Ecological Constraints Assessment

North Head Sanctuary Master Plan

Report prepared by Narla Environmental

for Harbour Trust c/o COX Architecture

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NARLA
environmental

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Prepared for:	Harbour Trust, C/o Cox Architecture
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Report Certification

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Glossary

Acronym/ Term	Definition
APZ	Asset Protection Zone
asl	Above sea level
BAM	Biodiversity Assessment Methodology
BC Act	New South Wales Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
DA	Development Application
DAFF	Department of Agriculture, Fisheries and Forestry (formerly DAWE)
DAWE	Department of Agriculture, Water and the Environment (now DAFF)
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPE	Department of Planning and Environment (formerly DPIE)
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment (now known as DPE)
EEC	Endangered Ecological Community
EP&A Act	Environmental Planning & Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
FFA	Flora and Fauna Assessment
ha	Hectares
km	Kilometres
LGA	Local Government Area
m	metres
mm	millimetres
NSW	New South Wales
OEH	Office of Environment and Heritage (now known as DPE)
RFS	NSW Rural Fire Service
SEPP	State Environmental Planning Policy
Subject Property	North Head Sanctuary Manly, NSW 2095 (Lot 2764/DP752038)
Subject Site	Areas within North Head Sanctuary identified as having the most potential for future planned actions
TEC	Threatened Ecological Community

Acronym/ Term	Definition
Threatened species, populations and ecological communities	Species, populations and ecological communities specified in Schedules 1 and 2 of the BC Act 2016

Executive Summary

Narla Environmental Pty Ltd (Narla) was engaged by Cox Architecture on behalf of the Harbour Trust ('the proponent') to prepare an Ecological Constraints Assessment (ECA) to determine ecological constraints and opportunities for planned activities associated with the land located within the North Head Sanctuary (Lot 2764/-/DP752038).

Narla conducted a site assessment, which in conjunction with historical vegetation and soil mapping and historical threatened species records, were able to deduce a series of ecological constraints associated with the Precinct including:

- Confirmation of historically recorded Threatened Ecological Communities (TECs);
- Potential Impacts to threatened flora and fauna species present and previously recorded; and
- Biodiversity Values Mapping.

Whilst a number of ecological constraints were identified within the precinct, Narla also identified areas which have the potential to be suitable for future proposed activities including:

- Areas identified as being of low ecological value such as urban native/exotic garden beds and urban lawn areas;
- Areas serving low ecological function such as native or exotic street tree plantings with no shrub or groundlayer present, which are not associated with any locally occurring vegetation community; and
- Areas which have been previously modified such as existing buildings, hardstand areas, or roads.

1. Introduction

1.1 Project Background

Narla Environmental Pty Ltd (Narla) was engaged by Cox Architecture on behalf of the Harbour Trust ('the proponent') to prepare an Ecological Constraints Assessment (ECA) to determine the ecological constraints and opportunities for planned activities within the North Head Sanctuary (hereafter referred to as the 'Subject Property; **Figure 1**). This report will focus on the areas within the Subject Property that area deemed to have the highest potential for future activities. These areas are hereafter referred to as the 'Subject Site'.

Narla understands that the proponent wishes to determine the existing ecological features of the Subject Site including the constraints for planned activities as well as opportunities to protect and/or enhance biodiversity across the site. The report will also focus on Threatened Ecological Communities (TECs) and threatened species listed under the Biodiversity Conservation Act 2016 (BC Act), the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) as well as the Sydney Harbour Federation Trust Act 2001.The report will also provide legislative context for future activities within the Subject Site, addressing the relevant Commonwealth legislation

Narla have produced this report in order to assess potential impacts associated with future development proposals as well as identify where biodiversity features can be protected and enhanced across the site through the implementation of strategies to protect ecological values.

1.2 Site Description and Location

The Subject Property (North Head Sanctuary) covers an area of approximately 73.8ha and is located 7km north-east of the Sydney CBD within the Northern Beaches Local Government Area (LGA). North Head Sanctuary is a large area surrounded by Sydney Harbour National Park, and is used for a range of tourism, heritage, recreational and residential purposes. The Subject Site covers an approximate area of 21.1ha and comprises areas within North Head Sanctuary identified as having the most potential for future planned activities. The vegetation within the Subject Site consists of remnant vegetation, historical landscaping, native and exotic garden beds, and open lawn areas.

1.3 Topography, Geology and Soil

The Subject Site occurs on land that is slightly undulating with an elevation ranging from 68m above sea level (ASL) in the north to approximately 105m ASL along the eastern boundary. The majority of the Subject Site is mapped as occurring on the North Head landscape, with a small section in the eastern area of the Subject Site mapped as occurring on the Lambert Soil Landscape (**Figure 2**).

North Head Soil Landscape consists of elevated gently undulating dune fields of wind-blown sands on coastal headlands. Heathland and scrub with occasional woodland. The geology is characterised by elevated, undulating to rolling rises of aeolian reworked dune fields. Local relief to 5m; slopes 5-15%. Rock outcrop is usually absent. Dune and swales have often been reworked and may be difficult to distinguish. Drainage is mostly sub-surface (Chapman et al. 2009).

Lambert Soil Landscape consists of undulating to rolling rises and low hills on Hawkesbury Sandstone. Local relief 20-120m, slope 20%. Rock outcrop >50%. Broad ridges, gently to moderately inclined slopes, wide rock benches with low broken scarps, small hanging valleys and areas of poor drainage. The geology is characterised by

Hawkesbury Sandstone, which consists of medium to coarse-grained quartz sandstone with minor shale and laminite lenses.

1.4 Hydrology

No mapped or unmapped watercourses occur within the Subject Site., however, one (1) unmapped drainage line was identified (**Figure 1**).

Figure 1. The location of the Subject Site within the Subject Property

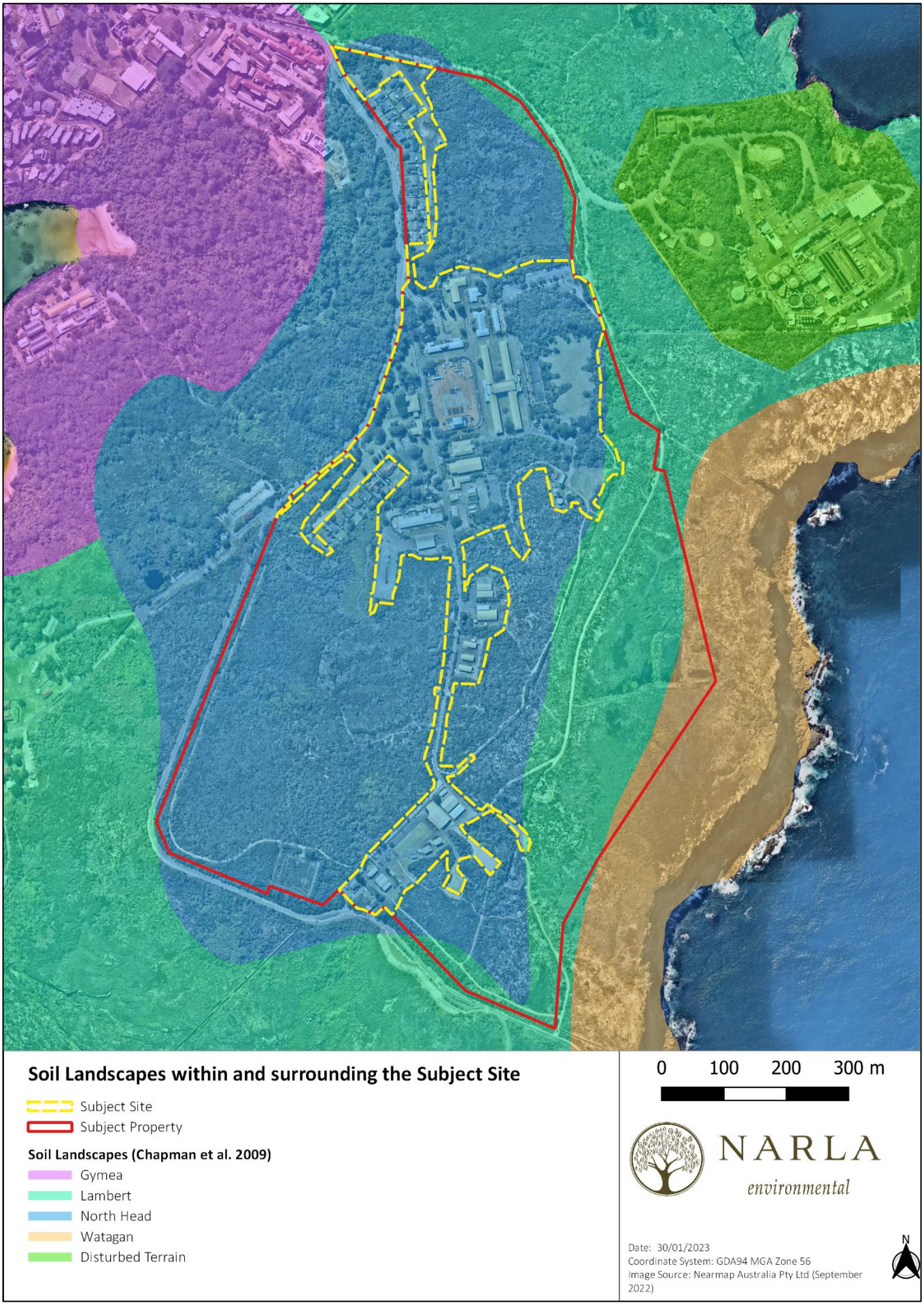

Figure 2. Soil landscapes within the Subject Site.

2. Planning Framework

2.1 Relevant Legislation and Policy

The legislation and policies that are addressed in this report are listed in Error! Reference source not found..

Table 1. Relevant Legislation and Policy Addressed.

