Ecological Constraints Assessment

10 Terminal, Middle Head Master Plan

Report prepared by Narla Environmental

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
Development	The use of land, and the subdivision of land, and the carrying out of a work, and the demolition of a building or work, and the erection of a building, and any other act, matter or thing referred to in section 26 that is controlled by an environmental planning instrument but does not include any development of a class or description prescribed by the regulations for the purposes of this definition (Environmental Planning and Assessment Act 1979)
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
MDCP	Mosman Development Control Plan 2012
MLEP	Mosman Local Environmental Plan 2012

Acronym/ Term	Definition
SEPP	State Environmental Planning Policy
Subject Site	The location of the proposed development as well as the associated asset protection zone.
Subject Property	Middle Head Road Mosman, NSW 2088 (Lot 203/DP1022020)
TEC	Threatened Ecological Community
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 associated with the land located within the 10 Terminal Precinct, Middle Head (Lot 203/DP1022020).

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:

- Potential presence of Threatened Ecological Communities (TECs);
- Threatened species records (excluding species likely to have been recorded as a sporadic fly in or over the subject site (White-bellied Sea Eagle); and
- Biodiversity Values Mapping.

Whilst numerous ecological constraints were identified within the precinct, Narla also identified a number of opportunities to improve biodiversity across the precinct, including:

- Revegetation of the patch of weedy dominant vegetation present within the northern extent of the precinct which is currently spreading to adjacent higher quality native areas;
- Locally indigenous street tree plantings along all roads in the precinct to improve canopy cover connectivity; and
- Areas of greenspace that can be created within the precinct utilising locally indigenous flora species to provide increased foraging resources for native species.

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 ecological constraints and opportunities of the land located within the 10 Terminal Precinct Middle Head (hereafter referred to as the 'Subject Site'; **Figure 1**).

Narla understands that the proponent wishes to determine the existing ecological features of the Subject Site including the constraints 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 (EPBC) Act 1999 (EPBC Act) as well as the Fisheries Management Act 1994 (FM Act). The report will also provide legislative context for future works within the Subject Site, addressing the relevant legislation such as EPBC Act, SHFT Act and Harbour Trust Management Plan.

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 site is owned and managed by the Sydney Harbour Federation Trust (the Harbour Trust). The Harbour Trust is a Commonwealth Government agency within the Department of Climate Change, Energy, the Environment and Water. Further background to the Harbour Trust, the location of sites and existing strategic and management plans may be obtained from the Harbour Trust's website: https://www.harbourtrust.gov.au. It covers an area of approximately 9.34ha and is adjoining Sydney Harbour National Park to the north-east, east and south of 10 Terminal.

The Subject Site is located approximately 4.5km north-east of the Sydney CBD within the Mosman Local Government Area (LGA) and is a large mixed use area providing range of tourism, heritage, recreation and business opportunities. Pockets of remnant vegetation do occur within and surrounding the subject site, however these areas are highly modified and include remnant canopy over hardstand carparks and built forms.

1.3 Topography, Geology and Soil

The Subject Site occurs on a modest slope with an elevation ranging from 64m above sea level (ASL) in the west to approximately 23m ASL along the northern boundary. The majority of the Subject Site is mapped as occurring on the Lambert soil landscape, with other small sections in the northern and southern boundaries of the Subject Site mapped as occurring on the Hawksbury Soil Landscapes (**Figure 2**).

Lambert Soil Landscape is characterised by Hawkesbury Sandstone, which consists of medium to coarse-grained quartz sandstone with minor shale and laminite lenses, with undulating to rolling low hills. Broad convex crests and plateau surfaces. Gently to moderately inclined side slopes, often associated with small hanging valleys. Characteristic sandstone bedrock that outcrops as wide benches, with broken scarps. Small, poorly drained seepage areas are common.

Hawksbury Soil Landscape is characterised by medium to coarse-grained quartz sandstone with minor shale and laminite lenses. Sandstones are either massive or cross-bedded sheet facies with vertical or subvertical joint sets.

The combination of bedding planes and widely spaced joints gives sandstone outcrops a distinctive blocky appearance.

The northern boundary of the site falls along the steep escarpment. Due to a lack of accessibility the exact location along this boundary was not able to be determined. Assessments in this area were isolated to established tracks and one drainage line, where a cave was identified. It's expected that more caves are likely to occur along this area of the site.

1.4 Hydrology

No mapped or unmapped watercourses or waterbodies occur within the Subject Site. Drainage and stormwater runoff from the Subject Site are required to minimise its adverse impact on adjoining bushland and the harbour. Stormwater management will ensure that nutrient rich runoff from disturbed areas does not occur. This will assist in the abatement of *Phytophthora cinnamomi*. Other measures will also be adopted to limit its spread.

Figure 1. The location of the Subject Site.

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 **Table 1.**

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 Middle Head, 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.

Legislation/ Policy	Relevance to Site	Triggered	Considerations for Future Planned Actions
Sydney Harbour Federation Trust Comprehensive Plan (The Plan) 2003	The former defence lands at Middle Head also fall into the category of "Trust Land Sites". 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 1975. This means that any future proposal on Commonwealth land would also have to be consistent with these Acts.	Yes	Future planned actions should follow the Trust's Comprehensive Plan (The Plan), in particular the Objectives and Policies (Section 3) as well as the Outcomes (Section 7) identified within the Plan. In general, any use of land should align with the following proposed outcomes of The Plan: ▪ Protection of bushland, biodiversity and open space ; and ▪ Conservation and interpretation of Aboriginal and Defence heritage is very important to the community.
Sydney Harbour Federation Trust Management Plan – Middle Head 2017	This Management Plan is the middle level of a three-tiered comprehensive planning system developed to guide the future of the Trust's lands. ▪ The Harbour Trust's Comprehensive Plan - this is an overarching plan that provides the strategic direction and planning context for all of the management plans; and ▪ Specific projects or actions - actions are defined in the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and are similar to the concept of development in the NSW planning legislation.	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 Act requires the Harbour Trust to have regard for the Commonwealth Heritage values of a place before it takes an action and to minimise the impact that the action might have on those values.
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Commonwealth)- National Heritage Values and	Parts of Terminal 10 Complex and Middle Head are identified as having National and Commonwealth Heritage Values. The former Defence lands at Headland Park, Mosman (which includes the Middle Head / Gubbuh Gubbuh precinct and the adjoining HMAS Penguin naval base), are together listed under the EPBC Act as Commonwealth Heritage Place No 105541.	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.

Legislation/ Policy	Relevance to Site	Triggered	Considerations for Future Planned Actions
Commonwealth Heritage Values	It is also listed on the Register of the National Estate as Historic Place No. 102619 and 'Middle Head and Georges Heights' Historic Place No. 101087. The precinct also contains items with individual listings: ▪ '10 Terminal Regiment Headquarters and AusAid Training Centre' as Historic Place No. 105587 on the Commonwealth Heritage List and Historic Place No. 103342 on the Register of the National Estate ▪ 'Golf Clubhouse (former)' as Historic Place No. 105575 on the Commonwealth Heritage List and Historic Place No. 103293 on the Register of the National Estate ▪ 'Military Road Framework' containing section of Cobblers Beach Road, section of Middle Head Road to the Sydney Harbour National Park boundary, and section of Chowder Bay Road to Middle Head Road as Historic Place No.105572 on the Commonwealth Heritage List and Historic Place No.103266 on the Register of the National Estate		Middle Head Management Plan sets out the outcomes and policies to protect National and Commonwealth Heritage Values and to minimise adverse impacts on those values.
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.

