

Flora and Fauna Assessment

1 46 Lane Cove Rd, Ingleside

Prepared by Ecological Consultants Australia Pty Ltd TA

Kingfisher Urban Ecology and Wetlands

April 2023



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Statement of Authorship

This study and report were undertaken by Ecological Consultants Australia for the client. The author of the report is Geraldene Dalby-Ball with qualifications BSc majoring in Ecology and Botany with over 25 years' experience in this field and Brooke Thompson with qualifications BSc majoring in Conservation Biology.

Limitations Statement

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

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Executive Summary

Ecological Consultants Australia (ECA) trading as Kingfisher Urban Ecology and Wetlands has been commissioned by Tamut Engineering Pty Ltd to provide a BDAR or Flora and Fauna Assessment for a proposal at 1 46 Lane Cove Rd, Ingleside NSW 2101 identified as Lot 1 in DP 1044346 within the Northern Beaches Council Local Government Area (LGA).

This addresses the RFI

Natural Environment Referral Response - Biodiversity

Application Number:	DA2022/2163
Proposed Development:	Construction of a dwelling house
Date:	21/02/2023
Responsible Officer	Adam Susko
Land to be developed (Address):	Lot 1 DP 1044346 , 1 / 46 Lane Cove Road INGLESIDE NSW 2101

Reasons for referral

This application seeks consent development on land, or within 40m of land, containing:

- All Development Applications on
- Actual or potential threatened species, populations, ecological communities, or their habitats;
- Wildlife corridors;
- Vegetation query stipulating that a Flora and Fauna Assessment is required;
- Vegetation query - X type located in both A & C Wards;

And as such, Council's Natural Environment Unit officers are required to consider the likely potential environmental impacts.

Officer comments

The proposal seeks approval for the construction of a dwelling house.

The proposal has been assessed against the following relevant provisions:

- Vegetation SEPP 2017
- Pittwater LEP 2014 - Clause 7.6 Biodiversity Protection
- Pittwater 21 DCP - Clause B4.18 Heathland/Woodland Vegetation

As part of the proposal, the applicant wishes to relocate the position of the driveway from its existing location. The proposed location of the driveway will require additional native vegetation clearing which may impact upon known threatened flora records within the site. As a result, an ecologist who is an accredited assessor under the Biodiversity Assessment Method (BAM) is required to be engaged by the applicant to determine the likelihood of impacts on threatened species and determine the extent of required vegetation clearing under the current proposal.

The ecologist is required to determine whether total future vegetation clearing (including any future clearing entitlements that may apply under the 10/50 rule) will trigger entry into the Biodiversity Offsets Scheme (BOS). If native vegetation clearing exceeds the clearing threshold, a Biodiversity Development Assessment Report (BDAR) will be required to be prepared by the accredited assessor and submitted as additional information. If it is determined that the clearing threshold is not exceeded, thus not triggering the BOS, a Flora and Fauna Assessment (FFA) Report is to be submitted as additional information. The FFA should include information on how the BOS was not triggered.

The proposal seeks to construct a residential dwelling, driveway, and associated landscaping.

The proposal does not trigger the area clearing or Biodiversity Values Map threshold as per the BOS entry requirements.

Methods

- On-ground survey took place in March 2023 by Principal Ecologist Geraldene Dalby-Ball.
- Data was gathered across two BAM plots located in the core vegetation and disturbance area.
- Flora and fauna observations were recorded onsite using binoculars and physical examination. Notes, photos, and samples of flora species were taken to assess the ecological health and value of the site.
- BioNet searches were performed for flora, fauna, and endangered populations to identify if there were previous records of threatened species occurring within the local area using a 10 km radius around the site.

Results

- No threatened flora or fauna were observed or recorded during site surveys. No habitat features would host threatened flora or fauna existing within the area of the proposed development.
- No significant habitat features, values or landscape corridors are impacted by the proposed development.
- The proposal does not trigger the area clearing threshold as the development, including the APZ is within existing cleared land or the Biodiversity Values Map threshold as the development is not on land identified by the Biodiversity Values Map.
- No native trees are required to be removed to facilitate the development in its current form nor if the Driveway was to go directly to the house as shown in diagrams in this report. Trees showing in the drive way route are *Acacia saligna* (QLD wattle / weed).
- The site is mapped as containing vegetation identified as PCT 3814 – Woronora Plateau Heath-Mallee and PCT 3592 – Sydney Coastal Enriched Sandstone Forest.
- On-site surveys indicate a mix of species that do not sit easily in any of the official PCTs this is partly to the history of disturbance and that this area has a great diversity of PCT (as can be seen in PCT mapping) with a high influence of soil types, microclimates and from fire frequency (with heath in some of the more frequently burnt area).
- The location is ridge top and there is evidence of ironstone nodules however there are no other characteristics of Duffy's Forrest Community. The site does not contain a Threatened Ecological Community (TEC).
- Threatened Species Test of Significance (5-Part Test of Significance) has been undertaken in accordance with section 5A of the *Environmental Planning & Assessment Act 1979* and section 7.3 of the *Biodiversity Conservation Act 2016*.

Mitigation Measures

- Delineation of work areas

- *Fire and Vegetation Management Plan* to be submitted pre CC that details tree protection, wet area protection, augmentation of frog habitat, implementation of the APZ, weed management and ID of threatened species particularly Tetratheca and management responses.
- Native species to be included in the landscaping – ecologist to review landscape plan prior to CC to ensure it is compliant with APZ as well as biodiversity values
- Installing nest boxes x 2 for microbats is recommended – at least 3m high and fixed to tree with plastic coated expandable wire (no nails).
- Pathogen prevention – see phytophthora and Chytrid fungus protocols in this report.
- Locating on-site wastewater system away from nutrient sensitive vegetation and maintenance of the on-site wastewater system.

See the recommendations section for a detailed explanation as to how these measures improve biodiversity values.

Before works:

- Removal / effective management of exotic weeds to prevent spread of seed. Currently at high level.
- Marking of areas to be retained and only to be worked by hand (could be in CEMP).
- Effective site management to minimise sediment runoff during construction.
- Micro-bat box installation

During works:

- Effective site management to minimise sediment runoff during construction.
- Bush hygiene protocols are to be followed to prevent the spread of pathogens including Phytophthora.

After completion of works:

- Landscaping works will be conducted and native species including tree species are to be included.
- Implementation and maintenance of the *Fire and Vegetation Management Plan*

Summary response to RFI from Northern Beaches Council

- *Vegetation SEPP 2017 / Pittwater LEP 2014 - Clause 7.6 Biodiversity Protection – no significant impact*
- *Pittwater 21 DCP - Clause B4.18 Heathland/Woodland Vegetation – due to the sites existing clearing and works including the APZ being in the cleared areas the works are compliant with the objectives of B4.18. For this to remain the case a management plan is required for fire, wastewater and vegetation mgt on the site.*

As part of the proposal, the applicant wishes to relocate the position of the driveway from its existing location. The proposed location of the driveway will require additional native vegetation clearing which may impact upon known threatened flora records within the site.

Driveway relocation (straightening as per the plans) is supported as it is a shorter route with less division of the land outside of the main building envelope, enabling that to be revegetated. The area proposed for the drive has weed – Acacia saligna as the canopy. One native Banksia is on the nature strip and would be impacted by the drive way route. A detailed search through this area did not find threatened species.

Tetratheace has been located in the vicinity (within 200m) previously (over 5 yrs ago) and it is possible that the species may re-appear with the disturbance of the site for building.

As a result, an ecologist who is an accredited assessor under the Biodiversity Assessment Method (BAM) is required to be engaged by the applicant to determine the likelihood of impacts on threatened species and determine the extent of required vegetation clearing under the current proposal.

Yes I am an accredited assessor (currently doing re-accreditation (with assignments in marking atm Accredited Biobank Assessor BAAS19008). Also back up by accredited assessor Kat Duchatel (when doing BDARs). We note a BDAR was not triggered.

The ecologist is required to determine whether total future vegetation clearing (including any future clearing entitlements that may apply under the 10/50 rule) will trigger entry into the Biodiversity Offsets Scheme (BOS).



The maximum area that could be impacted and more than 50% of this is 100% weed is 2080m²

*Based on the rule enabling tree removal on your property within 10 metres of a home, and underlying vegetation (other than trees) such as shrubs on your property within 50 metres of a home **AND providing all is in accordance with the Code of Practice including 7.8 and 7.9 (see extracts below).***

So there would be no extra tree clearing possible as all are more than 10m from the dwelling. Within 50m there are areas of shrubs – noting most is weed and would also be covered under the recommended VMP. The VMP can over-rides that would management clearing to ensure its in alignment with 7.8 and 7.9.

It is noted though that with the 10/50 rule the following applies from the Code of Practice (2015)
<https://www.rfs.nsw.gov.au/plan-and-prepare/1050-vegetation-clearing?a=18453>

Test of significance were considered for the following 4 species – result not significant impact.
 Management required though a plan (e.g. Fire and VMP) to protect possibly future occurrence of these plants and the Red-crowned Toadlet

<i>Pseudophryne australis</i>	Red-crowned Toadlet
<i>Tetratheca glandulosa</i>	Black Eyed Susan
<i>Microtis angusii</i>	Angus's Onion Orchid
<i>Grevillea caleyi</i>	Caley's Grevillea

7.8 Protection of vegetation to which a legal obligation exists to preserve that vegetation by agreement or otherwise

Clearing under this 10/50 Code cannot be inconsistent with any of the following:

- any conservation agreement entered into under Division 12 of Part 4 of the [National Parks and Wildlife Act 1974](#);
- any Trust Agreement entered into under Part 3 of the [Nature Conservation Trust Act 2001](#);
- any property management plan approved by the Director-General of the NSW National Parks and Wildlife Service under Section 113B of the [Threatened Species Conservation Act 1995](#); or
- any Property Vegetation Plan agreement entered into under Part 4 of the [Native Vegetation Act 2003](#); or
- any Biobanking Agreement entered into under Part 7A of the [Threatened Species Conservation Act 1995](#).
- any condition of development consent or approval under the [Environmental Planning and Assessment Act 1979](#) that identifies and requires the retention and management of vegetation for conservation purposes.
- any instrument under Section 88B of the [Conveyancing Act 1919](#) that identifies and requires the retention and management of vegetation for conservation purposes
- any order under the following Acts:
 - a. [Criminal Appeal Act 1912](#)
 - b. [District Court Act 1973](#)
 - c. [Land and Environment Court Act 1979](#)
 - d. [Local Court Act 2007](#)
 - e. [Supreme Court Act 1970](#), or
 - f. any order by a Court constituted under any of the above Acts.
- any Stop Work Order, Interim Protection Order or Remediation Direction under Part 6A of the [National Parks and Wildlife Act 1974](#).

7.9 Harm to native and introduced animals

Landowners have a duty of care to avoid cruelty and harm to native, introduced or domestic animals when clearing trees and vegetation in accordance with the 10/50 Scheme. It is important that landowners are aware that clearing of trees and vegetation under the 10/50 Scheme can result in harm to native animals and loss of their natural habitat.

Landowners who clear trees and vegetation under the 10/50 Scheme 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](#). Operating in accordance with the 10/50 Code 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 native vegetation clearing exceeds the clearing threshold, a Biodiversity Development Assessment Report (BDAR) will be required to be prepared by the accredited assessor and submitted as additional information. If it is determined that the clearing threshold is not exceeded, thus not triggering the BOS, a Flora and Fauna Assessment (FFA) Report is to be submitted as additional information. The FFA should include information on how the BOS was not triggered.

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1 Introduction

1.1 Proposed development

1.1.1 Development overview

Ecological Consultants Australia (ECA) trading as Kingfisher Urban Ecology and Wetlands has been commissioned by Tamut Engineering Pty Ltd to provide a **Flora and Fauna Assessment** for a proposal at 1 46 Lane Cove Rd, Ingleside NSW 2101 identified as Lot 1 in DP 1044346 within the Northern Beaches Council Local Government Area (LGA) to assess potential direct and indirect impacts on any threatened species, populations, and communities as per section 5A of the Environmental Planning & Assessment Act 1979 (EP&A Act).

The proposal seeks to construct a residential dwelling, driveway, and associated landscaping.

The 'test of significance' has been undertaken in accordance with the NSW Department of Planning, Industry and Environment (DPIE) 'threatened species test of significance'. The threatened species test of significance is used to determine if a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. The test of significance is set out in s. 7.3 of the Biodiversity Conservation Act 2016 (BC Act).

1.1.2 Limitations of the study

Limitations of the study may arise where certain cryptic species of plants may occur as soil-stored seed or as subterranean vegetation structures. Some species are identifiable above ground only after environmental circumstances related to factors such as periodic fire frequency, intensity or seasonality, soil moisture regime, biological life-cycle patterns as in the case of small plants such as species of orchids, etc. No specific invertebrate surveys were conducted.

Surveys at one time of the year cannot be expected to detect the presence of all species occurring, or likely to occur, in the study area. This is because some species may (a) occur seasonally, (b) utilise different areas periodically (as a component of a more extensive home range), or (c) become dormant during specific periods of the year. Rather, the survey provides the opportunity to sample the area, search specifically for species likely to be encountered within the available time frame and assess the suitability of habitat for particular species.

