* Swift Parrot 2016	TBDC is deficient. A request for this information has been requested from the BOS Helpdesk and GIS Environmental Consultants are awaiting a response.
Number or percentage of mature individuals in each subpopulation or whether the species is	100%	BirdLife International Data Zone – sources are from 2008 and 2014	None

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
likely to undergo extreme fluctuations			
Evidence of limited geographic range (Principle 3)			
Extent of occurrence (ha)	2.15ha (breeding/resident) 204ha (non-breading)	BirdLife International Data Zone – sources are from 2008 and 2014	The data is likely 10 or more years old. The database says the data quality is "medium". A request for this information has been requested from the BOS Helpdesk and GIS Environmental Consultants are awaiting a response.
Area of occupancy (ha)	The Area of Occupancy is not stated in the TBDC. However, the Threatened Species Scientific Committee states that "Area of occupancy appears to have declined significantly since European settlement, as can be inferred from the extent of habitat loss … White box-yellow gum-Blakely's red gum woodland, another important habitat in New South Wales, has been reduced to less than 4 percent of its pre-European extent on the south-western slopes and southern tablelands of New South Wales (Saunders 2003)" and estimates show "the area of occupancy for swift parrots ranged from 18.5 km^2 to 355 km^2 between 2009 and 2014."	Threatened Species Scientific Committee Conservation Advice *Lathamus discolor* Swift Parrot 2016	TBDC is deficient. A request for this information has been requested from the BOS Helpdesk and GIS Environmental Consultants are awaiting a response.
Number of threat-defined locations	11-100	BirdLife International Data Zone – sources are from 2008 and 2014	The data is likely 10 or more years old. A request for this information has been requested from the BOS Helpdesk and GIS Environmental Consultants are awaiting a response.
Whether the species' population is likely to	Unknown	TBDC	TBDC is deficient. A request for this information has been

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
undergo extreme fluctuations			requested from the BOS Helpdesk and GIS Environmental Consultants are awaiting a response.
Evidence that the species is unlikely to respond to management (Principle 4)			
Reproductive characteristics limit the ability to increase the existing population, or occupy new habitat	Only breeds in south-eastern Tasmania.	BirdLife International Data Zone	None
Species is reliant on abiotic habitats which cannot be restored or replaced	No information read about the Swift Parrot suggests that it relies on abiotic habitats	TBDC BirdLife International Data Zone Swift Parrot Population Analysis and Trends 2009-2022 Threatened Species Scientific Committee Conservation Advice *Lathamus discolor* Swift Parrot 2016	None
Life history traits and/or ecology is known, but the ability to control key threatening processes is currently negligible	The introduced Sugar Glider *Petaurus breviceps* in the Swift Parrot's breeding range are thought to be the main cause of the Swift Parrot's decline, with habitat loss and alterations, wildfire, collision mortality, and Psittacine Beak and Feather Disease also contributing to declines.	BirdLife International Data Zone Threatened Species Scientific Committee Conservation Advice *Lathamus discolor* Swift Parrot 2016	None

4. Impact assessment

Impact	Data / information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Impact on the species' population (Principles 1 and 2)			
Number of individuals (mature and immature) present in the subpopulation on the subject land	The number of individuals is not known.	-	This information is unknown.
Number of individuals (mature and immature) present as a	The number of individuals is not known.	-	This information is unknown.

Impact	Data / information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
percentage of total NSW population (%)			
Number of individuals (mature and immature) to be impacted by the proposal	The number of individuals is not known. However, the proposal is unlikely to cause the death of individuals. The proposal will impact 0.39ha of native vegetation	-	This information is unknown.
Individuals (mature and immature) to be impacted by the proposal as a percentage of total NSW population (%)	The number of individuals is not known.	-	This information is unknown.
Area of habitat to be impacted (ha) (for species measured by area only)	0.39ha of native vegetation habitat will be impacted.	GIS analysis by GIS Environmental Consultants	If there are any changes to the plans, this area will change.
Impact on geographic range (Principles 1 and 3)			
Area of the species' geographic range to be impacted by the proposal (ha)	The species geographic range includes all of Tasmania, Victoria and ACT, coastal and western slopes of NSW, the southeastern edges of SA and Queensland. The proposal will impact 0.39ha of habitat.	Australian Museum	The area of the species geographic range is not known
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)	0.39ha / 204ha = 0.002%	The extent of occupancy was used as the total area is not known	The area of the species geographic range is not known
Individuals impacted	Some individuals of subpopulation and habitat will be impacted	-	The Swift Parrot does not have any subpopulations, so the entire population is assumed to be the "subpopulation"
Determine if the subpopulation that is fragmented will remain viable, estimate the habitat area required to support the remaining population, and habitat available within dispersal distance, distance over which genetic exchange can occur, and pollination distance.	The proposal is unlikely to cause fragmentation of the subpopulation.	-	None
Determine if changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors	Refer to Sections 8.2 (Indirect Impacts) and 8.3 (Prescribed Impacts)	-	None

9.3 Assessment of Offset Requirements for Impacts

9.3.1 Impact on TECs

There are no Threatened Ecological Communities at the site that will be impacted by the proposal.

9.3.2 Impact on Threatened Species and SAII

Swift Parrots (*Lathamus discolor)* and the Eastern Cave Bat *(Vespadelus troughtoni) are* at risk of SAII may occur on the site. The site is part of the Swift Parrot's Important Habitat Map and there are historical records of the species within 5km of the site.

The credits required to offset the Threatened Species Credit Species are listed in Table 10.2 in section 10.1.3.

9.3.3 Impact on non-TEC Ecological Communities

Central Coast Escarpment Moist Forest (PCT 3230) occurs in Vegetation Zone 1, the area to be impacted is 0.39ha. The proposal will completely remove 0.14 of PCT 3230 and disturb an additional 0.25ha within the development footprint. The remainder of non-TEC Ecological Communities on the property, including the Biodiversity Management Area, will not be impacted by the proposal.

9.3.4 Date of BAM Calculation Finalisation

This report is to be submitted to Council within 14 days of this date, in accordance with section 6.15 of the BC Act. The offset credits in the table below were calculated in the BAM-Calculator on the date of finalisation. The cost of each credit is on an open market and varies over time an estimate can be obtained by applying at this web site: https://www.bct.nsw.gov.au/info/biodiversity-credits-price-estimation-service.

9.4 Assessment of Impacts Not Requiring Offsets

The Site does not include any Biocertified Land or impacts that have been previously offset.

Impacts that do not require offsetting include parts of the site that have native vegetation, but the integrity score is less than the following minimum requirements:

- An integrity score of 15 where the PCT is representative of an Endangered or Critically Endangered Ecological Community;
- An integrity score of 17 if the PCT is associated with Threatened species habitat (for ecosystem credit species) or is representative of a Vulnerable Ecological Community; and
- An integrity score of 20 if the PCT is not representative of a TEC or Threatened species habitat.

Vegetation Zone 1 is currently above the minimum integrity score requirements, thus, is required to be offset for the proposed clearing Management Zones.

10 Offset Summary (BAM-c Results)

As described in Chapter 10 of the BAM 2020.

The BAM sets the standard that will result in no net loss of biodiversity values in NSW where:

a. *the impacts on biodiversity values from a development, activity, clearing or biodiversity certification proposal are avoided, minimised or mitigated through reasonable measures, as per Chapter 7, and*
b. *all residual and direct impacts on biodiversity values from clearing native vegetation and habitat loss are offset by:*
    i. *retiring the required number of biodiversity credits determined in Section 10.1, with a class of credit identified in Section 10.2 that meets the 'like-for-like' rules under clause 6.3 of the BC Regulation, or*

ii. in the case of a development, activity, clearing or biodiversity certification proposal, undertaking biodiversity conservation actions that qualify as biodiversity conservation measures under the offset rules and are listed in the ancillary rules, and the action benefits the entity that is impacted by the proposal.

10.1 Determination of the Offset Requirements

10.1.1 Justification for Future Integrity Scores

See Table 10.1 for change in integrity score.

The Future integrity score justification in Management Zone 1 & 2 (VZ1MZ1, VZ1MZ2).

The Management Zones VZ1MZ1, (see the maps on Figure 8.1) within the Development Footprint will be totally cleared of all native vegetation and the future integrity score has been set to 0.

The Management Zone VZ1MZ2, (see the maps on Figure 8.1) is to be partially impacted by:

- Partial removal of the tree removal to 15% in the APZ
- Total removal of shrub layer in the paddocks and APZ but retention in other areas
- Total removal of ground cover layer in the paddocks and APZ but retention in other areas

The predicted future composition, structure and function of the habitat has been changed to reflect partial as shown in Table 4.8.

The Biodiversity Management Area will be managed in accordance with the accompanying Biodiversity Management Plan.

No increase in integrity proposed or calculated.

It is assumed that all of the native vegetation on the Development Footprint will be impacted.

Tree Canopy Cover and Species Change

The native trees that will be removed are summarised in the arborist report. This is based on the conclusions of the arborist as documented in the Arboricultural Impact Assessment.

Some of the tree canopy being removed is overlapping native tree canopy to be retained.

The estimated future native canopy cover has been estimated as 15% in VZ1MZ1 and 90% in VZ1MZ2

Shrub and Ground Cover Change

The ground cover within VZ1MZ1 will be cleared of all native ground cover plants, leaf litter and logs by:

- Footprint of the house, stables, and horse arena, driveway;
- Construction disturbance including stockpiles, waste storage, scaffolding etc;
- Path construction;
- Landscaping

The estimated future native Shrub species has been estimated as 0 species.

The estimated future native Shrub cover has been estimated as 0%.

The estimated future native Ground species has been estimated as 0 species.

The estimated future native Ground cover canopy has been estimated as 0%.

