



NGH

MULTIPLEX

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT WAIVER APPLICATION

Mosman High School Redevelopment

March 2021

Project Number: 21-142



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ACRONYMS AND ABBREVIATIONS

AoS	Assessment of Significance (under the EPBC Act)
BC Act	<i>Biodiversity Conservation Act 2016</i> (NSW)
BC Regulation	<i>Biodiversity Conservation Regulation 2017</i>
BDAR	Biodiversity Development Assessment Report
Biosecurity Act	<i>Biosecurity Act 2015</i>
BOM	Bureau of Meteorology
BOS	Biodiversity Offsets Scheme
Cwth	Commonwealth
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment
EEC	Endangered Ecological Community – as defined under relevant law applying to the proposed work area
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwth)
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
GDE	Groundwater Dependent Ecosystem
ha	hectares
km	kilometres
LGA	Local Government Area
m	Metres
MNES	Matters of National Environmental Significance
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change
PCT	Plant Community Type
PMST	Protected Matters Search Tool
SIS	Species Impact Statement
sp./spp.	Species/multiple species
TEC	Threatened Ecological Community
ToS	Test of Significance (under the BC Act)
VIS	Vegetation Information System

1 INTRODUCTION

A Biodiversity Development Assessment Report (BDAR) is required as part of a State Significant Development Application (SSDA) to redevelop Mosman High School. The purpose of this document is to provide sufficient information to support a request by School Infrastructure NSW to waive the requirement to prepare a BDAR in the form of a BDAR waiver application.

As part of the BDAR waiver application process, this document will detail information requirements as described within Attachment A of the NSW Department of Planning, Industry & Environment (DPIE) report *“How to Apply for a Biodiversity Development Assessment Report Waiver for a Major Project Application”* (DPIE, 2019).

It is noted that this BDAR waiver application is the second to be submitted to DPIE due to minor design changes to the SSDA including building footprint adjustments and subsequent tree retention/removal. The Project ID for this SSDA (SSD-10465) has not changed.

The following contents of this document will address all requirements within the DPIE report as per its Table 1 and Table 2. Refer to Appendix A of this document for a copy of these tables.

2 BDAR WAIVER REQUEST

Refer to Section 2.1 and 2.2 below for detailed information requirements.

2.1 TABLE 1 REQUIREMENTS

Table 2-1 Table 1 requirements as per the BDAR waiver application guideline (DPIE, 2019)

Information	Details
Admin	Proponent name NSW Department of Education (School Infrastructure NSW)
	Project ID SSD-10465
	Biodiversity Values assessor Martin Kim – NGH Environmental Consultant and Ecologist
Site details	Street address 769 Military Road, Mosman NSW 2088
	Involved lots Lot 1 DP782372, Lot 1 DP782373, Lot 1 and 2 DP177888, Lot 1 DP945443, Lot 1 DP945380, Lot 1 DP956035, Lot 1 DP945585, Lot 1-6 DP2375, Lot 1 DP181818, Lot 1 DP3430
	Local Government Area Mosman
	Description of existing site

Information

Details

The proposed site is within the existing Mosman High School, a public secondary school within a metro-suburban area of Sydney.

Location and site map



Figure 2-1 Site location context (base map source: SIX Maps)

Information	Details
Proposed development	<p>Project description</p> <p>The NSW Department of Education (School Infrastructure NSW) are seeking to redevelop Mosman High School under a SSDA. The proposal is to upgrade Mosman High School to provide a new building on the corner of Military Road and Belmont Road with capacity for up to 1,200 students. The proposal will include new building works, associated core infrastructure, new outdoor play areas including roof top play space and associated landscaping works. Future works have also been identified as part of a future Stage 2, which seeks to construct a new building on the existing covered outdoor learning area (COLA) to accommodate an additional 300 students. It is noted that future Stage 2 works do not form part of this SSDA. An initial masterplan study was completed in 2018 and has since progressed to the concept design phase.</p> <p>The scope of works assessed within the SSDA includes:</p> <ul style="list-style-type: none"> • Demolition of Building B, Building C and part Building E; • Removal of existing sports court and surrounding retaining walls and nominated trees; • Construction of a new part 3 / part 4 storey building (Building G) on the corner of Military and Belmont Road providing: <ul style="list-style-type: none"> ○ Administration and staff facilities; ○ Multipurpose gym / hall; ○ Library; ○ Canteen facilities; ○ General and senior learning units; ○ Science learning unit; ○ Health/PE and performing arts unit; and ○ Learning and admin support unit. • Associated landscaping works including new outdoor play areas, a roof top play space, and rooftop basketball court; and • Reinstatement of staff carparking. <p>Proposed site plan</p>

Information

Details

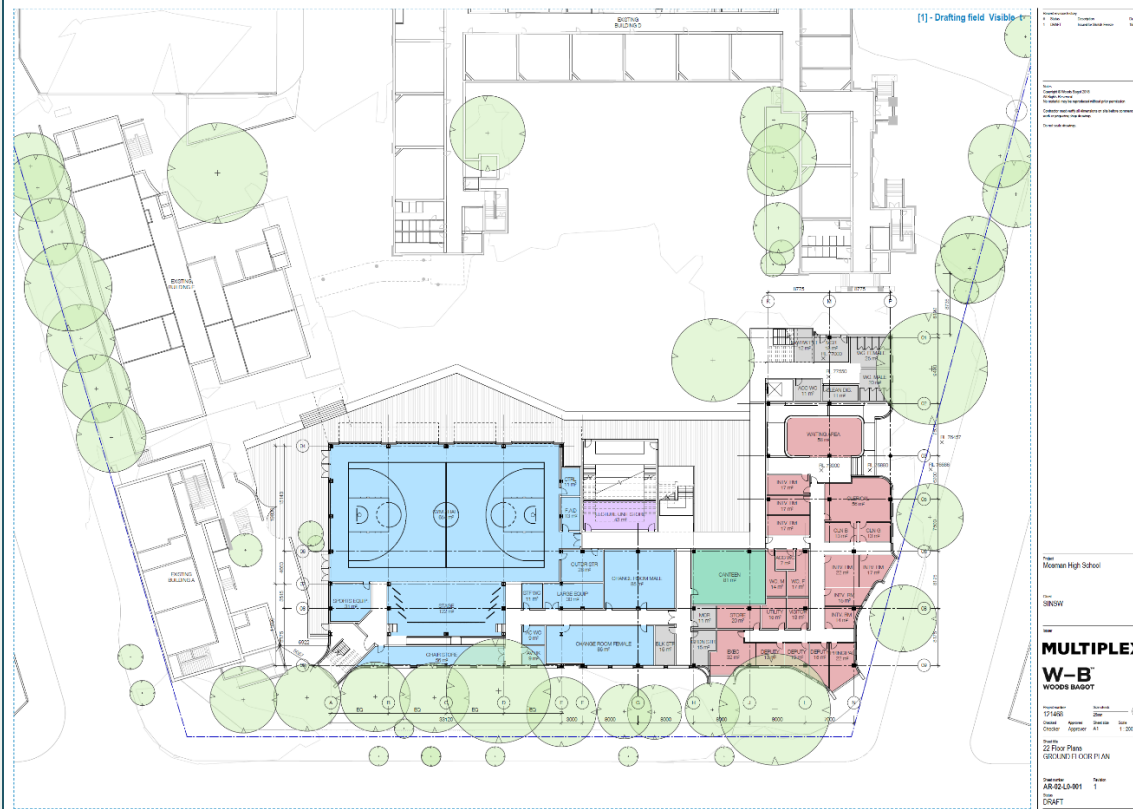


Figure 2-2 Site plan and proposed scope of works (Woods Bagot, February 2021)

Refer to Appendix B for complete drawings.

Impacts on biodiversity values

Refer to Section 2.2 for details.

2.2 TABLE 2 REQUIREMENTS

Table 2-2 Table 2 requirements as per the BDAR waiver application guideline (DPIE, 2019)

Biodiversity value and meaning	Relevant (✓ or NA)	Details
Vegetation abundance 1.4(b) BC Regulation <i>Occurrence and abundance of vegetation at a particular site</i>	✓	<p>The proposed works seek to minimise vegetation disturbance while maximising the proposal's commitment to meeting growth demands of the locality and to efficiently provide upgraded facilities to students and teaching staff.</p> <p>Mosman High School is within a highly disturbed region of metropolitan Sydney where the nearest regions mapped with established Biodiversity Values are approximately 1 km south (refer to Figure 2-3); the nearest Biodiversity Values added in the last 90 days (as of 25/02/2021) corresponds to vegetation within Lawry Plunkett Reserve approximately 500 metres east.</p> <p>Existing vegetation within the school is highly indicative of ornamental plantings due to the variety of species origins. State vegetation mapping of the Sydney Metropolitan Area (VIS 4489; OEH 2016) showed no Plant Community Types (PCTs) within the vicinity of the proposal; the nearest of which are all mapped as "Urban Exotic/Native" (refer to Figure 2-4).</p> <p>A site survey was undertaken in November 2019 where existing vegetation within the school was ground-truthed and mapped (refer to Figure 2-5). An Arborist Report for the development was undertaken in February 2021 by Birds Tree Consultancy where species lists were provided for the existing tree schedule for the proposal site. Refer to Figure 2-5 for the proposed development footprint in relation to the existing vegetation. Refer to Appendix C for the tree schedule number that corresponds to the mapping.</p>

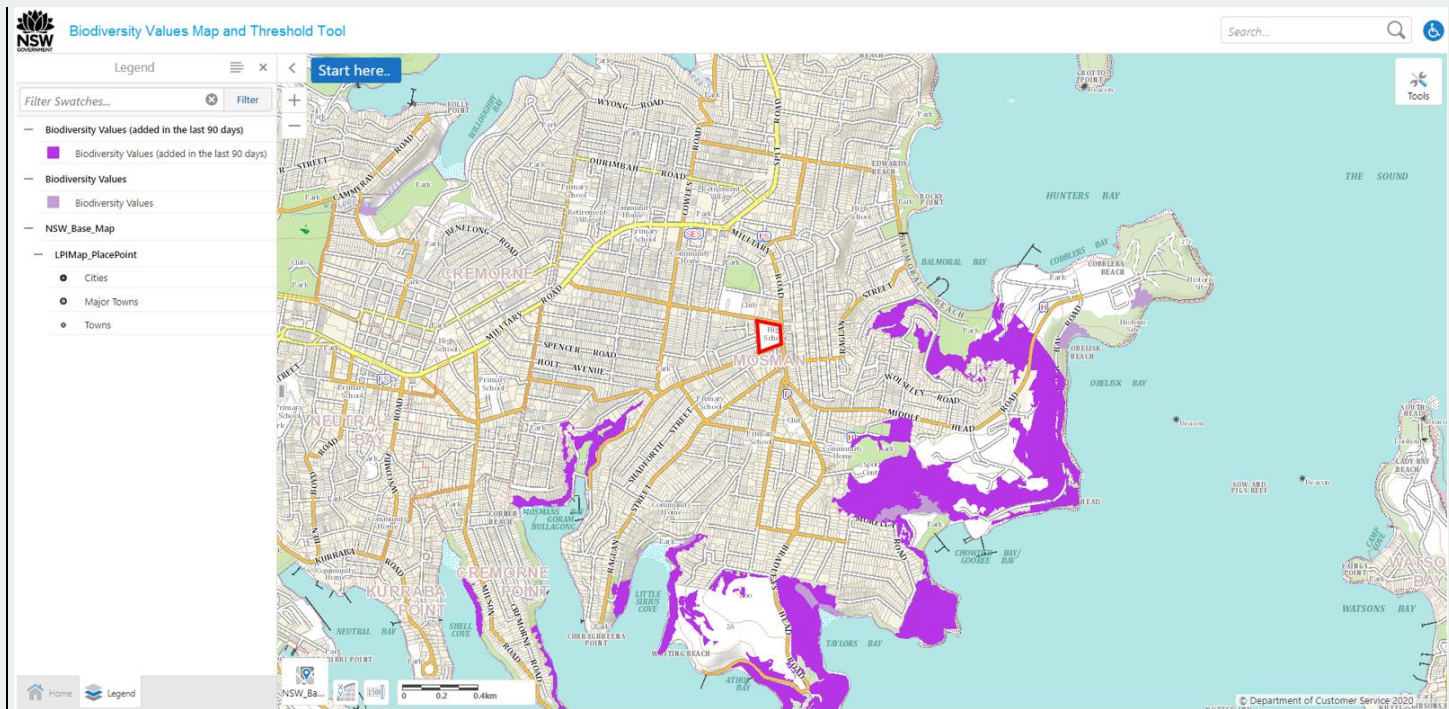


Figure 2-3 Biodiversity Values in relation to the proposal site (red)



Figure 2-4 Sydney Metro Area VIS 4489 vegetation mapping in the vicinity of the proposal site (red)

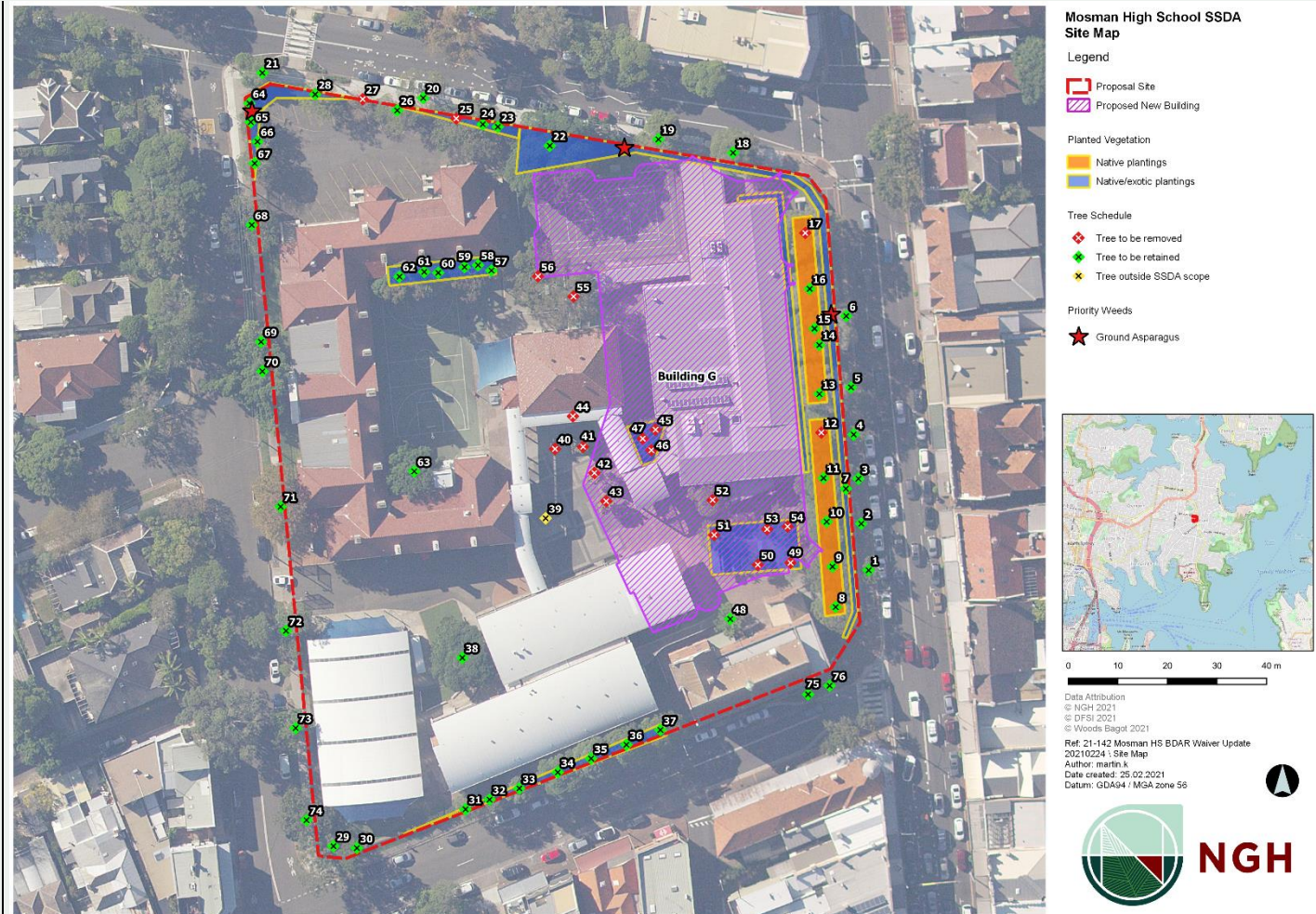


Figure 2-5 Site map including existing vegetation and proposed building footprint


Biodiversity value and meaning	Relevant (✓or NA)	Details
		<p>'Native vegetation' constituted vegetated areas that comprised of the row of Brush Box (<i>Lophostemon confertus</i>) and Broad-leaved Paperbark (<i>Melaleuca quinquenervia</i>) along the eastern region of the site. It is noted that this groundcover consists of artificial turf (refer to Figure 2-6).</p>  <p>Figure 2-6 Planted vegetation within Mosman High School, facing north (note artificial turf)</p> <p>'Native/Exotic vegetation' comprised a combination of native and exotic species including trees, hedges and groundcover. Vegetation abundance within the proposal site is low compared to the school's total area (refer to Table 2-3). The percentage of total existing vegetation comprises approximately 8% of the site.</p>

Table 2-3 Existing vegetation within the school site and vegetation proposed to be removed

Defined area		Existing area (m ²)	Area to be removed (m ²)
School site		14,600	-
Planted vegetation	Native	305	45
	Native/Exotic	845	355

The total area of vegetation proposed to be removed as a result of the proposal is approximately 400 m² which is approximately 35% of the total existing vegetation. This area includes the removal of 21 trees – refer to Table 2-4 below for the species list. All other trees and planted areas would be retained.

Table 2-4 Trees proposed to be removed

Scientific name	Common name	Native/Exotic	Tree no.
<i>Lophostemon confertus</i>	Brush Box	Native	12, 18, 19, 52
<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	Native	17
<i>Ficus microcarpa</i>	Chinese Banyan	Exotic	22
<i>Lagerstroemia indica</i>	Crepe-myrtle	Exotic	27
<i>Acmena smithii</i>	Common Lilly Pilly	Native	39 ¹ , 40, 44
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	Native	41, 42, 43
<i>Celtis sinensis</i>	Chinese Celtis	Exotic	45, 47, 54
<i>Phoenix canariensis</i>	Canary Island Date Palm	Exotic	46

Biodiversity value and meaning	Relevant (✓or NA)	Details			
		<i>Ulmus parviflora</i>	Chinese Elm	Exotic	51
		<i>Waterhousea floribunda</i>	Weeping Lilly Pilly	Native	53
		<i>Eucalyptus scoparia</i>	Wallangarra White Gum	Native	55
		<i>Corymbia gummifera</i>	Red Bloodwood	Native	56
		1 - Tree no. 39 <i>Acmena smithii</i> would be removed outside this SSD scope.			
		Considering the already-low abundance of vegetation within the school site, this quantity of proposed vegetation removal is effectively negligible. The quality of this existing vegetation is discussed in vegetation integrity below.			
Vegetation integrity 1.5(2)(a) BC Act <i>Degree to which the composition, structure and function of vegetation at a particular site and the surrounding landscape has been altered from a near natural state</i>	NA	Vegetation within the study area is characteristic of urban/suburban planted native/exotic species including Cook Pine (<i>Araucaria columnaris</i>), Brush Box (<i>Lophostomon confertus</i>) and Camphor Laurel (<i>Cinnamomum camphora</i>). Very small areas of vegetated groundcover were present on site due to artificial turfing of areas. Refer to Figure 2-6 for an example of this condition. No PCTs were identified within the proposal site, where existing vegetation most closely aligned with a general “urban/exotic vegetation” community. This community describes areas of vegetation dominated by planted ornamental species, non-endemic native species, or areas containing a high proportion of exotic species, including the priority weed Ground Asparagus <i>Asparagus aethiopicus</i> (refer to Figure 2-5 for its location). Furthermore it does not conform to any threatened ecological communities (TECs) listed under the <i>Biodiversity Conservation Act 2016</i> (BC Act) nor the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act). The existing vegetation integrity within the proposal site is therefore low.			
Habitat suitability 1.5(2)(b) BC Act	NA	The proposal site is within a highly disturbed region within metropolitan Sydney where it is adjacent to urban processes such as vehicle thoroughfare and commercial districts within the suburb of Mosman.			