Legislation/ Policy	Relevance to Site	Triggered	Considerations for Future Planned Actions
Biosecurity Act 2015 (Bio Act) (Commonwealth)	Six (6) priority weeds for the Greater Sydney region were identified within the Subject Site: ▪ *Anredera cordifolia (Madeira Vine);* ▪ *Asparagus virgatus (Asparagus Fern);* ▪ *Asparagus asparagoides (Bridal Creeper);* ▪ *Asparagus asparagus (Ground Asparagus);* ▪ *Lantana camara (Lantana); 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

Figure 3. Land zoning within the Subject Site.

3. Methodology

3.1 Desktop Assessment and Literature Review

A thorough literature review of local information relevant to the Mosman Municipal Council area was undertaken. Searches using NSW Wildlife Atlas (BioNet; DPIE 2022b) and the Commonwealth Protected Matters Search Tool (DAWE 2022) 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 Environmental Ecologist Luke Johnson on Wednesday the 5th of October 2022. 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 Botanic Gardens) prior to and during the general flora and fauna survey period are provided in **Table 2** (BOM 2022). The data reveals consistent rainfall leading up to the survey. These weather conditions may have been conducive to the emergence of annual herbs.

Table 2. Weather Conditions Recorded at Sydney Botanical Gardens (station 66006) Preceding and During the Site Assessment (survey date in bold).

Survey date	Day	Minimum Temp. (°C)	Maximum Temp. (°C)	Rainfall (mm)
28/09/2022	Wednesday	14.6	19.5	0
29/09/2022	Thursday	13.1	18.1	16.4
30/09/2022	Friday	13.5	17.7	10
1/10/2022	Saturday	14.5	17.4	1.2
2/10/2022	Sunday	11.7	16.7	0
3/10/2022	Monday	12.0	17.9	0
4/10/2022	Tuesday	12.6	18.5	18
5/10/2022	**Wednesday**	**15.2**	**17.5**	**32.6**

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 (DPIE 2020a) 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) (2022) NSW State Vegetation Type Map.

4. Native Vegetation

4.1 Vegetation Community

4.1.1 Historically Mapped Vegetation Communities

NSW State Vegetation Type Map (DPE 2022) identified the following vegetation communities as occurring within the Subject Site (**Figure 4**):

NSW State Vegetation Type Map (DPE 2022)

- North Coast Wet Sclerophyll Forest;
- Northern Warm Temperate Rainforests;
- Sydney Coastal Dry Sclerophyll Forest; and
- Non-Native Vegetation.

4.1.2 Field Validated Vegetation Communities

Due to limited access to vegetated areas within the Subject Site, Narla field survey could only confirm the presence of the following vegetation communities within the Subject Site:

- Sydney Coastal Dry Sclerophyll Forest; and
- Urban Exotic/Native landscaping.

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

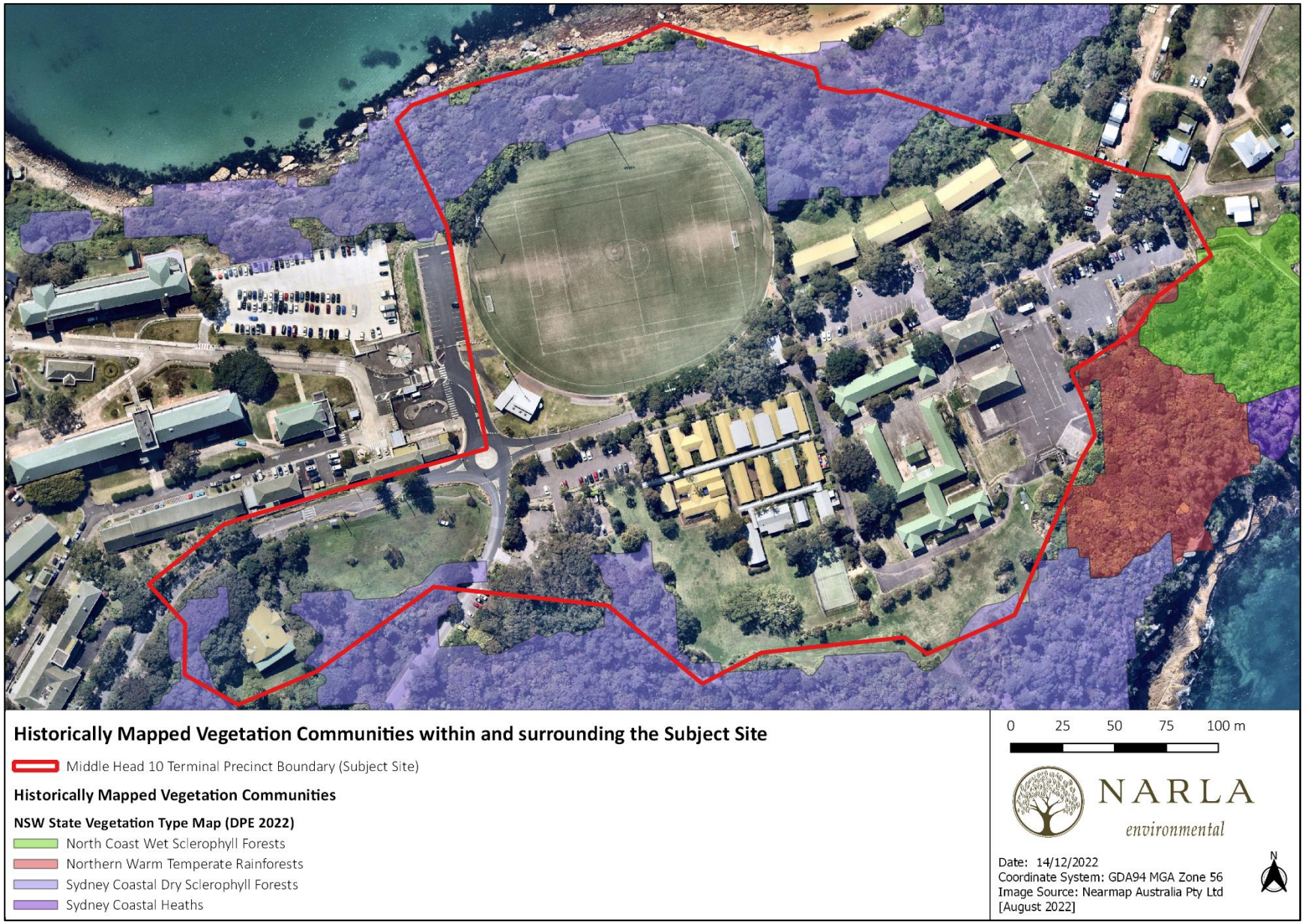

Figure 4. Historically mapped within and adjacent to the Subject Site.