10.1.2 Ecosystem Credits Requiring Offset

Table 10.1 Impact Offsets for Ecosystem Credits (Management Zones)

PCT	Vegetation Zone	Area (ha)	Existing Integrity Score	Management Zone (Impact or not)	Area (ha)	Future Integrity Score	Credits Required
3230	**VZ1**	**0.39**	**58**	VZ1MZ1 Full	0.14	0	7
				VZ1MZ2 Part	0.25	11.1	
			Total				**7**

10.1.3 Species Credit Species Requiring Offset

Table 10.2 Impact Offsets for Species Credit Species

Species Credit Species	Unit of Measure	Vegetation Zone(s) where the species occurs	Count or Area (ha) of Species Polygon Figure 5.2	Credits Required
Eastern Cave Bat *(Vespadelus troughtoni)*	Area	VZ1	0.39	15
Swift Parrot *(Lathamus discolor)*	Area	VZ1	0.39	15

Table 10.3 Biodiversity Offsets

Threatened Entity	Credits
3230-Central Coast Escarpment Moist Forest	7
Vespadelus troughtoni / Eastern Cave Bat	15
Lathamus discolor / Swift Parrot	15

10.1.4 Modification of the Number of Credits Required

Section 6.12 of the BC Act Regulations allow the Determining Authority to add or reduce the number of Biodiversity Credits required.

It is not considered that any increase or decrease in the number of credits required to be retired is appropriate.

Table 8.4 identifies that no additional credits due to indirect impacts are considered necessary.

If there are any inadvertent impacts such as tree death from trenching, then the BAM needs to be used to calculate addition of credits.

10.2 Credit Classes

Shown on the BAM Calculator Reports in Appendix B.

10.3 Offset Rules

Shown on the BAM Calculator Reports in Appendix B.

11 General References

Spatial (GIS) data sources are listed in section 2.6 and on the relevant map.

State and Local government legislation and guidelines are referenced is listed in section B.

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12 Appendices

Appendix A Targeted Threatened Species Survey Methods

The survey methods below are derived from the Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (2004) published by the then Department of Environment and Conservation NSW. The survey area is initially stratified on biophysical attributes, such as landform, geology, elevation, slope, soil type, aspect, followed by vegetation structure, such as forest, woodland, shrubland, and then floristics, such as species. Stratification is necessary to ensure that the required potential habitats and vegetation types are systematically sampled. The following sections list general methods that are commonly used to survey a broad range of animal species and groups, and the effort required per stratification unit.

Survey effort is generally described in relation to stratification units. In certain circumstances, such as areas of one hectare or less, the survey effort per stratification unit may be applied across the entire site (where the site is reasonably homogeneous). The effort should be distributed across the stratification units within site.

An initial **Habitat Assessment** is expert knowledge and desk-based and assists with predicting the likely occurrence of threatened animals in the study area including the location and techniques for targeted surveys for threatened species.

(A1) Targeted Flora survey methods

The candidate threatened flora species are surveyed in accordance with the *Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method* (DPIE 2020). All surveys are conducted using systematic parallel transects within suitable habitat.

During the targeted flora surveys, all sections of the study area and some of the surrounding lands are traversed by randomly meandering on foot. The study area is searched for the presence of the candidate threatened floral habitats using the published OEH guidelines. The random meander survey technique involves searching along a 5 metre transect across areas of potential habitat for each target threatened-plant species. Traverses are recorded on a global positioning system (GPS) and plotted on the site map in the report. The life form of the target threatened-plant species and the habitat being searched is recorded to determine the robustness of the floral community.

Distinguishing features of trees (bark, tree habit, canopy colour and shape) and tall shrubs are likely to be visible at 10 to 20 metres distance. In contrast, small life forms, including grasses, sedges, rushes and other graminoids, as well as forbs and herbs, orchids and ferns, are likely to be hidden behind other vegetation or tangled within dense understorey or ground cover; they may therefore be observable only at a maximum distance of 2.5 metres. These are minimum estimates: the plant surveyor may choose to use narrower widths to adequately survey the target species

Targeted Fauna survey methods

(A2) Habitat searches

Diurnal searches are conducted along transects or through targeted searches through the site to find potential habitat resources and the presence of targeted species. These are completed through 50 – 100 transects or through searching specific habitat areas. The time taken for searches varies with site size and habitat type. A general search will consist of two separate 30-minute searches.

Caves and rock boulders
Existing rocky areas including caves, crevices, outcrops, overhangs and escarpments are searched for the presence of targeted species including reptiles and bats. The locations of significant geological features are recorded and mapped. Searches involve lifting and looking underneath rocks, logs, and artificial ground debris.

Tree hollows
Tree hollows are searched for during the day on foot along transects or whenever encountered during any site survey. The type of tree, height above ground, presence of feathers or hair, dimensions, and direction of the hollow are recorded, and their locations are mapped. This is used to assess the suitability of the tree hollow for threatened arboreal species. In the case that occupancy and past use are unable to be determined, an endoscope can be used to access the cavity of the tree hollow.

Old buildings
Any old buildings or structures such as houses, culverts, mines, bridges, tunnels, sheds and basements are searched with the aid of torches for the presence or activity of targeted species such as reptiles and bats.

(A3) Opportunistic / Indirect detection methods

Indirect evidence of a species presence refers to finding signs of fauna activity. This includes conducting diurnal searches across the subject site for signs of animal activity such as scats, scratches on trees, sap-feeding scars on tree trunks, diggings in the ground, nests, remains, tracks and burrows. This is often done in conjunction with assessing habitat suitability and other survey methods. Time taken for these searches depends on site size and overlap with other survey methods.

Scat and carcasses
Any animal remains or scat are visually inspected to identify the age and species. Where appropriate scat or animal remains are collected and further analysed. Scat found containing bone and hair material during opportunistic searches were collected and sent to Scats About (Majors Creek NSW) for analysis and identification.

Tracks
Tracks (e.g. footprints, tail drags) left behind by animals are photographed inspected to identify the species or genus. Some tracks made by similar species or that are difficult to define may be followed up by targeted survey methods.

Diggings / Burrows
Diggings made by foraging animals are photographed and inspected to identify species or genus. Burrows made by burrowing species are documented and inspected and analysed to determine the presence of any threated species. The located and potential species are documented.

Stick Nests

Stick nests are searched for with binoculars to determine the potential presence of predatorial birds on and around the site. Nests are often located in the branches of mature dead or living trees, or other manmade existing structures.

(A4) Spotlighting

Spotlighting surveys are conducted at night to detect the presence of targeted nocturnal animals. Spotlight surveys are completed on foot using 163 lumen hand-held spotlights over 100 - 200 metre transects (depending on the site size and shape) that are 100m apart. Movement is generally at a pace of 10 metres per minute, plus time spent pausing and stopping along the transect. Transects are positioned to pass through areas of potential habitat for the targeted species. Two transects are

repeated over two separate nights. Observers search for the presence of nocturnal species, most often by seeing an animals' eye shine.
The effectiveness of this method is limited in areas of very dense understorey vegetation where light cannot penetrate as far.

(A5) Stag-watching

Stag-watching involves stationed observations conducted at dawn or dusk (depending on species) often near or around a shelter site or hollow-bearing trees. Time spent on stag-watching varies according to target species and subject site. Generally, observations are conducted for 60 minutes, with the use of binoculars and/or spotlighting if required. Individuals are counted and identified on site as they are spotted.

(A6) Call Detection and Call Playback Survey

Call detection surveys are conducted at dusk by passively listening for the calls of birds or mammals in suitable habitat, or by emitting sound recordings of calls of the targeted species. The method is: an initial listening period of 10-15 minutes, followed by broadcasting the characteristic call of the target species through a speaker device for intermittently for 5 minutes, then listen for a response for 10 minutes. This is done two times for two separate nights.

(A7) Motion detecting/Infrared cameras

Motion detecting or infrared cameras (Maginon, Signify, HC900A or Reconyx^{TM}) are installed onto trees, star pickets or stakes to detect target species on the site. Bait is provided in cannisters pegged to the ground in front of the cameras and smeared around the area to promote animal activity. Appropriate bait is used to target different animal species.

Infrared cameras employ a passive infrared system, requiring an animal to 'break' an invisible 'beam'. The cameras are set to operate diurnally and nocturnally, each being set to a sensitivity level of high and a photo interval of 3/ten seconds. The number of cameras set up depend on site size, approximately 5 are used per hectare, and set for a minimum of 5 days/nights.

(A8) Nest Tube Survey

Purpose-built nesting/denning tubes are installed across the site to target arboreal mammals. Nesting tubes are constructed from either hollow timber tree branches, PVC piping or bamboo (thickness of bamboo wood being 7 mm), the design of these being:

- Tube length – 35 cm long.
- Tubed capped at top and bottom. Bottom cap glued, top fitting with either threaded cap or screw to permit easy examination (with bamboo tubes, the presence of a nodal diaphragm negated the need for a bottom cap).
- Entrance hole – 25 mm diameter and located approximately 50 mm below top cap.
- Tube internal – insulating material and plastic mesh.
- Tube external – shade cloth (PVC piping only).

Nesting tubes are placed over a pre-determined trapping grid planned across the site either on or near a native tree at about 1 metre off the ground. A trail is constructed through native vegetation along the gridlines in a spiral so that every vertex on the grid is accessed but not all lines between the vertices were accessed.

The nesting tubes contain a bait mixture of rolled oats, peanut butter and honey. Double sided tape was placed around the inside lip of the entrance to collect hair samples.

(A9) Hair Tube Trapping

Hair-tube trapping is a non-invasive and more humane strategy for surveying mammal populations than traditional cage trap methods. PVC tubes are lined with adhesive tape and positioned in suitable habitat areas of targeted species. Hair tube traps are spaced at even intervals along linear transects within the site for a minimum of 4 days and 4 nights. Half of the hair tube traps were baited with tuna, and half with the universal bait (rolled oats, peanut butter and honey), with traps baited alternatively along the transects. Hair samples are sent to a laboratory for analysis and identification.

(A10) Harp Trapping

Har traps are used to survey microbat species through trapping and counting individuals. They are positioned in areas of potential habitat on the site. Bats fly into the wires of the harp trap and fall into a suspended hammock. This does not entangle or harm bats. The species, age and sex of the collected bats are assessed and recorded.

(A11) Ultrasonic (Bats)/Acoustic recording

An SongMeter™ Mini Bat 2 is an ultrasonic and acoustic recording device used to survey for bat species. Bats create ultrasonic navigational calls unique to each species. The recording devices are set up in fixed positions in potential bat habitat and are left on site for a minimum of 16 suitable nights. For example, if 2 recording devices available, survey can be completed in 8 nights. Recordings are stored on an SD card and assessed once collected to identify bat species present. Passive detection devices should be placed in areas that maximise the likelihood of recording bats, at least 50m apart to sample intrasite variability.