Biodiversity value and meaning	Relevant (✓or NA)	Details												
Degree to which the habitat needs of threatened species are present at a particular site		<p>Owing to the low vegetation integrity, habitat suitability of the proposal site's existing vegetation was assessed to be low. No trees with habitat features such as hollows were observed, nor were there any logs and fallen timber. No geological features such as karsts, caves nor crevices are in the vicinity of the site.</p> <p>While non-native vegetation exists within the proposal site, quantities of which that occasionally provide native fauna habitat, including for the Superb Fairy-wren <i>Malurus cyaneus</i> and Common Ringtail Possum <i>Pseudocheirus peregrinus</i>, were not observed.</p> <p>The loss of planted vegetation as a result of the proposal would result in a negligible reduction in low quality foraging habitat for fauna such as woodland birds, reptiles, and mammals. These impacts are not considered significant given the relatively small amount of vegetation removal required, previous disturbance, and location within a highly urbanised environment.</p>												
Threatened species abundance 1.4(a) BC Regulation	✓	<p>Threatened species database searches were undertaken to determine whether any threatened flora and fauna species, populations, TECs, migratory species and Areas of Outstanding Biodiversity Value (AOBVs) as detailed in the BC Act and EPBC Act occur or are likely to occur within the proposal's locality. Refer to Table 2-5 below for the database details.</p> <p>Table 2-5 Databases searches for threatened species and TECs</p> <table><tr><th>Resource</th><th>Target</th><th>Search date</th><th>Search area</th></tr><tr><td>OEH BioNet Atlas</td><td>Threatened flora and fauna species, populations and ecological communities listed under the BC Act.</td><td>21/05/2020</td><td>10 km radius of the study area</td></tr><tr><td>EPBC Act Protected Matters Search</td><td>Threatened flora and fauna, endangered populations and ecological communities and migratory species.</td><td>21/05/2020</td><td>10 km radius of the study area</td></tr></table> <p>While no PCTs and subsequently no TECs were identified within the proposal site, the following two (2) threatened flora species were identified during the survey:</p> <ul style="list-style-type: none">• 2x Wallangarra White Gum <i>Eucalyptus scoparia</i> – BC Act-Endangered, EPBC Act-Vulnerable• 3x Magenta Lilly Pilly <i>Syzygium paniculatum</i> – BC Act-Endangered, EPBC Act-Vulnerable <p>However, these species are not within their respective home ranges of the NSW/QLD border and NSW remnant littoral rainforest, and are most likely planted individuals.</p>	Resource	Target	Search date	Search area	OEH BioNet Atlas	Threatened flora and fauna species, populations and ecological communities listed under the BC Act.	21/05/2020	10 km radius of the study area	EPBC Act Protected Matters Search	Threatened flora and fauna, endangered populations and ecological communities and migratory species.	21/05/2020	10 km radius of the study area
Resource	Target	Search date	Search area											
OEH BioNet Atlas	Threatened flora and fauna species, populations and ecological communities listed under the BC Act.	21/05/2020	10 km radius of the study area											
EPBC Act Protected Matters Search	Threatened flora and fauna, endangered populations and ecological communities and migratory species.	21/05/2020	10 km radius of the study area											

Biodiversity value and meaning	Relevant (✓or NA)	Details
		<p>The proposed development would remove one (1) Wallangarra White Gum and three (3) Magenta Lilly Pilly individuals (refer to Table 2-4). Tests/Assessments of Significance (ToS/AoS) were undertaken for each species to show that no significant impact would occur as a result of the proposed development. Refer to Appendix F.1, G.1, F.2 and G.2 for their respective ToS and AoS.</p> <p>A threatened species habitat assessment (refer to 3Appendix D) assessed threatened species' potential presence within the proposal area, where the Grey-headed Flying Fox <i>Pteropus poliocephalus</i> was considered to have moderate likelihood of occurring. As such, a ToS and AoS were undertaken for the species to show that no significant impact would occur to this species as a result of the proposed development (refer to Appendix F.3 and G.3).</p> <p>The loss of planted vegetation as a result of the proposed works is unlikely to impact any threatened fauna species. Fauna habitats to be affected generally comprise common foraging and sheltering resources which occur widely within the surrounding landscape and are not unique to the proposal site.</p> <p>No threatened fauna species were recorded during the site survey. The nearest observations of threatened fauna via NSW BioNet were of Grey-headed Flying Fox <i>Pteropus poliocephalus</i>. Considering the infrequent potential habitat use within the proposal site due to a broad foraging range, the potential impact of the proposal to this species is considered to be low (refer to Appendix F.3 and G.3). Consequently, vehicle strike potential for this species during proposed construction activities would be low.</p> <p>The proposed demolition of Buildings B, C and partially E as part of the development is not considered to impact any threatened species due to the low potential for occurrence. In particular, microbat habitat potential within these buildings was assessed to be low due to the low habitat suitability of the site, and the infrequent and outlying NSW BioNet microbat species records. A microbat survey was undertaken (refer to Appendix E) which showed that no threatened microbat species were detected via daytime roost searches, and ultrasonic call detectors set up over four nights. A combined ToS for threatened microbats with habitat potential was undertaken to show that no significant impact would occur as a result of the proposed development (refer to Appendix F.4).</p> <p>The potential for aquatic fauna to occur on site is low due to the nearest aquatic habitat is Hunters Bay approximately 820 metres northeast of the proposal where no waterways traverse the area between. The scope of works for the proposed development is unlikely to result in the creation of non-natural water bodies for any threatened aquatic fauna habitat establishment.</p>
Habitat connectivity	NA	<p>The proposed development is within a highly developed area with urban plantings. The nearest contiguous area of moderate-high quality habitat is within the Sydney Harbour National Park regions in Middle Head, Georges Heights, and</p>

Biodiversity value and meaning	Relevant (✓or NA)	Details
1.4(c) BC Regulation		Clifton Gardens approximately 1 km east, southeast and south of the proposal site. These areas are considered to be outside any connective habitat potential from the proposed works and would provide better quality habitat for any potential errant species.
Threatened species movement 1.4(d) BC Regulation	NA	<p>No threatened species nor TECs would be impacted in the manner of which their lifecycles may be disrupted or inhibited as a result of the proposed development. As described above, the proposal site is outside the vicinity of any moderate-high quality habitat; threatened species occurrence within the proposal site is assessed to be low; and vegetation integrity of that which may provide any degree of threatened species movement is assessed to be low.</p> <p>Grey-headed Flying Fox <i>Pteropus poliocephalus</i> movement is not anticipated to be impacted as the proposed site does not represent a contiguous movement corridor, and the majority of the proposal site would be retained.</p>
Flight path integrity 1.4(e) BC Regulation	NA	<p>The new Building G, as part of the proposed development, would be constructed with up to four (4) storeys approximately 15 metres above ground level (refer to Appendix B).</p> <p>No flight paths of protected species in Schedule 5 of the BC Act nor any migratory species listed under the EPBC Act would be adversely impacted as a result of the proposed building. This has been determined by (1) the threatened species habitat assessment showing low impact potential for such migratory species and (2) the protected species in Schedule 5 of the BC Act include commonly occurring urban birdlife that navigate highly developed localities including Mosman. Thus, flight path integrity would not be adversely impacted by the construction of the proposed building.</p>
Water sustainability 1.4(f) BC Regulation	NA	A search of the Bureau of Meteorology's National Atlas of Groundwater Dependent Ecosystems (GDEs) found that no vegetation within the proposal area has potential for groundwater-dependent interaction (refer to Figure 2-7). This is reflected by the hydrological conditions surrounding the proposal area wherein no waterways, ephemeral nor intermittent, are in the vicinity of the proposal.

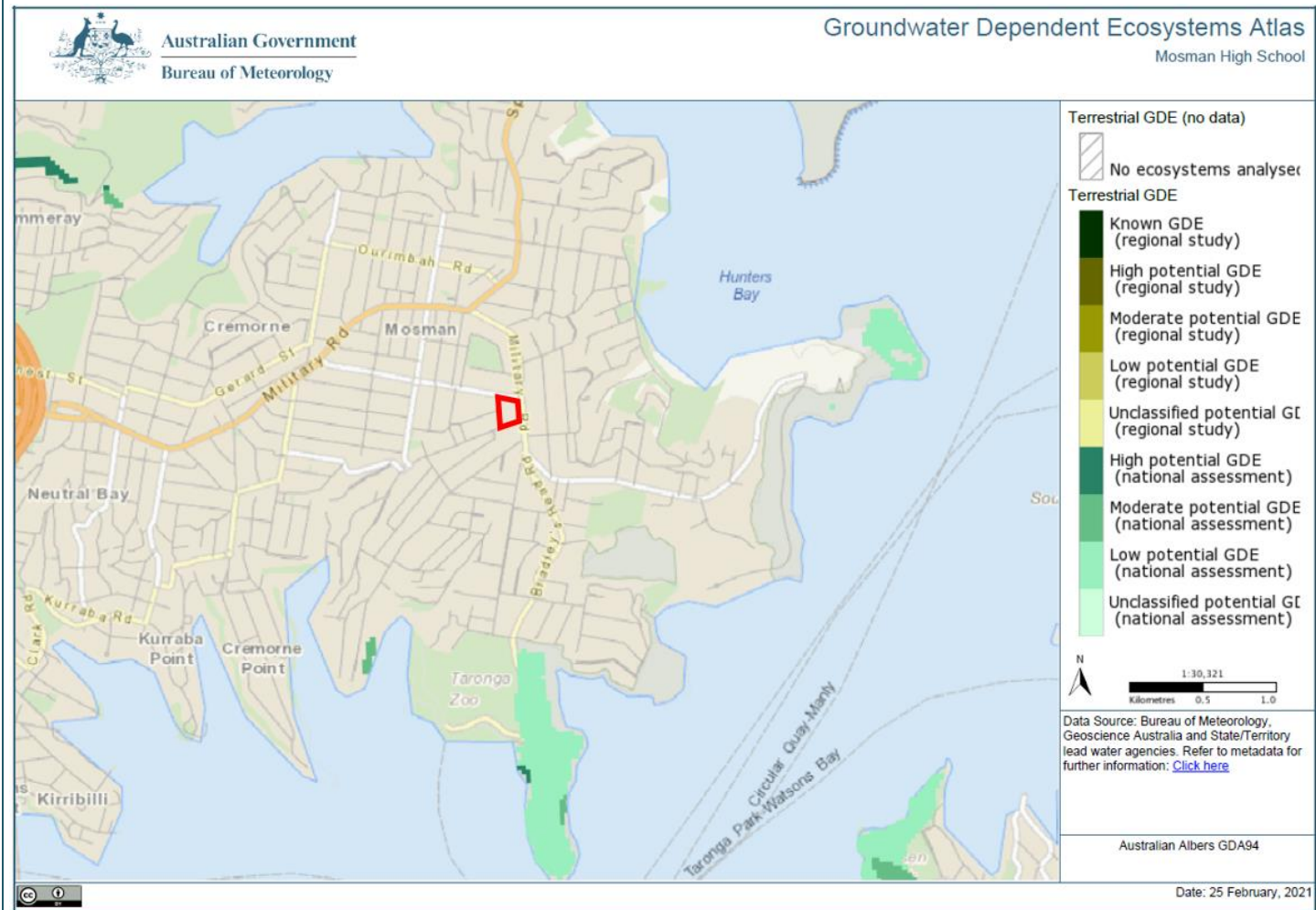


Figure 2-7 Groundwater Dependent Ecosystems within the locality (proposal in red)

As no TECs are within the vicinity of the proposal, potential impacts to water sustainability for the existing vegetation within the proposal area is considered to be low. Additionally, due to the absence of waterways in relation to the proposal, potential

Biodiversity value and meaning	Relevant (✓or NA)	Details
		impacts to water quality and hydrogeological processes in relation to any water-dependent threatened species as a result of the proposal is considered to be low.

3 CONCLUSION

The information within this BDAR waiver application provides sufficient evidence that the proposed development to Mosman High School is not likely to have any significant impact on biodiversity values within the site. Therefore, it is reasonable that a BDAR would not be required to accompany the SSDA (Project ID: SSD-10465) should the outcome of this waiver request be corroborated by the Planning Agency Head and Environmental Agency Head as per section 7.9(2) of the BC Act.

APPENDIX A BDAR WAIVER REQUIREMENTS

APPENDIX B SITE PLANS

APPENDIX C TREE SCHEDULE

ID No.	Binomial Name	Common Name	Native/Exotic
1	<i>Ulmus parvifolia</i>	Chinese Elm	Exotic
2	<i>Ulmus parvifolia</i>	Chinese Elm	Exotic
3	<i>Ulmus parvifolia</i>	Chinese Elm	Exotic
4	<i>Ulmus parvifolia</i>	Chinese Elm	Exotic
5	<i>Ulmus parvifolia</i>	Chinese Elm	Exotic
6	<i>Ulmus parvifolia</i>	Chinese Elm	Exotic
7	<i>Harpephyllum caffrum</i>	Wild Plum	Exotic
8	<i>Lophostemon confertus</i>	Brush Box	Native
9	<i>Lophostemon confertus</i>	Brush Box	Native
10	<i>Lophostemon confertus</i>	Brush Box	Native
11	<i>Lophostemon confertus</i>	Brush Box	Native
12	<i>Lophostemon confertus</i>	Brush Box	Native
13	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	Native
14	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	Native
15	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	Native
16	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	Native
17	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	Native
18	<i>Lophostemon confertus</i>	Brush Box	Native
19	<i>Lophostemon confertus</i>	Brush Box	Native
20	<i>Lophostemon confertus</i>	Brush Box	Native
21	<i>Lophostemon confertus</i>	Brush Box	Native
22	<i>Ficus microcarpa</i>	Chinese Banyan	Exotic
23	<i>Celtis sinensis</i>	Chinese Celtis	Exotic
24	<i>Eucalyptus robusta</i>	Swamp Mahogany	Native
31	<i>Cinnamomum camphora</i>	Camphor Laurel	Exotic
25	<i>Pittosporum undulatum</i>	Sweet Pittosporum	Native
26	<i>Lagerstroemia indica</i>	Crepe-myrtle	Exotic
27	<i>Melia azedarach</i>	Chinaberry	Exotic
28	<i>Eucalyptus punctata</i>	Grey Gum	Native
29	<i>Araucaria columnaris</i>	Cook Pine	Native
30	<i>Celtis sinensis</i>	Chinese Celtis	Exotic
33	<i>Lophostemon confertus</i>	Brush Box	Native
32	<i>Lophostemon confertus</i>	Brush Box	Native
34	<i>Lophostemon confertus</i>	Brush Box	Native
35	<i>Lophostemon confertus</i>	Brush Box	Native
36	<i>Lophostemon confertus</i>	Brush Box	Native
37	<i>Lophostemon confertus</i>	Brush Box	Native
38	<i>Ficus rubiginosa</i>	Port Jackson Fig	Native
39	<i>Acmena smithii</i>	Common Lilly Pilly	Native
40	<i>Acmena smithii</i>	Common Lilly Pilly	Native
41	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	Native
42	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	Native
43	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	Native
44	<i>Acmena smithii</i>	Common Lilly Pilly	Native
45	<i>Celtis sinensis</i>	Chinese Celtis	Exotic

ID No.	Binomial Name	Common Name	Native/Exotic
46	<i>Phoenix canariensis</i>	Canary Island Date Palm	Exotic
47	<i>Celtis sinensis</i>	Chinese Celtis	Exotic
48	<i>Cupaniopsis anacardiodes</i>	Tuckeroo	Native
49	<i>Celtis sinensis</i>	Chinese Celtis	Exotic
50	<i>Phoenix canariensis</i>	Canary Island Date Palm	Exotic
51	<i>Ulmus parvifolia</i>	Chinese Elm	Exotic
52	<i>Lophostemon confertus</i>	Brush Box	Native
53	<i>Waterhousea floribunda</i>	Weeping Lilly Pilly	Native
54	<i>Celtis sinensis</i>	Chinese Celtis	Exotic
55	<i>Eucalyptus scoparia</i>	Wallangarra White Gum	Native
56	<i>Corymbia gummifera</i>	Red Bloodwood	Native
57	<i>Pittosporum undulatum</i>	Sweet Pittosporum	Native
58	<i>Pittosporum undulatum</i>	Sweet Pittosporum	Native
59	<i>Eucalyptus scoparia</i>	Wallangarra White Gum	Native
60	<i>Phoenix canariensis</i>	Canary Island Date Palm	Exotic
61	<i>Eucalyptus pilularis</i>	Blackbutt	Native
62	<i>Acmena smithii</i>	Common Lilly Pilly	Native
63	<i>Jacaranda mimosifolia</i>	Blue Jacaranda	Exotic
64	<i>Lagerstroemia indica</i>	Crepe-myrtle	Exotic
65	<i>Melaleuca linarifolia</i>	Narrow-leaved Paperbark	Native
66	<i>Melaleuca linarifolia</i>	Narrow-leaved Paperbark	Native
67	<i>Lagerstroemia indica</i>	Crepe-myrtle	Exotic
68	<i>Cinnamomum camphora</i>	Camphor Laurel	Exotic
69	<i>Brachychiton acerifolia</i>	Flame Bottletree	Native
70	<i>Ficus microcarpa</i>	Chinese Banyan	Exotic
71	<i>Platanus x hybrida</i>	London Plane	Exotic
72	<i>Cinnamomum camphora</i>	Camphor Laurel	Exotic
73	<i>Cinnamomum camphora</i>	Camphor Laurel	Exotic
74	<i>Cinnamomum camphora</i>	Camphor Laurel	Exotic
75	<i>Ulmus parvifolia</i>	Chinese Elm	Exotic
76	<i>Ulmus parvifolia</i>	Chinese Elm	Exotic

APPENDIX D THREATENED SPECIES EVALUATIONS

The tables in this appendix present the habitat evaluation for threatened species, ecological communities and endangered populations listed for the locality in the *NSW BioNet Database*^[1] and those identified as potentially occurring in the area according to the Commonwealth EPBC Act *Protected Matters Search Tool*^[2].

The likelihood of occurrence is based on presence of habitat, proximity of nearest records and mobility of the species (where relevant). The assessment of potential impact is based on the nature of the proposal, the ecology of the species and its likelihood of occurrence. The following classifications are used:

Presence of habitat:

- Present: Potential or known habitat is present within the study area.
- Marginal: Habitat present that could be used by the species on occasion but not preferred.
- Absent: No potential or known habitat is present within the study area.