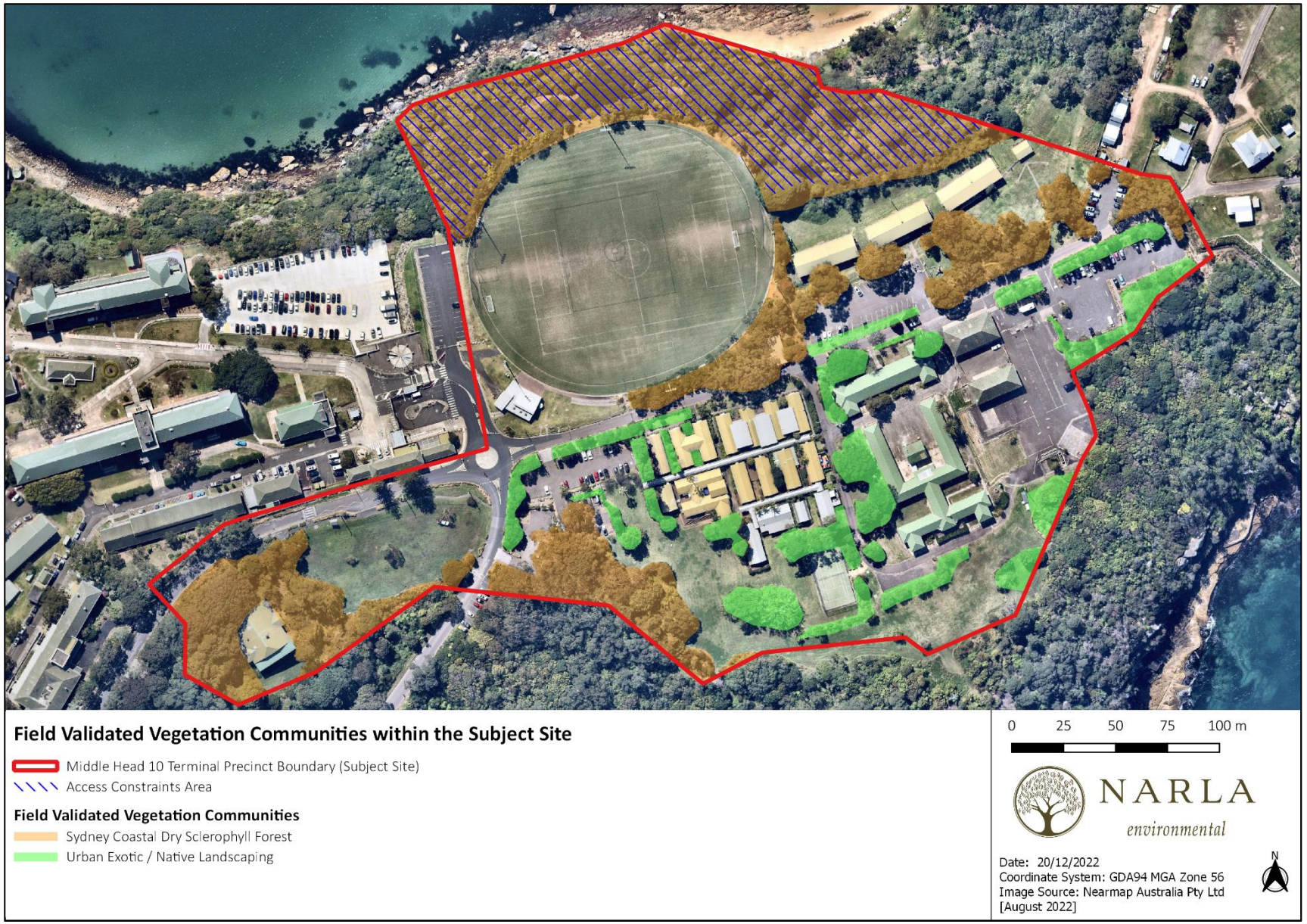

Figure 5. Field Validated Vegetation Communities Within the Subject Site

Table 3. Description of Sydney Coastal Sandstone Foreshores Forest occurring within the Subject Site.

Sydney Coastal Dry Sclerophyll Forest	
	
Vegetation Formation / Keith Class	Dry Sclerophyll Forests (Shrubby sub-formation)
Condition	Poor to Moderate
Extent within Subject Site (approximate)	2.12ha
Description from OEH (2022)	
A tall, occasionally very tall, sclerophyll open forest with a mixed understorey of dry shrubs and mesic small trees found along the foreshores of Sydney's major waterways and coastal escarpments. The tree canopy is very frequently dominated by *Angophora costata* with occasional local stands of *Eucalyptus botryoides* or rarely other eucalypt species. A sparse taller layer in the mid-stratum commonly includes *Banksia integrifolia* or *Allocasuarina littoralis* and occasionally *Ficus rubiginosa*. A combination of hardy mesic small trees including Pittos*porum undulatum, Glochidion ferdinandi* and *Elaeocarpus reticulatus* are almost always present with *Notelaea longifolia* also common. In the suburban environment, the proliferation of these mesic species in the understorey at long unburnt sites has generated considerable debate, particularly as there appears to be strong correlation between time since fire and their density. Our data suggests these species are also more common in these littoral zones than other sheltered sandstone forests situated further away from the coast. Sclerophyll shrubs are less frequent however include *Acacia longifolia, Acacia suaveolens, Breynia oblongifolia* and *Monotoca elliptica*. The ground layer is characterised by a mid-dense cover of ferns, graminoids, climbers and grasses. The low elevations adjoining major waterways expose the vegetation to a maritime influence brought by salt laden southerly winds. This PCT is mainly distributed between the Hacking River and Pittwater.	

Sydney Coastal Dry Sclerophyll Forest	
Description of the Vegetation in the Subject Site	
This vegetation community within the Subject Site was characterised by a canopy dominated by a mix of native and exotic shrubs including *Pittosporum undulatum, Acacia longifolia* and *Elaeocarpus reticulatus*. Generally, across the site vegetation appeared to improve in condition behind areas of dense weeds. Areas that could be accessed during the site assessment were lacking native diversity and were mostly dominated by exotic vegetation such as *Lantana camara* and *Olea europaea subsp. cuspidata*. This community was also assigned to large remnant canopy above exotic grass within the subject property consisting of *Angophora costata* and *Corymbia gummifera*.	
Justification of Vegetation Community	This community had several diagnostic species, located behind the weedy zone on the steep foreshore area and in isolated patches away from public access. Furthermore, the vegetation in this area was consistent with sandstone influenced soils.
BC Act Status	No associated TEC
EPBC Act Status	No associated TEC
References	Connolly, D., Binns, D., Turner, K., Hager, T., Lyons, M., Magarey, E. (in prep.) A revised classification of Plant Community Types for eastern New South Wales. NSW DPIE, Parramatta.

Table 4. Description of Urban Exotic/Native vegetation occurring within the Subject Site.

Urban Exotic/Native	
	
Extent within Subject Site (approximate)	1.19ha
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 recruited from bushland areas (**Figure 4**). Native species include several common native shrub sp. such as *Banksia sp. (Banksia integrifolia)* and Acacia *spp.* * Several remnant *Eucalyptus botryoides* in the image above turfed lawn are excluded from this Vegetation zone. Rather they have been assigned to the Sydney Coastal Dry Sclerophyll Forest in **Table 4.**	
Justification of Vegetation Assignment	The vegetation within this area was comprised of historically planted native and exotic vegetation as well as exotic species that have escaped from nearby properties.
BC Act Status	Not listed
EPBC Act Status	Not listed

5. Threatened Entities

5.1 Threatened Ecological Communities

No Threatened Ecological Communities under State (BC Act) or Federal (EPBC Act) legislation were identified within the Subject Site.