Survey effort for Bats include:

Type of trap

- Number of traps
- GPS location of traps
- Number of trap nights
- Location and duration of roost searches
- Methodology
- Timing

Devices should be configured to begin recording before sunset and finish recording after sunrise.

(A12) Amphibian Survey

Frog searches are dependent on the seasonal peak of activity of target species. In the optimal season the survey will include:

- Systematic day habitat search for 1 hour
- Night habitat search of damp and watery sites for 30 min on 2 separate nights
- Nocturnal call playback for at least one playback for each targeted species on 2 separate nights and if applicable a night watercourse search for 2 hours per 200m of water's edge.

(A13) Koala Survey

The 5 methods for surveying Koalas in Eucalypt forests and woodlands of NSW include;

- **Spot Assessment Technique (SAT)**

The SAT is an indirect survey method assessing the presence of koala scat within a prescribed search area. Surveys are done in a grid with:

- 150m spacing for suitable habitat ≤50 ha
- 250m spacing for suitable habitat >50 ha

The SAT protocol, as detailed in Phillips & Callaghan (2011), must be undertaken at each SAT site as follows:

- Locate and mark the tree of any species closest to the grid intersect coordinates – this is identified as the centre tree. To accommodate floristic variations, selection of the centre tree may vary by 10% of the sampling interval (i.e. 25 m for a 250 m grid).

- Move outwards from the centre tree, identifying the 29 nearest trees of any species to the centre tree within the area of suitable habitat. Where the minimum sampling effort of 30 trees cannot be met, sample the highest number possible before overlapping with the adjacent SAT site.

- Undertake a radial search for koala scat beneath each of the 30 marked trees, within a prescribed search area extending 1 m from the base of each tree. Scat search effort is a minimum of two person-minutes for each tree. For trees with a large DBH, it is expected that additional search time will be required.

- Searches should begin with a brief inspection of the undisturbed litter or grass and grass like growth form cover within the 1 m search area. If no koala scats are detected, a more thorough inspection of the search area, involving disturbance by hand of the litter or grass and grass like growth form cover, is required.

- The search at each tree is concluded when:

a koala scat is detected, or
b. the search time ends with no koala scat detected.

- Where the search time ends before a koala scat is detected, the SAT survey must continue at the next nearest tree.

All 30 trees at each SAT site must be sampled until a koala scat is detected, or all have been sampled. Koala presence within an area of suitable habitat is confirmed by detection of a koala scat. (DPE, Koala *(Phascolarctos cinereus)* BAM Survey Guide 2022)

- **Detection Dogs**

Superior speed and accuracy of dogs trained to identify koala scat is suitable for large sites.

- **Spotlighting**

Two 200m transects are required for every 5ha of suitable habitat. For sites smaller than 5ha, a single transect is permissible. Transects should be spaced 100m apart, as a maximum spotlight penetration of 50m is assumed for each side of the transect. The survey should be repeated on a second night. Spotlight intensity should be in between 750-1500 lumens.

- **Passive acoustic**

Vocalizations are strongest for recording between September-December, during the breeding season. Passive recorders should be left in the field for 7 nights.

- **Drones**

Remote piloted aircraft systems can be used to thermally detect koalas in large subject lands.

(A14) Invertebrate

Cumberland Plain Land Snail, Dural Land Snail and Maroubra Woodland Snail

Survey time: Anytime of the year

Extract from the TBDC:

"SURVEY METHOD:

Both diurnal and nocturnal surveys must be undertaken for the species. Diurnal surveys are used to locate empty shells and nocturnal surveys to locate live individuals. NOTE: for the purpose of survey, the presence of Cumberland Plain Land Snail shells confirms the presence of this species.

SURVEY CONDITIONS:

Diurnal surveys can be undertaken in any conditions.

Nocturnal surveys are to be undertaken between dusk and dawn after rainfall at the survey location. Optimal survey conditions include when the topsoil and leaf litter are moist, the humidity is approximately >75%, and temperature is >12 C. High levels of insect activity are also indicative of optimal survey conditions.

DIURNAL SURVEYS:

Use meandering transects across suitable habitat (associated PCTs) searching for empty shells. Shells for the species are often located within or near refugia. Refugia for the species includes, but is not limited to, soil cracks, leaf litter, decorticated bark, under coarse woody debris, grass clumps, and sometimes discarded rubbish such as corrugated iron and cardboard.

Care must be taken when disturbing leaf litter to not inadvertently injure live individuals. All overturned logs and other refuge should be replaced in its original position.

If the identification of empty shells cannot be confirmed in the field, shells should be georeferenced, collected and sent for identification by an expert i.e. the Australian Museum species identification services. Care must be taken to make sure that shells do not contain a live individual.

NOCTURNAL SURVEYS:

Use meandering transects across suitable habitat (associated PCTs) at a very slow walking pace, spotlighting the ground and other low objects for active snails. Survey locations should focus on targeting the habitat features outlined for diurnal survey. Surveys should be dedicated to observing ground-dwelling invertebrates and can be combined with surveys for other similar species.

Nocturnal surveys should be undertaken independently from spotlighting surveys for arboreal fauna."

(A14) Migratory Shore Bird Survey

Migratory wading birds is mostly a federal government issue but is also a requirement of the BAM.

- Significant species as listed on the Important Habitat Map (IHM) in the BOAMS will be assumed to occur and do not require surveying
- Other threatened shorebirds as predicted by BAM-C (and potential nearby historical records) will require survey

The EBPC guidelines state that survey efforts are:

- dependant on tide – surveys should be within 4hr period of either low or high tide
    - roosting at high tide
    - foraging at low tide
- All suitable areas of roosting and foraging habitat within the site should be surveyed – exposed shoreline, mudflats, saltmarshes, shallow pools, lagoons, wet grassland, tidal flats
- Observation from a distance to avoid disturbance – binoculars + telescope
- Survey especially important multiple times within the non-breeding period Sept-March when they've migrated here
- Survey effort
    - Minimum of 4x surveys during low tide for foraging summer

      e.g. 1x dec 2x jan 1x feb
        - 2x at spring (moon not season) low tide
        - 2x at neap low tide
    - Minimum of 4x surveys high tide roosting

      e.g. 1x dec 2x jan 1x feb
    - Minimum of 1x in winter for non migrating / non breeding
- Data should be collected as follows
    - Species
        - Total abundance

- Spp richness
- Spp abundance

- Behaviour
  - Activity – roosting / foraging
  - Foraging location – for spatial mapping
- Survey conditions
  - Date time
  - Tide height
  - Temp/precipitation/wind speed + direction

Appendix B BAM-c Calculator Reports (15 pages)

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00055486/BAAS17083/25/00055487	113 Orchard St Warriewood V2	28/10/2024
Assessor Name	Report Created	BAM Data version *
Nick Skelton	28/02/2025	Current classification (live - default) (80)
Assessor Number	BAM Case Status	Date Finalised
BAAS17083	Finalised	28/02/2025
Assessment Revision	BOS entry trigger	Assessment Type
1	BOS Threshold: Biodiversity Values Map	Part 4 Developments (Small Area)

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

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

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

Central Coast Escarpment Moist Forest												
1	3230_VZ1 Moderate	Not a TEC	58	50.9	0.39	PCT Cleared - 25%	High Sensitivity to Gain			1.50		7
											Subtotal	**7**
											Total	**7**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Lathamus discolor / Swift Parrot (Fauna)									
3230_VZ1Moderate	50.9	50.9	0.39	Environment Protection and Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Critically Endangered	True	15
								Subtotal	**15**
Vespadelus troughtoni / Eastern Cave Bat (Fauna)									
3230_VZ1Moderate	50.9	50.9	0.39	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	True	15
								Subtotal	**15**

BAM Candidate Species Report

Proposal Details

Assessment Id 00055486/BAAS17083/25/00055487	Proposal Name 113 Orchard St Warriewood V2	BAM data last updated * 28/10/2024
Assessor Name Nick Skelton	Report Created 28/02/2025	BAM Data version * Current classification (live - default) (80)
Assessor Number BAAS17083	Assessment Type Part 4 Developments (Small Area)	BAM Case Status Finalised
Assessment Revision 1	BOS entry trigger BOS Threshold: Biodiversity Values Map	Date Finalised 28/02/2025

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

List of Species Requiring Survey

Name	Presence	Survey Months
Asterolasia elegans Asterolasia elegans	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☑ Survey month outside the specified months?
Chalinolobus dwyeri Large-eared Pied Bat	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

BAM Candidate Species Report

Lathamus discolor Swift Parrot	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Rhodamnia rubescens Scrub Turpentine	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Tetratheca glandulosa Tetratheca glandulosa	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Vespadelus troughtoni Eastern Cave Bat	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

Threatened species Manually Added

Common Name	Scientific Name
Eastern Pygmy-possum	Cercartetus nanus
Barking Owl	Ninox connivens
Powerful Owl	Ninox strenua
Tetratheca glandulosa	Tetratheca glandulosa
Eastern Cave Bat	Vespadelus troughtoni
Southern Myotis	Myotis macropus

Threatened species assessed as not on site

Refer to BAR for detailed justification

BAM Candidate Species Report

Common name	Scientific name	Justification in the BAM-C
Barking Owl	Ninox connivens	Habitat constraints
Eastern Australian Underground Orchid	Rhizanthella slateri	Refer to BAR
Eastern Pygmy-possum	Cercartetus nanus	Refer to BAR
Grevillea shiressii	Grevillea shiressii	Refer to BAR
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Little Bent-winged Bat	Miniopterus australis	Habitat constraints
Powerful Owl	Ninox strenua	Habitat constraints
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Southern Myotis	Myotis macropus	Habitat constraints

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00055486/BAAS17083/25/00055487	113 Orchard St Warriewood V2	28/10/2024
Assessor Name	Report Created	BAM Data version *
Nick Skelton	28/02/2025	Current classification (live - default) (80)
Assessor Number	Assessment Type	BAM Case Status
BAAS17083	Part 4 Developments (Small Area)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
1	BOS Threshold: Biodiversity Values Map	28/02/2025