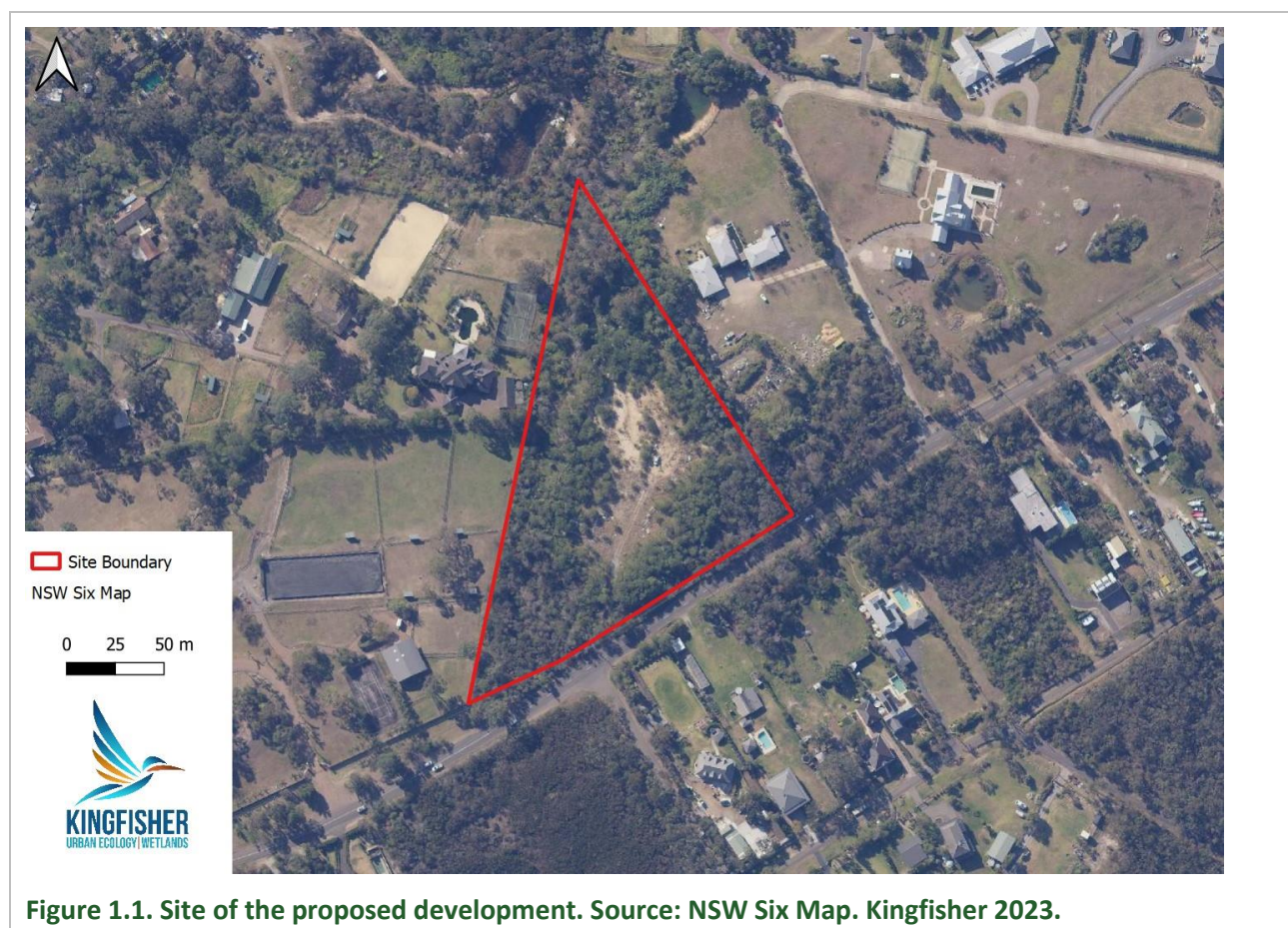
Considering the site and habitat availability Kingfisher are confident that this survey is representative of the likely species and vegetation community and that future studies at other times would not change the conclusions in this report.

1.1.3 Location

The Subject Site (the "Site") is the area of direct and likely indirect impacts and is defined as the whole of the property (see Figures 1.1 and 1.2). The study area includes the site, as well as any additional surrounding land traversed during the site survey.

Table 1.1. Site administrative information.

Category	Details
Title Reference (Lot/DP)	1/DP1044346
Area (ha)	2
Address	1 46 Lane Cove Rd, Ingleside NSW 2101
LGA	Northern Beaches Council
Land Zoning	RU2 – Rural Landscape





1.1.4 Proposed development and the subject site

The proposal seeks to construct a residential dwelling, driveway, and associated landscaping (see Figures 1.3a and Figure 1.3b).

1.1.5 APZ

Works also include to implementation and maintenance of the APZ for bushfire management. APZ is currently in areas that are already cleared or where weeds can be removed and no native vegetation. Following is an extract from the Bush Fire Report. Including a diagram of the proposed APZ. It is noted the distance pf 18m need not result in any tree removal. This area has 1 tree (Spotted Gum) and weed mid and understory. Removing the weed makes this patch compliant with IPZ.

Bushfire Attack Summary
Lot 1 DP 1044346
46 Lane Cove Road Ingleside NSW 2101

	Northwest	Southeast	Northeast
Vegetation Formation	Tall Heath (Area A)	Tall Heath (Area B)	Remnant forest
Vegetation Slope	Downslope > 0 to 5 degrees	Downslope > 0 to 5 degrees	Upslope
Building Separation Distance metres	18	32	18
Separation Slope	Downslope > 0 to 5 degrees	Upslope	Upslope
Fire Danger Index	100	100	100
AS 3959 Construction Standard	BAL 29	BAL 12.5	BAL 19

4.1 Classification of Vegetation and Separation Distance from Proposed Development

The vegetation was assessed for a distance of 140 metres from the proposed development building footprint in each of the following directions. To the north, east, south and west being the general direction adjacent and away from the proposed building elevations within such building footprint.



Figure 4: Vegetation study area  140 metre radius approx. Image ex Nearmap

 Proposed dwelling location  Bushfire Hazard Vegetation

Inner Protection Area (IPA)

The IPA is the area closest to the building and creates a fuel management area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defensible space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 10cm in height and be discontinuous.

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

When establishing and maintaining in IPA the following requirements apply;

Trees

- tree canopy cover should be listed 15% at maturity;
- trees at maturity should not overhang the building;
- lower limbs should be removed to a height of two metres above the ground;
- preference should be given to smooth bark and Evergreen trees

Shrubs

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

Grass

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

The creation and continued maintenance of the full asset protection zone is one of the primary factors in bushfire protection measures for developments in bushfire prone areas.

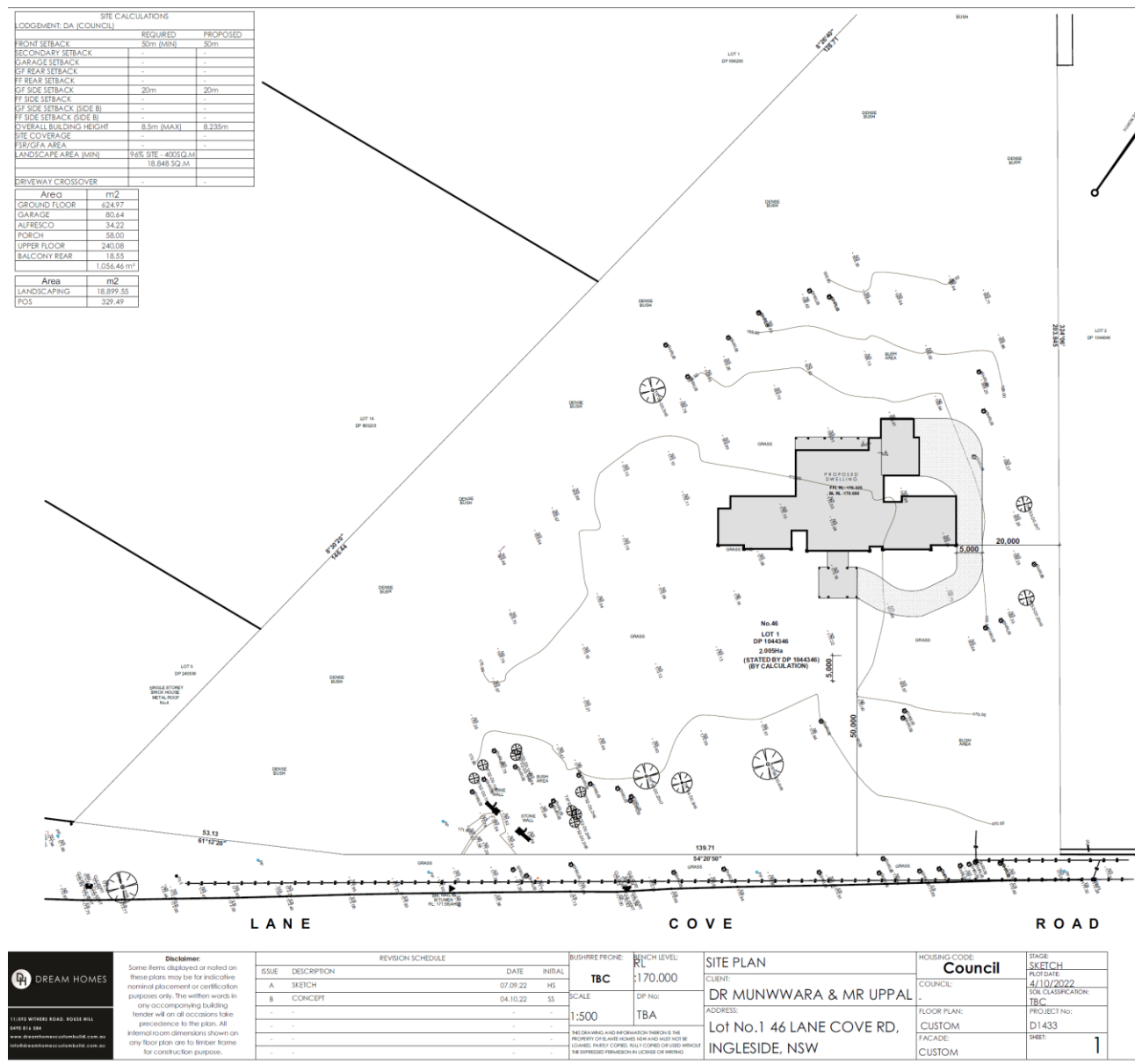
1.1.6 Wastewater Management

Management of black and grey water will be on-site. There is adequate room to ensure that water is adequately treated including the lowering of N and P prior to it entering the ground water or making its way to creek lines. This ridgetop location has no hydro lines within its boundary or close by.

1.1.7 Landscaping

While native species have been recommended in the landscaping they are hybrids (see below). This can be effective for an around the house screen however the Concept Landscape Plan (Fig 1.3b) will need to be amended pre CC to be consistent with the recommended Fire and Vegetation Mgt Plan. See landscape plan submitted with the DA for details.

PROPOSED PLANT SCHEDULE				
IN ACCORDANCE WITH AS 2008:2010				
CODE	BOTANICAL NAME	QUL	POT SIZE	APPROX MATURED HEIGHT
GROUND COVER/BOARDER				
2	Lomandra TANICA	15	150 mm	0.75
8	Asplenium Nodosa	12	150 mm	0.6
LOW SHRUBS				
19	Acmena 'Allyn's Magic'	34	200 mm	1.5
29	Westringia Myrsinoides	4	200 mm	1.2
TALL SHRUBS				
24	Callistemon SLIM	2	200 mm	3
25	Syzygium Superior	24	200 mm	3
FEATURE SHRUBS				
35	Cordyline 'Red Sensation'	48	25L	1.2
TREES				
44	Tristania laurina 'Luscious'	-	45L	8



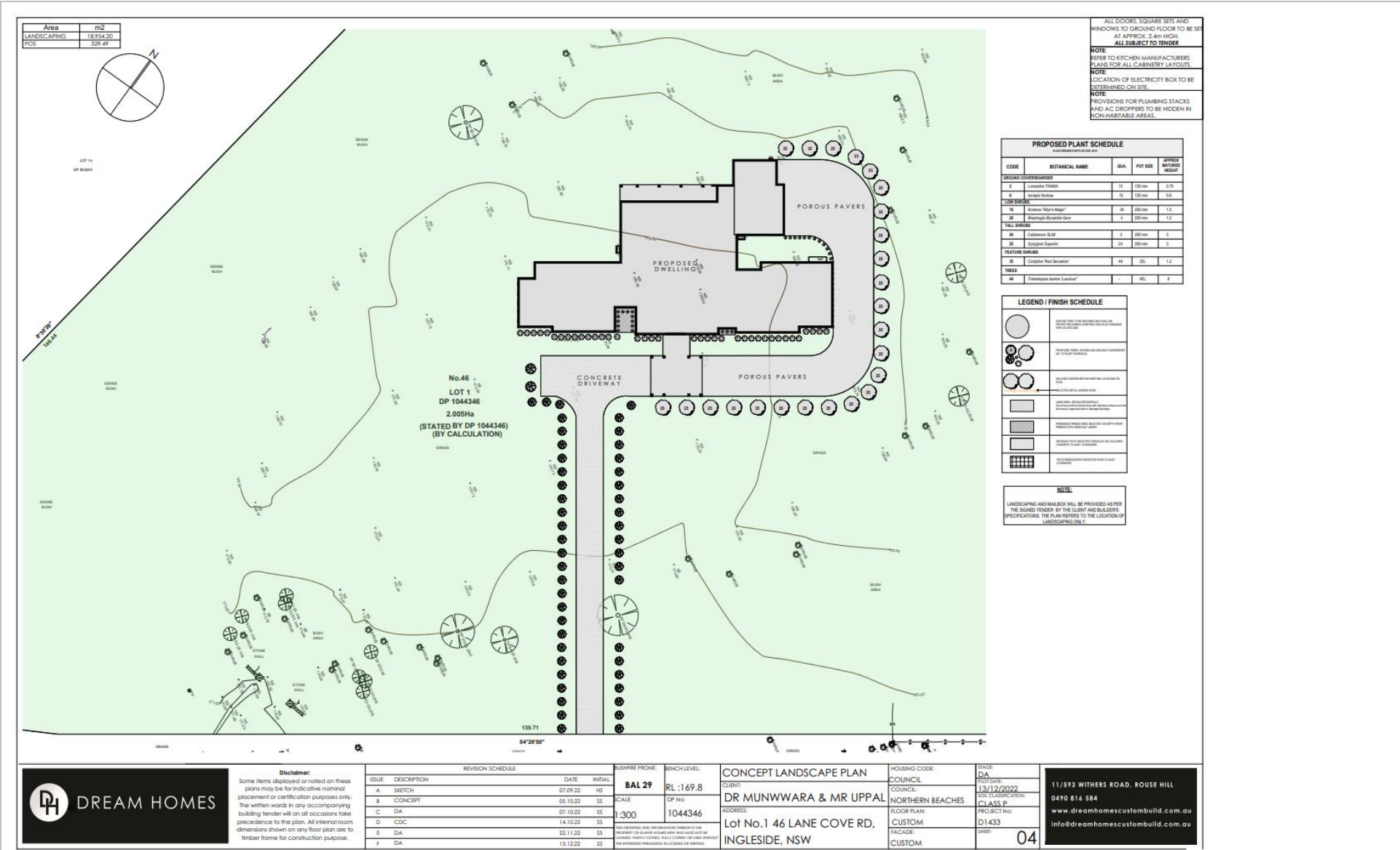


Figure 1.3b. Concept Landscape Plan. Source: Dream Homes. Revision F. 13.12.22.