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, one (1) species have been historically recorded on site, *Acacia terminalis subsp. terminalis* (Sunshine Wattle*;* Figure 7).

The following locally occurring species were assessed for their potential to occur within the Subject Site (Table 5). It was determined that outside of the one (1) threatened species historically recorded within the Subject Site. There is minimal potential that additional species are present, due to the heavily developed nature of the site and the lack of suitable habitat and areas for recruitment.

Table 5. 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, the Subject Site has undergone extensive development and native vegetation predominantly consist of landscaped areas. Vegetation within the northern areas of the subject site may provide suitable habitat for the species, however the topography of this area limits future potential development.
Acacia pubescens Downy Wattle	Vulnerable	Vulnerable	Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravely soils, often with ironstone. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	Low, the Subject Site has undergone extensive development and native vegetation predominantly consist of landscaped areas. Vegetation within the northern areas of the subject site may provide suitable habitat for the species, however the topography of this area limits future potential development.
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 survey, the assessment was outside of the recommended survey period.**
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.	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 is out of the known distribution for this species.

Species	BC Act	EPBC Act	Habitat Requirements (DPIE 2022b)	Likelihood of Occurrence
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.	Very low, populations in the Sydney region are presumed extinct.
Callistemon linearifolius (Netted Bottle Brush)	Vulnerable	-	Grows in dry sclerophyll forest on the coast and adjacent ranges.	Low. Areas of the subject site containing dry-sclerophyll forest have either a highly modified understory or consist of native canopy over developed land.
Chamaesyce psammogeton (Sand Spurge)	Endangered	-	Grows on fore-dunes, pebbly strandlines and exposed headlands, often with Spinifex (*Spinifex sericeus*) and Prickly Couch (*Zoysia macrantha*).	Medium, the northern boundary of the Subject Site is located on a headland, however high weed cover is expected to inhibit potential occurrence.
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 occurs on minor shale influence soil.
Eucalyptus camfieldii Camfield's Stringybark	Vulnerable	Vulnerable	Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges.	Low, the Subject Site does not contain coastal heath.
Eucalyptus nicholii Narrow-leaved Black Peppermint	Vulnerable	Vulnerable	Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock.	Low, species was not identified within the subject site. The subject site does not occur on granite derived soils.
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 area of the site historically mapped as littoral rainforest has been highly disturbed and impacted by native landscaping.
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*.	Very Low. The Subject Site is out of the known distribution for this species.

Species	BC Act	EPBC Act	Habitat Requirements (DPIE 2022b)	Likelihood of Occurrence
Lasiopetalum joyceae	Vulnerable	Vulnerable	Has a restricted range occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. It is currently known from 34 sites between Berrilee and Duffys Forest. Seventeen of these are reserved.	Very Low. The Subject Site is out of the known distribution for this species.
Macadamia integrifolia (Macadamia Nut)	-	Vulnerable	Occurs in drier types of subtropical rainforest north from Currumbin in Qld. It is not known to occur naturally in the wild in N.S.W.	Very Low. The Subject Site is out of the known distribution for this species.
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.	Very Low. The Subject Site does not contain any water ways or streams.
Melaleuca deanei Deane's Paperbark	Vulnerable	Vulnerable	The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone.	Very Low. The Subject Site is out of the known distribution for this species.
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 the Mittagong Formation and on the upper Hawkesbury Sandstone.	Low. No suitable geology or vegetated habitat was present within the Subject Site for either the northern or southern population.
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.	Low. The area of the Subject Site that has a shale influence is currently heavily developed consisting of either exotic turf or hard stand areas. Suitable habitat may occur along the northern boundary away from future development potential.
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.	Very Low. The Subject Site is out of the known distribution for this species.
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	Very Low. The Subject Site is out of the known distribution for this species.

Species	BC Act	EPBC Act	Habitat Requirements (DPIE 2022b)	Likelihood of Occurrence
			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.	
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 was present within the Subject Site. The area of the site historically mapped as littoral rainforest has been highly disturbed and impacted by ongoing landscaping.
Sarcochilus hartmannii Hartman's Sarcochilus	Vulnerable	Vulnerable	From the Richmond River in northern NSW to Gympie in south-east Queensland.	Very Low. The Subject Site is out of the known distribution for this species.
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 was present within the Subject Site. The area of the site historically mapped as littoral rainforest has been highly disturbed and impacted by ongoing landscaping.
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.	Low. No such habitat was present within the Subject Site. Suitable habitat may be present in the northern vegetation of the site, however due to the topography this area has low future development potential.
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.	Very Low. The Subject Site is out of the known distribution for this species. Suitable habitat may be present in the northern vegetation of the site, however due to the topography this area has low future development potential.

Species	BC Act	EPBC Act	Habitat Requirements (DPIE 2022b)	Likelihood of Occurrence
			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.	
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.

5.3 Threatened Fauna

A number of habitat features were present within the Subject Site, including hollow-bearing trees, nests and caves (**Table 6, Figure 6**). Desktop analysis revealed numerous threatened species as being historically recorded within the Subject Site (**Figure 7**) as well as a number of threatened fauna species have the potential to utilise habitat within the Subject Site during part of their lifecycles (**Table 7**). 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**). No threatened fauna species were observed within the Subject Site by the Narla Ecologist during the site assessment in October 2022.

Table 6. Fauna habitat values.

Habitat component	Site values
Coarse woody debris	Present in landscaped areas
Rock outcrops and bush rock	Present.
Caves, crevices and overhangs	Present. Large cave was observed on the northern escarpment.
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 *Corymbia gummifera* and *Angophora costata*.
Nectar-bearing shrubs	Nectar-bearing shrubs were recorded within the Subject Site including numerous *Callistemon 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* 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 and Corymbia gummifera*.
She-oak fruit (Glossy Black Cockatoo feed)	*Casuarina glauca* and *Allocasuarina littoralis* were present, which may provide foraging habitat for Glossy Black Cockatoos.
Seed-bearing trees and shrubs	Seed-bearing trees such as Eucalypt and *Allocasuarina* species may provide foraging habitat for Gang-gang Cockatoo.
Soft-fruit-bearing trees	Some fruit-bearing trees were identified within the Subject Site such as *Ficus macrophylla* (Moreton Bay Fig) which may provide potential foraging habitat for bird species.
Dense shrubbery and leaf litter	Dense thickets of Lantana may provide habitat for birds and ground-dwelling fauna.
Tree hollows	Present
Decorticating bark	Present
Wetlands, soaks and streams	Absent.
Open water bodies	Absent.
Estuarine, beach, mudflats, and rocky foreshores	The Subject Site is boarded by Rocky Foreshores to the north.

Figure 6. Habitat features associated with threatened fauna species that have been historically recorded within proximity to the site.

Table 7. Likelihood of Occurrence of Threatened Fauna Species Within the Subject Site.

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
Aepyprymnus rufescens Rufous Bettong	Vulnerable	-	The original range from Coen in north Queensland to central Victoria has been reduced to a patchy distribution from Cooktown, Queensland, to north-eastern NSW as far south as the Mount Royal National Park. In NSW it has largely vanished from inland areas but there are sporadic, unconfirmed records from the Pilliga and Torrington districts.	Rufous Bettongs inhabit a variety of forests from tall, moist eucalypt forest to open woodland, with a tussock grass understorey. A dense cover of tall native grasses is the preferred shelter.	Low. The Subject Site did not contain the preferred habitat for this species. In addition, the heavily altered and urban nature of the Subject Site makes the presence of this species unlikely.
Anseranas semipalmata Magpie Goose	Vulnerable	-	The Magpie Goose is still relatively common in the Australian northern tropics, but had disappeared from south-east Australia by 1920 due to drainage and overgrazing of reed swamps used for breeding. Since the 1980s there have been an increasing number of records in central and northern NSW. Vagrants can follow food sources to south-eastern NSW.	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	Low. The Subject Site did not contain the preferred habitat for this species. In addition, the heavily altered and urban nature of the Subject Site makes the presence of this species unlikely.