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

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

Common Name	Scientific Name	Vegetation Types(s)
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	3230-Central Coast Escarpment Moist Forest
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	3230-Central Coast Escarpment Moist Forest
Dusky Woodswallow	Artamus cyanopterus cyanopterus	3230-Central Coast Escarpment Moist Forest
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	3230-Central Coast Escarpment Moist Forest
Flame Robin	Petroica phoenicea	3230-Central Coast Escarpment Moist Forest
Gang-gang Cockatoo	Callocephalon fimbriatum	3230-Central Coast Escarpment Moist Forest
Grey-headed Flying-fox	Pteropus poliocephalus	3230-Central Coast Escarpment Moist Forest
Large Bent-winged Bat	Miniopterus orianae oceanensis	3230-Central Coast Escarpment Moist Forest

Little Bent-winged Bat	Miniopterus australis	3230-Central Coast Escarpment Moist Forest
Little Lorikeet	Glossopsitta pusilla	3230-Central Coast Escarpment Moist Forest
Regent Honeyeater	Anthochaera phrygia	3230-Central Coast Escarpment Moist Forest
Rosenberg's Goanna	Varanus rosenbergi	3230-Central Coast Escarpment Moist Forest
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	3230-Central Coast Escarpment Moist Forest
Spotted-tailed Quoll	Dasyurus maculatus	3230-Central Coast Escarpment Moist Forest
Square-tailed Kite	Lophoictinia isura	3230-Central Coast Escarpment Moist Forest
Swift Parrot	Lathamus discolor	3230-Central Coast Escarpment Moist Forest
Varied Sittella	Daphoenositta chrysoptera	3230-Central Coast Escarpment Moist Forest
White-throated Needletail	Hirundapus caudacutus	3230-Central Coast Escarpment Moist Forest
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	3230-Central Coast Escarpment Moist Forest

Threatened species Manually Added

None added

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Common Name	Scientific Name	Plant Community Type(s)
Black Bittern	Ixobrychus flavicollis	3230-Central Coast Escarpment Moist Forest
Eastern Osprey	Pandion cristatus	3230-Central Coast Escarpment Moist Forest
White-bellied Sea-Eagle	Haliaeetus leucogaster	3230-Central Coast Escarpment Moist Forest

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
Black Bittern	Ixobrychus flavicollis	Refer to BAR
Eastern Osprey	Pandion cristatus	Refer to BAR
White-bellied Sea-Eagle	Haliaeetus leucogaster	Refer to BAR

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00055486/BAAS17083/25/00055487

Assessment name
113 Orchard St Warriewood V2

BAM data last updated *
28/10/2024

Assessor Name
Nick Skelton

Report Created
28/02/2025

BAM Data version *
Current classification (live - default) (80)

Assessor Number
BAAS17083

Assessment Type
Part 4 Developments (Small Area)

BAM Case Status
Finalised

Assessment Revision
1

BOS entry trigger
BOS Threshold: Biodiversity Values Map

Date Finalised
28/02/2025

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

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	3230_VZ1Moderate	3230-Central Coast Escarpment Moist Forest	VZ1Moderate	0.39	1	VZ1MZ2Part (0.25 ha) VZ1MZ1Full (0.14 ha)

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00055486/BAAS17083/25/00055487

Proposal Name
113 Orchard St Warriewood V2

BAM data last updated *
28/10/2024

Assessor Name
Nick Skelton

Assessor Number
BAAS17083

BAM Data version *
Current classification (live - default) (80)

Proponent Names
Anthony Simpson

Report Created
28/02/2025

BAM Case Status
Finalised

Assessment Revision
1

BOS entry trigger
BOS Threshold: Biodiversity Values Map

Assessment Type
Part 4 Developments (Small Area)

Date Finalised
28/02/2025

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

Potential Serious and Irreversible Impacts

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

Species
Lathamus discolor / Swift Parrot
Vespadelus troughtoni / Eastern Cave Bat

BAM Biodiversity Credit Report (Like for like)

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Ixobrychus flavicollis / Black Bittern
Pandion cristatus / Eastern Osprey
Haliaeetus leucogaster / White-bellied Sea-Eagle

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3230-Central Coast Escarpment Moist Forest	Not a TEC	0.4	7	0	7

BAM Biodiversity Credit Report (Like for like)

3230-Central Coast Escarpment Moist Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests <50%	3230_VZ1Moderate	Yes	7	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Lathamus discolor / Swift Parrot	**3230_VZ1Moderate**	0.4	15.00

Vespadelus troughtoni / Eastern Cave Bat	**3230_VZ1Moderate**	0.4	15.00

Credit Retirement Options

Like-for-like credit retirement options

Lathamus discolor / Swift Parrot	Spp	IBRA subregion
	Lathamus discolor / Swift Parrot	Any in NSW
Vespadelus troughtoni / Eastern Cave Bat	Spp	IBRA subregion
	Vespadelus troughtoni / Eastern Cave Bat	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00055486/BAAS17083/25/00055487

Proposal Name

113 Orchard St Warriewood V2

BAM data last updated *

28/10/2024

Assessor Name

Nick Skelton

Assessor Number

BAAS17083

BAM Data version *

Current classification (live - default) (80)

Proponent Name(s)

Anthony Simpson

Report Created

28/02/2025

BAM Case Status

Finalised

Assessment Revision

1

BOS entry trigger

BOS Threshold: Biodiversity Values Map

Assessment Type

Part 4 Developments (Small Area)

Date Finalised

28/02/2025

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

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Lathamus discolor / Swift Parrot		
Vespadelus troughtoni / Eastern Cave Bat		

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Ixobrychus flavicollis / Black Bittern
Pandion cristatus / Eastern Osprey
Haliaeetus leucogaster / White-bellied Sea-Eagle

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3230-Central Coast Escarpment Moist Forest	Not a TEC	0.4	7	0	7.00

3230-Central Coast Escarpment Moist Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region

Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests <50%	3230_VZ1 Moderate	Yes	7	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region
Wet Sclerophyll Forests (Grassy sub-formation)	Tier 4 or higher threat status	3230_VZ1 Moderate	Yes (including artificial)	7	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Lathamus discolor / Swift Parrot	**3230_VZ1Moderate**	0.4	15.00
Vespadelus troughtoni / Eastern Cave Bat	**3230_VZ1Moderate**	0.4	15.00

Credit Retirement Options

Like-for-like options

Lathamus discolor/ Swift Parrot	Spp		IBRA region
	Lathamus discolor/Swift Parrot		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Vespadelus troughtoni/ Eastern Cave Bat	Spp		IBRA region
	Vespadelus troughtoni/Eastern Cave Bat		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Appendix C Field Data Sheet

GIS Environmental Consultants

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BAM Functional 20x50m Plot Data Sheet

See Back of Sheet for Methods

April 2022 Version

Address:	113 Orchard St, Warriewood	Plot:	1
Date:	6 / 1 / 24	Plot Origin Coordinate MGA:	340995 E / 6270872 S
Start time:	13:00		
Recorder:	Andreas	Origin Midline Bearing:	12 °
Other Ecologist:	Nick	400m2 Plot Dimensions:	20x20
Confirm PCT codes:	Confidence H M L	1000m2 Plot Dimensions:	20x50.
Vegetation Types:	Turpentine botrioidies + Ang. b. EUC. P.	Confirm Vegetation Zones:	Boundaries on Survey Map

down-slope 21°

elong - Slope: -4° Aspect: E 102° Drainage: No Landform: slope lower Soil: sandy Soil Depth: shallow 0-2m sandstone floaters

up-slope: 22°

Note: Tally large trees, large trees dependent on PCT Class Benchmarks (See Table on Back)

Native Tree Stems (20x50)

Diameter (cm)	Presence/ Absence Or Tally if large
<5	
5 to 9	III
10 to 19	~~IIII~~ ~~IIII~~IIII
20 to 29	~~IIII~~ III
30 to 49	~~IIII~~ II
50 to 79	IIII
80+	II

Coarse Woody Debris

(20x50) Length of fallen Logs >10cm Diameter (cm)

2m
1m
1.5m
} 4.5m total

Hollow bearing trees (inside 20x50)

	Tally
inside 20x50	~~IIII~~ II
outside 20x50	IIII

Hollows (Tree No, Dimensions, Height) site

- #58 4x4cm height: 1m
- #194 ? h: ~5m
- Angophora. 10x10cm h:10m
- #183 1x7cm h 4m
- #21, 10x10cm h: 40cm

Note: For hollows, count only the presene of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs. Hollows must be at least 5cm wide, appears to have depth and 1m above ground.

Litter Cover % in 1x1m (see Fig.)

Detached exotic an native <10cm diamet

Sub Plot	Percentage (%)
1	100
2	99
3	30
4	60
5	80

x̄ = 73.8

Rock Cover % in 20x50	2%

Structure Estimate Cover of native vascular plants by growth form group

	% Cover in 20x20 plot
(trunks 3%) Trees	canopy: 30%
Shrubs	0
Grasses sedges and restio	30%
Forbs (Herb)	7%
Ferns	2%
Other - tree fern, vine, palm, cycad, epi, Xanth	0 / 0

Disturbance — Notes

Clearing inc. logging, APZ, mechanical	APZ shrub removed
Grazing identify native/stock	none
Fire History Years since, heat	>30 yrs since fire
Weediness Cover %	1%
Soil Erosion Slope Existing Potential	
Added Nutrients Soil, sewage, stormwater	

Fauna Observed

Observation Types; Observed (O), Observed and Heard call (OW), Heard call (W), Scat (P), Nest/roost (E), Tracks or scratchings (F), Burrow (FB), Crushed Cones (G), Hair (H), Feathers or skin (I), Dead (K), Camera (Q), In scat (X), Bone or teeth or shell (Y), In raptor/owl pellet (Z), Ultrasonic bat detector (U)

Observ type	Species	Observ type	Species	Observ type	Species
O	Water Dragon				

(more on back)

Weather: Temp 26 °C Recent Rain yesterday 5th/1 Wind 17 km/h

☑ Hollow survey on property

- ☑ Photo taken of plot from origin
- ☑ Photo of general site
- ☑ All Boxes Filled Out
- ☑ Random Meander on rest of property
- ☑ Photo's taken from the 4 corners of 20x20m
- ☑ Photos taken of data sheets
- ☑ Photo of canopy centre of 20x20 plot
- ☑ Map Native Canopy Onsite
- ☑ Map Native Shrub layer Onsite
- ☑ Map Nat. Groundcover Onsite

Finish Time: 15:30

Man Hours:

* Arb tape measure !!! Add ruler measurement to sheet

Appendix D Alternative Development Options

Appendix E BDAR Requirements Compliance

BAM Appendix K Table 27 Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area

Assessment of compliance with BDAR minimum information requirements

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
Introduction	Chapters 2 and 3	Information	
		Introduction to the biodiversity assessment including:	-
		☒ brief description of the proposal	2.2
		☒ identification of subject land boundary, including: ☒ operational footprint	2.1
		☒ construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure	2.2
		☒ general description of the subject land	2.1
		☒ sources of information used in the assessment, including reports and spatial data	2.7
		☒ identification and justification for entering the BOS	2.3
		Maps and tables	
		☒ 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	2.1, 2.2, 2.3, 2.4, 2.5
Landscape	Sections 3.1 and 3.2, Appendix E	Information	
		Identification of site context components and landscape features, including:	-
		☒ general description of subject land topographic and hydrological setting, geology and soils	3.1, 3.3, 3.4, 3.5
		☒ per cent native vegetation cover in the assessment area (as described in BAM Section 3.2)	3.7

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BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☒ IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	3.1
		☒ rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3.) and Appendix E)	3.4
		☒ wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(3.))	3.4
		☒ connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5-6.))	3.6
		☒ karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(12.))	3.5
		☒ areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8-9.))	3.8
		☐ any additional landscape features identified in any SEARs for the proposal ***Not required in streamlined BDAR***	
		☒ NSW (Mitchell) landscape on which the subject land occurs ***Not required in streamlined BDAR***	3.2
		☒ details of field reconnaissance undertaken to confirm the extent and condition of landscape features and native vegetation cover (as described in Operational Manual Stage 1 Section 2.4) ***Not required in streamlined BDAR***	2.9
		Maps and tables	
		☒ Site Map ☒ Property boundary ☒ Boundary of subject land ☒ Cadastre of subject land (including labelling of Lot and DP or section plan if relevant) ☒ Landscape features identified in BAM Subsection 3.1.3	2.1
		☒ Location Map ☒ Digital aerial photography at 1:1,000 scale or finer ☒ Boundary of subject land ☒ Assessment area (i.e. the subject land and either 1500 m buffer area or 500 m buffer for linear development) ☒ Landscape features identified in BAM Subsection 3.1.3 ☒ Additional detail (e.g. local government area boundaries) relevant at this scale	2.2
		Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location Map include:	-
		☒ IBRA bioregions and subregions ☒ rivers, streams and estuaries	3.1, 3.2, 3.7

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☒ wetlands and important wetlands	
		☒ connectivity of different areas of habitat	
		☒ karst, caves, crevices, cliffs, rocks and other geological features of significance and if required, soil hazard features	
		☐ areas of outstanding biodiversity value occurring on the subject land and assessment area ***Not required in streamlined BDAR***	
		☐ any additional landscape features identified in any SEARs for the proposal ***Not required in streamlined BDAR***	
		☒ NSW (Mitchell) landscape on which the subject land occurs	
		Data	
		☒ All report maps as separate jpeg files	Can be provided on request
		Individual digital shape files of:	
		☒ subject land boundary	
		☒ assessment area (i.e. subject land and 1500 m buffer area) boundary	
		☒ cadastral boundary of subject land	
		☒ areas of native vegetation cover	
		☒ landscape features	
Native vegetation	Chapter 4, Appendix A and Appendix H	Information	
		☒ Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery (as described in BAM Section 4.1(1–3.) and Subsection 4.1.1)	4.1
		☒ Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2)	4.1, 4.2
		☒ Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area (described in BAM Section 4.1(3.) and Subsection 4.1.1)	4.1
		☒ Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2	2.9, 4.6
		☐ Where relevant, describe the use of more appropriate local data, provide reasons that support the use of more appropriate local data and include the written confirmation from the decision-maker that they support the use of more appropriate local data (as described in BAM Subsection 1.4.2 and Appendix A)	***Not relevant to this site***

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		For each PCT within the subject land, describe:	-
		☒ PCT name and ID	4.3
		☒ vegetation class	4.3
		☒ extent (ha) within subject land	4.3
		☒ evidence used to identify a PCT including any analyses undertaken, references/sources, existing vegetation maps (BAM Section 4.2(1-3.))	4.3
		☒ plant species relied upon for identification of the PCT and relative abundance of each species	4.3
		☒ if relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2(1-2.))	4.3
		☒ estimate of per cent cleared value of PCT (BAM Subsection 4.2.1(5.))	4.3
		Describe the vegetation integrity assessment of the subject land, including:	-
		☒ identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1)	4.4
		☒ description of vegetation zones within the subject land (as described in Operational Manual Stage 1 Table 2 and Subsection 3.3.2)	4.4, 4.7
		☒ area (ha) of each vegetation zone	4.7
		☒ assessment of patch size (as described in BAM Subsection 4.3.2)	4.5
		☒ survey effort (i.e. number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1-2.)	2.9
		☒ use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 4.3.3(5.))	4.8
		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):	*Not relevant to this site*
		☐ identify the PCT or vegetation class for which local benchmark data will be applied ☐ identify published sources of local benchmark data (if benchmarks obtained from published sources) ☐ describe methods of local benchmark data collection (if reference plots used to determine local benchmark data)	
		☐ provide justification for use of local data rather than BioNet Vegetation Classification benchmark values	
		☐ provide written confirmation from the decision-maker that they support the use of local benchmark data	
		Maps and tables	
		☒ Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of all areas of native vegetation including areas that are ground cover only, cleared areas (as described in BAM Section 4.1(1-3.)) and all parts of the subject land that do not contain native vegetation (BAM Subsection 4.1.2) *Cleared areas and ground cover not required in streamlined BDAR*	Figure 4.1

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☒ Map of PCTs within the subject land (as described in BAM Section 4.2(1.))	Figure 3.5
		☒ Map of vegetation zones within the subject land (as described in BAM Subsection 4.3.1)	Figure 4.2
		☒ Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries	Figure 4.3
		☒ Map of TEC distribution on the subject land and table of TEC listing, status and area (ha)	Figure 4.2
		☒ Map of patch size locations for each native vegetation zone and table of patch size areas (as described in BAM Subsection 4.3.2)	Figure 3.7, Table 4.4
		Table of current vegetation integrity scores for each vegetation zone within the site and including:	-
		☒ composition condition score ☒ structure condition score ☒ function condition score ☒ presence of hollow bearing trees ***Not required in streamlined BDAR***	Table 4.5
		Data	
		☒ All report maps as separate jpeg files	Can be provided on request
		☒ Plot field data (MS Excel format)	
		☒ Plot field datasheets	
		Digital shape files of:	
		☒ PCT boundaries within subject land	
		☒ TEC boundaries within subject land	
		☒ vegetation zone boundaries within subject land	
		☒ floristic vegetation survey and vegetation integrity plot locations	
Habitat suitability for threatened species	Chapter 5	Information	
		Streamlined assessment module - small area BDAR requirements:	-
		☒ Describe the review of existing information and any field survey undertaken to assess habitat constraints and microhabitats for threatened species within the subject land	Tables 5.1, 5.2
		☒ 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	5.2, 5.3

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☒ 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)	Table 5.3
		☒ Identification of candidate species credit species that are at risk of an SAII and therefore, must be further assessed (BAM Section 9.1)	5.4, 5.5 Tables 5.4, 5.5, 5.6
		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)	5.4, 5.5 Tables 5.4, 5.5
		☒ 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).	Table 5.6
		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	5.6
		☒ 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	5.6
		☒ 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)	5.6
		☒ 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)	5.6
		☒ 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.))	5.6
		Maps and tables	
		☒ 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	Table 5.6
		☒ the sensitivity to gain class of each species	Table 5.6

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☒ Table detailing species credit species in accordance with BAM Section 5.2 and identifying:	
		☒ 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	5.6, Table 5.4, 5.5, 5.6
		☒ 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.))	5.6, Table 5.4, 5.5, 5.6
		Data	
		☒ Digital shape files of species polygons	Can be provided on request
		☒ Species polygon map in jpeg format	
		☒ Expert reports and any supporting data used to support conclusions of the expert report	
		☒ Field data sheets (if relevant) for threatened species surveys	
Prescribed impacts	Chapter 6	Information	
		Streamlined assessment module - small area BDAR requirements:	-
		☒ Any prescribed impacts from the small area proposal must be set out in the BDAR consistent with Appendix K	6,9
		Maps and tables	
		☒ If relevant, maps showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.)	Figure 8.1
		Data	
		☒ If relevant, digital shape files of prescribed impact feature locations	Can be provided on request
		☒ Prescribed impact features map in jpeg format	
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	7.2
		☒ routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route ***Not required in streamlined BDAR***	7.2
		☒ Alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location	7.2

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☒ 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	7.2
		☒ Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2)	7.2
		☒ Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Subsection 7.2.1(3.))	7.2
		☒ Detail measures or options considered but not implemented because they are not feasible and/or practical (e.g. due to site constraints) *Not required in streamlined BDAR*	7.2
		Maps and tables	
		☒ Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	Table 7.2
		☒ Map of alternative footprints considered to avoid or minimise impacts on biodiversity values; and of the final proposal footprint, including construction and operation *Map of alternative footprints not required in streamlined BDAR*	Figure 7.1
		☒ Maps demonstrating indirect impact zones where applicable	Figure 7.1
		Data	
		Digital shape files of:	Can be provided on request
		☒ alternative and final proposal footprint	
		☒ direct and indirect impact zones	
		☒ Maps in jpeg format	
Assessment of impacts	Chapter 8, Sections 8.1 and 8.2	Information	
		Streamlined assessment module - small area BDAR requirements:	
		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	8.1, 8.2
		☒ Description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal	8.2
		☒ Any prescribed impacts from the small area proposal must be set out in the BDAR consistent with Appendix K	8.1, **Error! Reference source not found.**