Legislation/ Policy	Relevance to Site	Triggered	Considerations for Future Planned Actions
Sydney Harbour Federation Trust Act (SHFT Act) 2001 (Commonwealth)	The Subject Site is within North Head Sanctuary, which is a former defence site owned by the Sydney Harbour Federation Trust (Harbour Trust).	Yes	The Act (Part 2 Section 6) requires the Trust to prepare a plan within two years of proclamation of the Act (September 2001). The plan must be in accordance with the objects of the Trust, which are as follows: ▪ to ensure that management of Trust land contributes to enhancing the amenity of the Sydney Harbour region; ▪ to protect, conserve and interpret the environmental and heritage values of Trust land; ▪ to maximise public access to Trust land; ▪ to establish and manage suitable Trust land as a park on behalf of the Commonwealth as the national government to co-operate with other Commonwealth bodies that have a connection with any Harbour land in managing that land; and ▪ to co-operate with New South Wales, affected councils and the community in furthering the above objects The plan must also accord with the principles of Ecologically Sustainable Development.
Sydney Harbour Federation Trust Comprehensive Plan (The Plan) 2003	The former School of Artillery at North Head also falls into the category of Harbour Land. Although the Commonwealth has had "the use, occupation and enjoyment" of the land since 1910 it does not have title to it. The ability of the In addition to The Plan, Commonwealth land and activities are subject to environmental legislation such as the Environment Protection and Biodiversity Conservation Act 1999, and the Australian Heritage Commission Act	Yes	Future planned actions should follow the Trust's Comprehensive Plan (The Plan), in particular the Objectives and Policies (Part 3) as well as the Outcomes (Section 8) identified within the Plan. In general, any use of land should align with the following proposed outcomes of The Plan: ▪ to be planned and managed as one entity aimed at creating an environmental sanctuary. The Trust proposal for the former Artillery School is for the adaptive re-use of buildings and facilities with uses

Legislation/ Policy	Relevance to Site	Triggered	Considerations for Future Planned Actions
	1975. This means that any future proposal on Commonwealth land would also have to be consistent with these Acts.		that will complement the proposed sanctuary balancing this with public access for experiencing and learning about the headland's remarkable natural and cultural heritage.
Sydney Harbour Federation Trust Management Plan – North Head Sanctuary 2011	This Management Plan is the middle level of a three tiered comprehensive planning system developed to guide the future of the Trust's lands. This Management Plan is to be interpreted in conjunction with the Trust's Comprehensive Plan, in particular the Outcomes identified in Part 8 of the Trust's Comprehensive Plan and the Objectives and Policies in Part 3.	Yes	All 'actions' on Trust land, undertaken by either the Trust or on behalf of the Trust, are controlled by the EPBC Act. Section 26 of the EPBC Act protects all aspects of the environment on Trust land from actions taken either on the Trust's land or on adjoining land that may have a significant impact on it; Section 28 protects the environment from any actions of the Trust or any other Commonwealth agency that may have a significant impact. Section 341ZC of the EPBC Act requires the Trust not to take an action that has an adverse effect on National or Commonwealth Heritage Values of National or Commonwealth Heritage places, unless there is no feasible or prudent alternative. If no such alternatives are available, all measures should be taken to minimise any adverse impact on those values. This plan includes the National and Commonwealth Heritage Values described in the statutory listings of the site, and outcomes to reflect, and policies to protect those values.
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Commonwealth)- **National Heritage Values and Commonwealth Heritage Values**	Parts of the North Head Sanctuary are identified as having National and Commonwealth Heritage Values. North Head is listed on the National Heritage List and North Head Artillery Barracks is included on the Commonwealth Heritage List. North Head also contains additional land which may have potential Commonwealth Heritage Values.	Yes	The EPBC Act protects the environment from any actions of the Trust or any other Commonwealth Agency that may have a significant impact. The Trust is required to not take an action that has an adverse effect on National or Commonwealth Heritage places, unless there is no feasible or prudent alternative. North Head Sanctuary Management Plan sets out the outcomes and policies to protect National and Commonwealth Heritage Values and to minimise adverse impacts on those values.

Legislation/ Policy	Relevance to Site	Triggered	Considerations for Future Planned Actions
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Commonwealth)- **Threatened Flora, Fauna and/or Ecological Communities**	No flora or fauna listed under the EPBC Act were identified within the Subject Site at the time of the site assessment; however, a number of threatened species listed under the EPBC Act have been historically recorded within the Subject Site. Additionally, suitable habitat for threatened fauna and flora species listed under the EPBC Act was identified. One (1) EPBC Act listed critically endangered ecological community was observed within the Subject Site during the site assessment: ▪ Eastern Suburbs Banksia Scrub of the Sydney Region	Yes	An assessment of significance of impact from the proposed works on Matters of National Environmental Significance (MNES) EPBC Act Assessment of Significant Impact Criteria. This is to be included within a Flora and Fauna Assessment Report (FFA), Biodiversity Development Assessment Report (BDAR) or Review of Environmental Factors (REF), should the proposed works be likely to impact on any EPBC listed threatened species.
Biosecurity Act 2015 (Bio Act) (Commonwealth)	Two (2) priority weeds for the Greater Sydney region were identified within the Subject Site: ▪ *Asparagus aethiopicus* (Ground Asparagus); and ▪ *Olea europaea subsp. cuspidata* (African Olive).	Yes	Listed priority weeds must be managed in accordance with the Biosecurity Act 2015.
Fisheries Management Act 1994	No areas of mapped Key Fish Habitat are located within the Subject Site.	No	None

3. Methodology

3.1 Desktop Assessment and Literature Review

A thorough literature review of local information relevant to the Northern Beaches Council area was undertaken. Searches using NSW Wildlife Atlas (BioNet; DPIE 2023b) and the Commonwealth Protected Matters Search Tool (DCCEEW 2023) were conducted to identify all current threatened flora and fauna, as well as migratory fauna records within a 100 km^2 search area centred on the Subject Site. These data were used to assist in establishing the presence or likelihood of any ecological values as occurring on or adjacent to the Subject Site, and helped inform our Ecologist on what to look for during the site assessment.

Soil landscape and geological mapping was examined to gain an understanding of the environment on the Subject Site and to assist in determining whether any threatened flora or ecological communities may occur there (Chapman et al. 2009).

3.2 Ecological Site Assessment

3.2.1 General Survey

A site assessment was undertaken by Narla Ecologists Louise Neville and Hannah Martin on Monday the 23rd of January 2023. During the site assessments, the following activities were undertaken:

- Identifying and recording the vegetation communities present on the Subject Site, with focus on identifying any Threatened Ecological Communities (TEC);
- Recording a detailed list of flora species encountered on the Subject Site, with a focus on threatened species, species diagnostic of threatened ecological communities, and priority weeds;
- Recording opportunistic sightings of any fauna species seen or heard on or within the immediate surrounds of the Subject Site;
- Identifying and recording the locations of notable fauna habitat such as important nesting, roosting or foraging microhabitats;
- Targeting the habitat of any threatened and regionally significant fauna including:
    - Tree hollows (habitat for threatened large forest owls, parrots, cockatoos, and arboreal mammals);
    - Caves and crevices (habitat for threatened reptiles, small mammals, and microbats);
    - Termite mounds (habitat for threatened reptiles);
    - Soaks (habitat for threatened frogs);
    - Wetlands (habitat for threatened fish, frogs, and water birds);
    - Drainage lines (habitat for threatened fish and frogs);
    - Fruiting trees (food for threatened frugivorous birds and mammals);
    - Flowering trees (food for threatened nectivorous mammals and birds);
    - Trees and shrubs supporting nest structures (habitat for threatened birds and arboreal mammals);
    - Logs, bark and artificial debris (habitat for threatened frogs, reptiles, and snails);
    - Any other habitat features that may support fauna (particularly threatened) species; and
    - Assessing the connectivity and quality of the vegetation within the Subject Site and surrounding area.
- Identifying areas for possible ecological enhancement within the Subject Site.

3.2.2 Weather Conditions

Weather conditions recorded at the nearest weather station (Sydney Observatory Hill) prior to and during the general flora and fauna survey period are provided in Table 2 (BOM 2023). The data reveals warm temperatures and moderate rainfall leading up to the survey. These weather conditions are likely to have been conducive to the emergence of annual herbs.

Table 2. Weather conditions recorded at Sydney Observatory Hill (station 066214) preceding and during the Site Assessment (survey date in bold).

Survey date	Day	Minimum Temp. (°C)	Maximum Temp. (°C)	Rainfall (mm)
16/01/2023	Monday	21.4	29.2	0
17/01/2023	Tuesday	20.0	28.6	0
18/01/2023	Wednesday	19.5	30.2	0.2
19/01/2023	Thursday	18.7	20.3	20.0
20/01/2023	Friday	16.7	22.0	6.4
21/01/2023	Saturday	16.5	25.5	2.8
22/01/2023	Sunday	18.9	21.7	0.6
23/01/2023	**Monday**	**16.8**	**27.0**	**9.6**

3.2.3 Mapping and Analysis of Vegetation Communities

Narla examined local satellite imagery, geological mapping, soil landscape mapping and topographic mapping, in addition to existing vegetation mapping in order to stratify the Subject Site and guide the site assessment survey efforts. The following documents were consulted during assessment to assist with the identification of vegetation communities present within the Subject Site:

- Chapman G.A., Murphy C.L., Tille P.J., Atkinson G. and Morse R.J. (2009), Soil Landscapes of the Sydney 1:100,000 Sheet map, Ed. 4, Department of Environment, Climate Change and Water, Sydney;
- Department of Planning, Industry and Environment NSW (DPE 2022) eSPADE v2.2;
- NSW Office of Environment and Heritage (OEH) (2016) The Native Vegetation of the Sydney Metropolitan Area. Volume 2: Vegetation Community Profiles. Version 3.1; and
- Department of Environment (DPE) (2023) NSW State Vegetation Type Map.

4. Native Vegetation

4.1 Vegetation Community

4.1.1 Historically Mapped Vegetation Communities

Historical vegetation mapping (OEH 2016; DPE 2023) identified the following vegetation communities as occurring within and surrounding the Subject Site (**Figure 3**):

- Sydney Coastal Sand Mantle Heath;
- Sydney Coastal Sand Swamp Scrub;
- Coastal Headland Banksia Scrub;
- Coastal Sandstone Foreshore Forest; and
- Urban Exotic/Native.

4.1.2 Field Validated Vegetation Communities

The Narla field site assessment confirmed the presence of the following vegetation communities within the Subject Site:

- Sydney Coastal Sand Mantle Heath;
- Planted Native/Exotic Vegetation; and
- Urban Exotic Lawn.

The locations of the vegetation communities within the Subject Site are displayed in **Figure 4**. A description of these vegetation communities is provided in **Table 3, Table 4** and **Table 5)**.