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
				areas; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW. Often seen in trios or flocks on shallow wetlands, dry ephemeral swamps, wet grasslands and floodplains; roosts in tall vegetation.	
Anthochaera phrygia Regent Honeyeater	Endangered	Critically Endangered	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. 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. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands.	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. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	Low. The Subject Site did not contain the preferred habitat for this species. In addition, the heavily altered and urban nature of the Subject Site makes the presence of this species unlikely. The Subject site is not mapped on the Important areas map for the species.
Australasian Bittern (*Botaurus poiciloptilus*)	Endangered	Endangered	Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleocharis* spp.).	Low. The Subject Site did not contain the preferred habitat for this species. Lack of proximal records make this unlikely.

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
			the state except for the far north-west.		
Burhinus grallarius Bush Stone-curlew	Endangered	-	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range.	Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Nest on the ground in a scrape or small bare patch.	Low. The species is expected to be extinct within the South-east coast distribution. Furthermore, the Subject Site has low condition for nesting habitat given the heavily developed area and high public use.
Calyptorhynchus lathami Glossy Black-Cockatoo	Vulnerable	Vulnerable	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina.	Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of Sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods.	Medium. Whilst the Subject Site does provide potential foraging habitat for this species, its location within a heavily urbanised area and its altered state along with minimal proximal records makes the presence of this species less likely. Hollows identified on site were <15cm and below 8m off the ground.
Cercartetus nanus Eastern Pygmy-possum	Vulnerable	-	The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extends from the coast inland as far as the	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-	Low to Medium. Potential habitat for the species occurs in bushland area surrounding the site. The Subject Site is

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
			Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes.	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 Eucalypts alone is sufficient to support populations in low densities.	predominantly cleared and lacks suitable midstory vegetation.
Chalinolobus dwyeri Large-eared Pied Bat	Vulnerable	Vulnerable	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes.	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.	Medium. A large cave identified within the northern bush area of the Subject Site. No signs of bat occupation (guano, urine staining) were recorded, however more suitable habitat may be present surrounding the site within the cliff faces. The site provides marginal foraging habitat in the form of native canopy.
Daphoenositta chrysoptera Varied Sittella	Vulnerable	-	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands.	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with	Low. Whilst the Subject Site does provide potential habitat for this species, its location within a heavily urbanised area

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
			Distribution in NSW is nearly continuous from the coast to the far west. The Varied Sittella's population size in NSW is uncertain but is believed to have undergone a moderate reduction over the past several decades.	dead branches, mallee and Acacia woodland.	and its heavily altered state, along with a lack of recent proximal records, makes the presence of this species unlikely.
Dasyurus maculatus Spotted-tailed Quoll	Vulnerable	-	The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Only in Tasmania is it still considered relatively common.	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Quolls use hollow-bearing trees, fallen logs, other animal burrows, small caves and rock outcrops as den sites.	Very low. The Subject Site has been heavily altered. This combined with minimal recent proximal records indicates the presence of this species to be unlikely.
Erythrotriorchis radiatus Red Goshawk	Endangered	Vulnerable	Distributed sparsely through northern and eastern Australia, from the western Kimberley Division of northern Western Australia to north-eastern Queensland and south to far north-eastern NSW, and with scattered records in central Australia. The species is very rare in NSW, extending south to about 30°S, with most records north of this, in the Clarence River Catchment, and a few around the	Red Goshawks inhabit open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forests of coastal rivers.	Very low. The Subject Site is outside the know distribution for the species.

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
			lower Richmond and Tweed Rivers. Formerly, it was at least occasionally reported as far south as Port Stephens.		
Esacus magnirostris Beach Stone-curlew	Endangered	-	occupies coastlines from about Point Cloates in Western Australia, across northern and north-eastern Australia south to north-eastern NSW, with occasional vagrants to south-eastern NSW and Victoria. In NSW, the species occurs regularly to about the Manning River, but recent records show a breeding pair is known from the Port Stephens area (Dowadee Island and Soldiers Point [mid-north coast]) and more recently the species has been recorded at Whale Beach in Twofold Bay near Eden. These new records extend the known limit of the normal range of the species in Australia to the far south coast of NSW.	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.	Very low. The Subject Site lacks suitable habitat associated with the species. The northern boundary does not extend to the foreshore/ intertidal area.
Falsistrellus tasmaniensis Eastern False Pipistrelle	Vulnerable	-	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania.	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.	Medium. Whilst the Subject Site does provide potential habitat for this species, minimal recent proximal records, makes the

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
					presence of this species less likely.
Glossopsitta pusilla Little Lorikeet	Vulnerable	-	The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs.	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards.	Low. Whilst the Subject Site does provide potential habitat for this species, its location within a heavily urbanised area and its heavily altered state, along with minimal recent proximal records, makes the presence of this species unlikely.
Haematopus fuliginosus Sooty Oystercatcher	Vulnerable	-	Sooty Oystercatchers are found around the entire Australian coast, including offshore islands, being most common in Bass Strait. Small numbers of the species are evenly distributed along the NSW coast. The availability of suitable nesting sites may limit populations.	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.	Very low. The Subject Site lacks suitable habitat associated with the species. The northern Boundary does not extend to the foreshore/ intertidal area.

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
Haematopus longirostris Pied Oystercatcher	Endangered	-	The species is distributed around the entire Australian coastline, although it is most common in coastal Tasmania and parts of Victoria, such as Corner Inlet. In NSW the species is thinly scattered along the entire coast, with fewer than 200 breeding pairs estimated to occur in the State. 'Pied' Oystercatchers are occasionally recorded on Lord Howe island but it is uncertain which species is involved.	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.	Very low. The Subject Site lacks suitable habitat associated with the species. The northern Boundary does not extend to the foreshore/ intertidal area.
Haliaeetus leucogaster White-bellied Sea-Eagle	Vulnerable	-	The White-bellied Sea-eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. In New South Wales it is widespread along the east coast, and along all major inland rivers and waterways.	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. 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	High. This species is likely to utilise the surrounding waterways as foraging habitat and may intermittently stop and rest within the Subject Site. No suitable nesting trees were located within the Subject Site however, species has been recorded previously on site.

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
				branches or large dead trees nearby which are used as 'guard roosts.'	
Hieraaetus morphnoides Little Eagle	Vulnerable	-	The Little Eagle is found throughout the Australian mainland inhabiting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW.	Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	Low. The Subject Site has been heavily altered This combined with minimal recent proximal records indicates the presence of this species to be unlikely.
Hirundapus caudacutus White-throated Needletail	-	Vulnerable	Migratory and usually seen in eastern Australia from October to April. Breeds in forests in south-eastern Siberia, Mongolia, the Korean Peninsula and northern Japan June-August. More common in coastal areas, less so inland.	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.	Medium. This species is primarily aerial and are mostly recorded above wooded areas. Potential for this species to use the space above the Subject Site as foraging habitat.
Ixobrychus flavicollis Black Bittern	Vulnerable	-	The Black Bittern has a wide distribution, from southern NSW north to Cape York and along the north coast to the Kimberley region. The species also occurs in the south-west of Western Australia. In NSW, records of the	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	Low. The Subject Site has been heavily altered This combined with minimal recent proximal records indicates the presence of this species to be unlikely.