Likelihood of occurrence

- Recorded: The species was observed in the study area during the current survey
- High: It is highly likely that a species inhabits the study area and is dependent on identified suitable habitat (i.e. for breeding or important life cycle periods such as winter flowering resources), has been recorded recently in the locality (10km) and is known or likely to maintain resident populations in the study area. Also includes species known or likely to visit the study area during regular seasonal movements or migration.
- Moderate: Potential habitat is present in the study area. Species known to maintain sedentary populations, however, may seasonally use resources within the study area opportunistically or during migration. The species is known to be dependent (i.e. for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area, or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded.
- Low: It is known that the species inhabits the study area and has not been recorded recently in the locality (10km). It may be an occasional visitor, but habitat similar to the study area is widely distributed in the local area, meaning that the species is not dependent (i.e. for breeding or important life cycle periods such as winter flowering resources) on available habitat. Specific habitat is not present in the study

^[1] *BioNet* is administered by the NSW Office of Environment & Heritage (OEH) and is an online database of fauna and flora records that contains over four million recorded sightings.

^[2] This online tool is designed for the public to search for matters protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is managed by the Commonwealth Department of the Environment and Energy.

area or the species are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded.

Potential to be impacted

- Low: The proposal would not impact this species or its habitats. No Test of Significance (ToS) is necessary for this species.
- Moderate: The proposal could impact this species or its habitats however the impacts are considered manageable such that no direct or indirect impacts are likely. No Test of Significance (ToS) is necessary for this species.
- High: The proposal is likely to impact this species or its habitats. A ToS has been applied to these entities.

D.1 EVALUATION OF THE LIKELIHOOD AND EXTENT OF IMPACT ON THREATENED FLORA AND TECS

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
<i>Acacia bynoeana</i> Bynoe's Wattle BC-E, EPBC-V	Bynoe's Wattle is a semi-prostrate shrub to a metre high. This species is confined to the northern portion of the Sydney Basin Bioregion and the southern portion of the north coast Bioregion. Occurs in heath or dry sclerophyll forest on sandy clay soils, often containing ironstone gravels. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Bynoe's Wattle is a semi-prostrate shrub to a metre high. The single flower heads, on short hairy stems, appear anytime from September to March. Its seedpods are mature from September to January. The hairy branchlets distinguish the species from the similar and more common Three-veined Wattle <i>Acacia trinervata</i> . It is more likely to occur in sclerophyllous heath or woodland on Sandstone based substrates in association with <i>Corymbia gummifera</i> , <i>Eucalyptus sclerophylla</i> , <i>Banksia serrata</i> & <i>Angophora bakeri</i> , none of which occur in Cumberland Plain Woodland. It has been recorded in Castlereagh Nature Reserve.	12	Marginal	Low	Low
<i>Acacia pubescens</i> Downy Wattle BC-V, EPBC-V	A spreading shrub, 1 - 5 m high with brilliant yellow flowers, bipinnate leaves (divided twice pinnately) and conspicuously hairy branchlets. Concentrated around the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravelly 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. The topography of the habitat of		Marginal	Low	Low

¹ Information sourced from species profiles on NSW OEH's threatened species database or the Australian Government's Species Profiles and Threats database (SPRAT) unless otherwise stated.

OEH threatened species database: <http://www.threatenedspecies.environment.nsw.gov.au/index.aspx>
SPRAT: <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
	the species is flat to gently undulating, a characteristic of the Cumberland Plain region. The sites of <i>A. pubescens</i> range in altitude from 0 to 650 metres a.s.l. The species often associated with <i>A. pubescens</i> include <i>Melaleuca nodosa</i> , <i>M. styphelioides</i> , <i>Angophora bakeri</i> , <i>Ozothamnus diosmifolius</i> , <i>Acacia parramattensis</i> , <i>Dillwynia sieberi</i> , <i>Pultenaea villosa</i> , <i>Bursaria spinosa</i> , <i>Acacia falcata</i> , <i>Exocarpos cupressiformis</i> , <i>Themeda australis</i> , <i>Lomandra longifolia</i> , <i>Microlaena stipoides</i> , <i>Aristida vagans</i> , <i>Austrodanthonia tenuior</i> , <i>Dianella longifolia</i> , <i>Lepidosperma laterale</i> and other species characteristic of the above plant communities. Stands of <i>A. pubescens</i> have been recorded in open, disturbed sites. Longevity is unknown, but clonal species have been known to survive for many decades. Flowers from August to October. Pollination of Acacia flowers is usually by insects and birds. The pods mature in October to December. Recruitment is more commonly from vegetative reproduction than from seedlings. The percentage of pod production and seed fall for this species appears to be low. Acacia species generally have high seed dormancy and long-lived persistent soil seedbanks. It is thought that the species needs a minimum fire free period of 5 - 7 years to allow an adequate seedbank to develop.				
<i>Acacia terminalis</i> subsp. <i>terminalis</i> Sunshine Wattle BC-E, EPBC-E	An erect or spreading shrub, 1-5 metres tall, with pale yellow flowers and seed pods 3-11 cm long. Very limited distribution, mainly in near-coastal areas from the northern shores of Sydney Harbour south to Botany Bay, with most records from the Port Jackson area and the eastern suburbs of Sydney. Recorded from North Head, Middle Head, Dover Heights, Parsely Bay, Nielsen Park, Cooper Park, Chifley, Watsons Bays, Wollstonecraft and Waverley. 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. Flowers in autumn but may be through to early winter.	142	Marginal	Low	Low
<i>Allocasuarina glaireicola</i> BC-E, EPBC-E	An erect, often depauperate she-oak shrub 1-2 m high, with 20 cm branchlets. Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Grows in Castlereagh woodland on lateritic soil. Found in open woodland with <i>Eucalyptus parramattensis</i> , <i>Eucalyptus fibrosa</i> , <i>Angophora bakeri</i> , <i>Eucalyptus sclerophylla</i> and <i>Melaleuca decora</i> . Common associated understorey species include <i>Melaleuca nodosa</i> , <i>Hakea dactyloides</i> , <i>Hakea sericea</i> , <i>Dillwynia tenuifolia</i> , <i>Micromyrtus minutiflora</i> , <i>Acacia elongata</i> , <i>Acacia brownei</i> , <i>Themeda australis</i> and <i>Xanthorrhoea minor</i> . Not killed outright by fire but resprouts		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
	from the rootstock. Spreads by vegetative means, such that clumps of up to 100s of stems may be a single individual. The time taken for the plants to flower and set seed is not known, but only those plants growing in areas unburnt for some time produced substantial numbers of fruit.				
<i>Allocasuarina portuensis</i> BC-E, EPBC-E	A slender shrub, 3-5 m high with branchlets drooping to spreading and dark green in colour. The Nielsen Park She-oak has only been recorded from a single wild population at Nielsen Park in Sydney Harbour National Park, NSW. The Nielsen Park She-oak has only been collected from one site in the wild, at Nielsen Park. It is now extinct at this site, but translocated plants persist. The Nielsen Park She-oak is generally dioecious (each plant produces flowers of a different sex) but some cultivated plants have both male and female flowers. Flowering is mainly in April to August, although the translocated plants have also flowered in January and March. Plants of the family Casuarinaceae are generally obligate seed regenerators. Most species are killed by fire, although some species can re-sprout. The wild population of Nielsen Park She-oak showed no obvious clonal growth, but one of the cultivated plants is multi-stemmed arising from one base, possibly indicating clonality. The estimated life span of individuals is 30 years.	104	Absent	Low	Low
<i>Asterolasia elegans</i> BC-E, EPBC-E	A tall, thin shrub to 3 m high. Occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby local government areas. Also likely to occur in the western part of Gosford local government area. Known from only seven populations, only one of which is wholly within a conservation reserve. Occurs on Hawkesbury sandstone. Found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest. The canopy at known sites includes Turpentine (<i>Syncarpia glomulifera</i> subsp. <i>glomulifera</i>), Smooth-barked Apple (<i>Angophora costata</i>), Sydney Peppermint (<i>Eucalyptus piperita</i>), Forest Oak (<i>Allocasuarina torulosa</i>) and Christmas Bush (<i>Ceratopetalum gummiferum</i>). Ecological knowledge about this species is very limited. The species is considered to be fire sensitive and reliant on seed germination after disturbance to maintain populations. A soil seedbank appears to be established by this species, so for a number of years following fire or other disturbance the species may not be apparent, but be present only as seed in the soil. The size of the seedbank depends not only on the amount of seed contributed by mature plants each season, but on the level of dormancy of the seed which can vary		Marginal	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
	from year to year. The longevity of each crop of seed in the soil is probably relatively short (perhaps 5 - 10 years).				
<i>Caladenia tessellata</i> Thick-lipped Spider-orchid BC-E, EPBC-V	The Tessellated Spider Orchid is from a group of orchids characterised by five long spreading petals and sepals around a broad down-curved labellum ('lip'). Known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. It was also recorded in the Huskisson area in the 1930s. In NSW current populations occur in Morton NP, Munmorah State Recreation Area, Braidwood (private property), South Pacific Heathland Reserve, Wyrabalong NP, and Porter Creek Wetland Reserve. The species occurs on the coast in Victoria from east of Melbourne to almost the NSW border. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. The single leaf regrows each year. Flowers appear between September and November (but apparently generally late September or early October in extant southern populations).	6	Absent	Low	Low
<i>Callistemon linearifolius</i> Netted Bottle Brush BC-V	This shrub is up to 3-4 m tall, with linear (long and narrow) to linear-lanceolate (lance shaped) leaves 8-10 cm long, and 5-7 mm wide with a sharp tip, thickened margins, and distinct lateral veins. Flowers are clustered into the typical "bottlebrushes" of Callistemon species. The brushes are red and usually 9-10 cm long and approximately 50 mm in diameter. The stem upon which the filaments occur are covered in a soft downy hair at flowering. The seed capsules are approximately 7 mm in diameter. Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Recorded in 2000 at Coalcliff in the northern Illawarra. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. The species was more widespread in the past, and there are currently only 5-6 populations remaining from the 22 populations historically recorded in the Sydney area. Three of the remaining populations are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve and Spectacle Island Nature Reserve. The species has also been recorded from Yengo National Park.	5	Marginal	Low	Low
<i>Cryptostylis hunteriana</i>	The Leafless Tongue Orchid has no leaf. It produces an upright flower-stem to 45 cm tall, bearing five to 10 flowers between November and February. This species has inconsistent flowering, with individuals not always flowering each season. It has been recorded from as far north as Gibraltar Range National Park south into Victoria around		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
Leafless Tongue-orchid BC-V, EPBC-V	the coast as far as Orbost. It is known historically from a number of localities on the NSW south coast and has been observed in recent years at many sites between Batemans Bay and Nowra (although it is uncommon at all sites). In NSW there are Leafless Tongue-orchid populations of unknown size in Washpool, Gibraltar Range, Ku-ring-gai Chase, Ben Boyd, Meroo, Morton, Murramarang, Jervis Bay and Lake Conjola National Parks as well as Cambewarra Range and Triplarina Nature Reserves. Brown (2007) indicates that this species is also present in Red Rocks (Yuraygri) National Park and is located on the Red Rocks Plateau in Cambewarra Range Nature Reserve. Also recorded at Nelson Bay, Wyee, Nowendoc State Forest, and two large populations near Bulahdelah. The species occurs mostly in coastal heathlands, margins of coastal swamps and sedgeland, coastal forest, dry woodland, and lowland forest. It prefers open areas in the understorey of forested communities. The soils include moist sands, moist to dry clay loam and occasionally in accumulated eucalypt leaves. The larger populations typically occur in woodland dominated by Scribbly Gum (<i>Eucalyptus sclerophylla</i>), Silvertop Ash (<i>E. sieberi</i>), Red Bloodwood (<i>Corymbia gummifera</i>) and Black Sheoak (<i>Allocasuarina littoralis</i>); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (<i>C. subulata</i>) and the Tartan Tongue Orchid (<i>C. erecta</i>).				
<i>Cynanchum elegans</i> White-flowered Wax Plant BC-E, EPBC-E	A climber or twiner with a highly variable form. Mature stems have a fissured corky bark and can grow to 10 metres long and 3.5 cm thick. Restricted to eastern NSW where it is distributed from Brunswick Heads on the north coast to Gerroa in the Illawarra region. The species has been recorded as far west as Merriwa in the upper Hunter River valley. It has been recorded from the following conservation reserves: Illawarra Escarpment State Recreation Area (SRA) and Berkeley Islands Nature Reserve (NR) in the Illawarra area; Wollemi National Park (NP) and Goulburn River NP to the northwest of Sydney; and Booti Booti NP, Brunswick Heads NR, Camels Hump NR, Hat Head NP, Torrington SRA and Woko NP in northern NSW. The White-flowered Wax Plant usually occurs mainly at the ecotone between dry subtropical rainforest and sclerophyll forest/woodland communities. Other associated vegetation types include littoral rainforest; Coastal Tea-tree <i>Leptospermum laevigatum</i> , Coastal Banksia <i>Banksia integrifolia</i> subsp. <i>integrifolia</i> coastal scrub; Forest Red Gum <i>Eucalyptus tereticornis</i> aligned open forest and woodland; Spotted Gum <i>Eucalyptus maculata</i> aligned open forest and woodland; and Bracelet Honey myrtle <i>Melaleuca</i>		Marginal	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
	<p>armillaris scrub to open scrub. Flowering occurs between August and May, with a peak in November. Flower abundance on individual plants varies from sparse to prolific. The fruit can take up to six months to mature. Seeds are wind dispersed. It is considered to be unlikely that a soil seed bank for this species exists. Plants are capable of suckering from rootstock in response to occasional slashing or grazing.</p>				
<p><i>Darwinia biflora</i> BC-V, EPBC-V</p>	<p>An erect to spreading shrub to 80cm high. Recorded in Ku-ring-gai, Hornsby, Baulkham Hills and Ryde local government areas. The northern, southern, eastern and western limits of the range are at Maroota, North Ryde, Cowan and Kellyville, respectively. Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Associated overstorey species include <i>Eucalyptus haemastoma</i>, <i>Corymbia gummifera</i> and/or <i>E. squamosa</i>. The vegetation structure is usually woodland, open forest or scrub-heath. Longevity is thought to be 15-20 years. Flowering occurs throughout the year but is concentrated in autumn, with mature fruits being produced from May to August.</p>		Marginal	Low	Low
<p><i>Deyeuxia appressa</i> BC-E, EPBC-E</p>	<p>An erect perennial grass to 0.9 m high. A highly restricted NSW endemic known only from two pre-1942 records in the Sydney area. Was first collected in 1930 at Herne Bay, Saltpan Creek, off the Georges River, south of Bankstown. Was then collected in 1941 from Killara, near Hornsby. Has not been collected since and may now be extinct in the wild due to the level of habitat loss and development that has occurred within these areas. Given that <i>D. appressa</i> hasn't been seen in over 60 years, almost nothing is known of the species' habitat and ecology. Flowers spring to summer and is mesophytic (grows in moist conditions).</p>		Marginal	Low	Low
<p><i>Epacris purpurascens</i> var. <i>purpurascens</i> BC-V</p>	<p>An erect shrub, 50 - 180 cm high. Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Found in a range of habitat types, most of which have a strong shale soil influence.</p>	7			
<p><i>Eucalyptus camfieldii</i></p>	<p>Mostly mallee to 4 m tall though can grow to a straggly tree to 9 m high. Bark is rough, fibrous and stringy, red or dark grey-brown. Restricted distribution in a narrow band with the most northerly records in the Raymond Terrace Area south to Waterfall. Localised and scattered distribution includes sites at Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head,</p>	14	Marginal	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
Camfield's Stringybark BC-V, EPBC-V	Menai, Wattamolla and a few other sites in Royal National Park. Occurs in poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Grows in coastal heath mostly on exposed sandy ridges. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas. Associated species frequently include stunted species of <i>E. oblonga</i> Narrow-leaved Stringybark, <i>E. capitellata</i> Brown Stringybark and <i>E. haemastoma</i> Scribbly Gum. Population sizes are difficult to estimate because its extensive lignotubers may be 20 m across. A number of stems arise from these lignotubers giving the impression of individual plants. Flowering period is irregular, flowers recorded throughout the year. Poor response to too frequent fires.				
<i>Eucalyptus nicholii</i> Narrow-leaved Black Peppermint BC-V, EPBC-V	This species is sparsely distributed but widespread on the New England Tablelands from Nundle to north of Tenterfield, being most common in central portions of its range. Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock.	2	Marginal	Low	Low
<i>Genoplesium baueri</i> Bauer's Midge Orchid BC-E, EPBC-E	The species has been recorded from locations between Ulladulla and Port Stephens. About half the records were made before 1960 with most of the older records being from Sydney suburbs including Asquith, Cowan, Gladesville, Longueville and Wahroonga. No collections have been made from those sites in recent years. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments. Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March.		Marginal	Low	Low
<i>Grammitis stenophylla</i> Narrow-leaf Finger Fern BC-E	The Narrow-leaf Finger Fern is a little fern, growing in small colonies, with hanging or erect fronds. Occurs in eastern Queensland and eastern NSW. In NSW it has been found on the south, central and north coasts and as far west as Mount Kaputar National Park near Narrabri. Moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest.		Marginal	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
<i>Grevillea caleyi</i> Caley's Grevillea BC-CE, EPBC-CE	A medium to tall shrub, with long spreading branches, which grows to a height and width of up to 4 m. Restricted to an 8 km square area around Terrey Hills, approximately 20 km north of Sydney. Occurs in three major areas of suitable habitat, namely Belrose, Ingleside and Terrey Hills/Duffys Forest within the Ku-ring-gai, Pittwater and Warringah Local Government Areas. All natural remnant sites occur within a habitat that is both characteristic and consistent between sites. 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 <i>Eucalyptus sieberi</i> and <i>E. gummifera</i> . Commonly found in the endangered Duffys Forest ecological community. Killed by fire and relies entirely on seed that is stored in the soil for regeneration. Generally seedlings do not flower and produce seed before 2-5 years of age. Flowering is sporadic throughout the year, but with a definite spring pulse.		Marginal	Low	Low
<i>Haloragodendron lucasii</i> Hal BC-E, EPBC-E	An erect hairless shrub to 1.5 m tall, with four-winged branches arising in pairs. The known locations of this species are confined to a very narrow distribution on the north shore of Sydney. Associated with dry sclerophyll forest. Reported to grow in moist sandy loam soils in sheltered aspects, and on gentle slopes below cliff-lines near creeks in low open woodland. Associated with high soil moisture and relatively high soil-phosphorus levels. Highly clonal, which implies the true population size may be considerably smaller than expected. Flowering occurs from August to November with fruits appearing from October to December.		Marginal	Low	Low
<i>Hibbertia spanantha</i> Julian's Hibbertia BC-CE, EPBC-CE	A decumbent shrublet up to 30cm high with moderately branched main branches and branchlets with simple hairs. Endemic to NSW where it is restricted to four known locations. Grows in forest with canopy species including <i>Eucalyptus pilularis</i> , <i>E. resinifera</i> , <i>Corymbia gummifera</i> and <i>Angophora costata</i> . The understorey is open with species of Poaceae, Orchidaceae, Fabaceae and Liliaceae. Flowering in October and November, but with an odd flower throughout the year. The soil is identified as a light clay occurring on a shale sandstone soil transition.		Marginal	Low	Low
<i>Leptospermum deanei</i> BC-V, EPBC-V	Shrub to 5 m, with bark peeling in long strips. Occurs in Hornsby, Warringah, Ku-ring-gai and Ryde LGAs. Woodland on lower hill slopes or near creeks. Sandy alluvial soil or sand over sandstone. Occurs in Riparian Scrub - e.g. <i>Tristaniopsis laurina</i> , <i>Baechea myrtifolia</i> ; Woodland - e.g. <i>Eucalyptus haemstoma</i> ; and Open Forest - e.g. <i>Angophora costata</i> , <i>Leptospermum trinervium</i> , <i>Banksia ericifolia</i> . Flowers October-November.		Marginal	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
<i>Melaleuca biconvexa</i> Biconvex Paperbark BC-V, EPBC-V	A shrub or small tree, usually up to 10 m tall, though occasionally as high as 20 m. 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. Within the Gosford and Wyong area most populations occur on private land or on road reserves. Generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. May occur in dense stands forming a narrow strip adjacent to watercourses, in association with other <i>Melaleuca</i> species or as an understorey species in wet forest types. Flowering occurs over just 3-4 weeks in September and October. Resprouts following fire.	1	Marginal	Low	Low
<i>Melaleuca deanei</i> Deane's Paperbark BC-V, EPBC-V	Deane's Paperbark occurs in two distinct areas, in the Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas respectively. There are also more isolated occurrences at Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone. Flowers appear in summer but seed production appears to be small and consequently the species exhibits a limited capacity to regenerate.	2	Marginal	Low	Low
<i>Persicaria elatior</i> Knotweed EPBC-V	Tall Knotweed is an erect herb to 90 cm tall, with stalked, glandular hairs (i.e. they are knobbed when seen under a lens) on most plant parts. Tall Knotweed has been recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). The species also occurs in Queensland. This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.		Marginal	Low	Low
<i>Persoonia hirsuta</i> Hairy Geebung BC-E, EPBC-E	Has a scattered distribution around Sydney. The species is distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. <i>Persoonia hirsuta</i> has a large area of occurrence, but occurs in small populations, increasing the species fragmentation in the landscape. The Hairy Geebung has been recorded in the Sydney coastal area (subsp. <i>hirsuta</i> - Gosford to Berowra to Manly to Royal National Park), the Blue Mountains area (subsp. <i>evoluta</i> - Springwood, Lithgow, Putty) and the Southern Highlands (subsp. <i>evoluta</i> - Balmoral, Buxton, Yanderra and Hill Top areas). The Hairy Geebung is found in sandy soils in dry	5	Marginal	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
	sclerophyll open forest, woodland and heath on sandstone from near sea level to 600m altitude. It is usually present as isolated individuals or very small populations. It is probably killed by fire (as other Persoonia species are) but will regenerate from seed. Flowering is generally in summer.				
<i>Persoonia mollis</i> subsp. <i>maxima</i> BC-E, EPBC-E	A tall, branching, spreading shrub which grows 2 - 6 m high. Highly restricted, known from the Hornsby Heights-Mt Colah area north of Sydney in the Sydney Basin Bioregion. Occurs in three populations (described on a catchment basis) located over an approximate north-south range of 5.75 km and east-west distance of 7.5 km. Additional locations may exist outside the current distribution. Occurs in sheltered aspects of deep gullies or on the steep upper hillsides of narrow gullies on Hawkesbury Sandstone. These habitats support relatively moist, tall forest vegetation communities, often with warm temperate rainforest influences. Associated species: Smooth Barked Apple <i>Angophora costata</i> , Sydney Peppermint <i>Eucalyptus piperita</i> , Red Bloodwood <i>Corymbia gummifera</i> , Turpentine <i>Syncarpia glomulifera</i> , Coachwood <i>Ceratopetalum apetalum</i> and Black Wattle <i>Callicoma serratifolia</i> . Flowers late December – March.		Marginal	Low	Low
<i>Pimelea curviflora</i> var. <i>curviflora</i> BC-V, EPBC-V	An erect herb to 90 cm tall. Has been recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). The species also occurs in Queensland. Normally grows in damp places, especially beside streams and lakes. Occasionally found in swamp forest or associated with disturbance. Grows on sandy, alluvial soil in swampy areas and riparian herblands along watercourses and lake edges. Associated plant species include <i>Melaleuca linearifolia</i> , <i>M. quinquenervia</i> , <i>Pseudognaphalium luteoalbum</i> , <i>Persicaria hydropiper</i> , <i>Floydia praealta</i> and <i>Cyperus semifertilis</i> . The distribution of this species overlaps with the “White Box-Yellow Box-Blakely’s Red Gum Grassy Woodland and Derived Native Grassland” EPBC Act-listed threatened ecological community.	11	Marginal	Low	Low
<i>Pimelea spicata</i> Spiked Rice-flower	A shrub to 50 cm tall that may be erect or somewhat prostrate in habit. Once widespread on the Cumberland Plain, Spiked Rice-flower occurs in two disjunct areas, the Cumberland Plain (Narellan, Marayong, Prospect Reservoir, Freemans Reach, Georges Hall areas) and the Illawarra (Landsdowne to Shellharbour to northern		Marginal	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
BC-E, EPBC-E	Kiama). In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils. Associated species include: Grey Box (<i>Eucalyptus moluccana</i>), Forest Red Gum (<i>E. tereticornis</i>), Narrow-leaved Ironbark (<i>E. crebra</i>), Blackthorn (<i>Bursaria spinosa</i>), and Kangaroo Grass (<i>Themeda australis</i>). On the inland Cumberland Plain sites it is associated with Grey Box and Ironbark. In the coastal Illawarra it occurs commonly in Coast Banksia open woodland with a more well developed shrub and grass understorey. Has been recorded from both shale hills and shale plains woodland. Cryptic and difficult to detect. Flowers sporadically throughout the year (but mostly in summer), with flowering likely to depend upon climatic conditions, particularly rainfall.				
<i>Prostanthera junonis</i> Somersby Mintbush BC-E, EPBC-E	Low spreading shrub 0.1 - 0.3 m and up to 1 m diameter. Has a north-south range of approximately 19 km on the Somersby Plateau in the Gosford and Wyong local government areas. The species is restricted to the Somersby Plateau. It occurs on both the Somersby and Sydney Town soil landscapes on gently undulating country over weathered Hawkesbury sandstone within open forest/low woodland/open scrub. It occurs in both disturbed and undisturbed sites. The dominant flowering period for this species is October to mid-December depending on weather/site conditions. The plant is very difficult to identify outside of this time.		Marginal	Low	Low
<i>Prostanthera marifolia</i> Seaforth Mintbush BC-CE, EPBC-CE	<i>Prostanthera marifolia</i> is an erect, straggly, openly branched shrub up to 0.3 m high. <i>Prostanthera marifolia</i> 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. Occurs in localised patches in or in close proximity to the endangered Duffys Forest ecological community. Located on deeply weathered clay-loam soils associated with ironstone and scattered shale lenses, a soil type which only occurs on ridge tops and has been extensively urbanised.	168	Marginal	Low	Low
<i>Syzygium paniculatum</i> Magenta Lilly Pilly	Found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State Forest. Has been recorded in widely scattered small populations along the NSW coast from Booti (near Forster) in the north to Conjola State Forest (near Jervis Bay) in the south. Found in rainforest on sandy soils or stabilised Quaternary sand dunes at low altitudes in coastal areas. Rainforests are often remnant stands of littoral or gallery	68	Marginal	Observed	Low – individuals are planted in isolation. No test/assessment of significance required.