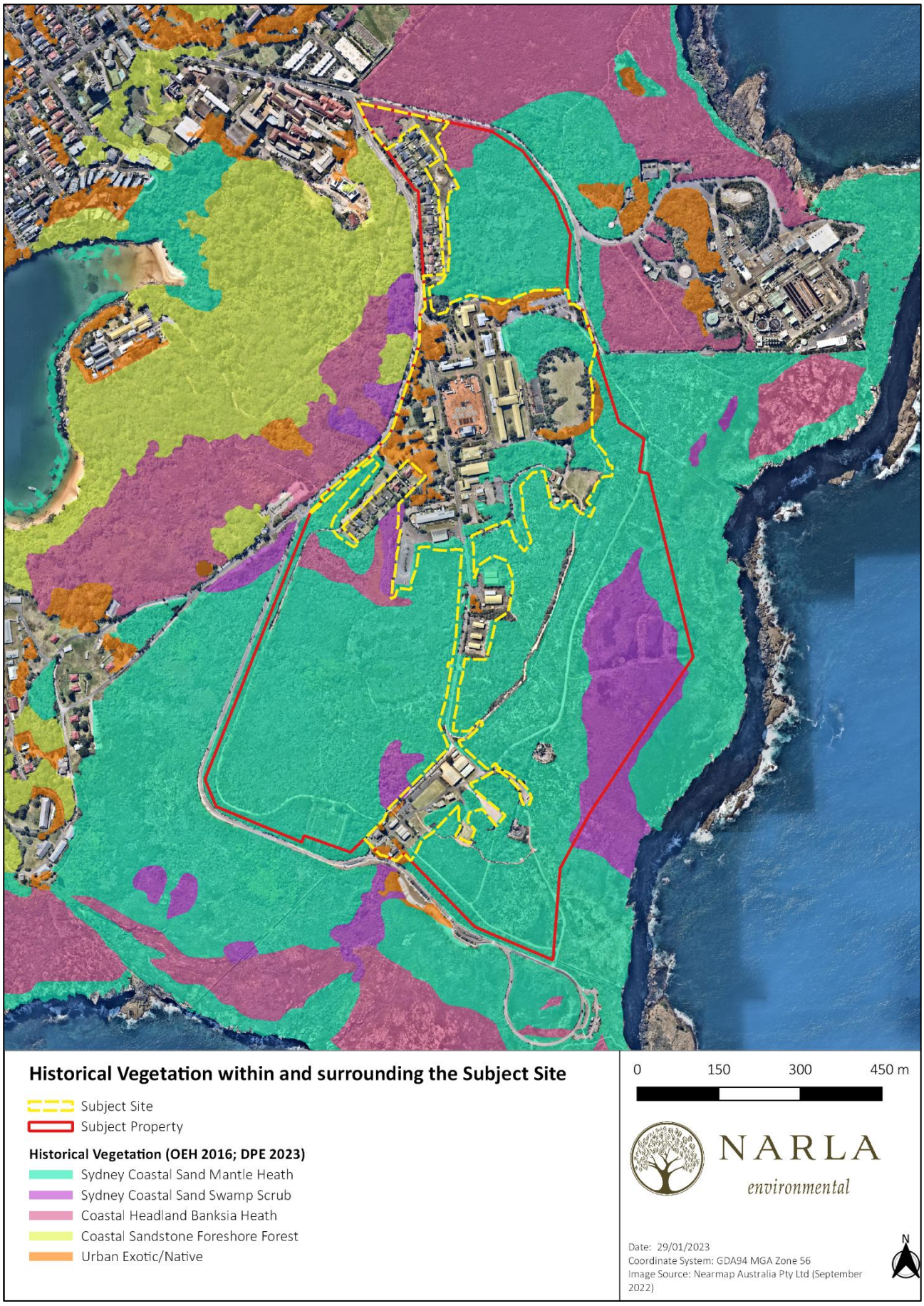

Figure 3. Historically mapped within and adjacent to the Subject Site.

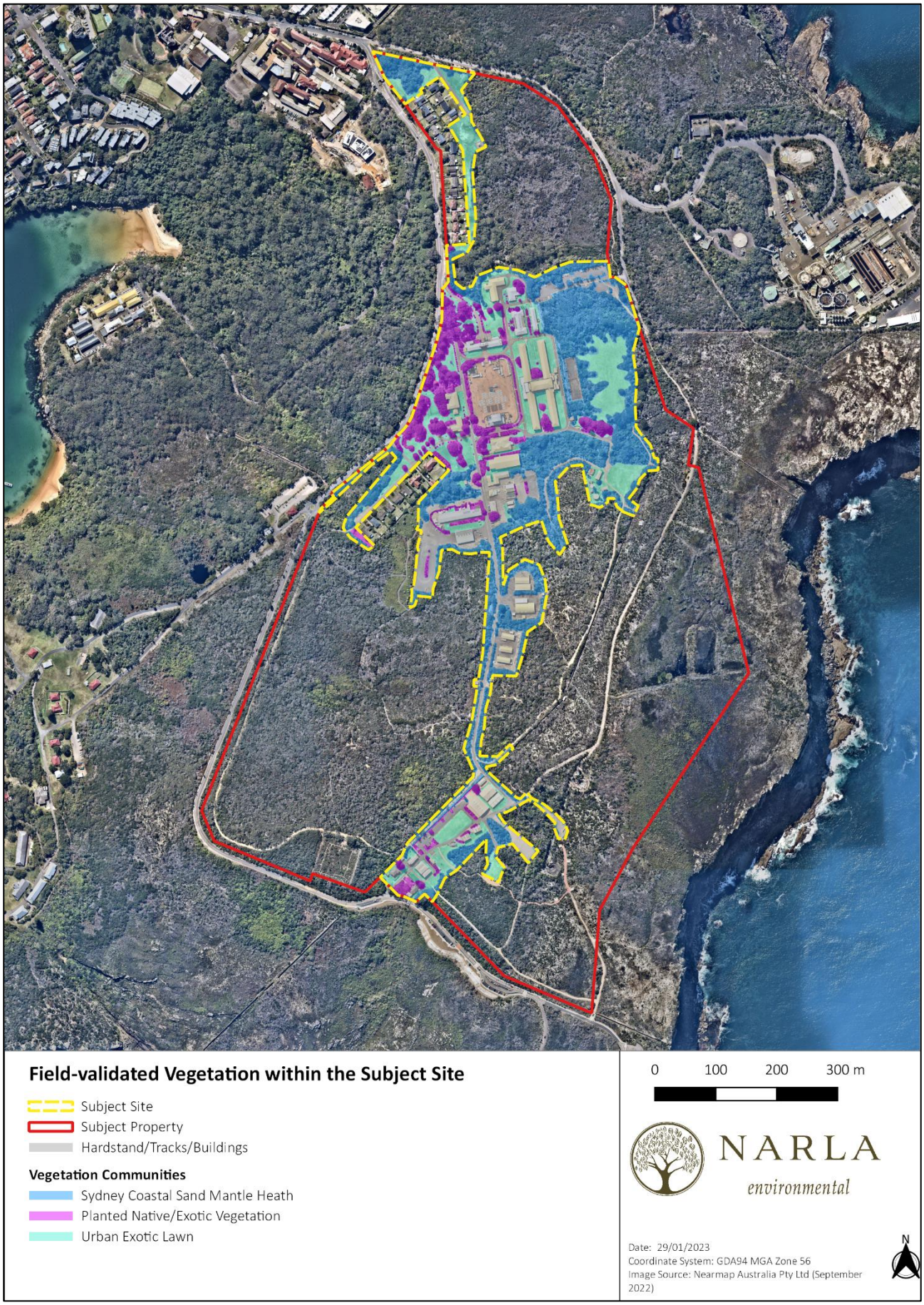

Figure 4. Field-validated vegetation communities within the Subject Site

Table 3. Description of Sydney Coastal Sand Mantle Heath occurring within the Subject Site.

Sydney Coastal Sand Mantle Heath	
	
Vegetation Formation / Keith Class	Wallum Sand Heaths
Condition	High
Extent within Subject Site (approximate)	8.1ha
Description from DPE (2023)	
A tall to very tall heathland or closed heathland with occasional eucalypt emergent, found on shallow to moderately deep sand mantles that are perched above some of Sydney's major sandstone headlands. It is recognised as part of Eastern Suburbs Banksia Scrub, a threatened ecological community under state and federal legislation. The landscapes on which it occurs are a component of the relictual dune systems that are formed from wind-blown deposits of sand. As a result of their age, they have been exposed to long periods of weathering and soil leaching that has produced highly podsolised soils. These shallower dunes support a wallum heath community that is unlike those found on Pleistocene dunes elsewhere in NSW. The shrub canopy very frequently includes a high cover of *Leptospermum laevigatum*, *Banksia aemula* and *Kunzea ambigua*, with a lower cover of *Acacia longifolia*, *Acacia suaveolens*, *Monotoca elliptica*, *Banksia ericifolia* and *Allocasuarina distyla*. Longer unburnt or disturbed patches will occasionally include *Pittosporum undulatum*. The ground layer is variable in cover depending on disturbance and drainage conditions. On drier sites there is a patchy to sparse cover of graminoids very frequently including *Dianella caerulea* and *Lomandra glauca* whereas poorly	

Sydney Coastal Sand Mantle Heath	
drained sites have a greater abundance and cover of sedges and rushes including *Caustis pentandra* and *Lepyrodia scariosa*. The grass tree *Xanthorrhoea resinosa* is also commonly recorded across multiple strata. This PCT is restricted to elevations of between 10-90 metres asl in the high coastal rainfall zone of 1190-1240 per annum. It has been extensively cleared from the Eastern Suburbs sand plains with only small and often disturbed remnants remaining. It is now largely restricted to coastal headlands at Malabar and La Perouse with the largest patches remaining on North Head.	
Description of the Vegetation in the Subject Site	
This vegetation community within the Subject Site was characterised by a canopy comprised of native canopy species *Eucalyptus botryoides* (Bangalay)*, Angophora costata* (Smooth-barked Apple), *Corymbia gummifera* (Red Bloodwood) and *Banksia serrata* (Saw Banksia). The shrub layer was dense, with a high diversity of native species such as *Monotoca elliptica* (Tree Broom Heath), *Acacia terminalis* (Sunshine Wattle), *Banksia marginata* (Silver Banksia), *Kunzea ambigua* (Tick Bush), *Grevillea buxifolia* (Grey Spider Flower), *Leptospermum laevigatum* (Coast Tea Tree) and *Epacris longiflora* (Fuchsia Heath). The groundlayer was sparse with few species, but those present included *Patersonia sericea* (Purple Flag), *Lepidosperma laterale* (Variable Sawsedge), *Ficinia nodosa* (Knotted Club-rush), *Lomandra longifolia* (Spikey-headed Mat-rush) and *Imperata cylindrica* (Blady Grass).	
Justification of Vegetation Community	The determination of this community was based on the IBRA Bioregion, IBRA Sub-region, landscape attributes including soil landscapes and elevation, and the presence of diagnostic species.
BC Act Status	This community is associated with the BC Act listed Critically Endangered Ecological Community (CEEC), Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion.
EPBC Act Status	This community is associated with the EPBC Act listed Critically Endangered Ecological Community (CEEC), Eastern Suburbs Banksia Scrub of the Sydney Region.
References	Department of Environment (DPE) (2023) NSW State Vegetation Type Map.

Table 4. Description of Planted Native/Exotic Vegetation within the Subject Site.