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
			species are scattered along the east coast, with individuals rarely being recorded south of Sydney or inland.	frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night.	
Lathamus discolor *Swift Parrot*	Endangered	Critically Endangered	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes.	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*.	Moderate. 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 its location within a historically developed area and its heavily altered state, along with minimal recent proximal records, makes the presence of this species less likely.
Miniopterus australis Little Bent-winged Bat	Vulnerable	-	East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW.	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub.	Moderate to high. The Subject Site does contain suitable cave habitat for this species to breed. Although due to the topography this area is unlikely to be

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
				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. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters.	affected by future development. It may however utilise sections of the Subject Site for foraging.
Large Bent-winged Bat *Miniopterus orianae oceanensis*	Vulnerable	-	Large Bent-winged Bats occur along the east and north-west coasts of Australia.	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 site. The Subject Site does contain suitable cave habitat for this species. Although due to the topography, this area is unlikely to be affected by future development. It may utilise sections of the Subject Site for foraging.
Myotis macropus Southern Myotis	Vulnerable	-	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria.	Generally, roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water	Moderate to High. Suitable habitat was located around the peripheries of the Subject Site.

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
			It is rarely found more than 100km inland, except along major rivers.	channels, buildings, under bridges and in dense foliage.	
Ninox connivens Barking Owl	Vulnerable	-	The Barking Owl is found throughout continental Australia except for the central arid regions. Although still common in parts of northern Australia, the species has declined greatly in southern Australia and now occurs in a wide but sparse distribution in NSW. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests.	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 to High. The Subject Site does provide some potential habitat for this species, its location within a heavily urbanised area and its heavily altered state, along with a lack of recent proximal records, makes the presence of this species less likely.
Ninox strenua Powerful Owl	Vulnerable	-	The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing. Now at low densities throughout most of its eastern range, rare along the Murray River	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	High. This species has been previously recorded within proximity to the site. Subject Site does provide potential habitat for this species.

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
			and former inland populations may never recover. Recent increases in population density across Sydney and some other semi-urban areas do not seem to be solely due to increased awareness of this flagship species.	*Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda*, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species.	
Pandion cristatus Eastern Osprey	Vulnerable	-	Eastern Ospreys are found right around the Australian coast line, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs.	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	Moderate. This species would be expected to utilize the site on an opportunistic basis as a flyover. No large nests were identified within the site.
Petaurus norfolcensis Squirrel Glider	Vulnerable	-	The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria.	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey.	Low. The subject Site provides marginal habitat for the species, however the highly developed areas are likely to reduce the occurrence within the site.
Petroica boodang Scarlet Robin	Vulnerable	-	The Scarlet Robin is found from south east Queensland to south east South Australia and also in Tasmania and south west Western Australia. In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet	The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest	Low. Whilst the Subject Site does provide potential habitat for this species, its heavily altered state, along with minimal recent proximal

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
			Robins disperse to the lower valleys and plains of the tablelands and slopes. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter.	communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat.	records, makes the presence of this species unlikely.
Phascolarctos cinereus Koala	Endangered	Endangered	In New South Wales, koala populations are found on the central and north coasts, southern highlands, southern and northern tablelands, Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range.	Inhabit eucalypt woodlands and forests. 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 Subject Site has been heavily altered and is surrounded by urban development. This combined with minimal recent proximal records indicates the presence of this species to be unlikely.
Pseudophryne australis Red-crowned Toadlet	Vulnerable	-	The Red-crowned Toadlet has a restricted distribution. It is confined to the Sydney Basin, from Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains.	Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. 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.	Low. Whilst the northern boundary of the site provides potential habitat for the species. The Subject site lacks drainage lines and suitable dense vegetation.
Pteropus poliocephalus	Vulnerable	Vulnerable	Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting	High. This species has is likely to occur as a fly over within the Subject Site.

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
Grey-headed Flying-fox			times of natural resource shortages, they may be found in unusual locations.	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.	
Ptilinopus superbus Superb Fruit-Dove	Vulnerable	-	The Superb Fruit-dove occurs principally from north-eastern in Queensland to north-eastern NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far south as Moruya. There are records of vagrants as far south as eastern Victoria and Tasmania.	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree 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.	Low. Whilst the northern boundary of the site provides potential habitat for the species. The Subject site lacks occurs outside of the common distribution for the species.

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	Vulnerable	-	The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes.	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.	Moderate to high. The Subject Site does provide potential habitat for this species in the form of abandoned buildings and hollow bearing trees.
Scoteanax rueppellii Greater Broad-nosed Bat	Vulnerable	-	The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500m.	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 to high. The Subject Site does provide potential habitat for this species in the form of abandoned buildings and hollow bearing trees.
Stagonopleura guttata Diamond Firetail	Vulnerable	-	The Diamond Firetail is endemic to south-eastern Australia, extending from central Queensland to the Eyre Peninsula in South Australia. It is widely distributed in NSW, with a concentration of records from the Northern, Central and	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in	Low. Whilst the Subject Site provided potential habitat for the species. The site is surrounded by highly urbanised landscape to the east and water on the remaining sides.

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
			Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW, though is very rare west of the Darling River.	secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland.	
Tyto novaehollandiae Masked Owl	Vulnerable	-	Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner.	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. Often hunts along the edges of forests, including roadsides.	Moderate to High. The Subject Site does provide some potential habitat for this species, its location within a heavily urbanised area and its heavily altered state, along with a lack of recent proximal records, makes the presence of this species less likely.
Tyto tenebricosa Sooty Owl	Vulnerable	-	Occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands. Territories are occupied permanently.	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-	Moderate to High. The Subject Site does provide some potential habitat for this species, its location within a heavily urbanised area and its heavily altered state, along with a lack of recent proximal

Species	BC Act	EPBC Act	Distribution (DPIE 2022b)	Habitat and Ecology (DPIE 2022b)	Likelihood of Occurrence
				dwelling mammals such as the Common Ringtail Possum (*Pseudocheirus peregrinus*) or Sugar Glider (*Petaurus breviceps*).	records, makes the presence of this species less likely.
Vespadelus troughtoni Eastern Cave Bat	Vulnerable	-	The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT.	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.	High. The Subject Site does provide potential habitat for this species and has been previously recorded within vegetation surrounding the site.