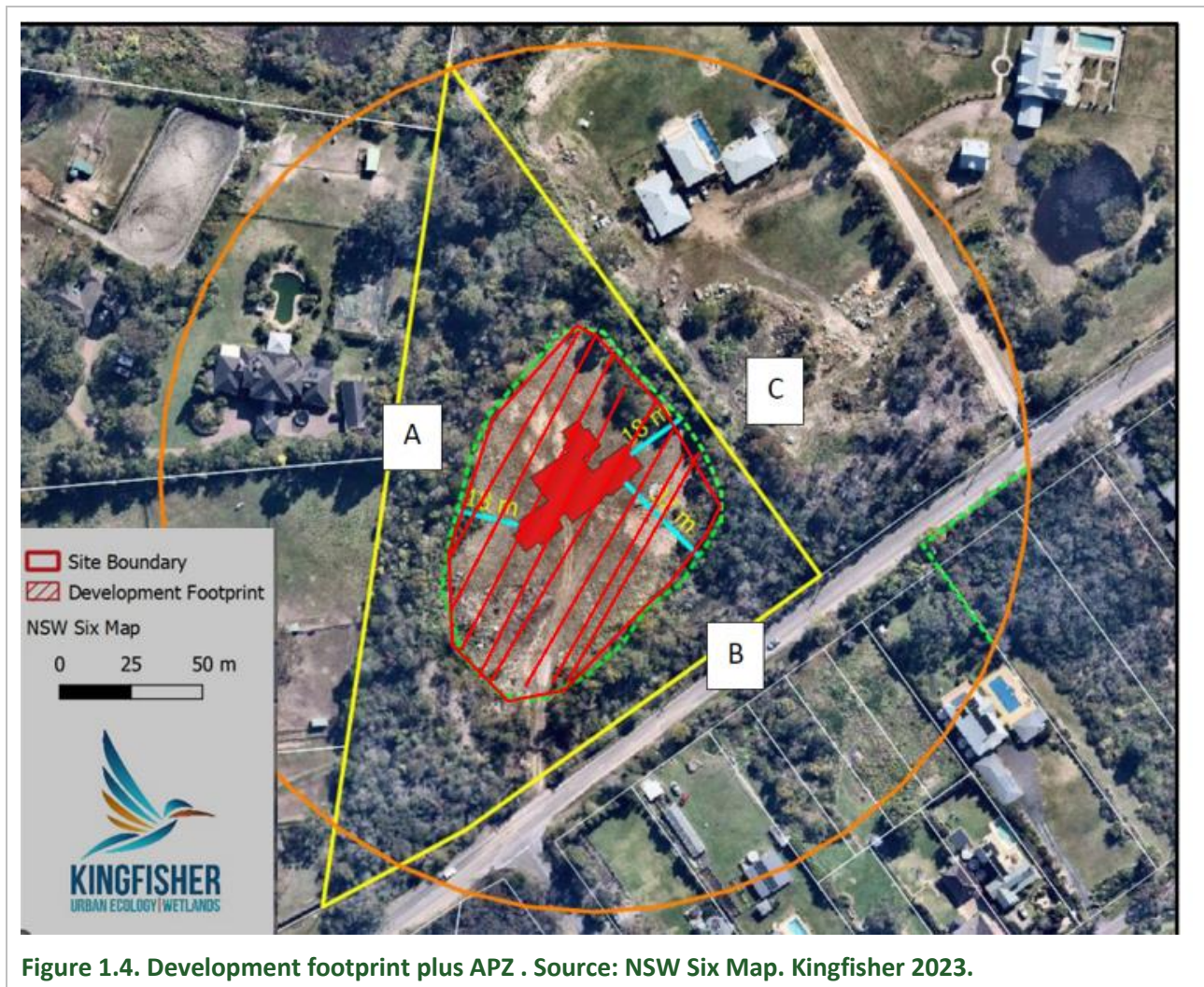


Figure 1.4. Development footprint plus APZ . Source: NSW Six Map. Kingfisher 2023.



Figure 1.5 Development impact on vegetation include possibly new drive alignment and footprint of APZ
. Source: NSW Six Map. Kingfisher 2023.

1.2 Sources of information used in the assessment

The following sources of information were used for the assessment.

BioNet, previous studies and the author's knowledge of the locality, were used to determine the likelihood of occurrence of threatened species or ecological communities, or their habitats onsite. BioNet records within a 10 km radius of the subject site were accessed and include records from 1993 to the present day.

Records from the following databases were collated and reviewed:

- BioNet Vegetation Classification (NSW DPIE)
- Atlas of NSW Wildlife (BioNet). New South Wales, Office of Environment and Heritage (OEH).
- NSW Six Map.
- Nearmap.
- NSW Threatened Species Information (DPIE).
- PlantNET (The Royal Botanic Gardens and Domain Trust, 2014).
- Protected Matters Search Tool of the Australian Government Department of the Environment (DoE) for matters protected by the Cwlth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Datasets used for the assessment:

- Biodiversity Values Map (ED Biodiversity & Conservation (EES))
- Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Subregions) (Australian Government Department of the Environment and Energy)
- Soil Landscapes of Central and Eastern NSW (ED Science (EES))
- NSW Hydrography (Spatial Services (DCS))
- NSW State Vegetation Type Map (ED Science (EES))
- The Native Vegetation of the Sydney Metropolitan Area – Version 3.1 (OEH, 2016) VIS_ID 4489 (ED Science (EES))

Plans and drawings specific to this development:

- DA. Dream Homes. Revision F. 13.12.22.

1.3 Legislative context and statutory requirements

1.3.1 NSW Environmental Planning and Assessment Act 1979

The *NSW Environmental Planning and Assessment Act 1979* and the *Environmental Planning and Assessment Regulation 2000* institutes and sets out a system for environmental planning and assessment in NSW and includes Part 4 which deals with development applications on private land and state significant development.

This proposal falls under a Part 4 development and requires development consent and associated environmental assessment.

1.3.2 NSW Biodiversity Conservation Act 2016 and associated documents

The *Biodiversity Conservation Act 2016* (BC Act 2016) is the key legislation that enables the conservation of biodiversity within the state of New South Wales. The BC Act 2016 facilitates the assessment and on-going protection of flora and fauna, including threatened species and ecological communities. The BC Act 2016

outlines assessment and offsetting requirements for activities with the potential to impact threatened species and ecological communities in NSW, and the clearing of native vegetation.

The BC Act 2016 also:

- Outlines the licences required under the BC Act 2016 to harm protected flora and fauna.
- Lists threatened species and ecological communities in Schedules 1 and 2.
- Sets out monetary and imprisonment penalties for offences relating to the harming of protected flora and fauna.
- Under Part 7 (s7.4), introduces a list of activities that exceed the biodiversity offsets scheme threshold.

1.3.3 Biodiversity Offsets Scheme entry

The Biodiversity Offsets Scheme applies to local development (assessed under Part 4 of the Environmental Planning and Assessment Act 1979) that triggers the Biodiversity Offsets Scheme threshold (see section 1.6) or is likely to significantly affect threatened species based on the test of significance in section 7.3 of the Biodiversity Conservation Act 2016.

The Biodiversity Conservation Regulation 2017 sets out the threshold level for when the BOS will be trigger. The threshold has two elements:

- *whether the amount of native vegetation being cleared exceeds an area threshold*
- *whether the impacts occur on an area mapped on the Biodiversity Values Map published by the Environment Agency Head*

Area Clearing Threshold

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

Table 1.2. Minimum lot size and threshold trigger.

Minimum lot size	2 ha
Threshold for clearing, above which the BAM and offsets scheme apply	0.5 ha
Direct impact area including impact of APZ and realignment of drive	0.1 ha

Area clearing threshold

The area threshold varies depending on the minimum lot size (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).

Minimum lot size associated with the property	Threshold for clearing, above which the BAM and offsets scheme apply
Less than 1 ha	0.25 ha or more
1 ha to less than 40 ha	0.5 ha or more
40 ha to less than 1000 ha	1 ha or more
1000 ha or more	2 ha or more

Figure 1.5. Area clearing threshold as per the BOS entry requirements. Source:

<https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/about-the-biodiversity-offsets-scheme/when-does-bos-apply>

Biodiversity Values Map threshold

The Biodiversity Values Map identifies land of high biodiversity value, as defined by clause 7.3(3) of the Biodiversity Conservation Regulation 2017. The Biodiversity Offsets Scheme applies to the clearing of native vegetation and other biodiversity impacts prescribed by clause 6.1 of the Biodiversity Regulation 2017 on land identified on the Biodiversity Values Map.

The proposal does not trigger the Biodiversity Values Map threshold as per the BOS entry requirements.

The proposal does not impact land identified on the Biodiversity Values Map as published by the Chief Executive of the NSW Office of Environment and Heritage. See Figure 1.6.

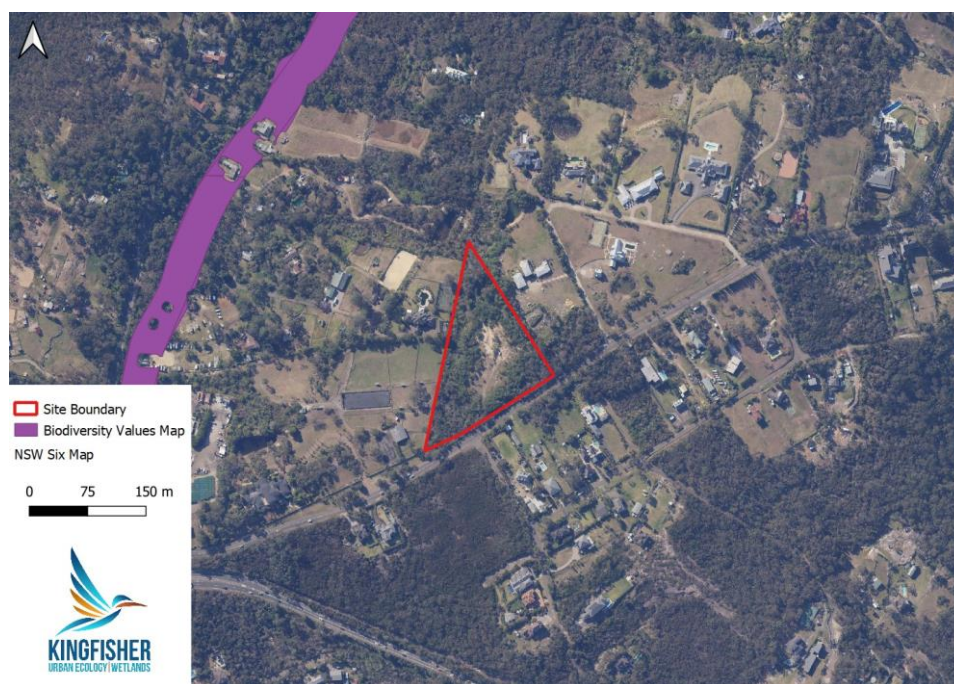


Figure 1.6. Biodiversity Values Map. Source: Biodiversity Values Map. Kingfisher 2023.

1.3.4 Commonwealth Environmental Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is applicable if it was considered that an impact on a 'Matter of National Environmental Significance (NES)' were likely, thus providing a trigger for referral of the proposal to the Department of Environment and Heritage.

Matters of national environmental significance identified in the Act are:

- world heritage properties;
- national heritage places;
- Ramsar wetlands;
- nationally threatened species and communities;
- migratory species protected under international agreements;
- the Commonwealth marine environment; and
- nuclear actions.