Planted Native/Exotic Vegetation	
	
Extent within Subject Site (approximate)	2.7ha
Description of the Vegetation in the Subject Site	
This area consisted of a mixture of planted native trees, native cultivars and exotic garden vegetation that have been historically planted within the Subject Site as landscaping or for native revegetation. Planted local native canopy species included *Eucalyptus saligna* (Blue Gum), *Melaleuca quinquenervia* (Broad-leaved Paperbark) and *Ficus macrophylla* (Moreton Bay Fig). Exotic canopy species included *Eucalyptus bicostata* (Southern Blue Gum) and *Araucaria heterophylla* (Norfolk Island Pine). A large number of planted native species were present in revegetated areas such as *Actinotus helianthi* (Flannel Flower), *Commersonia hermanniifolia* (Wrinkled Kerrawang), *Hibbertia scandens* (Snake Vine), *Dillwynia retorta* (Eggs and Bacon), *Coronidium elatum* (White Paper Daisy) and *Grevillea sericea* (Red Spider Flower). A number of exotic landscaped shrubs and groundcovers were identified throughout the Subject Site including *Nerium oleander* (Oleander), *Magnolia grandiflora* (Southern Magnolia), *Rhaphiolepis indica* (Indian Hawthorn), *Agapanthus sp.* (Lily of the Nile), *Clivia sp.* (Kaffir Lily) and *Nephrolepis cordifolia* (Fishbone Fern).	
Justification of Vegetation Assignment	The vegetation within this area was comprised of historically planted native and exotic vegetation. As the vegetation did not conform to any locally occurring ecological community found in the locality and has been extensively modified, it has been classified as Planted Native/Exotic Vegetation.
BC Act Status	Not listed
EPBC Act Status	Not listed

Table 5. Description of Urban Exotic Lawn within the Subject Site.

Urban Exotic Lawn	
	
Extent within Subject Site (approximate)	3.8ha
Description of the Vegetation in the Subject Site	
This community consisted primarily of maintained open exotic lawn areas with the dominant grass being exotic species *Stenotaphrum secundatum* (Buffalo Grass). In non-maintained areas other grass and forb species were more prevalent including *Seteria parviflora* (Pigeon Grass), *Paspalum dilatatum* (Dallis Grass), *Paspalum quadrifarium* (Tussock Paspalum), *Richardia stellaris* (Field Madder) and *Heliotropium amplexicaule* (Blue Heliotrope).	
Justification of Vegetation Assignment	The vegetation within this area was comprised of historically planted grass species and environmental weeds. As the vegetation did not conform to any locally occurring ecological community found in the locality and has been extensively modified, it has been classified as Urban Exotic Lawn.
BC Act Status	Not listed
EPBC Act Status	Not listed

5. Threatened Entities

5.1 Threatened Ecological Communities

One (1) threatened Ecological Community listed under State (BC Act) and Federal (EPBC Act) legislation was identified within the Subject Site:

- Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion (BC Act); and
- Eastern Suburbs Banksia Scrub of the Sydney Region (EPBC Act listed)

5.2 Threatened Flora

Desktop analysis revealed a range of threatened flora as occurring or having the potential to occur on or within 10km^2 of the Subject Site. Targeted surveys were undertaken throughout the Subject Site (where access permitted), for potentially occurring threatened flora. Whilst no threatened flora was identified during the site assessment, a number of threatened flora species have been historically recorded on site (**Figure 5**).

Locally occurring threatened flora species were assessed for their potential to occur within the Subject Site (**Table 6**). It was determined that a number of threatened species historically recorded within the Subject Site and the surrounds have the potential to be located within the Subject Site.

Table 6. Likelihood of Occurrence of Threatened Flora Species Within the Subject Site.

Species	BC Act	EPBC Act	Habitat Requirements (DPIE 2022b)	Likelihood of Occurrence
Acacia bynoeana (Bynoe's Wattle)	Endangered	Vulnerable	Occurs in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple.	Low-moderate. Although potential suitable habitat occurs within the Subject Site, much of the site has been extensively modified. Furthermore, the lack of proximal records within the Subject Site and surrounds makes its presence unlikely.
Acacia terminalis subsp. Eastern Sydney (Sunshine wattle)	E	E	Coastal scrub and dry sclerophyll woodland on sandy soils. Habitat is generally sparse and scattered. Most areas of habitat or potential habitat are small and isolated. Most sites are highly modified or disturbed due to surrounding urban development.	High. This species has been historically recorded within the Subject Site. Whilst the species was not recorded during the site assessment, numerous proximal records exist and the assessment occurred outside of the approved survey period (May-July).
Allocasuarina portuensis (Nielsen Park She-oak)	Endangered	Endangered	The original known habitat of the Neilsen Park She-oak is at Nielsen Park, in Woollahra local government area. There are no plants left at the original site where it was discovered.	Very low. The Subject Site is outside the original known distribution of this species.
Asterolasia buxifolia	Endangered	-	Known from a single site associated with granite geology in the riparian zone of the Lett River.	Very low. The Subject Site does not contain suitable habitat for this species, and the lack of proximal records makes its presence unlikely.
*Caladenia tessellata (*Thick Lip Spider Orchid*)*	Endangered	Vulnerable	Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	Absent, populations in the Sydney region are presumed extinct. The only proximal record is from 1883.
Callistemon linearifolius (Netted Bottle Brush)	Vulnerable	-	Grows in dry sclerophyll forest on the coast and adjacent ranges.	Low. The Subject Site does not contain suitable habitat for this species as the remnant vegetation is heathland. The lack of proximal records makes the presence of this species unlikely.

Species	BC Act	EPBC Act	Habitat Requirements (DPIE 2022b)	Likelihood of Occurrence
Chamaesyce psammogeton (Sand Spurge)	Endangered	-	Grows on fore-dunes, pebbly strandlines and exposed headlands, often with Spinifex (*Spinifex sericeus*) and Prickly Couch (*Zoysia macrantha*).	Moderate-high, this species has been previously recorded within the Subject Site. Only one record exists and it is in a highly modified area of the site and from 2002.
Epacris purpurascens var. *purpurascens*	Vulnerable	-	Found in a range of habitat types, most of which have a strong shale soil influence.	Low. The subject site does not occur on shale. The lack of proximal records makes the presence of this species unlikely.
Eucalyptus camfieldii (Camfield's Stringybark)	Vulnerable	Vulnerable	Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges.	High. The Subject Site contains coastal heath and a number of historical records exist within and surrounding the Subject Site.
Grammitis stenophylla (Narrow-leafed Finger Fern)	Endangered	-	Moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest.	Low. No rainforests or moist eucalypt forest was identified within the Subject Site. The lack of proximal records makes the presence of this species unlikely.
Grevillea caleyi (Caley's Grevillea)	Endangered	Critically Endangered	All sites occur on the ridgetop between elevations of 170 to 240m asl, in association with laterite soils and a vegetation community of open forest, generally dominated by *Eucalyptus sieberi* and *E. gummifera*.	Low. The Subject Site does not occur on laterite soil and the vegetation is heath not open forest. The lack of proximal records makes the presence of this species unlikely.
Melaleuca biconvexa (Biconvex Paperbark)	Vulnerable	Vulnerable	Biconvex Paperbark is only found in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Biconvex Paperbark generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Low. The Subject Site does not contain any water ways or streams, and does not occur on alluvial soil. The lack of proximal records makes the presence of this species unlikely.
Melaleuca deanei (Deane's Paperbark)	Vulnerable	Vulnerable	The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone.	Moderate. The Subject Site has small areas consisting of heath on sandstone. However, the lack of proximal records makes the presence of this species less likely.
Persoonia hirsuta (Hairy Geebung)	Endangered	Endangered	The Hairy Geebung is found in clayey and sandy soils in dry sclerophyll open forest, woodland and heath, primarily on	High. Remnant vegetation within the Subject Site primarily consists of heath on sandy soils.

Species	BC Act	EPBC Act	Habitat Requirements (DPIE 2022b)	Likelihood of Occurrence
			the Mittagong Formation and on the upper Hawkesbury Sandstone.	One proximal record from 2002 is located within the Subject Site.
Pimelea curviflora var. curviflora	Vulnerable	Vulnerable	Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowland Grassy Woodland habitat at Albion Park on the Illawarra coastal plain.	Moderate-high. Though the habitat present is not typical for this species, one proximal record exists from 2002 within the Subject Site. This area is now highly modified.
Prasophyllum fuscum (Slaty Leek Orchid)	Endangered	Vulnerable	Grows in moist heath, often along seepage lines. The known population grows in moist sandy soil over sandstone amongst sedges and grasses in an area that appears to be regularly slashed by the local council.	Moderate. The Subject Site is located in dry heath with few moist areas. The lack of proximal records makes the presence of this species less likely.
Prostanthera marifolia (Seaforth Mintbush)	Endangered	Critically Endangered	*Prostanthera marifolia* is currently only known from the northern Sydney suburb of Seaforth and has a very highly restricted distribution within the Sydney Basin Bioregion. The single population is fragmented by urbanisation into three small sites. All known sites are within an area of 2x2 km. The sites are within the local government area of Northern Beaches Council.	Very low. The Subject Site is out of the known distribution for this species.
Rhodamnia rubescens (Scrub Turpentine)	Endangered	-	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Low. No such habitat (rainforest or wet sclerophyll forest) was present within the Subject Site. The lack of proximal records makes the presence of this species unlikely.
Senecio spathulatus (Coast Groundsel)	Endangered	-	Grows on frontal dunes.	Absent. No such habitat occurs within the Subject Site.
Syzygium paniculatum (Magenta Lilly Pilly)	Endangered	Vulnerable	On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	Low. No such habitat (riverside or littoral rainforest was present within the Subject Site. All proximal records are located in nearby littoral rainforest communities.

Species	BC Act	EPBC Act	Habitat Requirements (DPIE 2022b)	Likelihood of Occurrence
Tetratheca glandulosa	Vulnerable	-	Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey/sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops.	Moderate. Suitable habitat occurs within the Subject Site, especially in the small areas of Lambert soil landscape. However, the lack of proximal records makes the presence of this species less likely.
Tetratheca juncea (Black-eyed Susan)	Vulnerable	Vulnerable	Confined to the northern portion of the Sydney Basin bioregion and the southern portion of the North Coast bioregion in the local government areas of Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes and Cessnock. It is usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also been recorded in heathland and moist forest. The majority of populations occur on low nutrient soils associated with the Awaba Soil Landscape.	Low. The Subject Site does contain a low open forest/woodland and does not occur on low nutrient soils associated with the Awaba soil landscape. The lack of proximal records makes the presence of this species unlikely.
Triplarina imbricata (Creek Triplarina)	Endangered	Endangered	Found only in a few locations in the ranges south-west of Glenreagh and near Tabulam in north-east NSW. The species was previously recorded in Parramatta, near Sydney, however, the species is no longer thought to occur in this area.	Very Low. The Subject Site is out of the known distribution for this species.