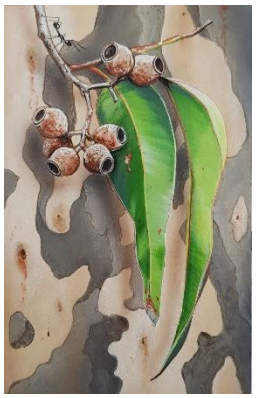
BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		Maps and tables	
		☒ Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Table 8.3
		Data	
		N/A	-
Mitigation and management of impacts	Chapter 8, Sections 8.4 and 8.5	Information	
		Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Sections 8.4 and 8.5 including:	-
		☒ techniques, timing, frequency and responsibility ☒ identify measures for which there is risk of failure ☒ evaluate the risk and consequence of any residual impacts ☒ document any adaptive management strategy proposed	8.5, 8.6, 8.7
		Identification of measures for mitigating impacts related to:	-
		☒ displacement of resident fauna (as described in BAM Subsection 8.4.1(2.)) ☒ indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.)) ☒ mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2)	7.4, 8.3
		☒ Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	8.6
		Maps and tables	
		☒ Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	8.5
		Data	
		N/A	-
Thresholds for assessing and offsetting the impacts of the proposal	Chapter 9	Information	
		Streamlined assessment module - small area BDAR requirements:	-
		☒ 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	9.1

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☒ Report on impacts of the proposal on TEC/s in accordance with BAM Subsection 9.2.1	9.1
		☒ 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	9.2
		☒ Identification of impacts requiring offset in accordance with BAM Section 9.2	9.3
		☒ Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	9.4
		☒ Identification of areas not requiring assessment in accordance with BAM Section 9.3	9.4
		Maps and tables	
		☒ Map showing the extent of TECs at risk of an SAII within the subject land	Figure 4.2, 4.3
		☒ Map showing location of threatened species at risk of an SAII within the subject land	Figure 4.3
		Map showing location of:	-
		☒ impacts requiring offset	Figure 8.1
		☒ impacts not requiring offset	Figure 8.1
		☒ areas not requiring assessment	Figure 8.1
		Data	
		Digital shape files of:	Can be provided on request
		☒ extent of TECs at risk of an SAII within the subject land	
		☒ location of threatened species at risk of an SAII within the subject land	
		☒ boundary of impacts requiring offset	
		☒ boundary of impacts not requiring offset	
		☒ boundary of areas not requiring assessment	
		☒ Maps in jpeg format	
Applying the no net loss standard (Offset summary)	Chapter 10	Information	
		Streamlined assessment module - small area BDAR requirements:	-
		☒ Description of the impact on PCTs/TECs	Table 9.1
		☒ Description of the impact on threatened species at risk of an SAII or incidentally observed via site visit	Table 9.2
		☒ Number of ecosystem credits required for impacts on biodiversity values according to BAM Subsection 9	Table 10.1

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☒ 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	Table 10.2
		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)	Appendix B
		Maps and tables	
		☒ Table showing biodiversity risk weightings	Appendix B
		☒ Table of BC Act listing status for PCTs and threatened species requiring offset	Table 10.1, 10.2
		☒ Table of PCTs requiring offset and number of ecosystem credits required (Subsection 10.2.1)	Table 10.1
		☒ Table of species at risk of an SAII or incidentally observed on site assessed for species credits and the number of credits required	Table 10.2
		☒ BAM-C credit report	Appendix B
		Data	
		N/A	

Appendix F Bat Call Analysis Results (6pgs)

15/12/2024



CORYMBIA ECOLOGY

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BAT CALL ANALYSIS RESULTS

GIS Environmental Consultants – 113 Orchard St, Warriewood – 11-22/11/24

The target bat species are:

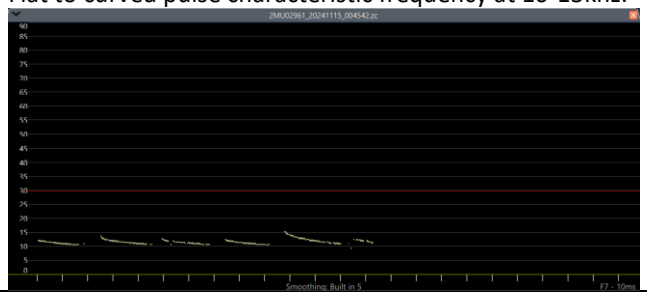
- Southern Myotis
- Eastern Cave Bat
- Large-eared Pied Bat

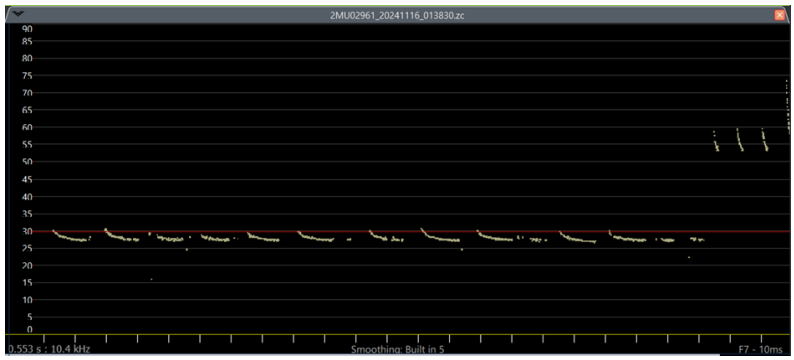
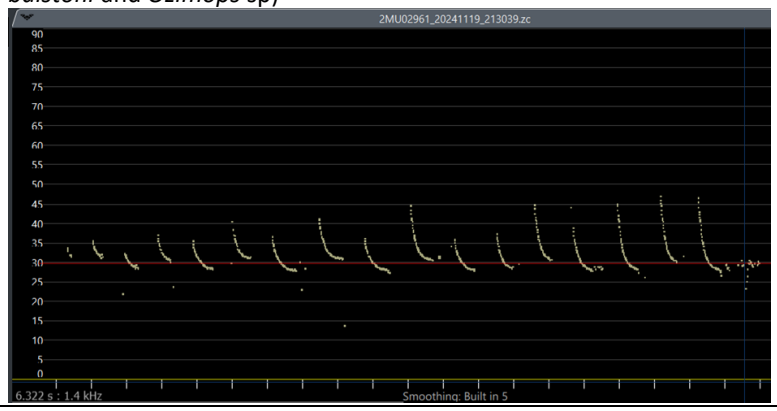
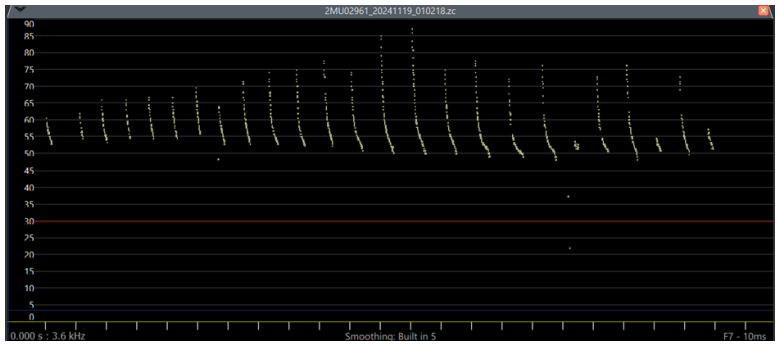
No passes of Large-eared Pied Bat were recorded.

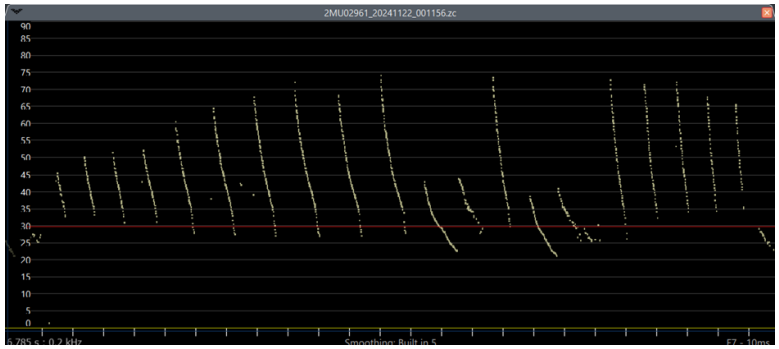
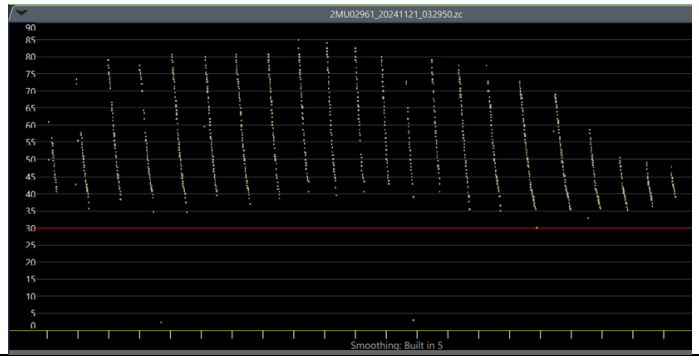
Two passes that could either be *Myotis* or *Nyctophilus* were recorded. If suitable foraging or roosting habitat occurs on site for this species, its presence should be considered. With only two passes the area (approx.. 30m around the detector) that the detector was monitoring does not contain significant foraging or roosting habitat.

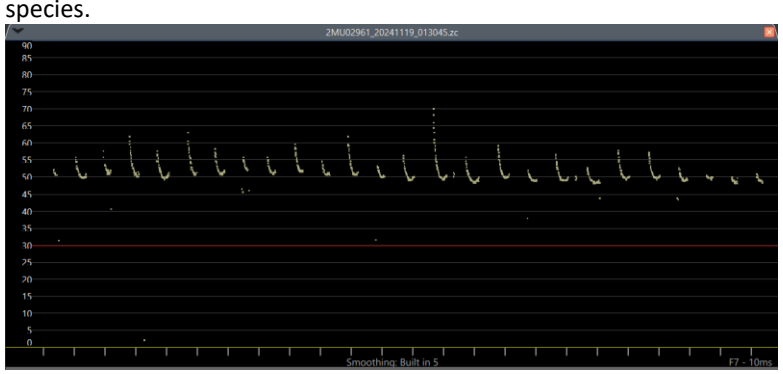
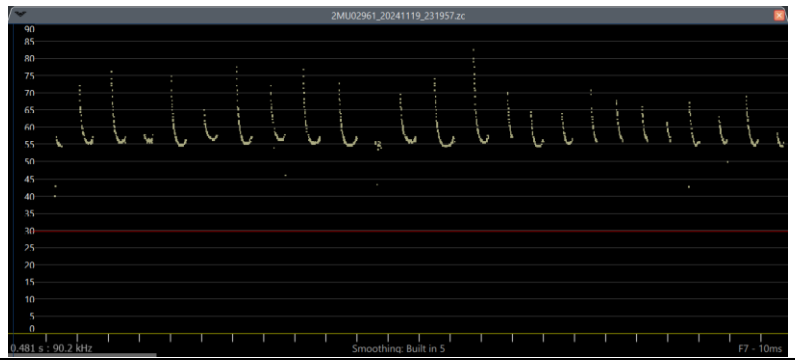
Vespadelus passes in the range of Eastern Cave Bat *Vespadelus troughtoni* were recorded. Due to overlap in call characteristics with other *vespadelus* species definite identification cannot be made. If suitable rock outcrop habitat occurs in the vicinity of the site, the presence of the species should be considered further.