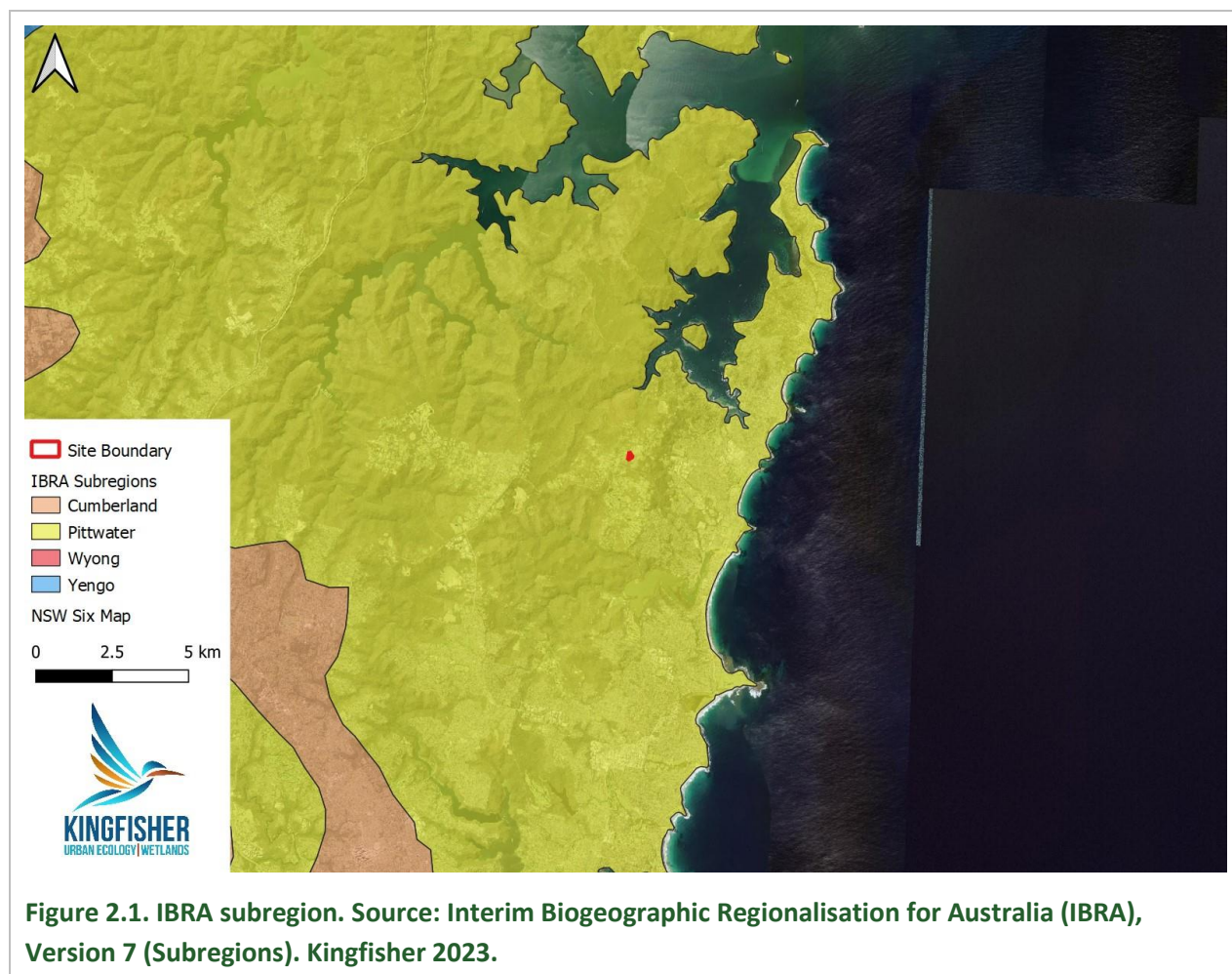
The Commonwealth Government has published Significant Impact Guidelines (DE 2013) to assist in the determination of whether an action is likely to have a significant impact on a matter of NES. The proposal is not expected to significantly impact any MNES.

2 Landscape features and site context

2.1 Landscape features

2.1.1 IBRA bioregions and IBRA subregions

The site occurs within the 'Sydney Basin' Interim Biogeographic Regionalisation for Australia ver. 7 (IBRA) bioregion and 'Pittwater' IBRA subregion (see Figure 2.1).

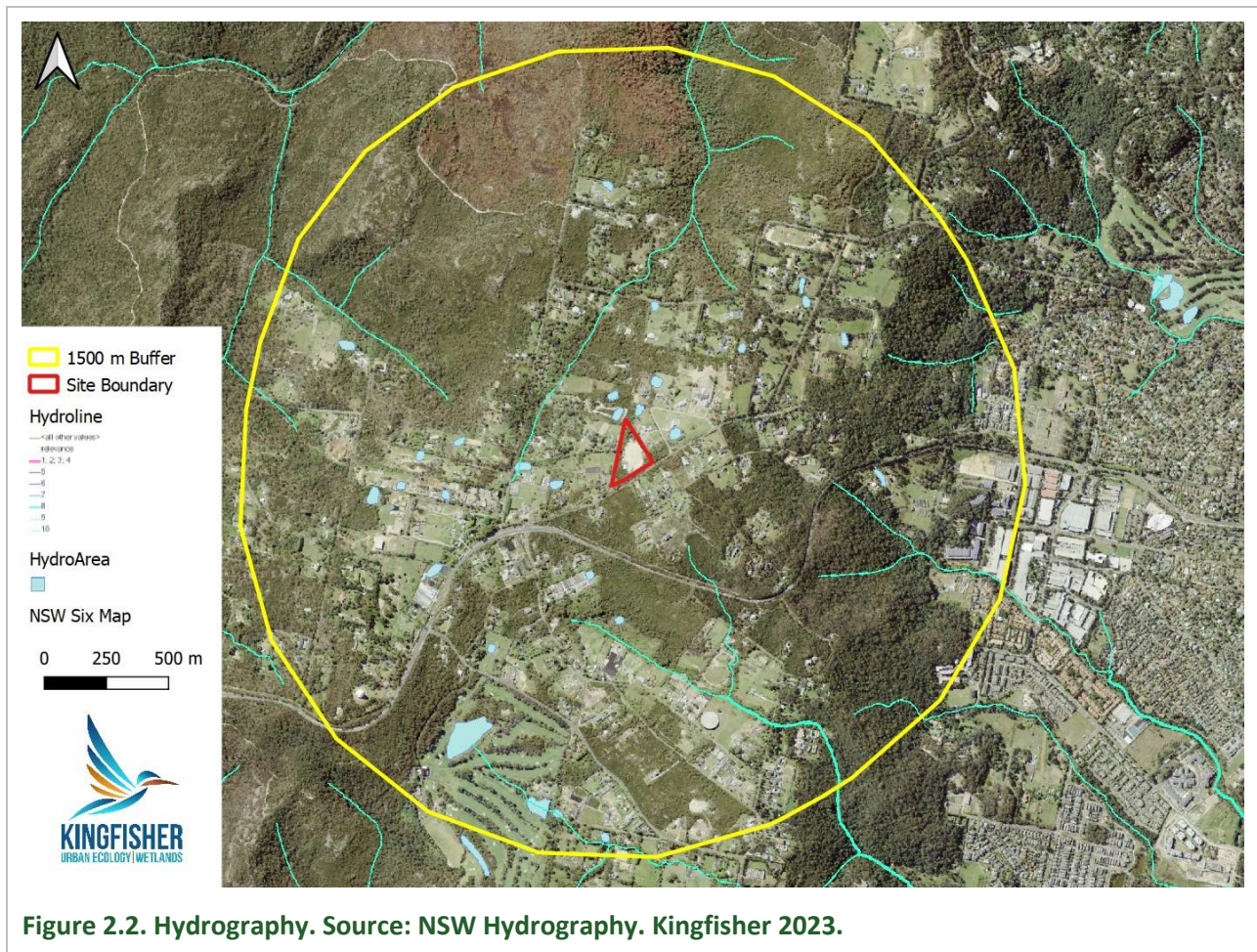


2.1.2 NSW (Mitchell) Landscape

The site occurs within the 'Belrose Coastal Slopes' Mitchell Landscape Ecosystem. The 'Belrose Coastal Slopes' landscape ecosystem is comprised of "benched hill slopes and deep valleys of the coastal fall on horizontal Triassic quartz sandstone, lithic sandstone and shales. High proportion of rock outcrop with discontinuous cliffs to 5m high. General elevation 0 to 180m, local relief 80m. Shallow uniform or gradational sands and earthy sands on ridges, deeper sands, loamy sands and organic sands on wet benches and in hanging swamps, grey or yellow texture-contrast soils on shale benches. Accumulations of deeper sand and occasional podsols in depositional sites and along streams. Low woodland of scribbly gum (*Eucalyptus haemostoma*), red bloodwood (*Corymbia gummifera*), yellow-top ash (*Eucalyptus leuhmanniana*), and narrow-leaved apple (*Angophora bakeri*) in deeper soils on ridges. Scrub and heath of she-oak (*Allocasuarina distyla*) and heath banksia (*Banksia ericifolia*), with other *Hakea*, *Grevillea*, and *Baeckea* sp., on ridges and upper benches. Wet heath and swamps with *Gahnia* sp. and swamp banksia (*Banksia robur*) in hanging valleys. Coastal forest in sheltered areas on better quality shale soil with; 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 with scrub of *Allocasuarina distyla*, coast rosemary (*Westringia fruticosa*), and dwarf kangaroo grass (*Themeda triandra*)." (Descriptions for NSW (Mitchell) Landscapes version 2, compiled in 2002 by Dr. Peter Mitchell).

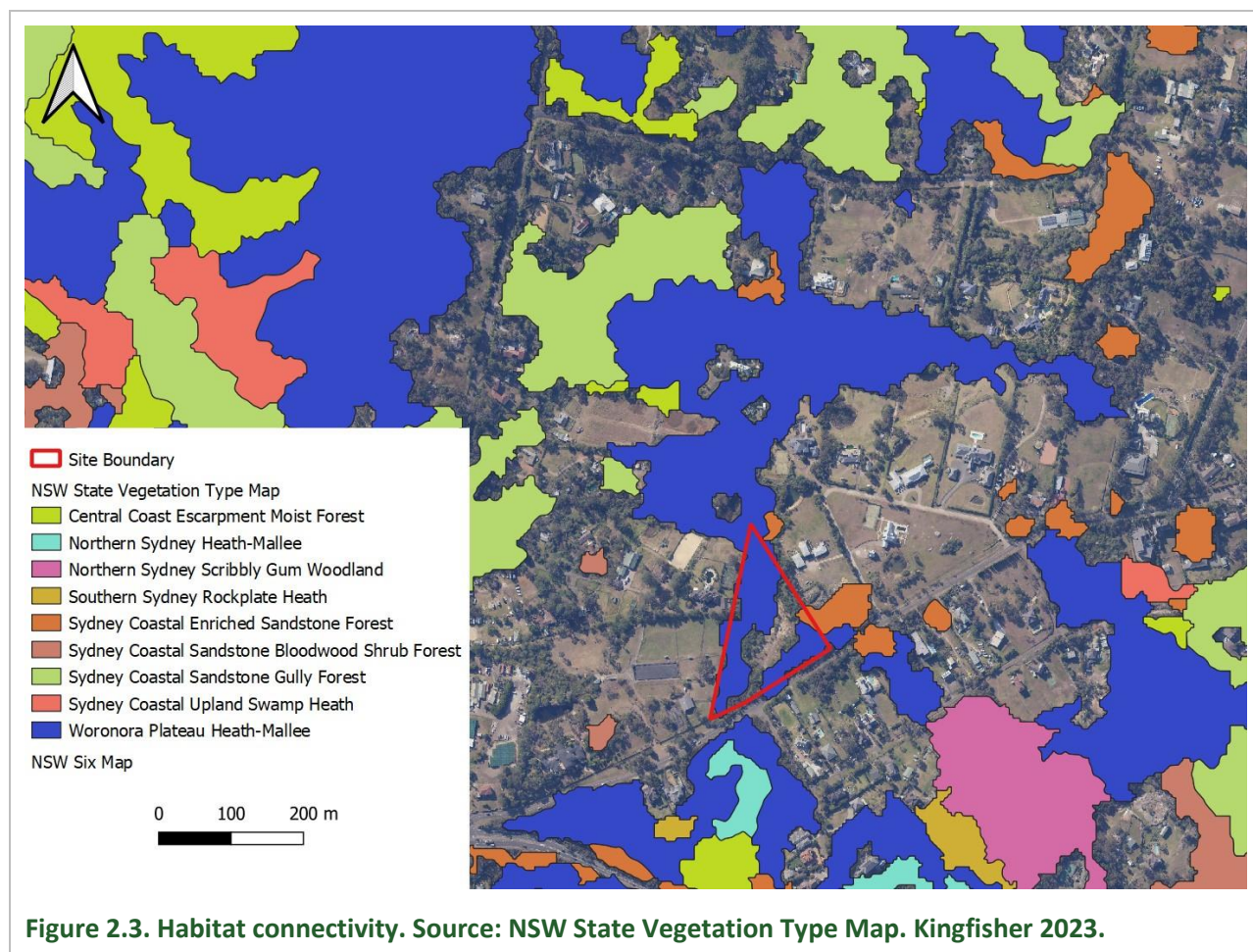
2.1.3 Rivers, streams, estuaries and wetlands

No rivers, streams, estuaries or wetlands occur on-site (see Figure 2.2). A number of 1st-order and 2nd-order streams, and dams occur within the 1500 m buffer around the site (see Figure 2.2). No rivers, streams, estuaries or wetlands are expected to be impacted by the proposed development.



2.1.4 Habitat connectivity

Vegetation on-site forms part of a remnant patch of Woronora Plateau Heath-Mallee, connected to vegetation on neighbouring properties to the north (see Figure 2.3).



2.1.5 Karst, caves, crevices, cliffs, rocks and other geological features of significance

No karst, caves, crevices, cliffs, rocks or other geological features of significance occur on-site.

2.1.6 Areas of outstanding biodiversity values

No areas of outstanding biodiversity value have been identified under the BC Act.