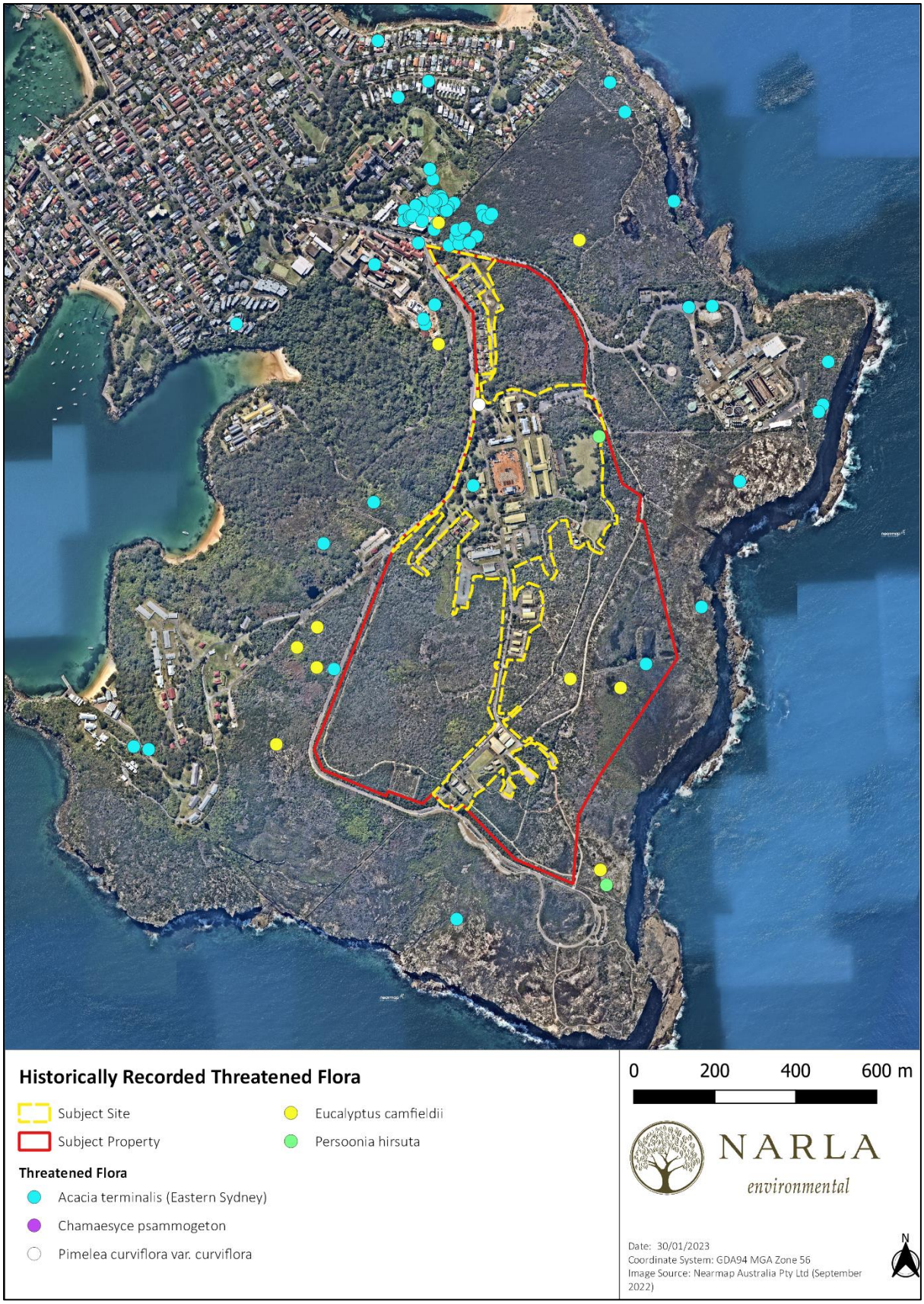

Figure 5. Historically recorded threatened flora species identified within proximity to the Subject Site.

5.3 Threatened Fauna

A number of habitat features were present within the Subject Site, including hollow-bearing trees, nests and small burrows (**Table 7, Figure 6**). Desktop analysis revealed numerous threatened species as being historically recorded within the Subject Site, as well as a number of threatened fauna species having the potential to utilise habitat within the Subject Site during part of their lifecycles (**Table 8**). The site assessment provided support for the desktop analysis, revealing that the Subject Site may provide intermittent habitat for numerous threatened species, particularly those associated with coastal zones and foreshore areas.

A few common native avian were identified within and surrounding the Subject Site during the site assessment. All native fauna species encountered were listed as 'protected' under the BC Act (**Appendix A**). One (1) threatened fauna species, *Hieraaetus morphnoides* (Little Eagle) was observed foraging within the Subject Site by the Narla Ecologists during the site assessment in January 2023.

Table 7. Fauna habitat values within the Subject Site.

Habitat component	Site values
Coarse woody debris	Absent.
Rock outcrops and bush rock	Absent.
Caves, crevices and overhangs	Absent.
Culverts, bridges, mine shafts, or abandoned structures	Present. Old abandoned structures were present within the Subject Site.
Nectar/lerp-bearing Trees	Many nectar-bearing trees were recorded within the Subject Site including *Eucalyptus botryoides, Corymbia gummifera* and *Angophora costata*.
Nectar-bearing shrubs	Nectar-bearing shrubs were recorded within the Subject Site including numerous *Callistemon* and *Melaleuca species*. These trees may provide intermittent nectar and/or lerp sources for nectivores.
Koala Feed Trees	The following Koala feed trees were identified on the Subject Site: *Angophora costata*, *Eucalyptus botryoides, Eucalyptus saligna* and *Corymbia gummifera*.
Large stick nests	No large stick nests suitable for threatened raptorial birds of prey were observed within the Subject Site.
Sap and gum sources	Native sap and gum source trees were recorded within the Subject Site including *Angophora costata*, *Eucalyptus botryoides and Corymbia gummifera*.
She-oak fruit (Glossy Black Cockatoo feed)	*Casuarina glauca* and *Allocasuarina distyla* were present, which may provide foraging habitat for Glossy Black Cockatoo.
Seed-bearing trees and shrubs	Seed-bearing trees such as *Eucalyptus* and *Allocasuarina* species may provide foraging habitat for threatened avian species.
Soft-fruit-bearing trees	Fruit-bearing trees were identified within the Subject Site such as *Pittosporum undulatum* (Sweet Pittosporum), and *Elaeocarpus reticulatus* (Blueberry Ash) which may provide potential foraging habitat for some bird species.
Dense shrubbery and leaf litter	Dense areas of vegetation were present, which may provide habitat for birds and ground-dwelling fauna such as long-nosed bandicoots.
Tree hollows	Present. Multiple hollow-bearing trees were located within the Subject Site. These may provide habitat for threatened bird or mammal species.
Decorticating bark	Present. This may provide habitat for threatened microbat species.
Wetlands, soaks and streams	Present. These may provide habitat for threatened amphibious species.
Open water bodies	Absent.

Habitat component	Site values
Estuarine, beach, mudflats, and rocky foreshores	Absent.

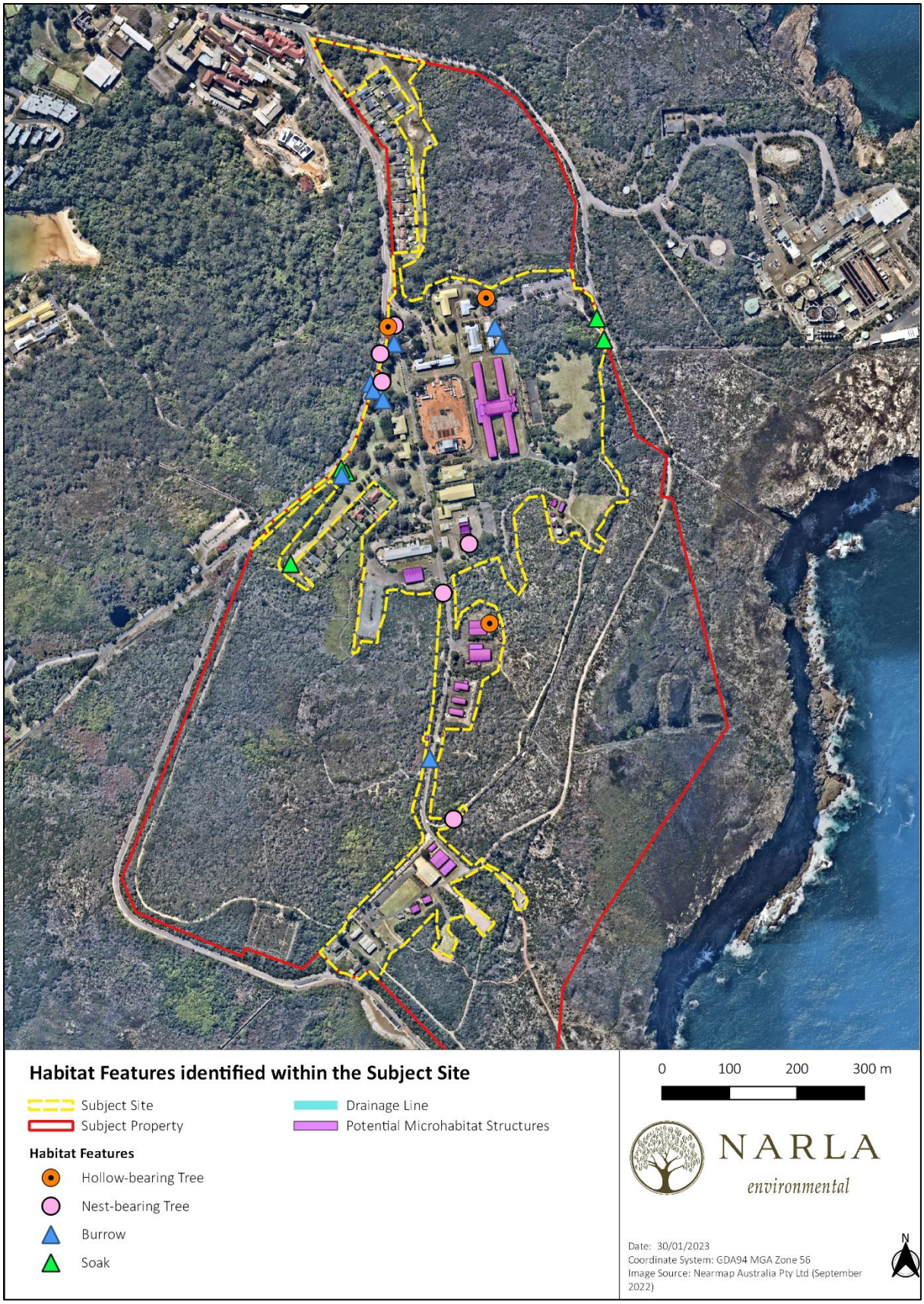

Figure 6. Habitat features recorded within the Subject Site.

Table 8. Likelihood of Occurrence of Threatened Fauna Species Within the Subject Site.