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
BC-E, EPBC-V	rainforest. Associated species include <i>Alphitonia obliqua</i> , <i>Acmena smithii</i> , <i>Cryptocarya glaucescens</i> , <i>Toona XVIIIblique</i> , <i>Eucalyptus saligna</i> , <i>Ficus fraseri</i> , <i>Syzygium oleosum</i> , <i>Acmena smithii</i> , <i>Cassine oblique</i> , <i>F. oblique</i> , <i>Glochidion ferdinandi</i> , <i>Endiandra sieberi</i> , <i>Synoum glandulosum</i> , <i>Podocarpus elatus</i> , <i>Notelaea longifolia</i> , <i>Guioa semiglauc</i> and <i>Pittosporum undulatum</i> . Is thought to tolerate wet and dry conditions on sands. 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. Flowers December to March, with fruit ripe from March to May, occasionally to September.				
<i>Tetratheca glandulosa</i> BC-V	A small, spreading shrub which grows 20–50 cm in height. Restricted to the following Local Government Areas: Baulkham Hills, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Pittwater, Ryde, Warringah, and Wyong. There are approximately 150 populations of this plant ranging from Sampons Pass (Yengo NP) in the north to West Pymble (Lane Cove NP) in the south. The eastern limit is at Ingleside (Pittwater LGA) and the western limit is at East Kurrajong (Wollemi NP). The current north-south range is approximately 65km. 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. Vegetation structure varies from heaths and scrub to woodlands/open woodlands, and open forest. Vegetation communities correspond broadly to Benson & Howell's Sydney Sandstone Ridgetop Woodland. Common woodland tree species include: <i>Corymbia gummifera</i> , <i>C. eximia</i> , <i>Eucalyptus haemastoma</i> , <i>E. punctata</i> , <i>E. lebeian</i> , and/or <i>E. sparsifolia</i> , with an understorey dominated by species from the families Proteaceae, Fabaceae, and Epacridaceae. Can also be found with the endangered species <i>Darwinia biflora</i> , usually as part of the Shale/Sandstone Transition Forest community. Flowers July-November however residual flowers may persist until late December. Flowering is influenced by seasonal weather conditions and/or the microclimate effects (e.g. Exposure) of each particular site. Resprouts from a woody root following fire.	14	Marginal	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
<i>Tetratheca juncea</i> Black-eyed Susan BC-V, EPBC-V	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. While some studies show the species has a preference for cooler southerly aspects, it has been found on slopes with a variety of aspects. It generally prefers well-drained sites below 200m elevation and annual rainfall between 1000 - 1200mm. The preferred substrates are sandy skeletal soil on sandstone, sandy-loam soils, low nutrients; and clayey soil from conglomerates, pH neutral. It usually spreads via underground stems which can be up to 50 cm long. Consequently, individual plants may be difficult to identify. It also reproduces sexually but this requires insect pollination.	2	Marginal	Low	Low
<i>Thesium australe</i> Austral Toadflax BC-V, EPBC-V	An erect perennial herb to 40 cm high. Found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland or grassy woodland, often found in damp sites in association with Kangaroo Grass (<i>Themeda australis</i>). A root parasite that takes water and some nutrients from other plants, especially Kangaroo Grass. Flowering is predominantly in spring and summer.		Marginal	Low	Low
TECs					
<i>Agnes Banks Woodland in the Sydney Basin Bioregion</i> BC-CEEC, EPBC-EEC	A low woodland community with Scribbly Gum <i>Eucalyptus sclerophylla</i> , Narrow-leaved Apple <i>Angophora bakeri</i> and Old Man Banksia <i>serrata</i> as the dominant canopy trees. Diverse understorey shrubs include Wallum Banksia <i>Banksia aemula</i> , <i>Banksia oblongifolia</i> , Coneseed <i>Conospermum taxifolium</i> , Wedding Bush <i>Ricinocarpus pinifolius</i> , Showy Parrot Pea <i>Dillwynia sericea</i> and Nodding Geebung <i>Persoonia nutans</i> . Contains many more species and other references should be consulted to identify these. Occurs in western Sydney and originally extended over about 615 hectares, but now has only 98 hectares remaining intact, mostly near Agnes Banks on the east bank of the Hawkesbury River, in the Penrith local government area. A good example can be seen at the Agnes Banks Nature Reserve, near Richmond. The community occurs on areas of wind-blown sand which overlay Tertiary Alluvium deposits from ancient river systems. Depending on drainage conditions, there is great		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
Blue Gum High Forest in the Sydney Basin Bioregion BC-CEEC, EPBC-CEEC	variation within the community, from low woodland on higher ridges to sedge-type vegetation in low lying depressions. A moist, tall open forest community, with dominant canopy trees of Sydney Blue Gum <i>Eucalyptus saligna</i> and Blackbutt <i>E. pilularis</i> . Forest Oak <i>Allocasuarina torulosa</i> and Sydney Red Gum <i>Angophora costata</i> also occur. Species adapted to moist habitat such as Lillypilly <i>Acmena smithii</i> , Sandpaper Fig <i>Ficus coronata</i> , Soft Bracken <i>Calochlaena dubia</i> and Maiden Hair <i>Adiantum aethiopicum</i> may also occur. Contains many more species and other references should be consulted to identify these. Originally restricted to the ridgelines in Sydney's north from Crows Nest to Hornsby, and extending west along the ridges between Castle Hill and Eastwood. In 2000 there was less than 200 ha remaining (about 4.5% of its original extent). It only occurs in small remnants of which the largest is less than 20 ha. The remnants mainly occur in the Lane Cove, Willoughby, Ku-ring-gai, Hornsby, Baulkham Hills, Ryde and Parramatta local government areas. An example of Blue Gum High Forest can be seen at the Dalrymple-Hay Nature Reserve, St Ives. The community also occurs on soils associated with localised volcanic intrusions, 'diatremes'. Occurs only in areas where rainfall is high (above 1100 millimetres per year) and the soils are relatively fertile and derived from Wianamatta shale. In lower rainfall areas, it grades into Sydney Turpentine-Ironbark Forest. The rainforest understorey species rely on birds and mammals to disperse their seeds and are vulnerable to fire. Along the drier ridgelines, fire would have been more frequent and an important factor in maintaining understorey diversity.		Absent	Low	Low
Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion BC-EEC, EPBC-CEEC	Characteristic tree species of this ecological community are <i>Eucalyptus deanei</i> (Deane's Gum), <i>E. cypellocarpa</i> (Monkey Gum) and <i>Syncarpia glomulifera</i> (Turpentine). Other tree species include <i>Angophora costata</i> , <i>A. floribunda</i> , <i>E. notabilis</i> , <i>E. piperita</i> and <i>E. punctata</i> . Tree species composition varies between sites depending on geographical location and local conditions (e.g. topography, rainfall exposure). Known from the local government areas of Blue Mountains and Hawkesbury, both within the Sydney Basin Bioregion. Blue Mountains Shale Cap Forest is found on deep fertile soils formed on Wianamatta Shale, on moist sheltered sites at lower to middle altitudes of the Blue Mountains and Wollemi areas. Extensive occurrences of shale are at Springwood, Berambing to Kurrajong Heights, Mountain Lagoon and Colo Heights. Blue Mountains Shale Cap Forest includes vegetation that is part of Map Unit 9a Shale		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
	Cap Forest of the Royal Botanic Gardens' 1:100 000 vegetation maps and vegetation that is part of Smith and Smith's <i>Eucalyptus deanei</i> – <i>Syncarpia glomulifera</i> Tall Open Forest. Blue Mountains Shale Cap Forest is a rich habitat for fauna, supporting greater numbers and a greater diversity of mammals and birds than the typical lower, drier eucalypt forests and woodlands of the Blue Mountains. The <i>Eucalyptus deanei</i> trees are a major provider of nest hollows for owls, parrots, gliders and other hollow dependent fauna including the threatened species Powerful Owl and Glossy Black-Cockatoo. Blue Mountains Shale Cap Forest has been extensively cleared for agricultural and urban development and is poorly represented in Blue Mountains and Wollemi national parks. The structure of the community was originally tall open forest to open forest, depending on site conditions and history, but as a result of partial clearance may now exist as woodland or as groups of remnant trees.				
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion BC-VEC, EPBC- EEC	The Castlereagh Scribbly Gum and Agnes Banks Woodlands ecological community is located in the Sydney Basin Bioregion as defined by version 7 of the Interim Biogeographic Regionalisation of Australia (IBRA v 7, 2012). It occurs primarily in the Castlereagh area in the north-west of the Cumberland Plain (also referred to as the Cumberland sub-region), with other known occurrences near Holsworthy (some patches at Holsworthy are just outside the Cumberland sub-region), Kemps Creek and Longneck Lagoon (Tozer et al., 2010; NSW Scientific Committee, 2013). The canopy is composed of trees with a mature height of 10 m to around 20 m. The canopy contains, and is often dominated by, one or more of the following species: <i>Angophora bakeri</i> (narrow leaved apple), <i>Eucalyptus racemosa</i> (syn. <i>E. sclerophylla</i>) ¹ (scribbly gum, narrow-leaved scribbly gum) and <i>E. parramattensis subsp. parramattensis</i> (Parramatta red gum) (Keith, 2004; CHAH, 2006; Tozer et al., 2010). <i>Melaleuca</i> species including <i>M. decora</i> (paperbark) may also be prominent in the canopy (and/or mid layer) of the ecological community. <i>Eucalyptus fibrosa</i> (red ironbark) is also occasionally prominent in the canopy (Keith, 2004; Tozer et al., 2010). A shrub layer (average height approximately 2 m) is present and is sometimes dominated by either <i>Banksia</i> or <i>Melaleuca</i> species. Mid layer species often include: <i>Banksia aemula</i> (wallum) and <i>Conospermum taxifolium</i> (variable smoke bush) (particularly in Agnes Banks Woodland), <i>B. serrata</i> (old man banksia), <i>B. oblongifolia</i> (fern-leaved banksia), <i>B. spinulosa</i> (hairpin banksia), <i>Melaleuca decora</i> (paperbark), <i>Leptospermum trinervium</i> (flaky-barked tea-tree), <i>Dillwynia sericea</i> (showy parrot-pea), <i>Monotoca scoparia</i>		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
	(broom heath), <i>Platysace ericoides</i> , <i>Persoonia nutans</i> (nodding geebung), <i>Pimelea linifolia</i> subsp. <i>linifolia</i> (slender rice-flower) and <i>Hakea sericea</i> (silky hakea). The ground layer consists of a diverse range of graminoids and forbs including <i>Themeda triandra</i> syn. <i>T. australis</i> (kangaroo grass), <i>Entolasia stricta</i> (wiry panic), <i>Cyathochaeta diandra</i> , <i>Dianella revoluta</i> subsp. <i>revoluta</i> (blue flax-lily), <i>Lepidosperma urophorum</i> (at Agnes Banks), <i>Stylidium graminifolium</i> (grass triggerplant), <i>Lepyrodia scariosa</i> , <i>Mitrasacme polymorpha</i> , <i>Trachymene incisa</i> subsp. <i>incisa</i> , <i>Laxmannia gracilis</i> (slender wire lily), <i>Lomandra</i> spp. and <i>Aristida warburgii</i> (Keith, 2004; Tozer et al., 2010; NSW Scientific Committee, 2000, 2010).				
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions BC-EEC, EPBC-VEC	Coastal Saltmarsh occurs in the intertidal zone along the NSW coast on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. It is frequently found as a zone on the landward side of mangrove stands. Characteristic plants include <i>Baumea juncea</i> , <i>Juncus kraussii</i> , <i>Sarcocornia quinqueflora</i> , <i>Sporobolus virginicus</i> , <i>Triglochin striata</i> , <i>Isolepis nodosa</i> , <i>Samolus repens</i> , <i>Selliera radicans</i> , <i>Suaeda australis</i> and <i>Zoysia macrantha</i> . Occasionally mangroves are scattered through the saltmarsh. Tall reeds may also occur, as well as salt pan. Species composition varies with elevation and latitude, with Saltmarsh in southern NSW being generally more species-rich than further north. The sediment surface may support a diversity of seaweed species. Species restricted to coastal saltmarshes include <i>Distichlis distichophylla</i> (endangered), <i>Halosarcia pergranulata</i> subsp. <i>pergranulata</i> , <i>Wilsonia backhousei</i> (vulnerable) and <i>Wilsonia rotundifolia</i> (endangered). Coastal Saltmarsh occurs in a number of conservation reserves including the Ramsar listed sites at Towra Point and Kooragang Island Nature Reserves, and at Sydney Olympic Park.		Absent	Low	Low
Coastal Upland Swamp in the Sydney Basin Bioregion BC-EEC, EPBC-EEC	The Coastal Upland Swamp in the Sydney Basin Bioregion includes open graminoid heath, sedgeland and tall scrub associated with periodically waterlogged soils on the Hawkesbury sandstone plateaux. The Coastal Upland Swamp is generally associated with soils that are acidic and vary from yellow or grey mineral sandy loams with a shallow organic horizon to highly organic spongy black peat soils with pallid subsoils. The vegetation of the Coastal Upland Swamp may include tall open scrubs, tall closed scrubs, closed heaths, open graminoid heaths, sedgelands and fernlands. Larger examples may include a complex of these structural forms. The flora comprising the upland swamp is diverse there are 73 plant species listed as characterising the		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
	ecological community. The total species list is much greater and is likely to exceed 200 species of vascular plants. The Coastal Upland Swamp is endemic to NSW and confined to the Sydney Basin Bioregion. It occurs in the eastern Sydney Basin from the Somersby district in the north to the Robertson district in the south. In the north it occurs on the Somersby-Hornsby plateaux, in the south it occurs on the Woronora plateau. It occurs in elevations from 20 metres to over 600 metres above sea level, with the majority of swamps occurring within 200 and 450 metres elevation. Coastal Upland Swamps occur primarily on impermeable sandstone plateaux with shallow groundwater aquifers in the headwaters and impeded drainage lines of streams, and on sandstone benches with abundant seepage moisture. The Coastal Upland Swamp is generally associated with soils that are acidic and vary from yellow to grey mineral sandy loams with a shallow organic horizon to highly organic spongy black peats with pallid subsoils.				
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion BC-EEC, EPBC-CEEC	Ranges from open forest to low woodland, with a canopy dominated by Broad-leaved Ironbark <i>Eucalyptus fibrosa</i> and Paperbark <i>Melaleuca decora</i> . The canopy may also include other eucalypts such as Woollybutt <i>E. longifolia</i> . The dense shrubby understorey consists of <i>Melaleuca nodosa</i> and Peach Heath <i>Lissanthe strigosa</i> , with a range of 'pea' flower shrubs, such as <i>Dillwynia tenuifolia</i> , <i>Pultenaea villosa</i> and <i>Daviesia ulicifolia</i> (can be locally abundant). The sparse ground layer contains a range of grasses and herbs. Contains many more species and other references should be consulted to identify these. Occurs in western Sydney, and the extent of intact remnants is now reduced to 1011 ha, with the most extensive stands occurring in the Castlereagh and Holsworthy areas. Smaller remnants occur in the Kemps Creek area and in the eastern section of the Cumberland Plain. Good examples can be seen at the Castlereagh and Windsor Downs Nature Reserves, and Cox Creek Nature Reserve. Has a very restricted natural distribution and mainly occurs on clay soils derived from the deposits of ancient river systems (alluvium), or on shale soils of the Wianamatta Shales. Can intergrade into Shale-Gravel Transition Forest (where the alluvium is shallow), Castlereagh Swamp Woodland (in moist depressions) and Castlereagh Scribbly Gum Woodland (on sandier soils).		Absent	Low	Low
Cumberland Plain Shale Woodlands	The Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest lies in a coastal valley rain shadow that occupies the driest part of the Cumberland Plain. It typically occurs on flat to undulating or hilly terrain, at elevations up to about 350 m		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
and Shale-Gravel Transition Forest EPBC-CEEC, BC-CEEC	above sea level, and on clay soils (derived from Wianamatta Group shales), with some occurrences on other soils. Annual rainfall in the region typically lies within the range of 700–900 mm. This ecological community has several vegetation layers in its natural state. The tree canopy is typically dominated by <i>Eucalyptus moluccana</i> (grey box), <i>E. tereticornis</i> (forest red gum), and/or <i>E. fibrosa</i> (red ironbark). Other canopy species may occur in association with the typical dominants and may be locally dominant at some sites, depending on local variation in the landscape. Smaller trees and shrubs grow underneath the tree canopy. The vegetation on the ground is a mix of grasses and herbs. It was formerly extensive across the Cumberland Plain, but now occurs as mostly small patches. The Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest is endemic to New South Wales, specifically the area in and around western Sydney. It mostly occurs within the Cumberland subregion of the Sydney Basin bioregion (as defined by the Interim Biogeographic Regionalisation for Australia—IBRA v6.1), with some occurrences extending into neighbouring subregions.				
Duffys Forest Ecological Community in the Sydney Basin Bioregion BC-EEC	Open-forest or woodland community dominated by Red Bloodwood <i>Corymbia gummifera</i> , Black Ash <i>Eucalyptus sieberi</i> , Smooth-barked Apple <i>Angophora costata</i> , and frequently a stringybark <i>E. capitellata</i> or <i>E. oblonga</i> . Other understorey species include Myrtle Wattle <i>Acacia myrtifolia</i> , Hairpin Banksia <i>Banksia spinulosa</i> , Rusty Velet-bush <i>Lasiopetalum ferrugineum</i> , Crinkle Bush <i>Lomatia silaifolia</i> , Broad-leaf Geebung <i>Persoonia levis</i> , Apple–berry <i>Billardiera scandens</i> , Wiry Panic <i>Entolasia stricta</i> , Twisted Mat-rush <i>Lomandra obliqua</i> , <i>Micrantheum ericoides</i> and <i>Xanthorrhoea media</i> . The endangered shrub <i>Grevillea caleyi</i> is largely restricted to Duffys Forest Ecological Community though it is not present at all locations of the community. Extensively fragmented distribution, occurring primarily within Warringah, and Ku-ring-gai Local Government Areas (LGA) with minor occurrences in the Pittwater (Ingleside and Bilgola Plateau), Manly (Seaforth Oval) and Hornsby (South Turramura and Epping North) LGAs. Estimated original extent was approximately 1450 ha, of which less than 16%, or approximately 240 ha, remains. Occurs in association with shale lenses and lateritic soils in Hawkesbury Sandstone. Rock outcrops are usually absent from this community, except on the fringes, where it adjoins typical sandstone vegetation, generally characterised by extensive sandstone outcrops. Situated on ridgetops, plateaus and upper slopes, but may also occur on mid-slopes or benches downslope of Sydney Sandstone Ridgetop Woodland. Occurs on Somersby,		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion BC-EEC, EPBC- EEC	Blacktown, Lucas Heights and Lambert Soil Landscapes and, to a lesser extent, the GyMEA and Hawkesbury Soil Landscapes. Predominantly a sclerophyllous heath or scrub community although, depending on site topography and hydrology, some remnants contain small patches of woodland, low forest or limited wetter areas. Common species include <i>Banksia aemula</i> , <i>B. ericifolia</i> , <i>B. serrata</i> , <i>Eriostemon australasius</i> , <i>Lepidosperma laterale</i> , <i>Leptospermum laevigatum</i> , <i>Monotoca elliptica</i> and <i>Xanthorrhoea resinifera</i> . Once occupied around 5,300 hectares of land between North Head and Botany Bay in Sydney's eastern suburbs. Surviving stands totalling approximately 146 hectares have been recorded from the local government areas of Botany, Randwick, Waverley, and Manly. All ESBS remnants are small (typically 0.06 to 1 ha), isolated and degraded to some extent. Occurs on disjunct patches of nutrient poor (windblown) dune sand. The community possesses soil seed bank and has been observed to regenerate naturally on cleared sand where the soil profile remains intact. Field observations indicate that after a prolonged period (>15 years) without fire or similar disturbance, the floristic composition and vegetation structure becomes simplified with a few species dominating the standing vegetation.		Absent	Low	Low
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions BC-EEC	Associated with coastal areas subject to periodic flooding and in which standing fresh water persists for at least part of the year in most years. Typically occurs on silts, muds or humic loams in low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes but may also occur in backbarrier landforms where floodplains adjoin coastal sandplains. Generally occur below 20 m elevation on level areas. They are dominated by herbaceous plants and have very few woody species. The structure and composition of the community varies both spatially and temporally depending on the water regime: Those that lack standing water most of the time are usually dominated by dense grassland or sedgeland vegetation, often forming a turf less than 0.5 metre tall and dominated by amphibious plants including <i>Paspalum distichum</i> (water couch), <i>Leersia hexandra</i> (swamp rice-grass), <i>Pseudoraphis spinescens</i> (mud grass) and <i>Carex appressa</i> (tussock sedge). Where they are subject to regular inundation and drying the vegetation may include large emergent sedges over 1 metre tall, such as <i>Baumea articulata</i> , <i>Eleocharis equisetina</i> and <i>Lepironia articulata</i> , as well as emergent or floating herbs such as <i>Hydrocharis dubia</i> (frogbit), <i>Philydrum lanuginosum</i> (frogsmouth), <i>Ludwigia peploides</i> subsp. <i>montevideensis</i> (water		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
	<p>primrose), <i>Marsilea mutica</i> (nardoo) and <i>Myriophyllum</i> spp. (milfoils). As standing water becomes deeper or more permanent, amphibious and emergent plants become less abundant, while floating and submerged aquatic herbs become more abundant. These latter species include <i>Azolla filiculoides</i> var. <i>rubra</i>, <i>Ceratophyllum demersum</i> (hornwort), <i>Hydrilla verticillata</i> (water thyme), <i>Lemna</i> spp. (duckweeds), <i>Nymphaea gigantea</i> (giant waterlily), <i>Nymphoides indica</i> (water snowflake), <i>Ottelia ovalifolia</i> (swamp lily) and <i>Potamogeton</i> spp. (pondweeds). The threatened aquatic plants, <i>Aldrovanda vesiculosa</i> and <i>Najas marina</i>, also occur within this community. Known from along the majority of the NSW coast. However, it is distinct from Sydney Freshwater Wetlands which are associated with sandplains in the Sydney Basin bioregion. Extensively cleared and modified. In the 1990s the extent remaining were: 3% in the NSW North Coast bioregion, 66% in the lower Hunter – Central coast region, 40% on the Cumberland Plain, 70% in the Sydney – South Coast region, and 30% in the Eden region. There is less than 150 ha remaining on the Tweed lowlands (estimate in 1985); about 10,600 ha on the lower Clarence floodplain (in 1982); about 11,200 ha on the lower Macleay floodplain (in 1983); about 3,500 ha in the lower Hunter – Central Hunter region (in 1990s); less than 2,700 ha on the NSW south coast from Sydney to Moruya (in the mid 1990s), including about 660 ha on the Cumberland Plain (in 1998) and about 100 ha on the Illawarra Plain (in 2001); and less than 1000 ha in the Eden region (in 1990). Poorly reserved, known to occur in Ukerebagh, Tuckean, Tabbimoble Swamp, Hexham Swamp, Pambalong and Pitt Town Nature Reserves and Bungawalbin, Scheyville and Seven Mile Beach National Parks.</p>				
Hygrocybeae Community of Lane Cove Bushland Park in the Sydney Basin Bioregion BC-CEEC	<p>An assemblage of more than 20 species of fungi in the family Hygrophoraceae (Fungi, Basidiomycota, Agaricales, Hygrophoraceae). Including <i>Camarophyllopsis kearneyi</i>, <i>Hygrocybe anomala</i> var. <i>ianthinomarginata</i>, <i>H. astatogala</i>, <i>H. aurantiopallens</i>, <i>H. aurantipes</i>, <i>H. austropratensis</i>, <i>H. cantharellus</i>, <i>H. cheelii</i>, <i>H. chromolimonea</i>, <i>H. erythrocala</i>, <i>H. graminicolor</i>, <i>H. helioides</i>, <i>H. involutus</i>, <i>H. irrigata</i>, <i>H. kula</i>, <i>H. lanecovensensis</i>, <i>H. lewellinae</i>, <i>H. mavis</i>, <i>H. miniata</i>, <i>H. reesia</i>, <i>H. sanguinocrenulata</i>, <i>H. stevensoniae</i>, <i>H. taekeri</i>, and <i>H. virginea</i>. Lane cove Bushland Park, Lane Cove Local Government Area, Sydney Basin Bioregion. Occurs in gallery warm temperate forests dominated by Lilly Pilly (<i>Acmena smithii</i>), Grey Myrtle (<i>Backhousia myrtifolia</i>), Cheese Tree (<i>Glochidion ferdinandii</i>) and Sweet Pittosporum (<i>Pittosporum undulatum</i>). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally</p>		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
	low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss. Does not produce above ground fruiting bodies (fungus) all year round. Fruiting bodies begin appearing mid May to mid July sometimes to August.				