2.1.7 Topography, geology and soils

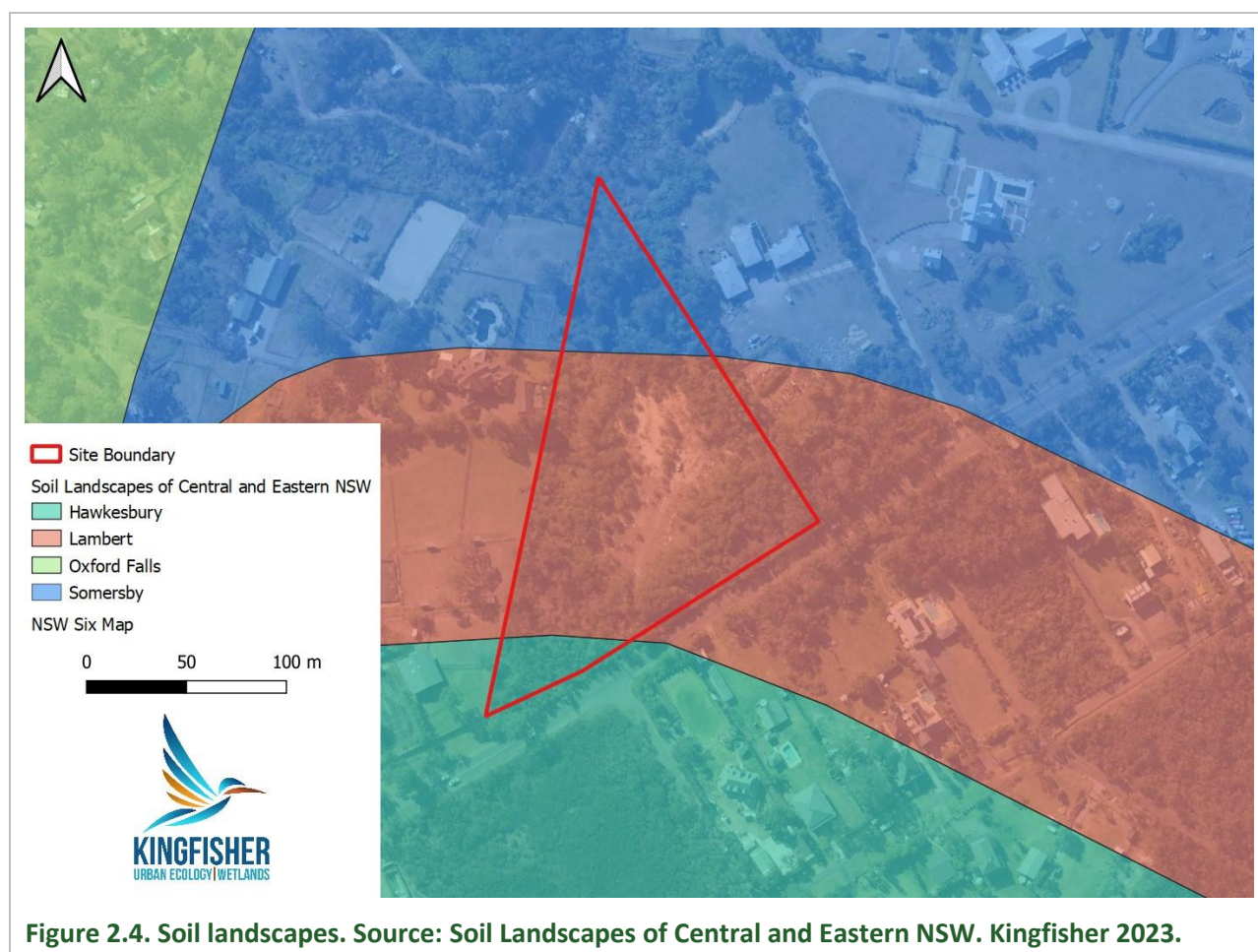
The site is situated over three soil landscapes:

- Hawkesbury (ha)
- Lambert (la)
- Somersby (so)

The 'Hawkesbury' soil landscape is comprised of "Hawkesbury Sandstone which consists of medium to coarse-grained quartz sandstone with minor shale and laminite lenses. Deep weathering of the sandstone is widespread. The deep weathering products are known as friable sandstone and have been described by Pecover (1984). Laterite material occurs on some crests (Hunt et al., 1977)" (NSW DPIE). It is characterised by "rolling to very steep hills. Local relief varies from 40–200 m. Slope gradients range from 25–70%. Crests and ridges are convex and narrow, at >300 m wide. Slopes are moderately inclined to precipitous. Rock outcrop occurs as horizontal benches and broken scarps up to 10 m high. Boulders and cobbles cover up to 50% of the ground surface. Valleys are narrow and incised" (NSW DPIE).

The 'Lambert' soil landscape is comprised of *"Hawkesbury Sandstone, which consists of medium to coarse-grained quartz sandstone with minor shale and laminite lenses"* (NSW DPIE). It is characterised by *"undulating to rolling low hills. Local relief 20–120 m and slopes <20%. Broad convex crests and plateau surfaces. Gently to moderately inclined sideslopes, often associated with small hanging valleys. Characteristic sandstone bedrock that outcrops as wide benches (10–100 m), with broken scarps 1–4 m high. Small, poorly drained seepage areas are common"* (NSW DPIE).

The 'Somersby' soil landscape is comprised of *"Hawkesbury Sandstone which consists of medium to coarse-grained quartz sandstone with minor shale and laminite lenses. Deep weathering of the sandstone is widespread. The deep weathering products are known as friable sandstone and have been described by Pecover (1984). Laterite material occurs on some crests (Hunt et al., 1977)"* (NSW DPIE). It is characterised by *"undulating low rises and plains on plateau surfaces. Local relief is up to 40 m. Slope gradients are generally <15%. Ridges and crests are broad and valleys are wide and open. Rock outcrop is absent"* (NSW DPIE).



2.2 Native vegetation cover

Native vegetation occurs across a range of conditions throughout the assessment area. See Figure 2.5 and Table 2.2.

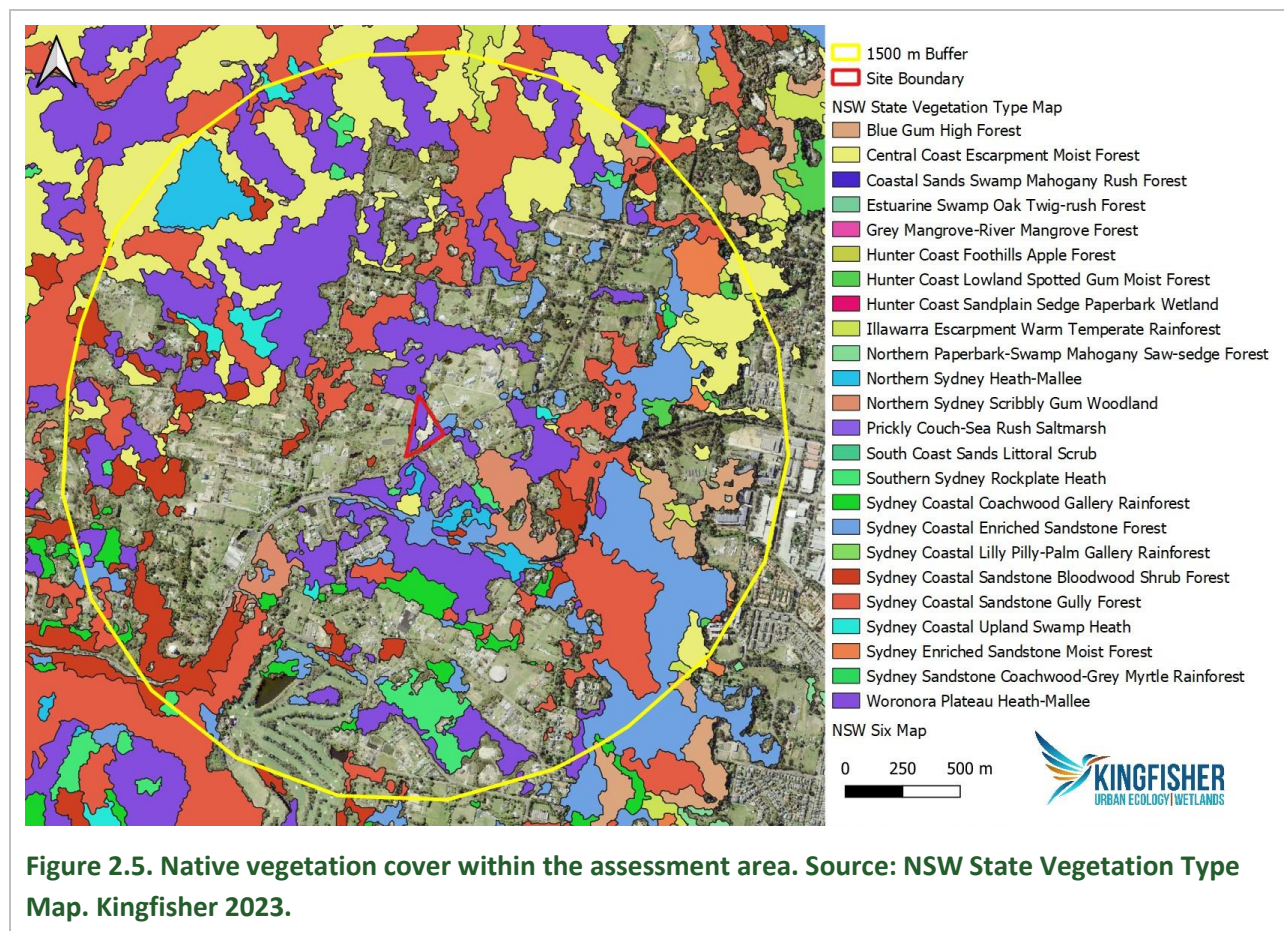


Table 2.2. Native vegetation cover in the assessment area.

Assessment area (ha)	802
Total area of native vegetation cover (ha)	523
Percentage of native vegetation cover (%)	65%
Class (0-10, >10-30, >30-70 or >70%)	>30-70

3 Native vegetation, threatened ecological communities and vegetation integrity

3.1 Native vegetation extent and plant community types

3.1.1 Mapped native vegetation extent

A review of the most complete and consistent representation of the distribution of Plant Community Types (PCTs) across NSW, NSW State Vegetation Type Map Edition C1.1.M1.1, identified two (2) PCT within the site. The PCT is listed in Table 3.1 below.

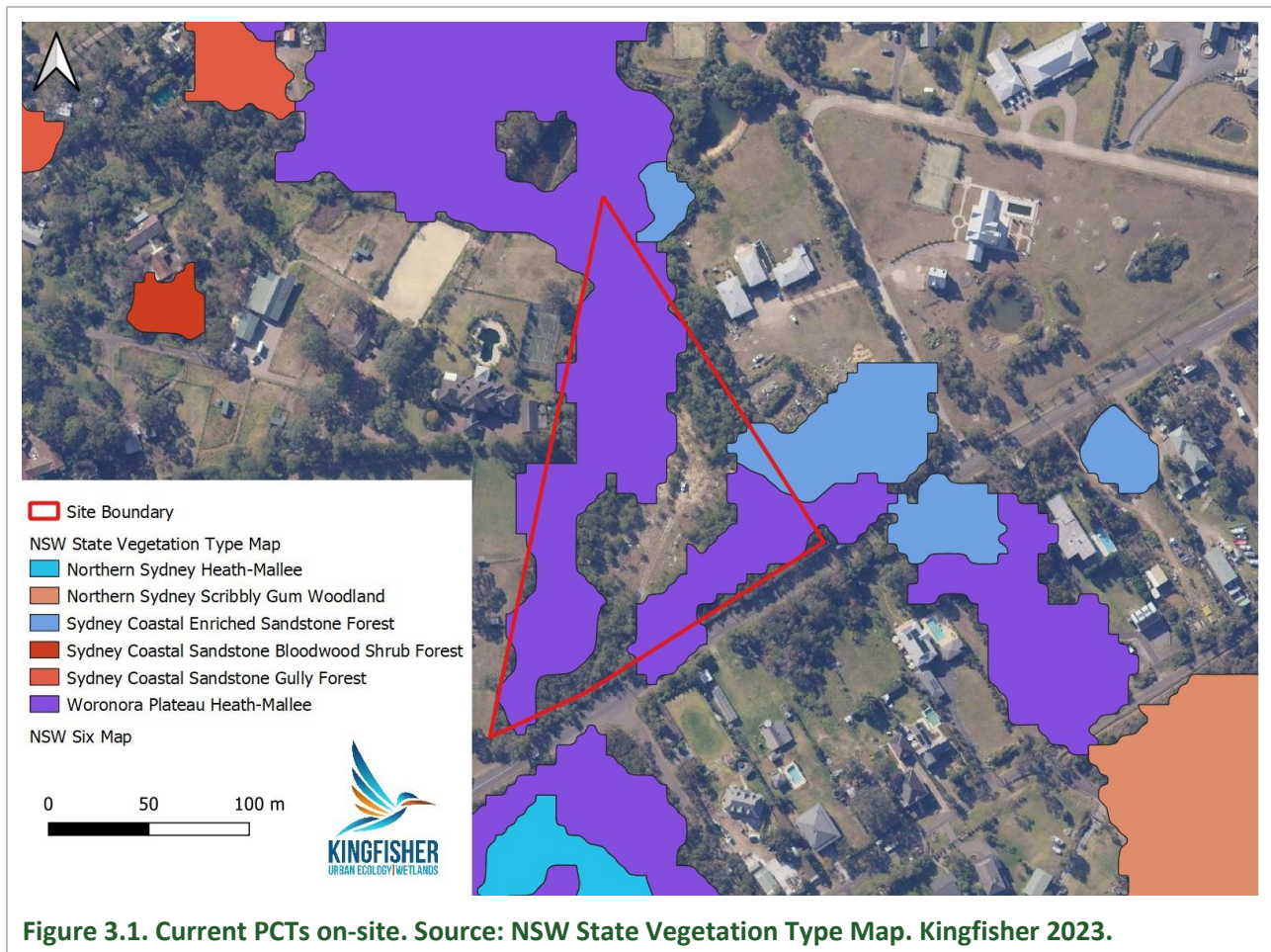
PCTs under the most up-to-date vegetation mapping, NSW State Vegetation Type Map Edition C1.1.M1.1, are not available under the BAM-C and therefore lineage PCTs are required to be assessed and identified. BioNet Vegetation Classification and *The Native Vegetation of the Sydney Metropolitan Area – Version 3.1 (OEH, 2016) VIS_ID 4489* were used to obtain lineage PCTs.

Table 3.1. PCT synonyms as per NSW and Commonwealth legislation.

PCT Code	Lineage PCT Code	PCT Name	BC Act 2016	EPBC Act 1999	Estimated Percentage Cleared
3814	1824	Woronora Plateau Heath-Mallee	No associated TEC	No associated TEC	6.43%
3592	1783	Sydney Coastal Enriched Sandstone Forest	No associated TEC	No associated TEC	60.82%

Lineage PCT 1824 – Coastal sandstone Heath Mallee (Mallee – Banksia – Tea-tree – Hakea heath-woodland of the coastal sandstone plateaus of the Sydney basin)

Lineage PCT 1783 – Sydney North exposed sandstone woodland (Red Bloodwood – Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast)



3.1.2 Field survey

The field survey assisted in verifying the distribution and quality of vegetation at the site.