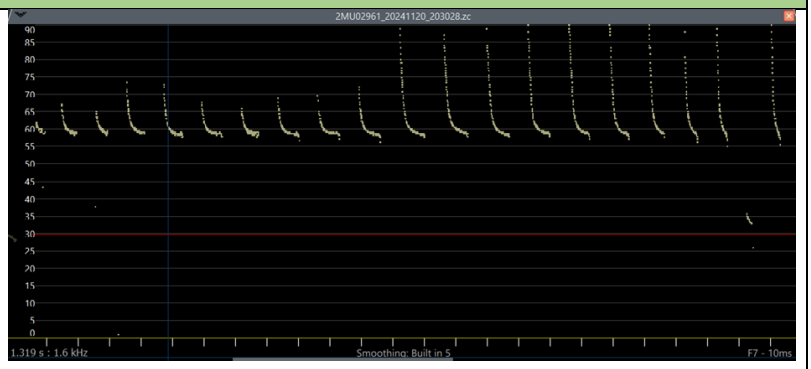
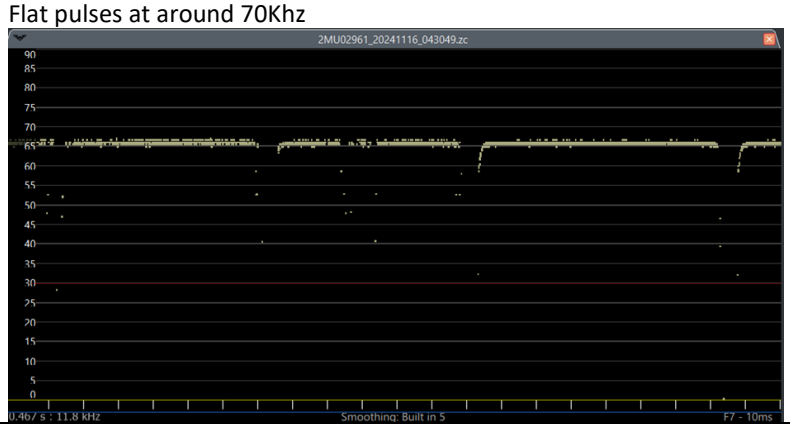
Table 1. Detector Results

Species	Identification confidence level	Comments
Austronomus australis	D	Flat to curved pulse characteristic frequency at 10-15khz. 

Species	Identification confidence level	Comments
Ozimops ridei	Pr	Characteristic frequency 28.5 to 31khz. Usually flat pulses, but also curved in attack phase. During attack phase this species can produce pulses that may be confused with other species calling in the same frequency range. Where distribution overlap this species may be confused with *Ozimops petersi* and *Ozimops planiceps* and *Micronomus norfolkensis.* 
Chalinolobus gouldii	D – high level of activity	Usually curved, upright pulses with a prominent foot with no tail. May sometimes downsweep and be flatter at the lower frequencies in more open areas. Alternation is present in many passes which distinguish the species from others calling at the same frequency (i.e. *Scotorepens balstoni* and *Ozimops* sp) 
Chalinolobus morio	D	Curved upright call with a downsweeping tail. Characteristic frequency at 46.5-53khz. 

Species	Identification confidence level	Comments
Scotorepens orion	Pr	*Scotorepens orion* - Characteristic frequency 34.5-37.5khz. Curved pulse shape with absent or downsweeping tail. Call characteristics for this species with *Scoteanax rueppellii* overlap considerably, usually difficult to give a definite ID for these species.
Myotis macropus	Po – 2 passes	*Myotis macropus* calls are very similar to *Nyctophilus* species and often cannot be distinguished. Good Myotis passes are often longer and stronger than *Nyctophilus* with a varying slope between consecutive pulses and often occur at a slightly lower frequency than *Nyctophilus*. The low number of possible Myotis passes, indicates that the area being monitored by the detector is not significant foraging or roost site for Myotis. However, if suitable habitat exists in the study area, it is recommended that further consideration be given to *Myotis macropus.* 
Nyctophilus geoffroyi / Nyctophilus gouldi	D-E	Near vertical pulse shape. *Nyctophilus* species currently indistinguishable on call characteristics. 
Vespadelus regulus / Vespadelus darlingtoni	Pr -E	Characteristic frequency for *V. regulus* 40-55khz, where this frequency and call shape varies geographically. Characteristic frequency for *V darlingtoni* 38-46khz. Curved pulse often upsweeping or absent with a fairly long characteristic section. Overlap with *Miniopterus orianae oceanensis,* but can be distinguished by having a lack of downsweeping tail and consistent consecutive pulses. In some regions *V. darlingtoni* may also be confused with other *Vespadelus sp.* and when this occurs it can be difficult to give positive identification.

Species	Identification confidence level	Comments
Vespadelus vulturnus / Vespadelus troughtoni / Vespadelus pumilus	D-E	Characteristic frequency for *V. vulturnus* 42.5-53khz, where this frequency varies geographically. The characteristic frequency of consecutive pulses often varies within a sequence. Characteristic frequency for *V. troughtoni* 49-53.5khz. Characteristic frequency for V. pumilus 50-58khz. Prominent upsweeping tail. Lower frequency passes may be confused with *V. troughtoni* and *V. vulturnus*. There were a range of *Vespadelus* passes recorded with frequency ranging from 48 to 55. It is likely that *V. vulturnus* is present with either *V. troughtoni* and/or *V.pumilus* calling at the higher frequency. Due to overlap in call characteristics, passes cannot be confidently identified to species.  
Miniopterus australis	D –high level of activity	Curved upright call with a downsweeping tail. Characteristic frequency at 54 - 64khz.

Species	Identification confidence level	Comments
		
Miniopterus orianae oceanensis	Po	Characteristic frequency 43-48khz. The passes at the mid to lower frequencies often have a relatively short initial section, with a fairly long characteristic section with no tail or down sweeping tail. Consecutive pulses in a sequence are often irregular with varying shape and frequency. There is considerable overlap with *Vespadelus sp* and some passes may not be confidently distinguishable. A more prominent down sweep tail helps to identify from *Vespadelus sp*. The higher frequency pulses, particularly in clutter or roost entrances are steeper with a longer initial section, shorter characteristic section, often down sweeping tail. These sequences may be confused with *Chalinolobus morio* .
Rhinolophus megaphyllus	D	Flat pulses at around 70Khz 

Note: only calls identified a definite should be entered in Bionet

- D – definite; Pr – probable; Po – possible; E – one or more
- Calls were analysed using Anabat Insight.
- Example calls presented below are displayed in this report at F7.
- Analysis was completed on the 13 December 2024.
- The following resources were consulted during analysis:
    - Pennay M., Law B., and Reinhold L. (2004) Bat Calls of NSW. DEC of NSW.
    - Corben C. (2009) Anabat Techniques Workshop, Titley Scientific.
    - Personal experience analysing calls and collection of reference calls in NSW
    - Anabat Insight Workshop (2019), Titley Scientific and Balance Environmental.
    - Bionet accessed 13 December 2024.

Amy Rowles

CORYMBIA ECOLOGY

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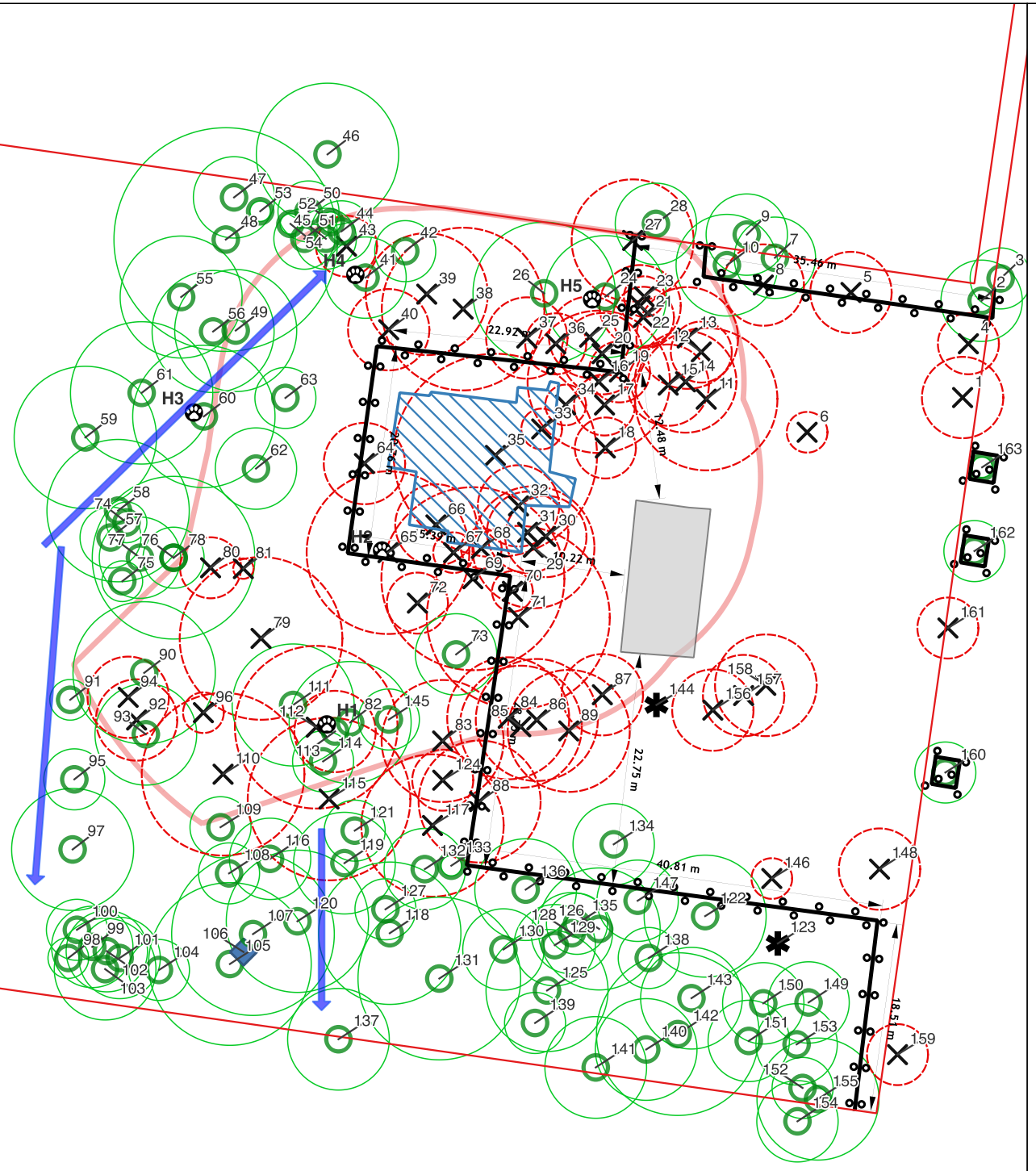
Amy is a Practising Member of the Ecological Consultants Association of NSW