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions BC-EEC, CEEC	Generally a closed forest, the structure and composition of which is strongly influenced by its proximity to the ocean. The plant species of this community are predominantly rainforest species. Several species have compound leaves, and vines may be a major component of the canopy. These features differentiate littoral rainforest from forest or scrub, but while the canopy is dominated by rainforest species, scattered emergent individuals of sclerophyll species, such as <i>Angophora costata</i> , <i>Banksia integrifolia</i> , <i>Eucalyptus botryoides</i> and <i>Eucalyptus tereticornis</i> occur in many stands. Littoral Rainforest occurs only on the coast and is found at locations in the NSW North Coast Bioregion, Sydney Basin Bioregion and South East Corner Bioregion. Littoral Rainforest is very rare and occurs in many small stands. In total, it comprises less than one percent of the total area of rainforest in NSW. The largest known stand occurs in Iluka Nature Reserve, which is about 136 hectares in size. Occurs on sand dunes and on soil derived from underlying rocks. Stands on headlands exposed to strong wind-action may take the form of dense, wind-pruned thickets. Stands are generally taller in sheltered sites such as hind dunes, although wind-pruning may still occur on their windward sides. Most stands occur within two kilometres of the sea, though are occasionally found further inland within reach of the maritime influence. A number of species characteristic of Littoral Rainforest in NSW reach their southern limits at various places along the coast; a number of temperate species are restricted to the south coast; the total Littoral Rainforest flora declines from north to south. The species composition (flora and fauna) of a site will be influenced by its geographic location, the size of the site, its degree of exposure and rainfall, its disturbance history (including fire) and, if previously disturbed, the stage of regeneration.		Absent	Low	Low
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	An ecological community of subtropical rainforest and some related, structurally complex forms of dry rainforest. Lowland Rainforest, in a relatively undisturbed state, has a closed canopy, characterised by a high diversity of trees whose leaves may be mesophyllous and encompass a wide variety of shapes and sizes. Typically, the trees form three major strata: emergents, canopy and sub-canopy which, combined with variations in crown shapes and sizes results in an irregular canopy appearance. The		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
BC-EEC, EPBC-CEEC	trees are taxonomically diverse at the genus and family levels, and some may have buttressed roots. A range of plant growth forms are present in Lowland Rainforest, including palms, vines and vascular epiphytes. In disturbed stands of this community the canopy cover may be broken, or the canopy may be smothered by exotic vines. The Hawkesbury River notionally marks the southern limit of Lowland Rainforest in the NSW North Coast and Sydney Basin bioregions. South of the Sydney metropolitan area, Lowland Rainforest is replaced by Illawarra Subtropical Rainforest of the Sydney Basin Bioregion, which is listed as an endangered ecological community. Milton Ulladulla Subtropical Rainforest is also a related rainforest endangered ecological community that occurs still further south in the South East Corner Bioregion.				
Moist Shale Woodland in the Sydney Basin Bioregion BC-EEC, EPBC-CEEC	Similar to Cumberland Plain Woodland. It differs in having a shrub understorey that contains plants from moist habitats. Dominant canopy trees include Forest Red Gum <i>Eucalyptus tereticornis</i> , Grey Box <i>E. moluccana</i> , Narrow-leaved Ironbark <i>E. crebra</i> and Spotted Gum <i>Corymbia maculata</i> . Small trees, such as Hickory Wattle <i>Acacia implexa</i> and Sydney Green Wattle <i>A. parramattensis</i> ssp <i>parramattensis</i> are also common. The shrub layer includes <i>Breynia oblongifolia</i> , Hairy Clerodendrum <i>Clerodendrum tomentosum</i> and Indian Weed <i>Siegesbeckia orientalis</i> ssp <i>orientalis</i> . Moist Shale Woodland usually occurs on soils derived from Wianamatta Shale on high country in the southern half of the Cumberland Plain, and occurs mainly in Wollondilly local government area. Also occurs in smaller amounts further north in the Camden, Campbelltown, Fairfield, Liverpool and Penrith local government areas. There are 604 ha remaining intact. A small remnant can be seen in Western Sydney Regional Park. Mainly occurs in the hilly country with higher elevations where there is increased rainfall. The shrubs and trees of Moist Shale Woodland provide excellent habitat for birds and insects, and provide ideal nesting hollows for mammals and birds. Occurs on clay soils derived from Wianamatta shale and is intermediate between Cumberland Plain Woodland on drier sites and Western Sydney Dry Rainforest on wetter sites. Understorey shrubs in moist habitats are sensitive to fire and would be lost from the community with frequent fire.		Absent	Low	Low
Pittwater and Wagstaffe Spotted Gum Forest in the	General structural form is open-forest but may now exist as woodland or remnant trees. The tree canopy layer is characterised by Spotted Gum <i>Corymbia maculata</i> and Grey Ironbark <i>Eucalyptus paniculata</i> and is associated with Smooth-barked Apple <i>Angophora costata</i> , Red Bloodwood <i>Corymbia maculata</i> , Broad-leaved White		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
Sydney Basin Bioregion BC-EEC	Mahogany <i>E. umbra</i> , Grey Gum <i>E. punctata</i> , Turpentine <i>Syncarpia glomulifera</i> , Bangalay <i>E. botryoides</i> , and Rough-barked Apple <i>Angophora floribunda</i> . Occurs entirely within the Pittwater Local Government Area, on the Barrenjoey Peninsula and Western Pittwater Foreshores. Remnants are typically small and on private property, however there are a few remnants in Council reserves and one remnant within Ku-ring-gai Chase NP. Occurs in association with shale derived soils with high rainfall on lower hillslopes on the Narrabeen Group - Newport Formations on the Barrenjoey Peninsula and western Pittwater Foreshores. Assemblage diversity must take into account species likely to be present in the soil seedbank. Structural form is typically open-forest but may now exist as woodland or remnant trees. Floristic composition and structural diversity influenced by the remnant size, disturbance history and fire severity and frequency.				
Posidonia australis seagrass meadows of the Manning- Hawkesbury ecoregion EPBC-E	The ecological community occurs mostly within the sheltered environments of permanently open estuaries along the warm temperate New South Wales coastline, from Wallis Lake (32°S) to Port Hacking (34°S). Posidonia australis dominated seagrass meadows occurring around islands within the geographic range are also included within the ecological community. occurs wholly within the Manning Shelf and Hawkesbury Shelf IMCRA v4.0 bioregions. The ecological community typically occurs in subtidal waters at depths ranging less than 1m to 10 m on sand and silty mud substrate (Cambridge and Kuo, 1979; West, 1990). In these waters, salinity is close to marine levels (30-50‰) (Meehan, 2001), dropping only for short periods following rainfall. The ecological community is absent from brackish water (i.e. hyposaline) conditions such as intermittently open lagoons. The ecological community is known to occur at the following locations: Wallis Lake; Port Stephens; Lake Macquarie; Brisbane Water; Hawkesbury River; Pittwater; Port Jackson (Sydney Harbour); Botany Bay, Port Hacking (Creese et al., 2009); and in the lee of Broughton Island.		Absent	Low	Low
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and	This EEC is found on the river flats of the coastal floodplains. It has a tall open tree layer of eucalypts, which may exceed 40 m in height. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include <i>Eucalyptus tereticornis</i> (forest red gum), <i>E. amplifolia</i> (cabbage gum), <i>Angophora floribunda</i> (rough-barked apple) and <i>A. subvelutina</i> (broad-leaved apple). <i>Eucalyptus baueriana</i> (blue box), <i>E. botryoides</i> (bangalay) and <i>E. elata</i> (river peppermint) south from Sydney. A layer of small trees may be present, including		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
South East Corner Bioregions BC-EEC	<p><i>Melaleuca decora</i>, <i>M. styphelioides</i> (prickly-leaved teatree), <i>Backhousia myrtifolia</i> (grey myrtle), <i>Melia azaderach</i> (white cedar), <i>Casuarina cunninghamiana</i> (river oak) and <i>C. glauca</i> (swamp oak). Scattered shrubs include <i>Bursaria spinosa</i>, <i>Solanum prinophyllum</i>, <i>Rubus parvifolius</i>, <i>Breynia oblongifolia</i>, <i>Ozothamnus diosmifolius</i>, <i>Hymenanthera dentata</i>, <i>Acacia floribunda</i> and <i>Phyllanthus gunnii</i>. The groundcover is composed of abundant forbs, scramblers and grasses including <i>Microlaena stipoides</i>, <i>Dichondra repens</i>, <i>Glycine clandestina</i>, <i>Oplismenus aemulus</i>, <i>Desmodium gunnii</i>, <i>Pratia purpurascens</i>, <i>Entolasia marginata</i>, <i>Oxalis perennans</i> and <i>Veronica plebeia</i>. The composition and structure of the understorey is influenced by grazing and fire history, changes to hydrology and soil salinity and other disturbance, and may have a substantial component of exotic shrubs, grasses, vines and forbs. Associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. Generally occurs below 50 m elevation, but may occur on localised river flats up to 250 m above sea level. The structure of the community may vary from tall open forests to woodlands, although partial clearing may have reduced the canopy to scattered trees. Typically form mosaics with other floodplain forest communities and treeless wetlands, and often fringe treeless floodplain lagoons or wetlands with semi-permanent standing water. Given its habitat, the community has an important role in maintaining river ecosystems and riverbank stability. Known from parts of the Local Government Areas of Port Stephens, Maitland, Singleton, Cessnock, Lake Macquarie, Wyong, Gosford, Hawkesbury, Baulkham Hills, Blacktown, Parramatta, Penrith, Blue Mountains, Fairfield, Holroyd, Liverpool, Bankstown, Wollondilly, Camden, Campbelltown, Sutherland, Wollongong, Shellharbour, Kiama, Shoalhaven, Palerang, Eurobodalla and Bega Valley but may occur elsewhere in these bioregions.</p>				
Shale Gravel Transition Forest in the Sydney Basin Bioregion BC-EEC EPBC- CEEC	<p>Has an open forest structure with a canopy dominated by Broad-leaved Ironbark <i>Eucalyptus fibrosa</i>, with Grey Box <i>E. moluccana</i> and Forest Red Gum <i>E. tereticornis</i> occurring less frequently. Paperbark <i>Melaleuca decora</i> is common in the small tree layer. A sparse shrub layer is usually present which includes Blackthorn <i>Bursaria spinosa</i>, <i>Daviesia ulicifolia</i>, and Peach Heath <i>Lissanthe strigosa</i>. Mainly found in the northern section of the Cumberland Plain, western Sydney, in the Richmond, Marsden Park and Windsor districts. Also appears in the Liverpool/ Holsworthy area, and there are small occurrences at Bankstown, Yennora and Villawood and the Kemps Creek</p>		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
	area. There are 1,721 ha remaining intact. Good examples can be seen at Windsor Downs Nature Reserve and Kemps Creek Nature Reserve. The shrub understorey includes a number of listed threatened species in the 'pea' flower group. The plants in this group rely on nitrogen fixing root nodules and soil/root fungi to extract nutrients from the poor soils. There are periodic fires in Shale-Gravel Transition Forest and most species are able to regenerate from lignotubers and buds beneath the bark, as well as seed stored in the soil. Occurs primarily where shallow deposits from ancient river systems overlay shale soils, but also associated with localised concentrations of iron-hardened gravel. A transitional plant community which grades into Cumberland Plain Woodland where the influence of gravel soil declines, and grades into Cooks River/Castlereagh Ironbark Forest or Castlereagh Scribbly Gum Woodland where gravel deposits are thick.				
Shale Sandstone Transition Forest of the Sydney Basin Bioregion BC-EEC EPBC-CEEC	Occurs at the edges of the Cumberland Plain, where clay soils from the shale rock intergrade with soils from sandstone, or where shale caps overlay sandstone. The boundaries are indistinct, and the species composition varies depending on the soil influences. The main tree species include Forest Red Gum <i>Eucalyptus tereticornis</i> , Grey Gum <i>E. punctata</i> , stringybarks (<i>E. globoidea</i> , <i>E. eugenoides</i>) and ironbarks (<i>E. fibrosa</i> and <i>E. crebra</i>). Areas of low sandstone influence have an understorey that is closer to Cumberland Plain Woodland. Contains many more species and other references should be consulted to identify these. Before European settlement, was extensive around the edges of the Cumberland Plain, western Sydney, particularly the southern half. Today, only 9,950 ha remains intact (22.6% of its original extent) and the bulk of this occurs in the Hawkesbury, Baulkham Hills, Liverpool, Parramatta, Penrith, Campbelltown and Wollondilly local government areas. It occurs in an area bounded by Sackville (north), Mulgoa (west), Wilton (south) and Revesby (east). Good examples can be seen at Gulguer Nature Reserve. High sandstone influence sites have poor rocky soils, some of the shrubs of which rely on nitrogen-fixing root nodules and soil/root fungi to obtain nutrients.		Absent	Low	Low
Southern Sydney sheltered forest on transitional sandstone soils in	An open forest dominated by eucalypts with scattered subcanopy trees, a diverse shrub layer and a well-developed groundcover of ferns, forbs, grasses and graminoids. The dominant trees include <i>Angophora costata</i> , <i>Eucalyptus piperita</i> and occasionally <i>Eucalyptus pilularis</i> , particularly around Helensburgh. Associated with occurrences of <i>Eucalyptus pilularis</i> , <i>Acacia binervata</i> , <i>Elaeocarpus reticulatus</i> , <i>Pittosporum undulatum</i>		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
the Sydney Basin Bioregion BC-EEC	and a relatively dense groundcover of ferns, grasses, rushes, lilies and forbs. The community typically has an open forest structure, although disturbance may result in local manifestations as woodland or scrub. Found within an estimated total extent of less than 45 000 ha, bounded approximately by Hurstville, Carss Park, Bundeena, Otford, Stanwell Tops, Darkes Forest, Punchbowl Creek and Menai. Within this range, the community is currently estimated to occupy an area of approximately 400 - 4 000 ha. The community has been recorded from the local government areas of Campbelltown, Hurstville, Kogarah, Sutherland, Wollondilly and Wollongong within the Sydney Basin Bioregion and may occur elsewhere in the Bioregion. In Hurstville, Kogarah and Sutherland, the community persists as small fragments surrounded by urban development. The community is also present in the upper Hacking River catchment around Helensburgh and in Royal National Park. The terrain is primarily gentle, with slopes not often exceeding 10°, and where sandstone outcrops occur infrequently. The community is typically associated with sheltered heads and upper slopes of gullies on transitional zones where sandstone outcrops may exist, but where soils are influenced by lateral movement of moisture, nutrients and sediment from more fertile substrates.				
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions BC-EEC, EPBC- EEC	This community is found on the coastal floodplains of NSW. It has a dense to sparse tree layer in which <i>Casuarina glauca</i> (Swamp Oak) is the dominant species northwards from Bermagui. Other trees including <i>Acmena smithii</i> (Lilly Pilly), <i>Glochidion</i> spp. (Cheese Trees) and <i>Melaleuca</i> spp. (Paperbarks) may be present as subordinate species, and are found most frequently in stands of the community northwards from Gosford. Tree diversity decreases with latitude, and <i>Melaleuca ericifolia</i> is the only abundant tree in this community south of Bermagui. Known from parts of the Local Government Areas of Tweed, Byron, Lismore, Ballina, Richmond Valley, Clarence Valley, Coffs Harbour, Bellingen, Nambucca, Kempsey, Hastings, Greater Taree, Great Lakes, Port Stephens, Maitland, Newcastle, Cessnock, Lake Macquarie, Wyong, Gosford, Pittwater, Warringah, Hawkesbury, Baulkham Hills, Hornsby, Lane Cove, Blacktown, Auburn, Parramatta, Canada Bay, Rockdale, Kogarah, Sutherland, Penrith, Fairfield, Liverpool, Bankstown, Wollondilly, Camden, Campbelltown, Wollongong, Shellharbour, Kiama, Shoalhaven, Eurobodalla and Bega Valley but may occur elsewhere in these bioregions. Major examples once occurred on the floodplains of the Clarence, Macleay, Hastings, Manning, Hunter, Hawkesbury, Shoalhaven and Moruya		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
	Rivers. Small areas of Swamp Oak Floodplain Forest are contained within existing conservation reserves, including Stotts Island, Ukerebagh, Tuckean, Pambalong, Wamberal, Towra Point and Cullendulla Creek Nature Reserves and Bongil Bongil, Myall Lakes and Conjola National Parks. Associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Generally occurs below 20 m (rarely above 10 m) elevation. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees. Often fringes treeless floodplain lagoons or wetlands with semi-permanent standing water.				
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions BC-EEC	Usually an open to closed forest with a shrubby or reedy/ferny understorey. Has an open to dense tree layer of eucalypts and paperbarks although some remnants now only have scattered trees as a result of partial clearing. The trees may exceed 25 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality where the tree stratum is low and dense. For example, stands dominated by <i>Melaleuca ericifolia</i> typically do not exceed 8 m in height. The community also includes some areas of fernland and tall reedland or sedgeland, where trees are very sparse or absent. The most widespread and abundant dominant trees include <i>Eucalyptus robusta</i> (Swamp Mahogany), <i>Melaleuca quinquenervia</i> (Paperbark) and, south from Sydney, <i>Eucalyptus botryoides</i> (Bangalay) and <i>Eucalyptus longifolia</i> (Woollybut). This community is known from parts of the Local Government Areas of Tweed, Byron, Lismore, Ballina, Richmond Valley, Clarence Valley, Coffs Harbour, Bellingen, Nambucca, Kempsey, Hastings, Greater Taree, Great Lakes and Port Stephens, Lake Macquarie, Wyong, Gosford, Hornsby, Pittwater, Warringah, Manly, Liverpool, Rockdale, Botany Bay, Randwick, Sutherland, Wollongong, Shellharbour, Kiama and Shoalhaven but may occur elsewhere in these bioregions. The exact amount of its original extent is unknown but it is much less than 30%. There are less than 350 ha of native vegetation attributable to this community on the Tweed lowlands, less than 2,500 ha on the Clarence floodplain, less than 700 ha on the Macleay floodplain, up to 7,000 ha in the lower Hunter – central coast district, and less than 1,000 ha in the Sydney – South Coast region. Small areas of Swamp Sclerophyll Forest on Coastal Floodplains are contained within existing conservation reserves, including Bungawalbin, Tuckean and Moonee Beach Nature Reserves, and Hat Head,		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
	Crowdy Bay, Wallingat, Myall Lakes and Garigal National Parks. Associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains. Generally occurs below 20 m (though sometimes up to 50 m) elevation. The composition of the community is primarily determined by the frequency and duration of waterlogging and the texture, salinity nutrient and moisture content of the soil, and latitude. The understorey may have a substantial component of exotic grasses, vines and forbs. Often fringes treeless floodplain lagoons or wetlands with semi-permanent standing water.				
Sydney Freshwater Wetlands in the Sydney Basin Bioregion BC-EEC	A complex of vegetation types largely restricted to freshwater swamps in coastal areas. These also vary considerably due to fluctuating water levels and seasonal conditions. Characteristic species include sedges and aquatic plants such as <i>Baumea</i> species, <i>Eleocharis sphacelata</i> , <i>Gahnia</i> species, <i>Ludwigia peploides</i> ssp. <i>montevidensis</i> and <i>Persicaria</i> species. Areas of open water may occur where drainage conditions have been altered and there may also be patches of emergent trees and shrubs. Occurs on sand dunes and low-nutrient sandplains along coastal areas in the Sydney Basin bioregion. Typically occur on silts, muds or humic loams in depressions, flats, drainage lines, backswamps, lagoons and lakes associated with coastal floodplains. It is known from the Lake Macquarie, Wyong, Gosford, Pittwater, Warringah, Woollahra, Waverley, Botany, Rockdale, Randwick, Sutherland and Wollongong local government areas, but is likely to occur elsewhere within the bioregion. Small areas of Sydney Freshwater Wetlands have been reported to occur in Wyrabalong, Royal and Botany Bay National Parks. Has been extensively cleared and filled and remnants are often small and disturbed. Largely restricted to freshwater swamps in swales and depressions on sand dunes and low nutrient sandplains such as those of the Warriewood and Tuggerah soil landscapes. Swampy areas on alluvium with a saline influence do not fall within this community.		Absent	Low	Low
Sydney Turpentine- Ironbark Forest BC-EEC, EPBC- CE	Open forest, with dominant canopy trees including Turpentine <i>Syncarpia glomulifera</i> , Grey Gum <i>Eucalyptus punctata</i> , Grey Ironbark <i>Eucalyptus paniculata</i> and Thin-leaved Stringybark <i>E. eugenoides</i> . In areas of high rainfall (over 1050 mm per annum) Sydney Blue Gum <i>E. saligna</i> is more dominant. The shrub stratum is usually sparse and may contain mesic species such as Sweet Pittosporum <i>Pittosporum undulatum</i> and Elderberry <i>Panax Polyscias sambucifolia</i> . Occurs in Sydney and is heavily fragmented, with only 0.5 percent its original extent remaining intact. Remnants mostly occur in the		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
	Baulkham Hills, Hawkesbury, Hornsby, Ku-ring-gai, Parramatta, Ryde, Sutherland and Wollondilly local government areas. Good examples can be seen in small reserves such as Wallumatta Nature Reserve and Newington Nature Reserve. Occurs close to the shale/sandstone boundary on the more fertile shale influenced soils, in higher rainfall areas on the higher altitude margins of the Cumberland Plain, and on the shale ridge caps of sandstone plateaus. A transitional community, between Cumberland Plain Woodland in drier areas and Blue Gum High Forest on adjacent higher rainfall ridges. Is reported to be a rich habitat for mammals and birds, providing nest hollows for species such as hollow-dependent fauna including the Powerful Owl and Glossy Black-Cockatoo.				
<i>Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions</i> BC-EEC	The structure of the community is typically closed tussock grassland, but may be open shrubland or open heath with a grassy matrix between the shrubs. <i>Themeda australis</i> is the dominant species in this ecological community. <i>Themeda australis</i> is an extremely widespread species, but in this community it may have a distinctive appearance, being prostrate and having glaucous leaves. These features are retained in cultivation and the form is believed to be genetically distinct. Scattered shrubs occur in many stands, most frequently <i>Pimelea linifolia</i> , <i>Banksia integrifolia</i> and <i>Westringia aculata</i> . These and other woody species often have dwarf growth forms. A number of threatened species occur in some stands of the community, including <i>Diuris</i> sp. aff. <i>Chrysantha</i> , <i>Pultenaea maritima</i> , <i>Rutidosus heterogama</i> , <i>Thesium aculat</i> and <i>Zieria prostrata</i> . Themeda Grassland on seacliffs and coastal headlands is found on a range of substrates in the NSW North Coast, Sydney Basin and South East Corner bioregions. Stands on sandstone are infrequent and small. Larger stands are found on old sand dunes above cliffs, as for example at Cape Banks and Henry Head in Botany Bay National Park, and on basalt headlands, as for example at Damerals Head in Moonee Beach National Park. Individual stands of the community are often very small, a few square metres, but at some sites larger stands of up to several hectares or tens of hectares occur. Overall, the community has a highly restricted geographic distribution comprising small, but widely scattered patches.		Absent	Low	Low
<i>Western Sydney Dry Rainforest and Moist</i>	The Western Sydney Dry Rainforest and Moist Woodland on Shale ecological community covers two vegetation units, Western Sydney Dry Rainforest and Moist Shale Woodland, described by Tozer (2003) and Tozer et al. (2010) and listed as endangered under the New South Wales <i>Threatened Species</i>		Absent	Low	Low