Approximately 80% of the vegetation on site has been previously cleared and/or disturbed. Vegetation cover is shown on the aerial below.





The canopy species on site are few and include red Bloodwood *Corymbia gummifera* and one *Corymbia maculata* (Spotted Gum). The mid-stratum is dominated by weed with the exception of a patch of *Banksia serrata* (~ 7 mature trees in the area not mapped as a particular PCT). In most areas *Acacia saligna* dominates mid story, with Lantana under that. The left hand side (west) has a patch indicating a wetter area with the weed *Arundo Dynox* (Walking Giant Reed). See aerial below.

Figure 3.2 shows Vegetation condition and current main species. Based on site survey March 2023.

- Purple: native canopy
- Yellow: canopy dominated by *Acacia saligna*, mid and ground weeds. Bracken Fern present in some areas.
- Blue: Damp area Giant Reed (weed) and small patches of *Juncus usitatus* (did searches for Onion Orchid)
- Orange: Patch of *Banksia serrata* - needs weed management.
- Green: high diversity native vegetation inc *Banksia*, *Lili Pili*, *Bursaria*.
- Red: cleared and 99% weed grasses

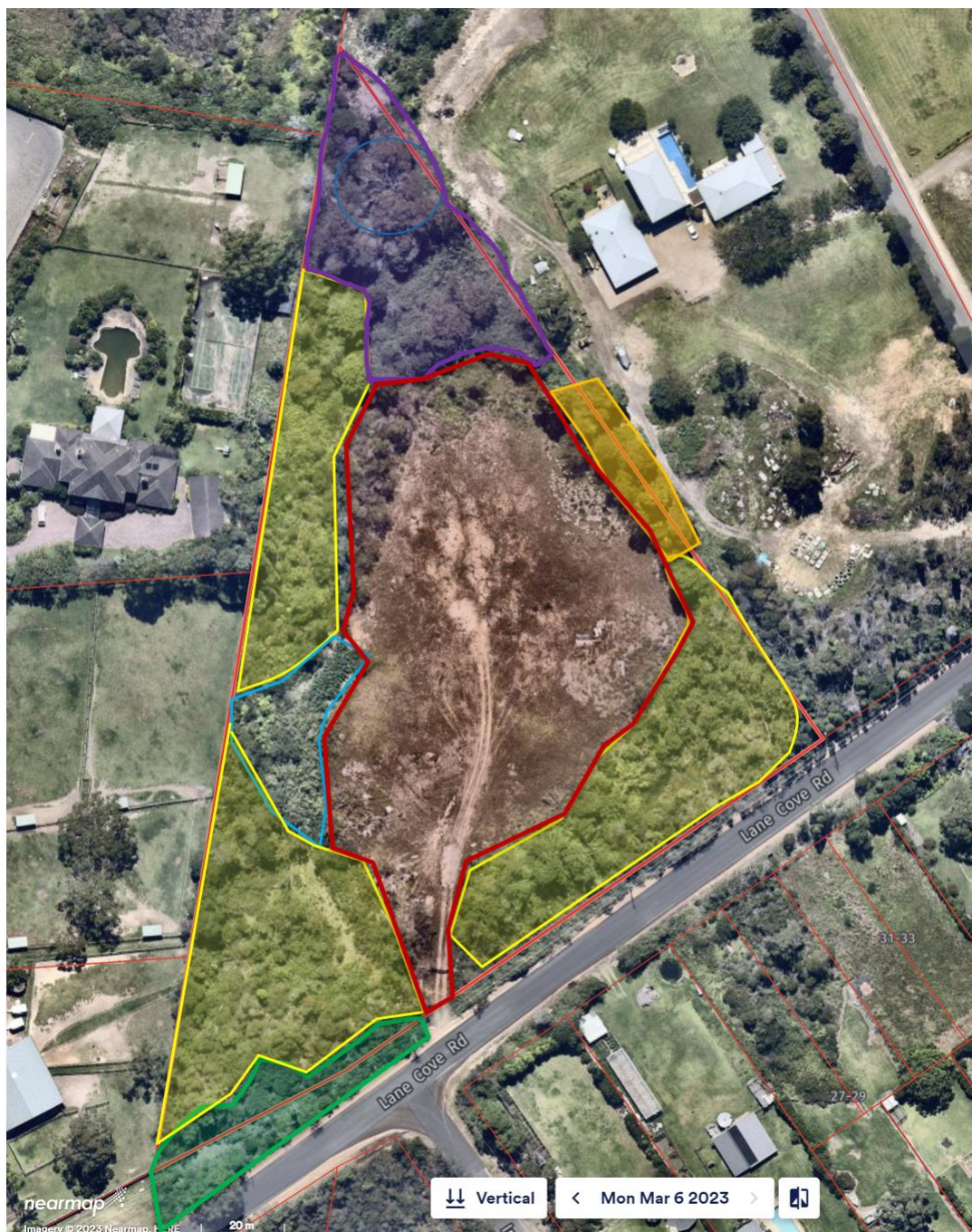


Figure 3.2. Field survey results showing vegetation condition within the proposed development area.
Source: NSW Six Map. Kingfisher 2023.

3.1.3 Changes to mapped vegetation extent

Aerial images of the site indicate no significant differences in the level of vegetation cover on-site. The aerial images of the site from 20/10/2009 (the oldest Nearmap imagery available) and 6/3/2023 indicate no changes to the vegetation extent (see Figures 3.3a and 3.3b).



Figure 3.3a. Aerial image of the site showing the vegetation extent on 20/10/2009. Source: Nearmap. Date accessed: 20/03/2023.



Figure 3.3b. Aerial image of the site showing the vegetation extent on 6/3/2023. Source: Nearmap. Date accessed: 20/03/2023.

3.1.4 Areas that are not native vegetation

Cleared land dominated by exotic turf grasses. Exotic weeds are present in high abundance beneath the scattered canopy.

3.2 Vegetation zones and integrity scores

Two vegetation zones were determined based on species composition at the site. Data following methods in BAM was gathered across two BAM plots. One in the weed and one in the front nature strip. .

Vegetation Zone 1 consisted of exotic turf grasses and cleared land and has a VIS well under 15 and the area is deemed too degraded to trigger offsets.

Vegetation Zone 2 area joining Lane Cove road in line with proposed dwelling, drive and near the previous Tetratheca sighting.

3.2.1 Stratification and plot dimensions

Plots were as per the BAM Method with 20 x 20 (400m²) for assessing structure and composition with a centre line extending 50 m and 100 m to create a 20 x 50 plot (1000m²) to assess function. See Biodiversity Assessment Method Operational Manual

<https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-operational-manual-stage-1-180276.pdf>



Figure 3.4. BAM plots locations and area (pink) of detailed search for threatened species and habitat.
Source: NSW Six Map. Kingfisher 2023.

3.2.2 Site photos

Plot 1. Vegetation Zone 1 – Woronora Plateau Heath-Mallee.

Consisted of exotic species with low abundance of native species including *Banksia serrata* and *Corymbia maculata*. For full native species see Data Sheet Appendix IV.



Natives include Bracken, Lomandra, Dianella, Bursaria, Kunzea.



Bursaria spinosa



Lilly Pilly

Plot 2. Vegetation Zone 2 – Cleared land.

Consisted of exotic grass and annual weeds such as Thistle. *Acacia saligna* seedlings throughout. Small patch of *Commelina* and *Juncus usitatus* present on the edge near other native vegetation.



3.2.3 Weeds

The following weeds of significant importance were identified within the site during the site survey. Weeds must be controlled as required under the Biosecurity Act 2015.



Lantana (*Lantana camara*) and Crofton Weed (*Ageratina adenophora*)



Morning Glory (*Ipomoea* sp.)



Northern end of site has Pampas Grass (*Cortaderia* sp.), Lantana (*Lantana camara*), and other weeds in ground and shrub layer – however, there is also patch of mature *Banksia serrata*



Western end of site with ground and shrub layer, dominated by exotics, particularly *Senna* sp. and Lantana (*Lantana camara*)

4 Threatened species

4.1 Flora and fauna field surveys

On-ground site surveys were conducted in March 2023 by Principal Ecologist Geraldene Dalby-Ball. Geraldene is very familiar (over 30 years' experience with the flora and fauna of the locality. Weather conditions were sunny at the time of the survey. *Tetratheca glandulosa* has been previously recorded on-site (see Figure 4.1), however, the species was not observed during the site survey. No threatened flora or fauna species were identified during Kingfisher field surveys. Red-crowned Toadlets could be possible in the swale areas that fill with fresh water (near road side) – neither are in a proposed disturbance zone. Rosenberg's Goanna, *Varanus rosenbergi*, has been seen (by the author) walking through habitat similar to the (18 years ago within 200m of this site)

Varanus rosenbergi

4.1.1 Opportunistic flora and fauna survey methods

Flora and fauna surveys were opportunistic in nature and were conducted as a random meander across the site and surrounding areas. During opportunistic surveys, notes and photos taken of the vegetation types and flora and fauna present on-site were recorded.

Fauna surveys included diurnal bird and fauna observations and assessment of suitable habitat resources including hollow-bearing trees, roosting and/or foraging trees, fruiting and flowering plants, rocks, burrows, scats, tree scratchings, loose bark, scrapes or diggings, dead trees and logs, long grass and leaf litter, and waterbodies.

4.1.2 Diurnal bird surveys

Diurnal bird surveys occurred during mid-afternoon. Opportunistic observations of birds were made during vegetation surveys.

The site survey for birds primarily focused on their breeding habitat requirements such as hollows, waterways onsite, nests that are present and other features that BAM identified bird species may use for breeding purposes. It was concluded that the impact area hosts marginal foraging habitat.

However, it is unlikely that threatened avifauna would use the impact area for breeding purposes, due to lack of optimal breeding habitat (suitable hollows, suitable waterways).

4.1.3 Microbat surveys

The impact area hosts marginal habitat for threatened microbat species which are identified in the BAM calculator for the site. The site survey for microbats primarily focused on their breeding habitat requirements such as caves, outcrops, hollows, and other features which microbat species may use for breeding purposes.

It has been concluded that while microbat species may use the site for foraging purposes, they are unlikely to use the site for breeding purposes due to lack of optimal breeding opportunities within the impact area.

4.1.4 Mammal surveys

Mammal surveys occurred during the mid-afternoon. The proposed development is not expected to significantly impact the breeding or foraging habitat for any mammal species identified in the BAM calculator as there are no optional habitat features within the development area.

4.1.5 Amphibian surveys

Amphibian surveys occurred during the mid-afternoon. Opportunistic observations of amphibians were made during vegetation surveys. Any potential habitat features were investigated however no threatened amphibian species identified in the BAM calculator were identified onsite. Habitat requirements for all threatened amphibian species identified in the BAM calculator are marginal within the impact area.

4.1.6 Reptile and snail surveys

Reptile and snail surveys were undertaken by thorough investigation of potential habitats including leaf litter, bark litter, stick piles, native ground cover vegetation, rocks, and rubbish. No threatened reptiles or snails were observed during site surveys.

4.1.7 Koala assessment summary

The proposal is will not have a significant impact on the Koala or areas of critical habitat for the species. It is unlikely that the species would occur on-site due to the degraded nature of vegetation and habitat, as such, there is a low likelihood of occurrence for the species.

Desktop (BioNet, ALA) and on-ground surveys were conducted to determine the presence/absence of the species. The on-ground survey also contributed to information regarding habitat availability within the site. Direct observation surveys for the species were generally opportunistic in nature, however, no individuals were observed on-site. No evidence of the species was found on-site.

4.2 Threatened flora – Desktop

BioNet records within a 10 km radius of the subject site returned a total of 17 threatened flora species out of a total of 1,791 species. These species are currently listed as vulnerable or endangered under state and/or Commonwealth legislation (See Table 4.1). The vulnerable and endangered species to focus searches are highlighted in bold (See Table 4.1). This is based on likelihood of occurrence.

Table 4.1. Threatened flora observed in previous ecological surveys within a 10 km radius of the study site. NSW DPIE BioNet 2023.

Family	Scientific Name	Common Name	NSW Status	Cth Status	Records
Elaeocarpaceae	<i>Tetradlea glandulosa</i>	Black Eyed Susan	V		77
Ericaceae	<i>Epacris purpurascens</i> var. <i>purpurascens</i>		V		3
Euphorbiaceae	<i>Chamaesyce psammogeton</i>	Sand Spurge	E1		12
Grammitidaceae	<i>Grammitis stenophylla</i>	Narrow-leaf Finger Fern	E1,3		2
Lamiaceae	<i>Prostanthera densa</i>	Villous Mint-bush	V	V	1
Malvaceae	<i>Lasiopetalum joyceae</i>		V	V	2
Myrtaceae	<i>Callistemon linearifolius</i>	Netted Bottle Brush	V,3		4
Myrtaceae	<i>Eucalyptus camfieldii</i>	Camfield's Stringybark	V	V	10
Myrtaceae	<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V	V	3
Myrtaceae	<i>Kunzea rupestris</i>		V	V	1
Myrtaceae	<i>Rhodamnia rubescens</i>	Scrub Turpentine	E4A	CE	33
Myrtaceae	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E1	V	13
Orchidaceae	<i>Genoplesium baueri</i>	Bauer's Midge Orchid	E1,P,2	E	2

Family	Scientific Name	Common Name	NSW Status	Cth Status	Records
Orchidaceae	<i>Microtis angusii</i>	Angus's Onion Orchid	E1,P,2	E	167
Proteaceae	<i>Grevillea caleyi</i>	Caley's Grevillea	E4A,3	CE	2066
Proteaceae	<i>Persoonia hirsuta</i>	Hairy Geebung	E1,P,3	E	2
Thymelaeaceae	<i>Pimelea curviflora</i> var. <i>curviflora</i>		V	V	8

NSW Status Key: 1 Sensitivity Class 1 (Sensitive Species Data Policy) 2 Sensitivity Class 2 (Sensitive Species Data Policy) 3 Sensitivity Class 3 (Sensitive Species Data Policy) E1 Endangered (BC Act 2016) E4A Critically Endangered (BC Act 2016) P Protected (National Parks & Wildlife Act 1974) V Vulnerable (BC Act 2016)	Comm. Status Key: CE Critically Endangered (EPBC Act 1999) E Endangered (EPBC Act 1999) V Vulnerable (EPBC Act 1999)
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4.3 Threatened fauna – Desktop

BioNet records within a 10 km radius of the site returned a total of 45 threatened fauna species out of a total of 477 species. These species are currently listed as vulnerable or endangered under state and/or Commonwealth legislation (See Table 4.2). The vulnerable and endangered species to focus searches are highlighted in bold (See Table 4.2). This is based on likelihood of occurrence.