Appendix G Tree Removal Plan

Num	ImpactFina
1	Remove
2	Keep
3	Keep
4	Remove
5	Remove
6	Remove
7	Keep
8	Remove
9	Keep
10	Keep
11	Remove
12	Remove
13	Remove
14	Remove
15	Remove
16	Remove
17	Remove
18	Remove
19	Remove
20	Remove
21	Remove
22	Remove
23	Remove
24	Keep
25	Remove
26	Keep
27	Remove
28	Keep
29	Remove
30	Remove
31	Remove
32	Remove
33	Remove
34	Remove
35	Remove
36	Remove
37	Remove
38	Remove
39	Remove
40	Remove
41	Keep
42	Keep
43	Remove
44	Keep
45	Keep
46	Keep
47	Keep
48	Keep
49	Keep
50	Keep
51	Keep
52	Keep
53	Keep
54	Keep
55	Keep
56	Keep
57	Keep
58	Keep
59	Keep
60	Keep

Num	ImpactFina
61	Keep
62	Keep
63	Keep
64	Remove
65	Remove
66	Remove
67	Remove
68	Remove
69	Keep
70	Keep
71	Keep
72	Keep
73	Keep
74	Keep
75	Keep
76	Keep
77	Keep
78	Keep
79	Keep
80	Remove
81	Remove
82	Keep
83	Keep
84	Keep
85	Keep
86	Remove
87	Remove
88	Remove
89	Remove
90	Keep
91	Keep
92	Remove
93	Keep
94	Remove
95	Keep
96	Remove
97	Keep
98	Keep
99	Keep
100	Keep
101	Keep
102	Keep
103	Keep
104	Keep
105	Keep
106	Missing
107	Keep
108	Keep
109	Keep
110	Remove
111	Keep
112	Remove
113	Keep
114	Keep
115	Remove
116	Keep
117	Remove
118	Keep
119	Keep
120	Keep

Num	ImpactFina
121	Keep
122	Keep
123	Dead
124	Remove
125	Keep
126	Keep
127	Keep
128	Keep
129	Keep
130	Keep
131	Keep
132	Keep
133	Keep
134	Keep
135	Keep
136	Keep
137	Keep
138	Keep
139	Keep
140	Keep
141	Keep
142	Keep
143	Keep
144	Dead
145	Keep
146	Remove
147	Keep
148	Remove
149	Keep
150	Keep
151	Keep
152	Keep
153	Keep
154	Keep
155	Keep
156	Remove
157	Remove
158	Remove
159	Remove
160	Keep
161	Remove
162	Keep
163	Keep



Legend

113 Orchard St, Warriewood

- Property
- Temporary Environment Protection Fence
- Clean Water Diversion Mound
- Proposed Dwelling
- Existing House
- Tree Hollows

Tree Impact [163]

- Keep [93]
- Remove [67]
- Missing [1]
- Dead [2]

Tree Canopies

- Keep
- Remove
- Bushfire Report APZ Feb 25, 2796 sqm

Notes:
To be read in conjunction with the arborist report and the Bushland Management Plan.
The Site Ecologist is to be present during vegetation clearence and tree removal.
This site has a steep slope and high soil erosion potential.
No machinery is permitted to the west of the Environment Protection Fence.
This plan varies from the Arborist report in the following ways, Trees 41, 42, 49, 58, 60, 91, 95, 97, 119 and 120 are considerd not to be impacted by the low narrow 200x200m clean water diversion mount as there is no digging and there is no other impact to these trees, these trees are retained.
Bushfire APZ requires removal of trees 25, 36, 37, 38, 39, 40, 43, 72, 80, 92, 94, 112 to meet the tree canopy limit within the APZ.

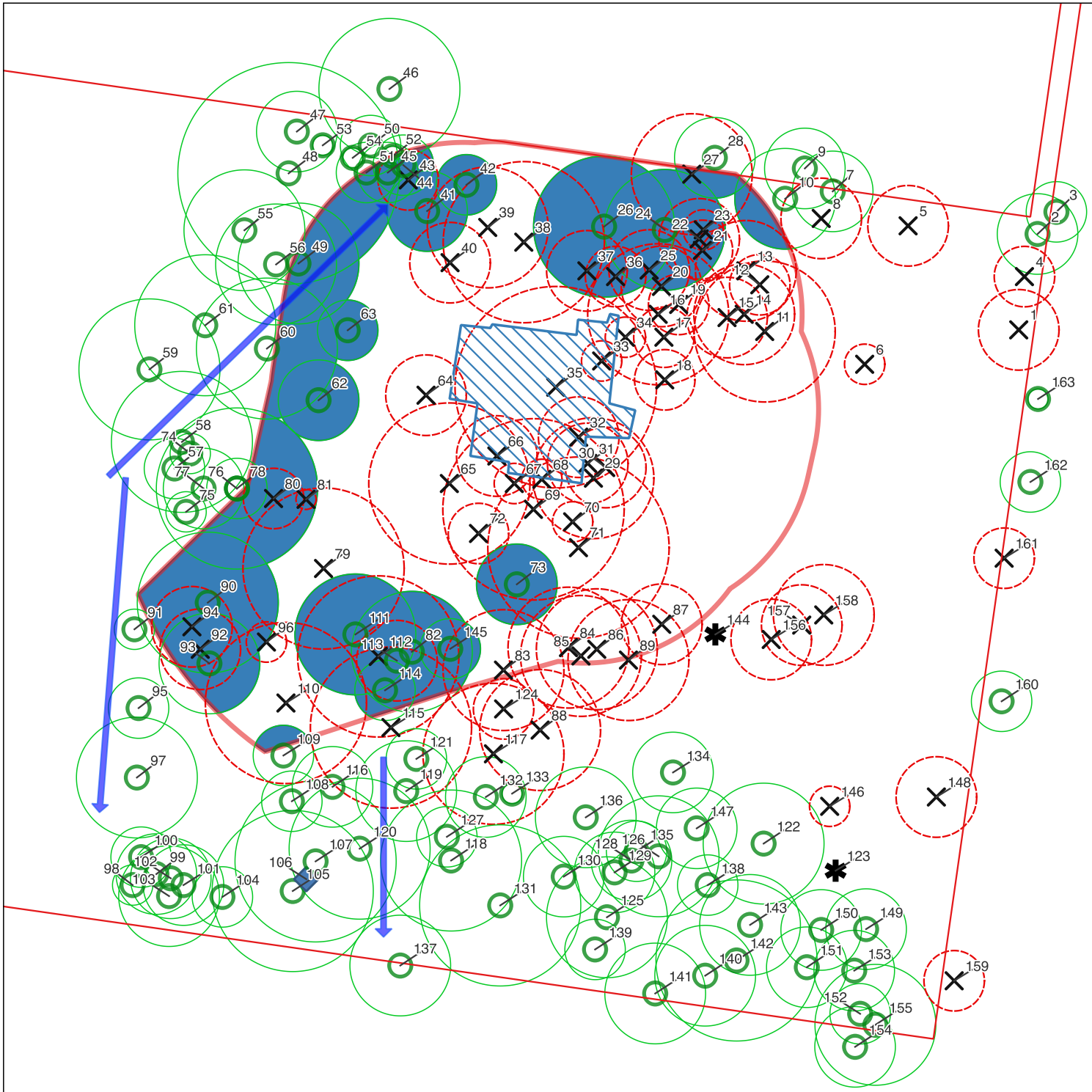
Tree Removal Plan

GIS Environmental Consultants
Ph: (02) 9939 5129, Mobile: 0419 438 672
ecology@ecology.net.au, ecology.net.au

Date: 12/2/2025
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 10 20 m

Appendix H Tree Canopy Retention in APZ Plan



Legend

113 Orchard St, Warriewood

- Property
- Clean Water Diversion Mound
- Proposed Dwelling

Tree Impact [163]

- Keep [93]
- Remove [67]
- Missing [1]
- Dead [2]

Tree Canopies

- Keep
- Remove
- Bushfire Report APZ Feb 25, 2796 sqm
- Tree Canopy Keep in APZ

APZ tree Canopy Projected Cover Calculation

APZ = 2796 sqm
Tree Canopy in APZ = 1005 sqm
Area of Tree Canopy = 36%
Projected Cover of DSF Tree ratio = 0.4

Tree Canopy retained within APZ = 14.37%

Notes:
This plan varies from the Arborist report in the following ways, Trees 41, 42, 49, 58, 60, 91, 95, 97, 119 and 120 are considerd not to be impacted by the low narrow 200x200m clean water diversion mount as there is no digging and there is no other impact to these trees and these trees are retained. Bushfire APZ requires removal of trees 25, 36, 37, 38, 39, 40, 43, 72, 80, 92, 94, 112, 113 to meet the tree canopy limit within the APZ.

Tree Canopy Retension in APZ

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Date: 12/2/2025
Cartographer: Nicholas Skelton
Version: 1.0
File Path: Server/Projects/Current/GIS/Maps
Projection: GDA 94 MGA 56

0 9 18 m