Species	Description of habitat ¹	BioNet Record s	Presence of habitat	Likelihood of occurrence	Possible impact?
Woodland on Shale BC-E, EPBC-CEEC	<i>Conservation Act 1995</i> (NSW Scientific Committee, 2000a; 2000b). The ecological community varies from a low closed rainforest, typically in lower slopes and gullies, to a more open moist woodland form on upper slopes and disturbed sites. Emergent trees can be up to around 25 m high and a lower tree layer is often present. Dominant species of the canopy and the sub-canopy vary across the latitudinal range of the ecological community, and also according to the available moisture and shelter. Each dry rainforest stand is unique in its assemblage of species, although there are a group of common species throughout with local floristics depending on local conditions. In sheltered gullies and on lower slopes the canopy layer of the ecological community is typically dominated by <i>Melaleuca styphelioides</i> (prickly-leaved paperbark). Other diagnostic tree species include <i>Acacia implexa</i> (hickory wattle), <i>Alectryon subcinereus</i> (native quince), <i>Brachychiton populneus</i> (kurrajong), <i>Corymbia maculata</i> (spotted gum), <i>Melicope micrococca</i> (white euodia) and <i>Streblus brunonianus</i> (whalebone tree). <i>Eucalyptus</i> spp. occur as emergents in the rainforest form, and grade into a canopy in moist woodlands, the dominant species generally being <i>E. tereticornis</i> (forest red gum), <i>E. moluccana</i> (coastal grey box) and/or <i>E. crebra</i> (narrow-leaved ironbark).				
<p>E BC = listed as Endangered under Schedule 1 of the NSW <i>Biodiversity Conservation Act 2016</i></p> <p>E EPBC = listed as Endangered under the Commonwealth <i>Environment Protection & Biodiversity Conservation Act 1999</i>.</p> <p>V BC = listed as Vulnerable under Schedule 2 of the NSW <i>Biodiversity Conservation Act 2016</i></p> <p>V EPBC = listed as Vulnerable under the Commonwealth <i>Environment Protection & Biodiversity Conservation Act 1999</i>.</p>		<p>EEC BC = Endangered Ecological Community listed under Schedule 1 of the NSW <i>Biodiversity Conservation Act 2016</i></p> <p>CE EPBC = listed as Critically Endangered under the Commonwealth <i>Environment Protection & Biodiversity Conservation Act 1999</i>.</p>			