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
Anseranas semipalmata Magpie Goose	Vulnerable	-	1	Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. Equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level; most breeding now occurs in monsoonal areas; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW.	Low. The Subject Site did not contain the preferred habitat for this species and the number of proximal records are very low, with no records of this species on site. In addition, the heavily altered and urban nature of much of the Subject Site makes the presence of this species unlikely.
Anthochaera Phrygia (Regent Honeyeater)	Endangered	Critically Endangered	2	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region.	Low. The Subject Site does not occur within important areas mapped for this species. In addition, the heavily altered and urban nature of much of the Subject Site makes the presence of this species unlikely.

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
Ardenna carneipes (Flesh-footed Shearwater)	Vulnerable	JAMBA* ROKAMBA**	1	Nest on Lord Howe Island in forests on sandy soils. Eggs are laid at the end of a burrow 1-2m in length.	Low. Whilst the Subject Site does contain potential foraging habitat for this species it would only be opportunistic due to the migratory nature of the species. The highly modified and urban nature of much of the Subject Site along with low proximal records indicates the presence of this species is unlikely.
Burhinus grallarius (Bush Stone-curlew)	Endangered	-	4	Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber. Nest on the ground in a scrape or small bare patch. In the south-east it is either rare or extinct throughout its former range.	Low. Suitable habitat does exist within the Subject Site for this species. However, the species is presumed rare or extinct within the South-east coast distribution.
Cercartetus nanus (Eastern Pygmy-possum)	Vulnerable	-	418	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. They may occupy small patches of vegetation in fragmented landscapes and although the species prefers habitat with a rich shrub understory, they are known to occur in grassy woodlands and the presence of	Very high. Potential habitat for the species occurs in bushland area surrounding the site. This species is known to be present in the surrounding bushland area. Hollow-bearing trees were located within the Subject Site and the number of proximal records indicates a very high likelihood of their presence.

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
				Eucalypts alone is sufficient to support populations in low densities.	
Chalinolobus dwyeri (Large-eared Pied Bat)	Vulnerable	Vulnerable	330	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years.	Moderate. This species is likely to occur in the bushland surrounds and have been recorded in the broader Subject Property. Potential foraging habitat may occur within the Subject Site, however, no suitable breeding/roosting habitat (crevices, cliffs, old mine workings, disused mud nests) was located within the Subject Site.
Daphoenositta chrysoptera (Varied Sittella)	Vulnerable	-	1	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Low. Whilst the Subject Site does provide potential habitat for this species, the heavily altered and urban nature of much of the Subject Site, along with a lack of proximal records, makes the presence of this species unlikely.
Diomedea exulans (Wandering Albatross)	Endangered	Endangered	5	Spend the majority of their time in flight, soaring over the southern oceans. They breed on a number of islands just north of the Antarctic Circle. Breeding takes place on	Absent. The Subject Site does not contain suitable foraging or breeding habitat for this species.

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
				exposed ridges and hillocks, amongst open and patchy vegetation.	
Esacus magnirostris Beach Stone-curlew	Endangered	-	1	Found exclusively along the coast, on a wide range of beaches, islands, reefs and in estuaries, and may often be seen at the edges of or near mangroves. They forage in the intertidal zone of beaches and estuaries, on islands, flats, banks and spits of sand, mud, gravel or rock, and among mangroves. Beach Stone-curlews breed above the littoral zone, at the backs of beaches, or on sandbanks and islands, among low vegetation of grass, scattered shrubs or low trees; also among open mangroves.	Low-moderate. The Subject Site lacks suitable habitat associated with this species. However, possible habitat does exist within the broader Subject Property and surrounds, with one (1) recent proximal record on the eastern border of the Subject Property.
Eudyptula minor (Little Penguin in the Manly Point Area)	Endangered	-	40	Only known breeding population on the mainland in NSW. A range of nest sites at Manly including under rocks on the foreshore, under seaside houses and structures, such as stairs, in wood piles, and under overhanging vegetation.	Low. The Subject Site does not contain suitable habitat for this species. Critical Little Penguin habitat exists along the Manly Foreshore just south of Collins Beach and extending up past Little Manly Beach, approximately 0.4 km south-west of the Subject Site. These areas are designated as of "Outstanding Biodiversity Value" under the BC Act. These areas are not anticipated to be impacted by

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
					any proposed activity but further assessment is required if any future works are planned in proximity to those areas.
Falsistrellus tasmaniensis (Eastern False Pipistrelle)	Vulnerable	-	1	Prefers moist habitats, with trees taller than 20m. Generally, roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	Low-moderate. Whilst the Subject Site does provide potential habitat for this species, (eucalypt hollows, loose bark, buildings) the heavily altered and urban nature of much of the Subject Site, along with low proximal records, makes the presence of this species unlikely.
Glossopsitta pusilla (Little Lorikeet)	Vulnerable	-	2	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Nests in hollows in the limb or trunk of smooth-barked Eucalypts. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.	Low. Whilst the Subject Site does contain potential habitat for this species, the heavily altered and urban nature of much of the Subject Site, along with low proximal records, makes the presence of this species unlikely.
Haematopus fuliginosus (Sooty Oystercatcher)	Vulnerable	-	7	Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels.	Absent. The Subject Site lacks suitable habitat associated with this species and proximal records are low.

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
Haematopus longirostris Pied Oystercatcher	Endangered	-	2	Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. The chisel-like bill is used to pry open or break into shells of oysters and other shellfish. Nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones.	Absent. The Subject Site lacks suitable habitat associated with this species and proximal records are low.
Haliaeetus leucogaster (White-bellied Sea-Eagle)	Vulnerable	-	11	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts.'	Moderate. This species is likely to utilise waterways in the surrounding area as foraging habitat and may intermittently stop and rest within the Subject Site. No large stick nests were located within the Subject Site and this species has not been recorded previously on site.
Hieraaetus morphnoides (Little Eagle)	Vulnerable	-	2	Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	Present. This species may use the waterways and large areas of bushland in the surrounding area for foraging habitat and may intermittently forage or rest within

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
					the Subject Site. No large stick nests were located within the Subject Site and proximal records suggest this is a species unlikely to permanently take up residence and breed within the Subject Site.
Hirundapus caudacutus (White-throated Needletail)	-	Vulnerable JAMBA ROKAMBA CAMBA	1	Most often seen in eastern Australia before storms, low pressure troughs and approaching cold fronts and occasionally bushfire. These conditions are often used by insects to swarm (eg termites and ants) or tend to lift insects away from the surface which favours sighting of White-throated Needletails as they feed.	Low. Whilst the Subject Site does contain potential foraging habitat for this species, the heavily altered and urban nature of much of the Subject Site, the migratory nature of the species, along with low proximal records, makes the presence of this species unlikely.
Isoodon obesulus obesulus (Southern Brown Bandicoot [eastern])	Endangered	Endangered	1	Found in heath and open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and underground fruiting fungi. They nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material.	Moderate. Although potential habitat does exist within the Subject Site, the lack of proximal records suggests this species is unlikely to occupy the site.

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
Ixobrychus flavicollis (Black Bittern)	Vulnerable	-	4	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night.	Very low. The Subject Site lacks suitable habitat associated with this species. The species has never been recorded within the Subject Site and low proximal records exist.
Lathamus discolor (Swift Parrot)	Endangered	Critically Endangered	3	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*, Forest Red Gum *E. tereticornis*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Inland Grey Box *E. microcarpa*, Grey Box *E. moluccana*, Blackbutt *E. pilularis*, and Yellow Box *E. melliodora*.	Low. The subject site is located within proximity to areas mapped as important habitat for the species. The Subject Site does provide potential habitat for this species, however, the heavily altered and urban nature of much of the Subject Site, along with low proximal records, makes the presence of this species unlikely.
Macronectes giganteus (Southern Giant Petrel)	Endangered	Endangered	1	Species nests in small colonies amongst open vegetation on Antarctic and subantarctic islands, including Macquarie and Heard Islands and in Australian Antarctic	Low. Whilst the Subject Site does contain potential foraging habitat for this species it would only be opportunistic due to the migratory nature of the species. The highly

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
				territory. It is an opportunistic scavenger and predator and will predate on smaller birds both at land and sea.	modified and urban nature of much of the Subject Site along with low proximal records, makes the presence of this species unlikely.
Miniopterus australis (Little Bent-winged Bat)	Vulnerable	-	156	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	High. The Subject Site contains tree hollows and a large number of buildings which may be suitable habitat for this species to breed.
Miniopterus orianae oceanensis (Large Bent-winged Bat)	Vulnerable	-	1481	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Breeding or roosting colonies can number from 100 to 150,000 individuals. Hunt in forested areas, catching moths and other flying insects above the tree tops.	High. This species has been previously recorded on within the Subject Site and broader Subject Property. The Subject Site does contain suitable breeding habitat for this species including buildings and other man-made structures.
Myotis Macropus (Southern Myotis)	Vulnerable	-	28	Generally, roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.	Moderate. Potential habitat for the species occurs within the Subject Site as both hollow-bearing trees and buildings were located during the site assessment. However,

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
					proximal records suggest this species prefers the bushland areas surrounding the Subject Property due to the species preference to be close to water.
Ninox connivens (Barking Owl)	Vulnerable	-	3	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey found on these fertile riparian soils.	Moderate. The Subject Site provides potential foraging habitat for this species. However, the lack of large hollows and the low number of proximal records, makes the presence of this species less likely.
Ninox strenua (Powerful Owl)	Vulnerable	-	99	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked	High. The Subject Site provides potential foraging habitat for this species and proximal records exist within the broader Subject Property. The lack of large hollows suggests the species is more likely to use the Subject Site as foraging habitat than for breeding.

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
				Apple *Angophora floribunda*, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species.	
Onychoprion fuscata (Sooty Tern)	Vulnerable	-	2	Large flocks can be seen soaring, skimming and dipping but seldom plunging in off shore waters. Breeds in large colonies in sand or coral scrapes on offshore islands and cays including Lord Howe and Norfolk Islands.	Low. Suitable foraging and breeding habitat does not occur within the Subject Site. The lack of proximal records indicates this species is unlikely to occupy the Subject Site.
Pandion cristatus (Eastern Osprey)	Vulnerable	-	8	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	Low. This species would be expected only to utilise the site as opportunistic foraging habitat. No large nests were identified within the site and few proximal records exist.
Perameles nasuta (Long-nosed Bandicoot, North Head)	Endangered	-	4878	Essentially a solitary animal that occupies a variety of habitats on North Head. Forages mainly at or after dusk, digging for invertebrates, fungi and tubers. The conical holes it leaves in the soil are often seen at the interface of naturally vegetated and areas of open grass around the Quarantine Station, former Defence Lands and Saint Patrick's Estate. Shelters during the day in a well-concealed nest based on a shallow hole lined with leaves and grass, sometimes under debris, sometimes hidden	Certain. This species is known to occupy the Subject Site and surrounding area, with numerous recent proximal records.