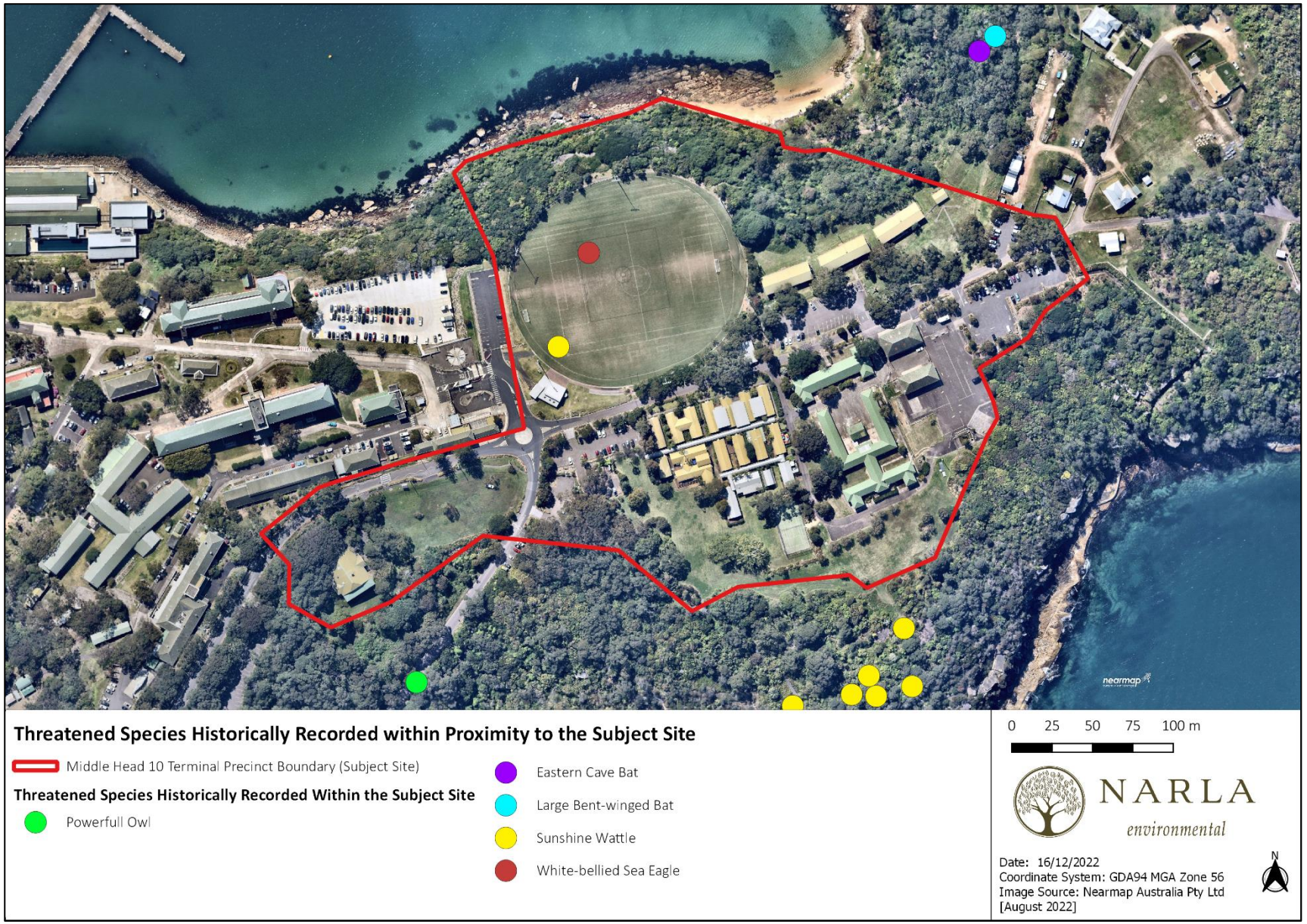

Figure 7. Historically recorded threatened species identified within the Subject Site.

6. Recommendations

6.1 Avoidance of Impacts

6.1.1 Threatened Ecological Communities

Whilst no TECs were identified within the Subject Site. Should the future Master Plan propose impacts to historically mapped vegetation with associated TECs, the following has been recommended.

The historically mapped vegetation within the Subject Site (**Figure 4**) as: Northern Warm Temperate Rainforest is associated with the BC Act listed Endangered ecological community Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. If any future works involve the clearing of these EECs within this area, an 'Assessment of Significance', also known as a '5-part test', will be required in order to determine whether the proposed activity will have a significant impact on the threatened ecological community.

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

6.1.2 Environmental Protection and Biodiversity Conservation (EPBC) Act

Sections of the Subject Site historically mapped as Northern Warm Temperate Forest, may also meet the listing criteria Littoral Rainforest and Coastal Vine Thickets TEC under the EPBC Act. Further investigations are required into these areas to see if the vegetation meets the criteria for Commonwealth protection. If these communities are found to meet the EPBC criteria than and future works that involve the clearing of this communities will require the production of an EPBC Assessment of Significant Impact, and potentially a EPBC Act Referral to the Commonwealth depending on the level of impact.

6.1.3 Threatened Species Habitat

Numerous threatened species have been historically recorded within proximity to the Subject Site, including:

- *Acacia terminalis* (Sunshine Wattle; Endangered);
- *Haliaeetus leucogaster* (White-bellied See Eagle; Vulnerable);
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat; Vulnerable);
- *Ninox strenua (Powerful Owl); and*
- *Vespadelus troughtoni* (Eastern Cave Bat; Vulnerable).

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 fauna (**Figure 7**) an 'Assessment of Significance' (also known as a '5-part test'), may also be required if any proposed works will have any direct or indirect impacts on the habitat features such as the unoccupied structures identified within the Subject Site.

6.2 Ecological Opportunities

6.2.1 Street Landscaping

The Subject Site has partial areas of habitat connectivity outside of the bushland vegetation around the periphery of the Subject Site. One strategy for improving habitat connectivity within the Subject Site that should be considered is through strategic tree plantings along the roads of the Precinct. Street landscaping enables for large scale canopy connectivity which provides 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 the provide the greatest

habitat resources for native species, and are better suited to the conditions so require less maintenance and upkeep.

6.2.2 Rehabilitation and Enhancement

Considerable amounts of exotic vegetation and priority weeds were recorded within the Subject Site. Whilst the majority of the surrounding vegetation area could not be accessed during the site assessment due to access constraints, the areas that were surveyed indicates it being highly disturbed and infiltrated with exotic species. Bushland rehabilitation should be a focus of any future planning proposal, outlining how the surrounding vegetation can be returned to its natural state through the removal of exotic vegetation and the completion of locally indigenous infill planting.

6.2.3 Foreshore Rehabilitation and Usage

The utilisation of the foreshore provides opportunities for strategic locally indigenous landscaping to be conducted which would enhance the habitat connectivity of the foreshore environment within the Precinct. All proposed foreshore works however should be conducted in a manner to avoid impacting the area (e.g., raised platforms and cycleways). Any additional plantings must not compromise existing asset protection zones (Black Ash Bushfire 2022.)

6.2.4 Greenspace

The Subject Site in its current state, has a considerable amount of public recreation areas and greenspace. Greenspace not only provides recreational areas for the public but also provides opportunities for habitat enhancement. Greenspace areas should incorporate locally indigenous landscaping to improve the habitat values of the area for native fauna.

7. Biodiversity Constraints Mapping

Narla has mapped the Subject Site into three (3) levels of 'Biodiversity Development Constraints'. The interpretation of each zone is detailed in **Table 8**. 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 8**.

Table 8. Biodiversity development constraints mapping key.