Table 4.2. Threatened fauna observed in previous ecological surveys within a 10 km radius of the study site. NSW DPIE BioNet 2023.

Class	Scientific Name	Common Name	NSW Status	Cth Status	Records
Myobatrachidae	<i>Pseudophryne australis</i>	Red-crowned Toadlet	V,P		93
Limnodynastidae	<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V,P	V	51
Hylidae	<i>Litoria aurea</i>	Green and Golden Bell Frog	E1,P	V	3
Varanidae	<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V,P		75
Columbidae	<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	V,P		2
Columbidae	<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V,P		3
Ardeidae	<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1,P	E	3

Class	Scientific Name	Common Name	NSW Status	Cth Status	Records
Ardeidae	<i>Ixobrychus flavicollis</i>	Black Bittern	V,P		21
Accipitridae	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V,P		41
Accipitridae	<i>Hieraaetus morphnoides</i>	Little Eagle	V,P		9
Accipitridae	<i>Lophoictinia isura</i>	Square-tailed Kite	V,P,3		5
Accipitridae	<i>Pandion cristatus</i>	Eastern Osprey	V,P,3		29
Burhinidae	<i>Burhinus grallarius</i>	Bush Stone-curlew	E1,P		12
Haematopodidae	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V,P		6
Rostratulidae	<i>Rostratula australis</i>	Australian Painted Snipe	E1,P	E	3
Scolopacidae	<i>Xenus cinereus</i>	Terek Sandpiper	V,P	C,J,K	2
Cacatuidae	<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V,P,3	E	3
Cacatuidae	<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V,P,2	V	107
Psittacidae	<i>Glossopsitta pusilla</i>	Little Lorikeet	V,P		11
Psittacidae	<i>Lathamus discolor</i>	Swift Parrot	E1,P	CE	32
Psittacidae	<i>Neophema pulchella</i>	Turquoise Parrot	V,P,3		1
Strigidae	<i>Ninox connivens</i>	Barking Owl	V,P,3		36
Strigidae	<i>Ninox strenua</i>	Powerful Owl	V,P,3		441
Tytonidae	<i>Tyto novaehollandiae</i>	Masked Owl	V,P,3		6
Meliphagidae	<i>Anthochaera phrygia</i>	Regent Honeyeater	E4A,P	CE	40
Meliphagidae	<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V,P		1
Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella	V,P		3
Artamidae	<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V,P		3
Petroicidae	<i>Petroica boodang</i>	Scarlet Robin	V,P		2
Dasyuridae	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V,P	E	17

Class	Scientific Name	Common Name	NSW Status	Cth Status	Records
Peramelidae	<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	E1,P	E	57
Phascolarctidae	<i>Phascolarctos cinereus</i>	Koala	E1,P	E	58
Burramyidae	<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V,P		485
Petauridae	<i>Petaurus norfolcensis</i>	Squirrel Glider	V,P		7
Pteropodidae	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	V	117
Emballonuridae	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V,P		3
Molossidae	<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V,P		24
Vespertilionidae	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V,P	V	17
Vespertilionidae	<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V,P		3
Vespertilionidae	<i>Myotis macropus</i>	Southern Myotis	V,P		48
Vespertilionidae	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V,P		10
Vespertilionidae	<i>Vespadelus troungtoni</i>	Eastern Cave Bat	V,P		1
Miniopteridae	<i>Miniopterus australis</i>	Little Bent-winged Bat	V,P		51
Miniopteridae	<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V,P		106
Petaluridae	<i>Petalura gigantea</i>	Giant Dragonfly	E1		2

NSW Status Key: 1 Sensitivity Class 1 (Sensitive Species Data Policy) 2 Sensitivity Class 2 (Sensitive Species Data Policy) 3 Sensitivity Class 3 (Sensitive Species Data Policy) E1 Endangered (BC Act 2016) E4A Critically Endangered (BC Act 2016) P Protected (National Parks & Wildlife Act 1974) V Vulnerable (BC Act 2016)	Comm. Status Key: C Listed on China Australia Migratory Bird Agreement CE Critically Endangered (EPBC Act 1999) E Endangered (EPBC Act 1999) J Listed on Japan Australia Migratory Bird Agreement K Listed on Republic of Korea Australia Migratory Bird Agreement V Vulnerable (EPBC Act 1999)
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4.4 Endangered populations

No endangered populations have been recorded to occur within a 10 km radius of the site.

Likelihood of occurrence

See Appendix I for a 'Rationale for Likelihood of Occurrence', which outlines why species have been retained or omitted from BAM calculations. Reasons for inclusion or removal are based on species habitat preferences, site investigations, species survey, BioNet records and expert opinion. During the survey, none of the above threatened species were observed on the subject site. Marginal foraging habitat for several species is present. *Thus, all predicted species were retained in the BAM-C.* Habitat suitability has been assessed in Appendix I for candidate species generated in the BAM-C.

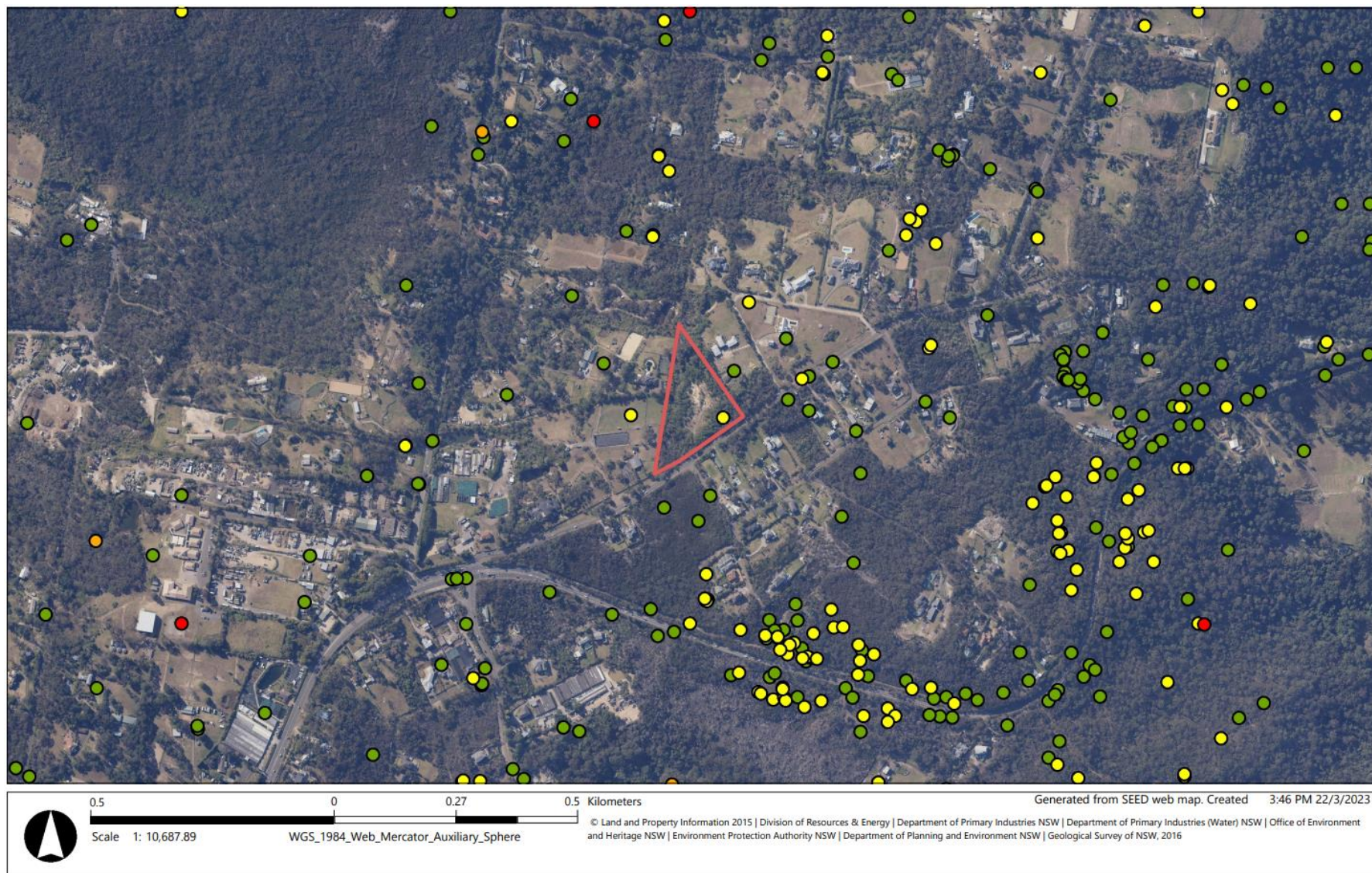


Figure 4.1. BioNet species sightings. Source: SEED NSW BioNet Species Sightings. Date accessed: 22/03/2023.

5 Direct impacts

5.1.1 Clearing and modification of vegetation

See previous Figures and section on the up to 0.1ha impact including APZ.

6 Indirect impacts

6.1.1 On-site wastewater changing hydrological and nutrient properties.

This is within the already cleared area and not likely to move into areas of native species. Management is required to ensure this.

6.1.2 Loss of breeding opportunities

Works on-site may result in temporary reduced breeding opportunities for locally occurring native species including amphibians, reptiles, birds, mammals, and invertebrates through the production of construction noise.

6.1.3 Weed growth and invasion

Weeds are present on site and must be properly managed. Weeds are to be managed in the direct works zone by stopping seed spread on machinery, tools, equipment, and worker clothes (e.g., boots). Additionally, after weed removal around the perimeter area of the construction, there must be continuous maintenance of the site otherwise exacerbated weed growth may occur due to the presence of weeds pre-works. Weeds will colonize and pioneer on any cleared grounds so must be managed throughout the project as well as on-going post-works.

6.1.4 Introduction of pathogens

The introduction of pathogens may occur into the site, and surrounding remnant bushland, via machinery, tools, equipment, and worker clothing (e.g., boots). Diseases to watch out for include Phytophthora (also known as Root Rot – type of water mold) and Myrtle Rust (*Puccinia psidii* – type of fungus). See Appendix IV for Bushland Hygiene Protocols for Phytophthora.

6.1.5 Soil disturbance and erosion

The removal of vegetation and trees can result in soil disturbance. Soil compaction could occur from machinery use. It is recommended that soil compaction in non-built areas is to be avoided and not occur within the trees to be retained. Replacement of woody debris and a covering of organic matter over the cleared site will prevent erosion and thus is highly recommended.

6.1.6 Water quality

There are no streams present on-site however the proposed actions may result in transport of sediment from the work zones because of increased storm water runoff to areas downstream. Which may impact water quality, riparian vegetation, and aquatic fauna. To avoid and minimise impacts on the water quality see recommendations section.

7 Recommendations

7.1 Mitigations measures

7.1.1 Delineation of work areas

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

7.1.2 Wildlife corridor and revegetation

Planting is one of several best practice measures to retain and support the long-term survival of the vegetation community on site. Species plantings should aim to restore maximum diversity at the site. This will provide greater foraging and breeding habitat for native species and could deliver greater biodiversity gain outcomes in the area whilst adhering to bushfire protection requirements. Shrub and ground covers will also increase the habitat for other wildlife including small insectivorous birds.

It is recommended that seeds are collected from the site during tree removal. Seeds can then be propagated and planted on-site once established. Plantings of tube stock across the site should be selected from locally native shrub and ground cover species and this is to be in accordance with bushfire protection requirements. Species characteristic of the Woronora Plateau Heath-Mallee are considered suitable for revegetation activities. See Appendix V for recommended species to include in plantings.

7.1.3 Native species landscaping

Landscape plantings schedule is revised by a qualified bush regenerator or qualified Ecologist. Schedule uses a diversity of local provenance native species from the relevant native vegetation community (or communities) that occur, or once occurred on site (rather than use exotic species or non-local native species).

7.1.4 Erosion and sedimentation controls

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

7.1.5 Weed management

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

All bush regeneration activities requiring the use of chemicals must be performed in accordance with the NSW Pesticides Act 1999. Herbicides must not be applied whilst exotic plants are setting seed. The weed

removal program aims to be broad in approach and sustained in application to provide the best possible conditions for natural regeneration and to control weeds within the site.

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

7.1.6 Installing a nest box

The installation of two nest boxes designed for microbats should be added to the site to replace the potential loss of roosting habitat. This will encourage threatened microbats to utilise the area.

Image from: nestboxes.com.au



7.1.7 Pathogen prevention

To prevent the introduction of pathogens, Bushland Hygiene Protocols outlined in Appendix III should be followed. The site is considered to be an area that may promote the spread of Phytophthora (a group of fungus-like diseases affecting plants) due to its moist soil and proximity to the drainage channel. It is recommended that Bushland Hygiene Protocols be followed closely.



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



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

8 Appendices

8.1 Appendix I – Rationale for Likelihood of Occurrence

Rationale for Likelihood of Occurrence all Species in Bionet and likely to be present (authors knowledge).

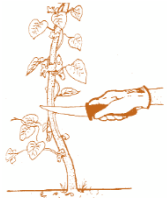
Where a species has a specific habitat constraint, which is not present within the subject land, or if the species is a vagrant within the IBRA subregion, the species is considered unlikely to occur and no further assessment is required. Additionally, in accordance with section 6.4.1.17 of the BAM, a candidate species credit species can be considered unlikely to occur within the subject land (or specific vegetation zones) where habitat is substantially degraded such that the species is unlikely to utilise area. As discussed in Sections 2 and 3, much of the vegetation within the subject land and 1,500 m buffer has been previously cleared, fragmented and is subject to ongoing disturbance.