D.2 EVALUATION OF THE LIKELIHOOD AND EXTENT OF IMPACT ON THREATENED FAUNA

Species and Status	Description of habitat ²	BioNet Records	Presence of habitat	Likelihood of occurrence	Potential for impact?
Aves					
<i>Anthochaera phrygia</i> Regent Honeyeater BC-CE, EPBC-CE	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. Once recorded between Adelaide and the central coast of Queensland, its range has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. 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. In some years, flocks converge on flowering coastal woodlands and forests. The Regent Honeyeater is a flagship threatened woodland bird whose conservation will benefit a large suite of other threatened and declining woodland fauna. 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. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. In the last 10 years Regent Honeyeaters have been recorded in urban areas around Albury where woodlands tree species such as Mugga Ironbark and Yellow Box were planted 20 years ago.	3	Marginal	Low	Low

² Information sourced from species profiles on NSW OEH's threatened species database or the Australian Government's *Species Profiles and Threats* database (SPRAT) unless otherwise stated.

OEH threatened species database: <http://www.threatenedspecies.environment.nsw.gov.au/index.aspx>
SPRAT: <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
	<p>The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. Other tree species may be regionally important. For example the Lower Hunter Spotted Gum forests have recently been demonstrated to support regular breeding events. Flowering of associated species such as Thin-leaved Stringybark <i>Eucalyptus eugenioides</i> and other Stringybark species, and Broad-leaved Ironbark <i>E. fibrosa</i> can also contribute important nectar flows at times. Nectar and fruit from the mistletoes <i>Amyema miquelii</i>, <i>A. pendula</i> and <i>A. cabbagei</i> are also utilised. When nectar is scarce lerp and honeydew can comprise a large proportion of the diet. Insects make up about 15% of the total diet and are important components of the diet of nestlings. Colour-banding of Regent Honeyeater has shown that the species can undertake large-scale nomadic movements in the order of hundreds of kilometres. However, the exact nature of these movements is still poorly understood. It is likely that movements are dependent on spatial and temporal flowering and other resource patterns. To successfully manage the recovery of this species a full understanding of the habitats used in the non-breeding season is critical. There are three known key breeding areas, two of them in NSW - Capertee Valley and Bundarra-Barraba regions. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and Sheoaks. Also nest in mistletoe haustoria. An open cup-shaped nest is constructed of bark, grass, twigs and wool by the female. Two or three eggs are laid and incubated by the female for 14 days. Nestlings are brooded and fed by both parents at an average rate of 23 times per hour and fledge after 16 days. Fledglings fed by both parents 29 times per hour.</p>				
<i>Botaurus poiciloptilus</i> Australasian Bittern BC-E, EPBC-E	<p>In NSW, this species occurs along the coast and is frequently recorded in the Murray-Darling Basin, notably in floodplain wetlands of the Murrumbidgee, Lachlan, Macquarie and Gwydir Rivers. Occurs in permanent freshwater wetlands with tall, dense vegetation. Favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and/or</p>	1	Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
	reeds (e.g. <i>Phragmites</i> , <i>Cyperus</i> , <i>Eleocharis</i> , <i>Juncus</i> , <i>Typha</i> , <i>Baumea</i> , , <i>Bolboschoenus</i>) or cutting grass (<i>Gahnia</i>) growing over muddy or peaty substrate. Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds; there are usually six olive-brown eggs to a clutch. In Australia, the Bittern occurs with the Australian Painted Snipe <i>Rostratula benghalensis australis</i> .				
<i>Burhinus grallarius</i> Bush Stone-curlew BC-E	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. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch. Two eggs are laid in spring and early summer.	2	Absent	Low	Low
<i>Calidris canutus</i> Red Knot EPBC-E, Migratory	Breeding in the Arctic Circle between August and April, it visits Australian shores in large numbers and frequents coastal sand flats and the margins of estuaries and rivers. It feeds in close-packed flocks that move in unison. The red knot (all six subspecies combined) has a global distribution and an extremely large range. The species breeds at a range of locations around the Arctic and, for the boreal winter, migrates to non-breeding areas that extend to the southernmost parts of the Americas, Africa, Europe and Australasia. The red knot breeds in the northern hemisphere and undertakes migrations along the East Asian-Australasian Flyway (EAAF) to spend the boreal winter in Australasia. The vast majority of the population is considered to spend the non-breeding period in Australia. The red knot breeds on dry upland tundra in high Arctic areas. During the boreal summer, they nest on open vegetated tundra or stone ridges, often close to a clump of vegetation. Breeding density is normally around one pair per km ² .		Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
<i>Calidris ferruginea</i> Curlew Sandpiper BC-E, EPBC-CE, Migratory	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Curlew Sandpipers generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh. This species does not breed in Australia. This species forages mainly on invertebrates, including worms, molluscs, crustaceans, and insects, as well as seeds.		Absent	Low	Low
<i>Calidris tenuirostris</i> Great Knot BC-V, EPBC-CE	In NSW, the species has been recorded at scattered sites along the coast down to about Narooma. It has also been observed inland at Tullakool, Armidale, Gilgandra and Griffith. Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms. Migrates to Australia from late August to early September, although juveniles may not arrive until October-November. Most birds return north in March and April, however some individuals may stay over winter in Australia.		Absent	Low	Low
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo BC-V	The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern New South Wales. In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee. In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. May also occur in sub-alpine Snow Gum <i>Eucalyptus pauciflora</i> woodland and occasionally in temperate rainforests. Move to lower altitudes in winter, preferring more open eucalypt	1	Marginal	Low	Low