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
				with soil and with the entrance closed for greater concealment.	
Phascolarctos cinereus (Koala)	Endangered	Endangered	1	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	Low. The heavily altered and urban nature of much of the Subject Site, along with only one proximal record from 1960, makes the presence of this species unlikely.
Phoebetria fusca (Sooty Albatross)	Vulnerable	Vulnerable	1	Pelagic or ocean-going species inhabits subantarctic and subtropical marine waters, spending the majority of its time at sea, and rarely occurs in continental shelf waters. Species nests	Absent. The Subject Site does not contain suitable breeding or foraging habitat for this species.
Pseudophryne australis (Red-crowned Toadlet)	Vulnerable	-	120	Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter.	Moderate. A small number of soaks and a drainage line were located within the Subject Site. However, the Subject Site is heavily altered and urban in nature, with only two proximal records within the vicinity of the Subject Property, making the presence of this species less likely.
Pterodroma leucoptera	Vulnerable	Endangered	2	Nesting occurs on Cabbage Tree Island in natural rock crevices among the rock scree and in hollow fallen palm	Absent. The Subject Site does not contain suitable foraging or breeding habitat for this species.

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
leucoptera (Gould's Petrel)				trunks, under fallen palm fronds, and in the cavities of the buttresses of fig trees.	
Pteropus poliocephalus (Grey-headed Flying-fox)	Vulnerable	Vulnerable	165	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young. This species feeds on the nectar and pollen of native trees, in particular *Eucalyptus*, *Melaleuca* and *Banksia*, and fruits of rainforest trees and vines.	High. This species is likely to forage within the Subject Site. No camps were observed during the site assessment.
Ptilinopus regina (Rose-crowned Fruit-dove)	Vulnerable	-	2	Occurs mainly in sub-tropical and dry rainforest and occasionally moist eucalypt forest and swamp forest, where fruit is plentiful. They feed entirely on fruit from vines, shrubs, large trees and palms.	Low. Potential habitat for this species is present, however the Subject Site is heavily altered and urban in nature, with sub-optimal foraging habitat due to the remnant vegetation being heathy and not rainforest. The lack of proximal records indicates this species is unlikely to occupy the Subject Site.
Ptilinopus superbus	Vulnerable	-	4	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree	Low. Potential habitat for this species is present, however the

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
(Superb Fruit-Dove)				species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees. Part of the population is migratory or nomadic. There are records of single birds flying into lighted windows and lighthouses, indicating that birds travel at night. At least some of the population, particularly young birds, moves south through Sydney, especially in autumn.	Subject Site is heavily altered and urban in nature, with sub-optimal foraging habitat due to the remnant vegetation being heathy and not rainforest. The lack of proximal records indicates this species is unlikely to occupy the Subject Site.
Saccolaimus flaviventris (Yellow-bellied Sheathtail-bat)	Vulnerable	-	2	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	High. The Subject Site does provide potential habitat for this species in the form of buildings and hollow-bearing trees. One recent proximal record on the eastern border of the Subject Property suggests the species may occupy the Subject Site.
Scoteanax rueppellii (Greater Broad-nosed Bat)	Vulnerable	-	1	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings.	Moderate-High. The Subject Site does provide potential habitat for this species in the form of buildings and hollow-bearing trees. The lack of proximal records though does make this species presence less likely.
Stagonopleura guttata	Vulnerable	-	1	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora	Low. The Subject Site is heavily altered and much of it is urban in

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
(Diamond Firetail)				Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland.	nature. The existing remnant vegetation is unlikely to support this species due to it being a heathy community. The lack of proximal records also indicates the low likelihood of this species presence.
Thalassarche cauta (Shy Albatross)	Vulnerable	Vulnerable	2	This pelagic or ocean-going species inhabits subantarctic and subtropical marine waters, spending the majority of its time at sea. Known breeding locations include Albatross Island off Tasmania, Auckland Island, Bounty Island and The Snares, off New Zealand.	Absent. The Subject Site does not contain suitable foraging or breeding habitat for this species.
Thalassarche melanophris (Black-browed Albatross)	Vulnerable	Vulnerable	4	Inhabits Antarctic, subantarctic, subtropical marine and coastal waters over upwellings and boundaries of currents. Spends most of the time at sea, breeding on small isolated islands.	Absent. The Subject Site does not contain suitable foraging or breeding habitat for this species.
Varanus rosenbergi (Rosenberg's Goanna)	Vulnerable	-	2	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in. Termite mounds are a critical habitat component. Shelters in hollow logs, rock crevices and in burrows. May use other species burrows such as rabbit warrens.	Low. Although suitable breeding habitat occurs within the Subject Site (burrows), no termite mounds were located. Additionally the lack of proximal records indicates this species is unlikely to occupy the Subject Site.

Species	BC Act	EPBC Act	Number of proximal records within 10km of the Subject Site (DPIE 2023b)	Habitat and Ecology (DPIE 2023b)	Likelihood of Occurrence
Vespadelus troughtoni (Eastern Cave Bat)	Vulnerable	-	1	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.	Low-moderate. Potential foraging habitat may occur, however much of the Subject Site is heavily altered and urban in nature. The lack of proximal records indicates the presence of this species is unlikely.

JAMBA* = Japan Australia Migratory Bird Agreement

ROKAMBA** = Republic of Korea-Australia Migratory Bird Agreement

CAMBA*** = China-Australia Migratory Bird Agreement

6. Recommendations

6.1 Avoidance of Impacts

6.1.1 Threatened Ecological Communities

The vegetation within the Subject Site mapped as Sydney Coastal Sand Mantle Heath (**Figure 4**) is associated with BC Act listed CEEC Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion. Any future activities should aim to avoid these areas. If any future activities involve the clearing of this CEEC, an 'Assessment of Significance', also known as a '5-part test' under the BC Act, is recommended in order to determine whether the proposed activity will have a significant impact on the ecological community.

If it is deemed that the proposed activity will have a significant impact on this ecological community, further assessment of impacts pursuant to the BC Act (e.g. Biodiversity Development Assessment Report) should be considered.

Sections of the Subject Site mapped as Sydney Coastal Sand Mantle Heath may also meet the listing criteria of CEEC Eastern Suburbs Banksia Scrub of the Sydney Region under the EPBC Act. Further investigations are required into these areas to see if the vegetation meets the criteria for Commonwealth protection. All planned activities should aim to avoid these areas. If this community is found to meet the EPBC criteria, the production of an EPBC Assessment of Significant Impact, and potentially a EPBC Act Referral to the Commonwealth depending on the level of impact, is recommended for future activities that may impact this community.

6.1.2 Threatened Species Habitat

Numerous threatened species have been historically recorded within proximity to the Subject Site. Therefore, it is recommended further targeted surveys in line with DPE approved survey guidelines should be conducted for any future works proposed to be conducted in the vicinity of any historical records of threatened flora. An EPBC Assessment of Significant Impact, and potentially a EPBC Act Referral to the Commonwealth depending on the level of impact may also be required if any proposed works will have any direct or indirect impacts on EPBC threatened fauna or fauna habitat features such as unoccupied structures within the Subject Site.

6.1.3 Biodiversity Values Map

All areas shown as purple on this map (Error! Reference source not found.), indicate areas that are mapped as having 'Biodiversity Values' by DPIE. Any planned activities should aim to avoid these areas.

6.2 Ecological Opportunities

6.2.1 Revegetation and Weed Management

The Subject Site currently contains areas along some of the roads and in garden beds, where native revegetation has commenced. Any proposed activity should aim to continue current works and contribute towards the improvement of habitat connectivity within the Subject Site. Additional street landscaping and revegetation of garden beds allows for large scale canopy connectivity, providing habitat and safe havens for numerous bird and mammal species, whilst also improving the aesthetic of the area. Local indigenous trees should be utilised as they provide the greatest habitat resources for native species, and are better suited to the conditions so require less maintenance and upkeep.

Efforts should be made to remove target weed species during these revegetation works. Priority weeds such as *Olea europaea subsp.* (African) and *Asparagus aethiopicus* (Ground Asparagus), though identified in only in a small number of areas, should be removed whilst they are easily managed. Environmental weed, *Nerium Oleander* (Oleander), was also

identified and has been historically planted in some of the open exotic lawn areas. This species should be removed as it is known to be highly toxic to both humans and animals.

7. Biodiversity Constraints Mapping

Narla has mapped the Subject Site into three (3) levels of 'Biodiversity Constraints for Planned Activities'. The interpretation of each zone is detailed in **Table 9**. This map was produced using information gathered from both desktop assessment of existing/historical mapping and data obtained from fieldwork undertaken by the Narla Ecologist. It is to be used as a guide only and a strong degree of caution must be expressed when interpreting it. This map is presented in **Figure 7**.

Table 9. Biodiversity constraints mapping key for planned activities.

Zone	Description
Low Constraint Area - Green	This zone is deemed to have high potential for future planned activities with accompaniment of the appropriate environmental assessments. This zone encompasses areas mapped as: ▪ Hardstand, tracks and buildings (all new/occupied structures) without Biodiversity Values mapping; ▪ Urban exotic lawn; and ▪ Planted Native/Exotic Vegetation deemed to have low habitat potential for endangered Long-nosed Bandicoots.

Moderate Constraints Area - Orange	This zone is deemed to still have moderate potential for future planned activities, however considerations may be required in regards to the following:
	
	▪ Habitat features of moderate value:
	  ○ Soaks, drainage lines;
	  ○ Buildings (all old/unoccupied structures) that may provide roosting habitat for threatened microbat or small mammal species; and
	  ○ Nest-bearing trees
	▪ Planted native/exotic vegetation areas identified as containing moderate potential habitat (dense planted exotic vegetation) for endangered Long-nosed Bandicoot.

High Constraints Area - Red	This zone is deemed to have a low potential for future planned activities without the implementation of appropriate environmental assessment, impact mitigation strategies, assessments of significance or Biodiversity Offsets. This zone encompasses: ▪ Areas mapped as Sydney Coastal Sand Mantle Heath (Eastern Suburbs Banksia Scrub TEC); ▪ Areas with historically recorded threatened flora species; ▪ Planted native/exotic vegetation areas identified as containing high potential habitat (dense native planted vegetation) for endangered Long-nosed Bandicoot. ▪ Areas containing habitat features of high value such as hollows or small mammal burrows associated with threatened species previously recorded within proximity to the site; and ▪ Areas of Biodiversity Values mapping.