A predicted candidate species credit species that is not considered to have suitable habitat on the subject land (or specific vegetation zones) in accordance with section 6.4.1.17 of the BAM does not require further assessment on the subject land (or specific vegetation zones). The reasons for determining that a predicted species credit species is unlikely to have suitable habitat on the subject land (or specific vegetation zones) has been included below for each Candidate Species for the BDAR.

8.2 Appendix II – Key Weed Removal Methods

Physical removal

Technique	Method	Equipment
Hand Removal 	Seedlings and smaller weed species where appropriate will be pulled out by hand, without risk of injury to workers. The size that this can occur varies throughout the treatment area. Generally, it ranges from post seed to approximately 300mm in height. Rolling and raking is suitable for larger infestations of Wandering Jew. The weed can be raked and stems and plants parts rolled. The clump of weed material can then be bagged and removed from site.	Tools: Gloves, Rakes, Knife and Weed Bags
Crowning	Plants that possess rhizomes or bulbs might not respond to various removal techniques and may need to be treated with crowning.	Tools: Knife, mattock, trowel, impervious

	A knife, mattock or trowel is to be driven into the soil surrounding the bulb or rhizome at an angle of approximately 45 degrees with surrounding soil, so as to cut any roots that may be running off. This is to occur in 360 degrees around the bulb/rhizome. The rhizome or bulb is to be bagged and removed from the site and disposed of at an appropriate waste recycling facility Soil disturbance is to be kept to a minimum when using this technique.	gloves, and all other required P.P.E.
Cut and Paint Stems 	Weed species deemed unsuitable for hand removal shall be cut. Those that have persistent or vigorous growth will be cut and painted with Roundup® Biactive Herbicide or equivalent. Juvenile and smaller weed species will be cut with secateurs at base of plant, and herbicide applied via applicator bottle. Stem to be cut horizontally as close to the ground as possible, using secateurs, loppers or a pruning saw. Horizontal cuts to be made on top of stem to prevent the herbicide running off the stump. Apply herbicide to the cut stem immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. Herbicide is not to reach sediment or surrounding non-targeting plants.	Tools: loppers, secateurs, pruning saw, herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide and all other required P.P.E.
Scrape and Painting 	More resilient weed species, where other techniques are less reliable are to be scraped with a knife or chisel and painted with undiluted Roundup® Biactive Herbicide. Works to be carried out by a contractor with a current herbicide license. Weed species will be scraped with a knife or chisel up the length of the trunk, and herbicide applied via applicator bottle. Scrape the trunk from as close to the ground as possible to approximately ¾ of the plant height. Where trunk diameters exceed approximately 5 cm a second scrape shall be made on the other side of the trunk. Apply undiluted herbicide to the cut trunk immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. All care must be taken by the contractor not to spill herbicide onto sediment or surrounding non-targeting plants. Follow up treatment may be required. If plants resprout, scrape and paint the shoots using the same method after sufficient regrowth has occurred.	Tools: knife, chisel, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required P.P.E.

Cut with a Chainsaw and Paint 	Larger size weed species, too large for cutting with hand tools, shall be cut with a chainsaw and painted with undiluted Roundup® Biactive Herbicide. Works to be carried out by a contractor with a current chainsaw and herbicide license. Larger weed species will be cut with a chainsaw at base of plant, and herbicide applied via applicator bottle. Cut the stem horizontally as close to the ground as possible, using the chainsaw. Remove upper branches to reduce bulk of plant. If cutting at the base is impractical, cut higher to get rid of the bulk of the weed, then cut again at the base and apply herbicide. Make cuts horizontal to prevent the herbicide running off the stump. Apply undiluted herbicide to the cut trunk immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. Ensure there is no runoff of poison. All care must be taken by the contractor not to spill herbicide into water, onto sediment, or surrounding non-targeting plants. Follow up treatment will be required. If plants resprout, cut and paint the shoots using the same method.	Tools: chainsaw, ear muffs, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required P.P.E.
Spot Spraying	Spot spraying involves spraying non-seeding annuals and grasses, and for regrowth of weeds once an area has been cleared or brushcut. Works to be carried out by a contractor with a current herbicide license. Herbicide will be mixed up according to the manufacturer's directions for the particular weed species being targeted. Mixed herbicide shall be applied to the targeted weed species with a backpack sprayer. All care must be taken by the contractor not to spill herbicide onto sediment or surrounding non-targeting plants.	Tools: P.P.E.

Flame Weeding

Thermal (flame) weeding is a method where high temperatures are applied to weeds, causing the plant to die. Thermal weeding is particularly useful in situations where conservation or health considerations are high and weed density is low such as waterways where herbicide use is not permitted.

Also, for native vegetation areas thermal weeding, with a flame weeder, has been shown to stimulate germination of native plants while killing the seeds of annual weeds such as Devils Pitchfork, *Bidens pilosa*. Flame weeding is also effective in killing persistent weeds like Mother of Millions. Best results are obtained when follow up weed control is undertaken 4-6 weeks after treatment. In addition, weed control should be conducted periodically after that for example to control weeds over a period of a year it is likely that between 3-5 applications will be necessary, depending on rainfall and the extent of the weed seed bank. This method is most effective on young annual weeds and least effective on older perennial weeds. In some cases, control of perennial weeds will be ineffective however this depends on the species present and its age.

FLAME WEEDER – ECO BURN

Case Study: Weed
Mgt and Eco-burn
Glenorie in the
Hills Shire Council



Flame weeding should be undertaken outside of the fire seasons. Flame weeding allows for the mimicking of a burn in areas where a control burn could not be undertaken. See native plants regenerating after flame weeding.

Images provided by Dragonfly
Environmental



8.3 Appendix III – Bushland Hygiene Protocols for Phytophthora

- Always assume that the area you are about to work in is free of the disease and therefore needs to be protected against infection.
- Always assume that the activity you are about to undertake has the potential to introduce the disease.
- Arrive at site with clean shoes, i.e.: no dirt encrusted on them.
- If you arrive with shoes that are encrusted with dirt, they will have to be completely soaked in metho or disinfectant and allow a few minutes to completely soak in. NEVER scrape untreated dirt off your shoes onto the ground.
- Before you move onto the site spray the bottom of your shoes with 70 % metho. Bleach solution (1% strength) or household/commercial disinfectant (as per label) are also suitable.
- Check all tools and equipment that comes in contact with soil are clean before entering the area (they should have been cleaned on site at the end of the previous work session). If there is any dirt on them, spray them with 70% metho.
- Clean all tools at the end of each work session while still on site ensuring this is done away from drainage lines and adjacent work areas. Knock or brush off encrusted dirt and completely spray with 70 % metho. Replace in storage/transport containers.
- Preferably compost all weed material on site.
- Never drag vegetation with exposed roots and soil through bushland.
- When removing weeds from site, remove as much soil as possible from them in the immediate work area and carefully place vegetative material into plastic bags.
- Try not to get the bag itself dirty; don't put it on/in a muddy area.
- Always work from the lower part of a slope to the upper part.
- Always work in areas known to be free of the pathogen before working in infected areas.
- Minimise activities wherever possible when the soil is very wet.
- Vehicles should not be driven off track or into reserves (unless vehicle decontamination is carried out before and after entering a single work site)
- Only accredited supplies of plants/mulch to be used.

Kit should contain: 1 bucket, 1 scrubbing brush, 1 spray bottle (metho 70% solution), 1 bottle tap water, 1 bottle methylated spirits.

Facts about Phytophthora

Phytophthora cinnamomi (Phytophthora) is a microscopic, soil borne, water-mould that has been implicated in the death of remnant trees and other plants in Australian bushland. Phytophthora is not native to Australia. It is believed to have been introduced sometime after European settlement. Phytophthora is a national problem and is listed as a key threatening process under the Commonwealth's Environmental Protection and Biodiversity Conservation Act 1999.

8.4 Appendix IV Species considered for Test of Significance

Test of significance were considered for the following 4 species – result not significant impact. Management required though a plan (e.g. Fire and VMP) to protect possibly future occurrence of these plants and the Red-crowned Toadlet. Additional searches for Tetratheca and Onion Orchid will occur as part of the VMP, alter in the year when it's more likely to be flowering. Neither are in the direct impact area.

<i>Pseudophryne australis</i>	Red-crowned Toadlet
<i>Tetratheca glandulosa</i>	Black Eyed Susan
<i>Microtis angusii</i>	Angus's Onion Orchid
<i>Grevillea caleyi</i>	Caley's Grevillea

For general information on *Tetratheca glandulosa* see:

<https://www.environment.nsw.gov.au/resources/nature/TglandulosaEia0500.pdf>

Tetratheca glandulosa is inconspicuous when not flowering. An initial assessment of habitat was made based known habitat requirements. Suitable habitat is present, and a targeted survey for the plant be conducted during the plant's main flowering period (July-November). We know that surveys outside of this period may detect occasional flowers, but should not be relied upon as a confident assessment of the plant's presence/absence and/or population size.

8.5 Appendix V Species list sheets

Ecological Consultants Australian ecologicalca@outlook.com m. 0488 481 929

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	18-3-23	Lane Cove Rd	1 Grass	GDB

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
1	Canopy = 0					
2						
3	Exotics					
4	Paspalum	E	10%	40		
5	Fire Weed Senecio	E	1	3		
6	Grass	E	70%	1000+		
7	Grass - Balfago Pennisetum	E	5%	20+		
8	Acacia siligna	E	2%	14		seedlings
9	Kykyu Grass	E	1%	20+		
10	Thistle	E	1%	4		
11	Small leaf Priest	E	1%	3		seedlings
12	Arundo dytax Walking Phoradendron	E	1%	2		
13	Pampus Grass	E	1%	3		seedlings
14	Malva parviflora	E	1%	9		
15	Conyza bonariensis	E	1%	19		
16	Senecio madagascariensis	E	1%	2		
17						
18	In Grass open Area					
19	Natives out of quad					
20						
21	Commelinia cyanea	N	1	1		
22	Juncus usitatus	N	1	1		
23						

. Plot 2

Ecological Consultants Australia ecologicalca@outlook.com m. 0488 481 929

400 m ² plot: Sheet <u>13</u> of <u>23</u>		Survey Name	Plot Identifier <u>2</u>	Recorders			
Date	<u>13/3/23</u>	<u>Lane Cove</u>	<u>veg weed</u>	<u>ANB</u>			
GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher	
1	<i>Eucalyptus maculata</i> (seedling)	N	1	1			
2							
3	<i>Banksia ericifolia</i>	N	2	3			
4	<i>Banksia serrata</i>	N	2	1			
5	<i>Bracken Fern</i> <i>Pteridium aculeatum</i>	N	5	50+			
6	<i>Leptospermum</i>	N	2	20+			
7							
8	<i>Stephania</i> (vine)						
9							
10	<i>Senna pedunculata</i>	E	100	100			
11	<i>Tradescantia fluminensis</i>	E	2	1			
12	<i>Exotic Solanum nigrum</i>	E	2	1			
13	<i>Thistle = Carduus thiermeri</i>	E	2	1			
14	<i>Conyza bonariensis</i>	E	1	1			
15	<i>Acacia saligna</i>	E	4	1			
16	<i>Lantana camara</i>	E	10	1			
17	<i>Morning Glory</i>	E	10	1			
18	<i>Plant small leafed</i>	E	2	1			
19	<i>Arundo donax</i>	E	5	1			
20	<i>Elephant Ears</i>	E	1	20			
21	<i>Cotton Weed Ageratum</i>	E	4	1			
22	<i>Grass weed riparian</i>	E	15	1			
23	<i>Blue weed</i>	E	2	20			
24	<u>Outside of Plot - native</u>						
25							
26	<i>Corymbia maculata</i>	N					
27							
28	<i>Banksia serrata</i>	N					
29							
30	<i>Lily Lily</i>	N					
31							
32	<i>Bursaria</i>	N					
33							
34	<i>Yellow flowering one in wet areas</i>						
35							
36	<i>Juncus</i>						
37							
38							
39							
40							

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF - circle code if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, 100, 200, 1000

Appendix VI Expertise of authors

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

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

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

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

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

Geraldene Dalby-Ball DIRECTOR



SPECIALISATIONS

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

CAREER SUMMARY

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

QUALIFICATIONS AND MEMBERSHIPS

- **Bachelor of Science with 1st Class Honors**, Sydney University
- **Accredited Biobank Assessor BAAS19008**
- WorkCover WHS General Induction of Construction Industry NSW White Card.
- Senior First Aid Certificate.
- **Practicing member** Ecological Consultants Association of NSW



Brooke is an ecologist with valuable on-ground experience working on bush regeneration projects throughout the Sydney region, including revegetation and weed management projects. Brooke is passionate about conserving and restoring natural areas for native species to thrive.

Brooke completed her undergraduate Bachelor of Science degree majoring in Conservation Biology. She has knowledge of experimental design and analysis, research and reports, geographic information systems (GIS), environmental legislation, and flora identification.

Brooke has experience working with conservation organisations, including Sea Shepherd Australia, helping to raise awareness around the destruction of habitats in the world's oceans. She has participated in the organisation and delivery of fundraising events around Sydney.

Brooke has exceptional communication and customer service skills and an extended client relations history.

Brooke Thompson ECOLOGIST

SPECIALISATIONS

- Urban and Landscape Ecology
- Fauna and Flora Assessments
- Vegetation Management
- Habitat Tree Assessment, Marking and Mapping

CAREER SUMMARY

- **Ecologist**, Ecological Consultants Australia. 2022-*present*
- **Natural Area Specialist**, Dragonfly Environmental. 2022

QUALIFICATIONS AND MEMBERSHIPS

- **BSc Conservation Biology**, University of Wollongong.
- WHS General Induction of Construction Industry NSW White Card.



Photos from outside of plots, but on-site including one *Viminaria juncea* (away from development area).