Zone	Description
Low Constraint Area - Green	This zone is deemed to have high potential for future development with accompaniment of the appropriate environmental assessments. This zone encompasses areas mapped as: ▪ Cleared land and hardstand; and ▪ Urban Exotic/Native landscaping.
Moderate Constraints Area - Orange	This zone is deemed to still have high potential for future development however development considerations may be required in regards to the following: ▪ Proximity to Littoral Rainforest Area; ▪ Unoccupied buildings that may provide roosting habitat for threatened Microbats species previously recorded within proximity to the site; and ▪ Patches of vegetation consisting of mature remnant/planted native canopy.
High Constraints Area - Red	This zone is deemed to have a low potential for future development without the implementation of appropriate environmental assessment, impact mitigation strategies, assessments of significance (5-part Tests) or Biodiversity Offsets. This zone encompasses: ▪ Previously mapped Threatened Ecological Communities; ▪ Habitat features such as large hollows associated with threatened species previously recorded within proximity to the site; ▪ Areas of Littoral Wetlands; and ▪ Biodiversity Values Mapping.

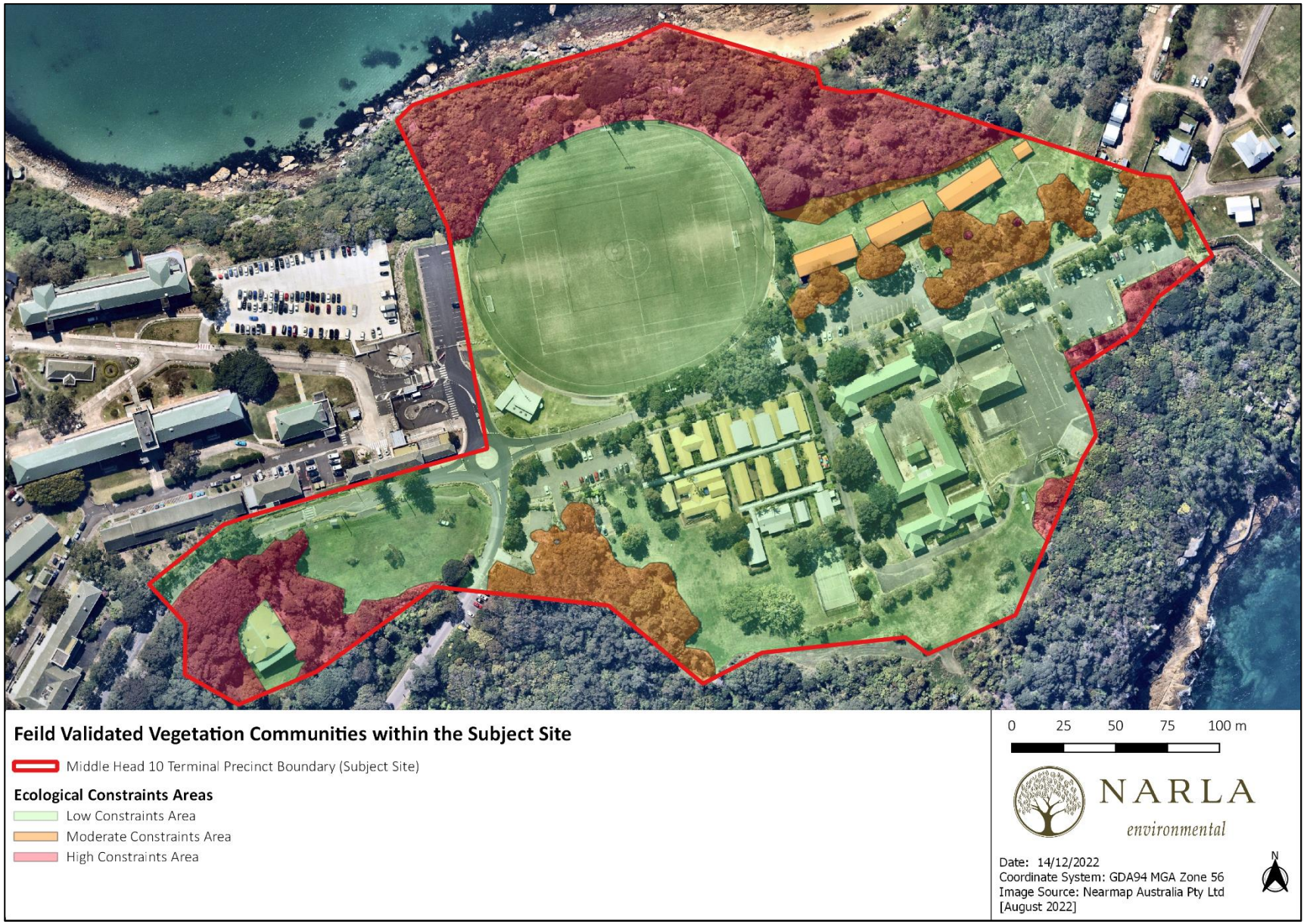

Figure 8. Ecological constraints mapped within the Subject Site.

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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	Understorey	Status
Acacia parramattensis		x		
Allocasuarina littoralis	*x*			
Angophora costata	x			
Angophora floribunda	x			
*Araujia sericifera**			x	Priority Weed
*Anredera cordifolia**			x	Priority Weed
*Asparagus virgatus **			x	Priority Weed
*Asparagus asparagoides**			x	Priority Weed
*Asparagus asparagus**			x	Priority Weed
*Alternanthera pungens**			x	
Banksia integrifolia		x		
Banksia serrata		x		
*Bidens pilosa**			x	
*Bromus catharticus**			x	
Callistemon spp.		X		
*Cardiospermum grandiflorum**			x	
Casuarina cunninghamiana	x			
Casuarina glauca	x			
*Cenchrus clandestinus**			x	
*Chloris gayana**			x	
*Cinnamomum camphora**	x			
*Conyza bonariensis**			x	
Corymbia maculata	x			
Corymbia gummifera	x			
Cynodon dactylon			x	
Dichondra repens			x	
*Dietes grandiflora**			x	
Elaeocarpus reticulatus		x		
*Eragrostis curvula**			x	
Ficus rubiginosa	*x*			
Glochideon ferdinandi	*x*			
*Hyparrhenia hirta**			x	
Kunzea ambigua		x		
*Lantana camara**			x	Priority Weed
*Ligustrum lucidum**		x		
Lomandra longifolia			x	
*Malva sylvestris**			x	
Melaleuca quinquenervia	x			
Melaleuca styphelioides	x			
*Modiola caroliniana**			x	
Notelaea longifolia	*x*			
*Olea europaea subsp. cuspidata**		x		Priority Weed

Pittosporum undulatum	x			
*Senna pendula**			x	
*Sida rhombifolia**			x	
*Taraxacum officinale**			x	
*Tradescantia fluminensis**			x	
Typha orientalis			x	

* Denotes exotic species

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

Class	Scientific Name	Common Name	Status
Aves	*Columba livia*	Rock Dove	Exotic
	Sturnus tristis	Common Myna	
	Cacatua galerita	Sulphur-crested Cockatoo	Protected
	Chroicocephalus novaehollandiae	Silver Gull	
	Corvus coronoides	Australian Raven	
	Cracticus tibicen	Australian Magpie	
	Eolophus roseicapillus	Galah	
	Grallina cyanoleuca	Magpie Lark	
	Hirundo neoxena	Welcome Swallow	
	Manorina melanocephala	Noisy Miner	
	Ocyphaps lophotes	Crested Pigeon	
	Threskiornis molucca	Australian White Ibis	
	Trichoglossus haematodus	Rainbow Lorikeet	
	Vanellus miles	Masked Lapwing	

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