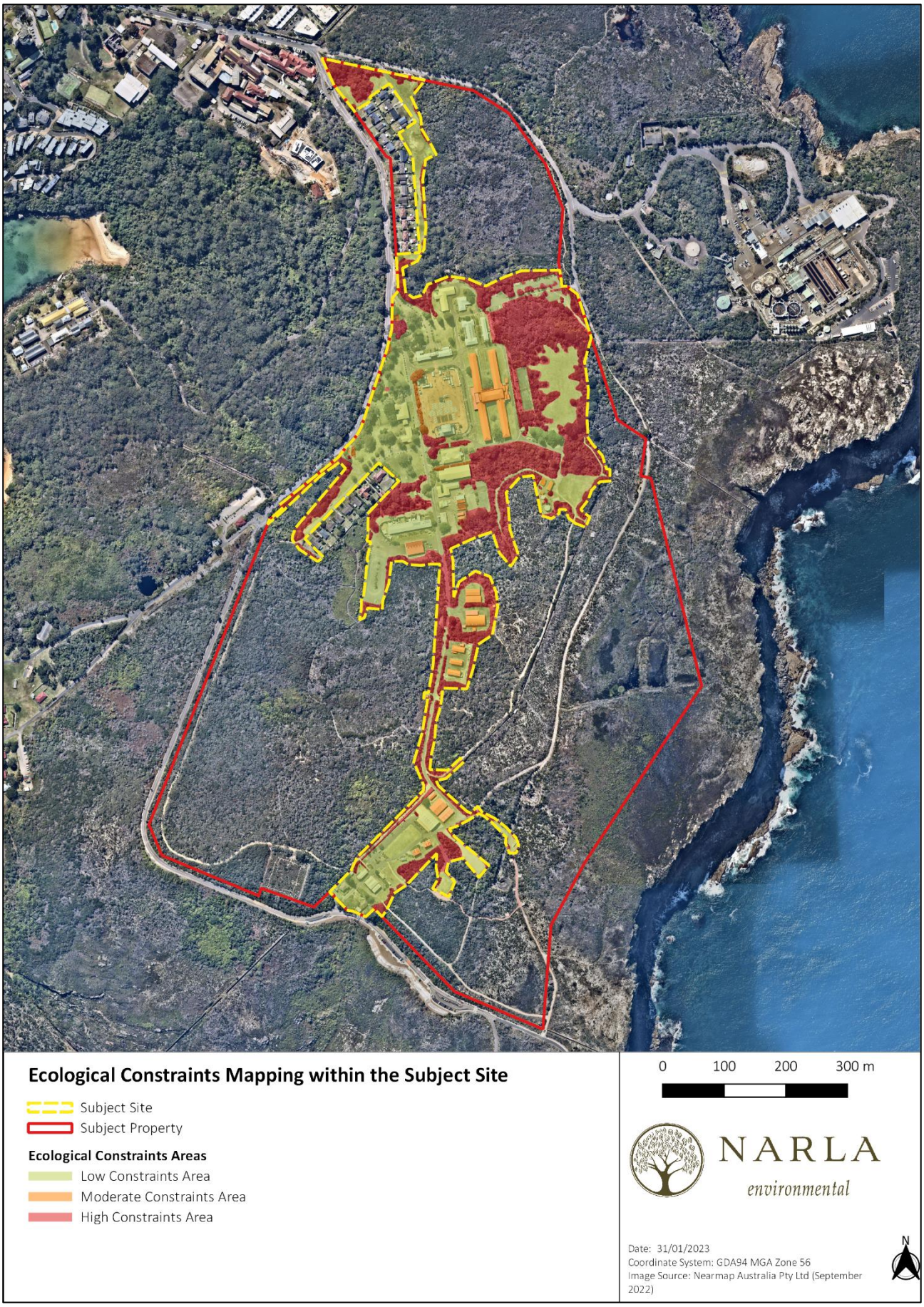

Figure 7. Ecological constraints within the Subject Site.

8. References

Bureau of Meteorology (BOM) (2023) Sydney Observatory Hill, New South Wales, January 2023 Daily Weather http://www.bom.gov.au/climate/dwo/202301/html/IDCJDW2124.202301.shtml

Chapman G.A., Murphy C.L., Tille P.J., Atkinson G. and Morse R.J., 2009, Soil Landscapes of the Sydney 1:100,000 Sheet map, Ed. 4, Department of Environment, Climate Change and Water, Sydney

Commonwealth of Australia Department of Agriculture, Water and the Environment (DAWE) (2023) Protected Matters Search Tool, http://www.environment.gov.au/epbc/pmst/

Department of Planning and Environment (DPE) (2022) eSPADE v2.2 https://www.environment.nsw.gov.au/eSpade2Webapp#

Department of Planning and Environment (DPE) (2023b) NSW BioNet. The website of the Atlas of NSW Wildlife http://www.bionet.nsw.gov.au/

Department of Planning and Environment (DPE) (2023c) NSW Native Vegetation Type Map

Department of Primary Industries (DPI) (2023) NSW WeedWise: Priority weeds for the Greater Sydney https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=34

NSW Government Spatial Services (SIXMaps) (2023) NSW Government Land & Property Information Spatial Information Exchange map viewer, https://six.nsw.gov.au/

NSW Office of Environment and Heritage (OEH) (2016) The Native Vegetation of the Sydney Metropolitan Area. Volume 2: Vegetation Community Profiles. Version 3.0

PlantNET (2023) The NSW Plant Information Network System, Royal Botanic Gardens and Domain Trust, Sydney. http://plantnet.rbgsyd.nsw.gov.au

Sydney Harbour Federation Trust (2011) Sydney Harbour Federation Trust Management Plan – North Head Sanctuary

Sydney Harbour Federation Trust (2003) – The Plan

Sydney Harbour Federation Trust Act (2001)

9. Appendices

Appendix A. Flora species identified within the Subject Site.

Appendix B. Fauna species identified within and surrounding the Subject Site.

Appendix A. Flora species identified within the Subject Site.

Scientific Name	Canopy	Midstorey	Ground
Acacia longifolia		x	
Acacia myrtifolia		x	
Acacia terminalis		x	
Acacia ulicifolia		x	
Acmena smithii		x	
Actinotus helianthi			x
*Agapanthus sp.**			x
*Agave sp.**			x
Allocasuarina distyla		x	
Angophora costata	x		
Angophora hispida	x		
*Araucaria heterophylla**	x		
*Asparagus aethiopicus***			x
Astroloma pinifolium		x	
Baeckea imbricata		x	
Banksia ericifolia		x	
Banksia integrifolia		x	
Banksia marginata		x	
Banksia robur		x	
Banksia serrata	x		
Bossiaea heterophylla		x	
Breynia oblongifolia		x	
Callistemon citrinus		x	
Callistemon pinifolius		x	
Casuarina glauca	x		
Caustis flexuosa			x
Centella asiatica			x
*Chlorophytum comosum**			x
*Cirsium vulgare**			x
*Clivia sp.**			x
Commelina cyanea			x
Commersonia hermanniifolia			x
*Cordyline sp.**		x	
Coronidium elatum		x	
Correa reflexa		x	
Corymbia gummifera	x		
*Cotoneaster sp.**		x	
*Cupressus sp.**		x	
Cymbopogon refractus			x
Cynodon dactylon			x
Darwinia fascicularis		x	
Dianella caerulea			x
*Dietes grandiflora**			x
Dillwynia retorta		x	
*Ehrharta erecta**			x
Elaeocarpus reticulatus		x	

Scientific Name	Canopy	Midstorey	Ground
Epacris longiflora		x	
Eragrostis brownii			x
*Eragrostis curvula**			x
Eucalyptus bicostata	x		
Eucalyptus botryoides	x		
Eucalyptus robusta	x		
Eucalyptus saligna	x		
Ficinia nodosa			x
Ficus macrophylla	x		
Ficus rubiginosa	x		
Ficus sp.		x	
Gleichenia dicarpa			x
Glochidion ferdinandi	x		
Glycine clandestina			x
Grevillea buxifolia		x	
Grevillea speciosa		x	
Hakea gibbosa		x	
Hakea teretifolia		x	
*Heliotropium aplexicaule**			x
Hibbertia dentata			x
Hibbertia obtusifolia			x
Hibbertia scandens			x
*Hydrangea sp.**		x	
Imperata cylindrica			x
Isopogon anethifolius		x	
Kunzea ambigua		x	
Kunzea capitata		x	
Lambertia formosa		x	
Lasiopetalum ferrugineum		x	
Lepidosperma laterale			x
Leptospermum laevigatum		x	
Lomandra longifolia			x
*Lonicera japonica**			x
Lophostemon confertus	x		
*Magnolia grandiflora**		x	
Melaleuca hypericifolia		x	
Melaleuca nodosa		x	
Melaleuca quinquenervia	x		
Melaleuca styphelioides	x		
Microlaena stipoides			x
Monotoca elliptica		x	
Myrsine variabilis		x	
*Nephrolepis cordifolia**			x
*Nerium oleander**		x	
Ochna serrulata		x	
*Olea europaea subsp. cuspidata**		x	
Olearia tomentosa		x	

Scientific Name	Canopy	Midstorey	Ground
*Paspalum dilatatum**			x
*Paspalum quadrifarium**			x
Patersonia sericea			x
Persoonia lanceolata		x	
Pimelea linifolia		x	
Pittosporum revolutum		x	
Pittosporum undulatum		x	
Platysace lanceolata		x	
*Plumeria sp.**		x	
Pomax umbellata			x
*Rhaphiolepis indica**		x	
*Richardia stellaris**			x
*Rumex sagittatus**			x
Sarcopetalum harveyanum			x
*Senna pendula**		x	
*Seteria parviflora**			x
Smilax glyciphylla			x
*Sonchus oleraceus**			x
*Sporobolus africanus**			x
*Stellaria media**			x
*Stenotaphrum secundatum**			x
Stephania japonica			x
*Strelitzia sp.**			x
Themeda triandra			x
*Tradescantia pallida**			x
Westringia fruticosa		x	
Woollsia pungens		x	
Xanthorrhoea resinosa			x

* Denotes exotic species

**Denotes Priority Weed

Appendix B. Fauna species identified within and surrounding the Subject Site.

Class	Scientific Name	Common Name	Status
Amphibia	*Crinia signifera*	Common Eastern Froglet	Protected
	Limnodynastes peronii	Striped Marsh Frog	
Aves	*Alectura lathami*	Australian Brush-turkey	
	Anthochaera carunculata	Red Wattlebird	
	Anthochaera chrysoptera	Little Wattlebird	
	Cacatua galerita	Sulphur-crested Cockatoo	
	Corvus coronoides	Australian Raven	
	Cracticus tibicen	Australian Magpie	
	Dacelo novaeguineae	Laughing Kookaburra	
	Hieraaetus morphnoides	Little Eagle	Vulnerable
	Hirundo neoxena	Welcome Swallow	Protected
	Malurus cyaneus	Superb Fairywren	
	Manorina melanocephala	Noisy Miner	
	Phylidonyris niger	White-cheeked Honeyeater	
	Psophodes olivaceus	Eastern Whipbird	
	Strepera graculina	Pied Currawong	
Mammalia	*Tachyglossus aculeatus*	Short-beaked Echidna	
	Oryctolagus cuniculus	European Rabbit	Exotic
Reptilia	*Intellagama lesueurii lesueurii*	Eastern Water Dragon	Protected

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