Species and Status	Description of habitat ²	BioNet Records	Presence of habitat	Likelihood of occurrence	Potential for impact?
<i>Calyptrorhynchus lathamii</i> Glossy Black-cockatoo BC-V	forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. Favours old growth attributes for nesting and roosting. 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. An isolated population exists on Kangaroo Island, South Australia. Dependent on large hollow-bearing eucalypts for nest sites. One or two eggs are laid between March and August. Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak (<i>Allocasuarina littoralis</i>), Forest She-oak (<i>A. torulosa</i>) or Drooping She-oak (<i>A. verticillata</i>) occur. In the Riverina area, inhabits open woodlands dominated by Belah (<i>Casuarina cristata</i>). Feeds almost exclusively on the seeds of several species of she-oak (<i>Casuarina</i> and <i>Allocasuarina</i> species), shredding the cones with the massive bill.	2	Marginal	Low	Low
<i>Charadrius leschenaultii</i> Greater Sand Plover EPBC-V	In Australia, the Greater Sand Plover occurs in coastal areas in all states, though the greatest numbers occur in northern Australia, especially the north-west (Marchant & Higgins 1993; Minton et al. 2006). It is also abundant in south-eastern parts of the Gulf of Carpentaria in Queensland, and is widespread from the Torres Strait, along the eastern coast, into the Northern Rivers region of northern NSW, with occasional records south to about Shoalhaven Heads. During the non-breeding season, the species is recorded in many coastal areas of Australia (Marchant & Higgins 1993), especially in the north, as well as islands in the south-western Pacific Ocean, including Micronesia, New Guinea, the Solomon Islands and New Zealand. In the non-breeding grounds in Australasia, the species is almost entirely coastal, inhabiting littoral and estuarine habitats. They mainly occur on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons (Bamford 1988; Blakers et al. 1984; Lane 1987; Sibson 1948; Stewart et al. 2007), and inshore reefs, rock platforms, small rocky islands or sand cays on coral reefs (Abbott 1982; Morris 1989; Sedgwick 1978). They are occasionally recorded on near-coastal saltworks and saltlakes, including marginal saltmarsh, and on brackish swamps (C.D.T. Minton 2002		Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
<i>Charadrius mongolus</i> Lesser Sand Plover EPBC-E	<p>pers.comm; Sibson 1953; Storr 1964b, 1977; Storr et al. 1986). They seldom occur at shallow freshwater wetlands (Storr 1977). Once, during a severe drought, the species was recorded in a poorly grassed paddock with large bare areas, more than 1 km from the nearest water (Eckert 1968). They usually roost on sand-spits and banks on beaches or in tidal lagoons, and occasionally on rocky points (Bamford 1988; Ewart 1973; Pegler 1983; Sibson 1948, 1953), or in adjacent areas of saltmarsh (Gosper & Holmes 2002) or claypans (Collins et al. 2001). They tend to roost further up the beach than other waders, sometimes well above high-tide mark (C.D.T Minton, 2002 pers.comm).</p> <p>Within Australia, the Lesser Sand-Plover is widespread in coastal regions, and has been recorded in all states. It mainly occurs in northern and eastern Australia, in south-eastern parts of the Gulf of Carpentaria, western Cape York Peninsula and islands in Torres Strait, and along the entire east coast, though it occasionally also occurs inland. It is most numerous in Queensland and NSW. A few Plovers remain to winter at various sites along the migratory route, but most from the East Asian-Australasian Flyway winter in Australia, and the species is a scarce but regular visitor to New Zealand, where fewer than five birds are recorded each year. In non-breeding grounds in Australia, this species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sandflats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wave-cut rock platforms and rocky outcrops. It also sometime occurs in short saltmarsh or among mangroves. The species also inhabits saltworks and near-coastal saltpans, brackish swamps and sandy or silt islands in river beds (Marchant & Higgins 1993). In north-western Australia, the species appears to use the Port Hedland saltworks in preference to nearby beaches (C. Minton 2002, pers.comm.). The species is seldom recorded away from the coast, at margins of lakes, soaks and swamps associated with artesian bores (Marchant & Higgins 1993). On its breeding grounds it occurs in alpine valleys (Dement'ev & Gladkov 1951). The species feeds mostly on extensive, freshly-exposed areas of intertidal sandflats and mudflats in estuaries or beaches, or in shallow ponds in saltworks (Evans 1975; Hindwood & Hoskin 1954; Johnstone & Storr 1998; McGill & Keast 1945; Thomas 1968). They also occasionally forage on coral reefs and on sandy or</p>		Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
<i>Daphoenositta chrysoptera</i> Varied Sittella BC-V	muddy river margins They roost near foraging areas, on beaches, banks, spits and banks of sand or shells (McGill & Keast 1945; Pegler 1983), and occasionally on rocky spits, islets or reefs (McGill & Keast 1945). They rarely roost in mangroves The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands, with a nearly continuous distribution in NSW from the coast to the far west. It inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and <i>Acacia</i> woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decorticated bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.	1	Marginal	Low	Low
<i>Dasyornis brachypterus</i> Eastern Bristlebird BC-E, EPBC-E	The distribution of the Eastern Bristlebird has contracted to three disjunct areas of south-eastern Australia: southern Queensland/northern NSW, the Illawarra Region and in the vicinity of the NSW/Victorian border. The estimated population size is less than 2000 individuals occupying a total area of about 120 sq km. There are now only four populations in the southern Queensland/northern NSW area with a total of 35 birds, compared to 15 years ago when 14 populations and 154 birds were recorded. This population once extended as far south as at least Dorrigo and has recently been identified as a separate ultrataxon (<i>monoides</i>) but further research is being undertaken to determine the validity of this. The remaining populations are the nominate ultrataxon (<i>brachypterus</i>) and once extended at least to what is now the Sydney urban area. The Illawarra population comprises an estimated 1600 birds, mainly from Barren Grounds Nature Reserve, Budderoo National Park and the Jervis Bay area. The southern population in Nadgee Nature Reserve and Howe's Flat is around 200 birds. Further surveys are required in parts of Ben Boyd National Park and Sydney Catchment Authority lands to determine whether further populations of the Eastern Bristlebird occur in these areas. Habitat is characterised by dense, low vegetation including heath and open woodland with a heathy understorey; in northern NSW occurs in open forest		Marginal	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
	with tussocky grass understorey; all of these vegetation types are fire prone. Age of habitat since fires (fire-age) is of paramount importance to this species; Illawarra and southern populations reach maximum densities in habitat that has not been burnt for at least 15 years; however, in the northern NSW population a lack of fire in grassy forest may be detrimental as grassy tussock nesting habitat becomes unsuitable after long periods without fire; northern NSW birds are usually found in habitats burnt five to 10 years previously. Shy and cryptic and rarely flies, although can be seen scampering over the ground; when approached, may move to a lookout perch 1 m or more above the ground, then retreat into dense vegetation. Feeds on a variety of insects, particularly ants. Nests are elliptical domes constructed on or near the ground amongst dense vegetation. Two eggs are laid during August to February; producing more than one clutch a year is rare, and recruitment into the population is low.				
<i>Diomedea antipodensis</i> Antipodean Albatross BC-V, EPBC-M	The Antipodean Albatross is endemic to New Zealand, however forages widely in open water in the south-west Pacific Ocean, Southern Ocean and the Tasman Sea, notably off the coast of NSW. They nest in open patchy vegetation, such as among tussock grassland or shrubs on ridges, slopes and plateaus. Antipodean Albatrosses are migratory and disperse over the Tasman Sea and South Pacific Ocean as far as the coast of South America during the non-breeding period following weather systems, in order to exploit food resources. Between each nesting cycle, adults that fail to breed before June are usually absent from their colonies for around 5–12 months. Those that fail to breed after June remain absent from their colonies for 12–17 months.		Absent	Low	Low
<i>Diomedea antipodensis gibsoni</i> Gibson's Albatross BC-V, EPBC-V	In Australian territory, Gibson's Albatross has been recorded foraging between Coffs Harbour, NSW, and Wilson's Promontory, Victoria. Males and females appear to use different foraging areas, with females frequenting the Tasman Sea in the vicinity of 40° S, while males either disperse westwards at lower latitudes or north-east towards the mid-Pacific Ocean. There are no breeding colonies of Gibson's Albatross in Australian territory. This albatross visits Australian waters while foraging and during the non-breeding season. On breeding islands, the Gibson's Albatross nests on coastal or inland ridges, slopes, plateaux and plains, often on marshy ground. Nests of the Gibson's		Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
<i>Diomedea epomophora</i> Southern Royal Albatross EPBC-V	Albatross are sited on moss terraces, in dense tussocks, and often in loose aggregations on the west (windward) side of islands. It prefers open or patchy vegetation (tussocks, ferns or shrubs), and it requires nesting areas that are near exposed ridges or hillocks so that it can take off. Gibson's Albatross eggs hatch in early March, and the chick is brooded by both adults in turn for four to five weeks, after which it is visited on irregularly to be fed. Both adults continue to feed the chick at different times throughout winter. At an average wingspan of above 3m, it is one of the two largest species of albatross, together with the Wandering Albatross. Most of the royal albatross population is found between 30° S and 45° S. The majority of the world's population of southern royal albatross nests on the rat free Subantarctic Campbell Island, around 8,200 to 8,600 pairs. There are smaller colonies on Adams Island and Auckland Island in the Auckland Islands, 20 pairs combined, and 69 pairs on Enderby Island and some <i>sanfordi</i> x <i>epomophora</i> hybrids at the northern royal albatross colony on the Otago Peninsula in New Zealand. They range along the southern oceans concentrating on the west and east coast of southern South America, and also in the waters surrounding New Zealand. They prefer to nest on tussock grassland, plateaus, or ridges, and will lay one egg biennially. This will normally take place in November or December. Both parents will incubate the egg, and rear the young.		Absent	Low	Low
<i>Fregetta grallaria grallaria</i> White-bellied Storm-Petrel (Tasman Sea) EPBC-V	The White-bellied Storm-Petrel (Tasman Sea) is about 20 cm long. It has a wingspan of about 40 to 48 cm and a mass of 45 to 65 g. The White-bellied Storm-Petrel (Tasman Sea) breeds on small offshore islets and rocks in the Lord Howe Island group, including Roach Island and Balls Pyramid. Its pelagic distribution is poorly understood, but it has been recorded north and east of its breeding islands to the tropics, in the Tasman Sea, Coral Sea, and north of New Zealand and it is thought that some birds also reach the central Pacific Ocean. It has also been recorded over near-shore waters off the coasts of Queensland, NSW and Tasmania. The White-bellied Storm-Petrel (Tasman Sea) breeds in late summer and autumn; eggs are laid from January to March, and the young fledge in May. It nests in crevices between large volcanic rocks, or in burrows excavated in banks. The nest chamber is sparsely lined with dried grass.		Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
<i>Grantiella picta</i> Painted Honeyeater BC-V, EPBC-V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus <i>Amyema</i> . Insects and nectar from mistletoe or eucalypts are occasionally eaten. Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.		Marginal	Low	Low
<i>Haliaetus leucogaster</i> White-bellied Sea Eagle BC-V, EPBC-M	White-bellied Sea-Eagles are a common sight in coastal and near coastal areas of Australia. Birds form permanent pairs that inhabit territories throughout the year. Their loud "goose-like" honking call is a familiar sound, particularly during the breeding season. Birds are normally seen, perched high in a tree, or soaring over waterways and adjacent land. In addition to Australia, the species is found in New Guinea, Indonesia, China, south-east Asia and India. The White-bellied Sea-Eagle feeds mainly off aquatic animals, such as fish, turtles and sea snakes, but it takes birds and mammals as well. It is a skilled hunter and will attack prey up to the size of a swan. Sea-Eagles also feed on carrion (dead prey) such as sheep and fish along the waterline. They harass smaller birds, forcing them to drop any food that they are carrying. Sea-Eagles feed alone, in pairs or in family groups. White-bellied Sea-Eagles build a large stick nest, which is used for many seasons in succession. The nest can be located in a tree up to 30m above the ground but may be also be placed on the ground or on rocks, where there are no suitable trees. At the start of the breeding season (May to October), the nest is lined with fresh green leaves and twigs. The female carries out most of the incubation of the two white eggs, but the male performs this duty from time to time.	60	Marginal	Low	Low
<i>Hieraaetus morphnoides</i> Little Eagle	The Little Eagle is a medium-sized bird of prey that is found throughout the Australian mainland excepting 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	2	Marginal	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
BC-V	living trees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.				
<i>Hirundapus caudacutus</i> White-throated Needletail EPBC-V	In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps. When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks. In coastal areas, they are sometimes seen flying over sandy beaches or mudflats, and often around coastal cliffs and other areas with prominent updraughts, such as ridges and sand-dunes.	16	Marginal	Low	Low
<i>Ixobrychus flavicollis</i> Black Bittern BC-V	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. During the day, roosts in trees or on the ground amongst dense reeds. When disturbed, freezes in a characteristic bittern posture (stretched tall, bill pointing up, so that shape and streaked pattern blend with upright stems of reeds), or will fly up to a branch or flush for cover where it will freeze again. Generally solitary, but occurs in pairs during the breeding season, from December to March. Like other bitterns, but unlike most herons, nesting is solitary. Nests, built in spring are located on a branch overhanging water and consist of a bed of sticks and reeds on a base of larger sticks. Between three and five eggs are laid and both parents incubate and rear the young.	4	Absent	Low	Low
<i>Lathamus discolor</i>	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	7	Marginal	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
Swift Parrot BC-E, EPBC-CE	South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. Migrates to the Australian south-east mainland between February and October. 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 <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Forest Red Gum <i>E. tereticornis</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Inland Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> , Blackbutt <i>E. pilularis</i> , and Yellow Box <i>E. melliodora</i> . Return to some foraging sites on a cyclic basis depending on food availability. Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum <i>Eucalyptus globulus</i> .				
<i>Limosa lapponica baueri</i> Bar-tailed Godwit (baueri) EPBC-V	This migratory species arrives in great numbers in August/September from its breeding grounds in north-east Siberia and spreads right around the coast for its summer visit until take-off time for breeding in April/May. Concentrations of tens of thousands have been recorded on Eight Mile Beach between Broom and Port Headland in WA. It is seen on coastal sandy shores, mud-flats and marches, probing, sweeping and jabbing into mud or sand between the tides for small crustaceans and worms.	1	Absent	Low	Low
<i>Limosa lapponica menzbieri</i> Northern Siberian Bar-tailed Godwit EPBC-CE	A large migratory shorebird. The migratory bar-tailed godwit (northern Siberian) does not breed in Australia. The bar-tailed godwit (both subspecies combined) has been recorded in the coastal areas of all Australian states. It is widespread in the Torres Strait and along the east and south-east coasts of Queensland, NSW and Victoria. In Tasmania, the bar-tailed godwit has mostly been recorded on the south-east coast. In South Australia it has mostly been recorded around coasts from Lake Alexandrina to Denial Bay. In Western Australia it is widespread around the coast, from Eyre to Derby. Populations have also been recorded in the northern Australia, from Darwin east to the Gulf of Carpentaria. The bar-tailed godwit is a regular migrant to Christmas Island, Norfolk Island, Lord Howe Island. It has also been recorded on subantarctic		Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
	islands such as Macquarie Island, Snares Islands, Auckland Islands and Campbell Islands (Higgins & Davies 1996).				
<i>Neophema chrysogaster</i> Orange-bellied Parrot BC-CE, EPBC-CE	The orange-bellied parrot is a small ground-feeding bird that migrates between distinct breeding and non-breeding ranges. Breeding occurs in south-west Tasmania in summer, and the birds overwinter on the coast of south-east mainland Australia. The migration route follows the west coast of Tasmania, and at least some birds stop on King Island during the northward migration in autumn.		Marginal	Low	Low
<i>Ninox connivens</i> Barking Owl BC-V	Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. During the day they roost along creek lines, usually in tall understorey trees with dense foliage such as <i>Acacia</i> and <i>Casuarina</i> species, or the dense clumps of canopy leaves in large <i>Eucalypts</i> . Feeds on a variety of prey, with invertebrates predominant for most of the year, and birds and mammals such as smaller gliders, possums, rodents and rabbits becoming important during breeding. Live alone or in pairs. Territories range from 30 to 200 hectares and birds are present all year. Three eggs are laid in nests in hollows of large, old eucalypts including River Red Gum (<i>Eucalyptus camaldulensis</i>), White Box (<i>Eucalyptus albens</i>), (Red Box) <i>Eucalyptus polyanthemos</i> and Blakely's Red Gum (<i>Eucalyptus blakelyi</i>). Breeding occurs during late winter and early spring.	6	Marginal	Low	Low
<i>Ninox strenua</i> Powerful Owl BC-V	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 the Powerful Owl lives in forests and woodlands occurring in the coastal, escarpment, tablelands and western slopes environments. Specific habitat requirements include eucalypt forests and woodlands on productive sites on gentle terrain; a mosaic of moist and dry types, with mesic gullies and permanent streams; presence of leafy sub-canopy trees or tall shrubs for roosting; presence of large old trees to provide nest hollows. Optimal habitat includes a tall shrub layer and abundant hollows supporting high densities of arboreal marsupials. Roosts in groves of dense mid-canopy trees or tall shrubs	278	Marginal	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
	<p>in sheltered gullies, typically on wide creek flats and at the heads of minor drainage lines, but also adjacent to cliff faces and below dry waterfalls. Species commonly used for roosting include the She-oaks <i>Allocasuarina</i> spp., rainforest species such as Coachwood <i>Ceratopetalum apetalum</i>, Lilly Pilly <i>Acmena smithii</i> and Sassafras <i>Doryphora sassafras</i>, Black Wattle <i>Acacia melanoxylon</i>, Turpentine <i>Syncarpia glomulifera</i> and eucalypts. Roosting sites are commonly among small groves of up to 2 ha of similar-sized trees with dense foliage in the height range 3-15 m. Nests in old hollow eucalypts in unlogged, unburnt gullies and lower slopes within 100 m of streams or minor drainage lines, with hollows greater than 45 cm diameter and greater than 100 cm deep; surrounded by canopy trees and subcanopy or understorey trees or tall shrubs. Hollow entrances are greater than 6 m above ground, commonly more than 20 m where the forest permits, in trees of at least 80 cm diameter at breast height. During the breeding season, the male Powerful Owl roosts in a "grove" of up to 20-30 trees, situated within 100-200 metres of the nest tree where the female shelters. Nesting occurs from late autumn to mid-winter, but is slightly earlier in north-eastern NSW (late summer - mid autumn). The Powerful Owl is highly sensitive to nest disturbance during the egg and chick stages and will readily abandon the nest if disturbed. Home range has been estimated as 300-1500 ha according to habitat productivity. Moist forest in unlogged corridors in gully systems is used for nesting and roosting, and also preferentially for foraging although much foraging is also conducted in dry and regrowth forest. The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider.</p>				
<p><i>Numenius madagascariensis</i></p> <p>Eastern Curlew</p> <p>EPBC-CE, Migratory</p>	<p>The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. The Eastern Curlew mainly forages on soft sheltered intertidal sandflats or mudflats, open and without vegetation or covered with seagrass, often near mangroves, on saltflats and in saltmarsh, rockpools and among rubble on coral reefs, and on ocean beaches near the tideline. The Eastern Curlew roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among</p>		Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
<i>Pachyptila turtur subantarctica</i> Fairy Prion (southern) EPBC-V	coastal vegetation including low saltmarsh or mangroves. It occasionally roosts on reef-flats, in the shallow water of lagoons and other near-coastal wetlands. Breeds on Macquarie Island and a number of other subantarctic islands outside of Australia. There are 80 to 250 breeding pairs in Australia and a global population of 80 000. In Australia, breeding is recorded on two rock stacks off Macquarie Island and on the nearby Bishop and Clerk Island. The population may have been larger prior to the arrival of black rats on Macquarie Island. The subspecies digs burrows among rocks or low vegetation in which to nest. Burrows may be dug below mat forming herbs. Feeds by plucking food from the ocean surface. Some individuals may migrate towards New Zealand and southern Australia in winter		Absent	Low	Low
<i>Pandion cristatus</i> Eastern Osprey BC-V	The breeding range of the Eastern Osprey extends around the northern coast of Australia (including many offshore islands) from Albany in Western Australia to Lake Macquarie in NSW. In NSW, the breeding population occurs from the Queensland border (contiguous with the Queensland population) south to Gosford and recently (2005-2007) to Sydney, with a more recent (2008) breeding attempt recorded further south at Ulladulla, where a bird has been observed nest-building (Clancy 2008, 2009). Vagrants occur south to and beyond the Victorian border. Forages over clear estuarine and inshore marine waters and coastal rivers, and nests in tall (usually dead or dead-topped) trees in coastal habitats from open woodland to open forest, within 1-2 km of water. Build a large stick bowl usually in the top of a dead or partly dead tree, from isolated trees in open country to open forest, with prominent emergent perches nearby (e.g. dead trees). The species is increasingly seen making use of artificial structures for nest sites and lookout perches (e.g. power pylons, towers, bridges) and purpose-built nest platforms on poles. A clutch of usually three eggs is laid in winter, with a single attempt per season. The incubation period is about 38 days, the nestling period 9-11 weeks, and the post-fledging dependence period lasts two to three months. Breeding productivity is 0.9-1.1 young per pair per year in NSW. Feed mostly on surface-swimming, schooling fish caught by diving into water. Highly mobile and dispersive.	8	Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
<i>Ptilinopus superbus</i> Superb Fruit-Dove BC-V	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.	15	Absent	Low	Low
<i>Rostratula australis</i> Australian Painted Snipe BC-E, EPBC-E	Little is known of the ecology, habitat requirements and reproductive biology of Australian Painted Snipe. They feed in shallow water or at the waters' edge and on mudflats, taking seeds and invertebrates such as insects, worms, molluscs and crustaceans. Females, which are larger and more brightly coloured than males, are thought to sometimes be polyandrous, mating with several males and leaving each one to incubate and raise chicks. They lay 3-4 eggs per clutch and incubation lasts about 15-16 days. Most records of Australian Painted Snipe are from temporary or infrequently filled freshwater wetlands and although they have occurred at many sites, no site can be identified in which they are resident or regular in occurrence. This may suggest the species is nomadic but the extent to which its cryptic behaviour may contribute to this belief is uncertain. The birds are able to remain hidden in rank vegetation, but many reports are of birds not being secretive, but rather still and unobtrusive. Primarily occurs along the east coast from north Queensland (excluding Cape York) to the Eyre Peninsula in South Australia, including the majority of Victoria and NSW. In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin. Inhabits inland and coastal shallow freshwater wetlands. The species occurs in both ephemeral and permanent wetlands, particularly where there is a cover of vegetation, including grasses, Lignum and Samphire. Individuals have also been known to use artificial habitats, such as sewage ponds, dams and waterlogged grassland. Nests on		Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
<i>Sternula nereis nereis</i> Australian Fairy Tern EPBC-V	the ground amongst tall vegetation, such as grass tussocks or reeds. Forages nocturnally on mud flats and in shallow water. Breeding is often in response to local conditions; generally occurs from September to December. Nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation. The subspecies has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline. The bird roosts on beaches at night. The subspecies may migrate within southern Western Australia and Tasmania, where are seen less frequently during the winter months. The bird is more sedentary in the north of Western Australia, South Australia and Victoria.		Absent	Low	Low
<i>Thinornis rubricollis rubricollis</i> Hooded Plover EPBC-V	The Hooded Plover is endemic to southern Australia and is nowadays found mainly along the coast from south of Jervis Bay, NSW, south through Victoria and Tasmania to the western side of the Eyre Peninsula (South Australia). Southern coastal Queensland and northern NSW were probably once part of the range of the Hooded Plover, but the species has not been recorded there since the 1920s. In the late 1920s and early 1930s the species was recorded from Port Stephens but are now considered locally extinct. It has not been seen in the Sydney area since the 1940s. Presently the Hooded Plover occurs in NSW north to Sussex Inlet. Occasionally, individual birds are sighted slightly further north to the Shoalhaven River and Comerong Beach and one bird was sighted at Lake Illawarra in March 2001. In south-eastern Australia Hooded Plovers prefer sandy ocean beaches, especially those that are broad and flat, with a wide wave-wash zone for feeding, much beachcast seaweed, and backed by sparsely vegetated sand-dunes for shelter and nesting. Occasionally Hooded Plovers are found on tidal bays and estuaries, rock platforms and rocky or sand-covered reefs near sandy beaches, and small beaches in lines of cliffs. They regularly use near-coastal saline and freshwater lakes and lagoons, often with saltmarsh.		Absent	Low	Low
<i>Tyto tenebricosa</i> Sooty Owl BC-V	A medium-sized owl to 45 cm long, with dark eyes set in a prominent flat, heart-shaped facial disc. Dark sooty-grey in colour, with large eyes in a grey face, fine white spotting above and below, and a pale belly. The plumage of the fledglings is similar to the adult, but has tufts of down on the head and	2	Marginal	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
	underparts. 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-dwelling mammals such as the Common Ringtail Possum (<i>Pseudocheirus peregrinus</i>) or Sugar Glider (<i>Petaurus breviceps</i>). Nests in very large tree-hollows.				
Fish					
<i>Epinephelus daemeli</i> Black Rockcod EPBC-V	Adult black cod can grow to 2 m in length and at least 80 kg in weight, but it is more common to see smaller fish (up to 1m/30kg). A large, reef-dwelling, carnivorous grouper species. They are found in warm temperate and subtropical parts of the south-western Pacific, and naturally occurred along the entire NSW coast including Lord Howe Island. Adult black cod are usually found in caves, gutters and beneath bomboras on rocky reefs. They are territorial and often occupy a particular cave for life. Small juveniles are often found in coastal rock pools, and larger juveniles around rocky shores in estuaries. Black cod are opportunistic carnivores, eating mainly other fish and crustaceans. They can change from one colour pattern to another in just a few seconds. They are usually black in estuaries and banded around clear water reefs.		Absent	Low	Low
<i>Macquaria australasica</i> Macquarie Perch EPBC-E	Macquarie perch grow to a maximum size of 400 mm. They are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. The conservation status of the different populations is not well known, but there have been long-term declines in their abundance. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries. They are quiet, furtive fish that feed on aquatic insects, crustaceans and molluscs. Sexual maturity occurs at two years for males and three years for females. Macquarie perch spawn in spring or summer in shallow upland streams or flowing parts of rivers. Females produce around 50,000-100,000 eggs which settle among stones and gravel of the stream or river bed.		Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
<i>Prototroctes maraena</i> Australian Grayling EPBC-V	<p>Australian Grayling occur in freshwater streams and rivers, especially clear gravelly streams with a moderate flow, as well as estuarine areas. They occur in fast-moving shoals and are a shy fish, fleeing when disturbed. They reach sexual maturity at 1–2 years of age when approximately 150 mm in length. Spawning takes place during late summer or autumn. Females can lay up to 82 000 small (approx. 1 mm) eggs, probably in the middle reaches of rivers, where they presumably settle among the gravel of the streambed. Once hatched, the larvae swim towards the water surface where they are swept downstream to the sea. The larvae and young juveniles have a marine stage before returning to freshwater rivers during spring when they are about 6 months old. The rest of their life cycle is spent in freshwater. Australian grayling are opportunistic omnivores, with a mixed diet of aquatic algae and insects.</p>		Absent	Low	Low
Mammals					
<i>Cercartetus nanus</i> Eastern Pygmy-possum BC-V	<p>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. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. Also feeds on insects throughout the year; this feed source may be more important in habitats where flowers are less abundant such as wet forests. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (<i>Pseudocheirus peregrinus</i>) dreys or thickets of vegetation, (eg. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. Appear to be mainly solitary, each individual using several nests, with males having non-exclusive home-ranges of about 0.68 hectares and females about 0.35 hectares. Young can be born whenever food sources are available, however most births occur between late spring and early autumn. Agile climbers, but can be caught on the ground in traps, pitfalls or postholes; generally nocturnal. Frequently spends time in torpor especially in</p>	11	Marginal	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
	winter, with body curled, ears folded and internal temperature close to the surroundings.				
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat BC-V, EPBC-V	<p>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. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Hirundo ariel</i>), 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. Found in well-timbered areas containing gullies. This species probably forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring.</p>	2	Absent	Low	Low
<i>Dasyurus maculatus</i> Spotted-tailed Quoll BC-V, EPBC-E	<p>Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. 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. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites. Mostly nocturnal, although will hunt during the day; spends most of the time on the ground. The home-range of this species is unknown, but estimates are between 800ha and 20km². Usually traverse their ranges along densely vegetated creeklines. They need suitable den sites and abundant food, requiring large areas of intact vegetation for foraging. Use 'latrine sites', often on flat rocks among boulder fields and rocky cliff-faces; latrine sites can be recognised by the accumulation of the sometimes characteristic 'twisty-shaped' faeces deposited by animals. Consumes a variety of prey, including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits and insects; also eats carrion and takes domestic fowl.</p>	2	Absent	Low	Low
<i>Falsistrellus tasmaniensis</i>	<p>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 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles,</p>	1	Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
Eastern False Pipistrelle BC-V	moths, weevils and other flying insects above or just below the tree canopy. Hibernates in winter. Females are pregnant in late spring to early summer.				
<i>Isoodon obesulus obesulus</i> Long-nosed Bandicoot, North Head BC-E	<p>A nocturnal marsupial of medium size. Adults range from 310 - 425 mm in head and body length, tail length varies from 120 - 155 mm and body weight may vary from 850 - 1100 grams. Males are larger than females. Colour is typically dark, greyish-brown above and creamy white below. The forefeet and upper surfaces of the hindfeet are also creamy white. The muzzle is long and pointed and the ears are distinctly larger and more pointed than short-nosed bandicoots of the genus <i>Isoodon</i>. 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.</p> <p>Shelters during the day in a well-concealed nest based on a shallow hole lined with leaves and grass, sometimes under debris, sometimes hidden with soil and with the entrance closed for greater concealment. Mating takes place at night and may occur throughout the year in the Sydney Region, although there is a trough in breeding activity from late autumn (April) to mid-winter (June). Has a very high reproductive capacity. There are 8 teats in the pouch and litter sizes range from one to five but usually two to three. Birth takes place during the daylight hours after a gestation of only 12.5 days. The young are carried in the pouch for 50 to 54 days and are then left in the nest. When the young are about 50 days old the mother may mate again and produce another litter several days after the previous one has been weaned. In good years, females may produce up to 4 litters. Female bandicoots may begin breeding at about four months of age and males at about five months. Has been recorded living up to three years in captivity. Assumed to live for up to two to two and a half years in the wild. Monitoring of the North Head population since 1997 has recorded some individuals living for up to three years.</p>	257	Marginal	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
<i>Micronomus norfolkensis</i> Eastern Freetail-bat BC-V	The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.	10	Absent	Low	Low
<i>Miniopterus australis</i> Little Bentwing-bat BC-V	Moist eucalypt forest, rainforest or dense coastal banksia scrub. Little Bentwing-bats roost in caves, tunnels and sometimes tree hollows 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. In NSW the largest maternity colony is in close association with a large maternity colony of Common Bentwing-bats (<i>M. schreibersii</i>) and appears to depend on the large colony to provide the high temperatures needed to rear its young.	6	Absent	Low	Low
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat BC-V	Large Bent-winged Bats (formerly known as Eastern Bent-wing 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. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. 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.	88	Absent	Low	Low
<i>Myotis macropus</i> Southern Myotis BC-V	The Large-footed Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. 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. Forage over streams and pools catching insects and small fish by raking their feet across	54	Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
	the water surface. In NSW females have one young each year usually in November or December.				
<i>Petauroides norfolcensis</i> Squirrel Glider EPBC-V	Adult Squirrel Gliders have a head and body length of about 20 cm. They have blue-grey to brown-grey fur above, white on the belly and the end third of the tail is black. There is a dark stripe from between the eyes to the mid-back and the tail is soft and bushy averaging about 27 cm in length. Squirrel Gliders are up to twice the size of Sugar Gliders, their facial markings are more distinct and they nest in bowl-shaped, leaf lined nests in tree hollows. Squirrel Gliders are also less vocal than Sugar Gliders. 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. Live in family groups of a single adult male one or more adult females and offspring. Require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	1	Marginal	Low	Low
<i>Phascolarctos cinereus</i> Koala BC-V, EPBC-V	Occurs in eastern Australia, from north-eastern Queensland to south-eastern South Australia and to the west of the Great Dividing Range. In NSW it mainly occurs on the central and north coasts with some populations in the western region. It was historically abundant on the south coast of NSW, but now occurs in sparse and possibly disjunct populations. The koala inhabits a range of eucalypt forest and woodland communities, including coastal forests, the woodlands of the tablelands and western slopes, and the riparian communities of the western plains. Examples of important shelter trees are cypress pine and brush box. The quality of forest and woodland communities as habitat for koalas is influenced by a range of factors, such as; species and size of trees present; structural diversity of the vegetation; soil nutrients; climate and rainfall; size and disturbance history of the habitat patch. 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. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size. Breeding season for the koala peaks between September and February.	4	Marginal	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox BC-V, EPBC-V	<p>Grey-headed Flying-foxes are found within 200 km of the eastern coast of Australia, from Bundaberg in Queensland to Melbourne in Victoria. 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 20 km of a regular food source, often in stands of riparian rainforest, Paperbark or Casuarina forest, and are commonly found in gullies, close to water, or in vegetation with a dense canopy. Forage on the nectar and pollen of native trees, in particular <i>Eucalyptus</i>, <i>Melaleuca</i> and <i>Banksia</i>, and fruits of rainforest trees and vines. Travel up to 50 km to forage. Annual mating commences in January and a single young is born each October or November. Site fidelity to camps is high with some camps being used for over a century.</p>	1077	Present	Moderate	<p>Low – proposal would only result in a very small impact area for opportunistic foraging for the species. Better quality habitat is present outside the study area, therefore low potential impact. Refer to Appendix E.2 and F.2 for the respective ToS and AoS.</p>
<i>Saccolaimus flaviventris</i> Yellow-bellied Sheathtail-bat BC-V	<p>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. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.</p>	1	Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
<i>Scoteanax rueppellii</i> Greater Broad- nosed Bat BC-V	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 500 m. 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. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young.	1	Absent	Low	Low
Amphibians					
<i>Pseudophryne australis</i> Red-crowned Toadlet BC-V	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. Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. Eggs are laid in moist leaf litter, from where they are washed by heavy rain; a large proportion of the development of the tadpoles takes place in the egg. Disperses outside the breeding period, when they are found under rocks and logs on sandstone ridges and forage amongst leaf-litter.	94	Absent	Low	Low
Reptiles					
<i>Caretta caretta</i>	The Loggerhead Turtle is a large sea turtle to 1.5 m in length. The shell is an elongated heart-shape, dark brown above and white, cream or yellowish	2	Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
Loggerhead Turtle BC-E, EPBC-E	below. The large head is dark brown on top becoming pale at the sides, with darker blotches. Loggerhead Turtles are found in tropical and temperate waters off the Australian coast. In NSW they are seen as far south as Jervis Bay and have been recorded nesting on the NSW north coast and feeding around Sydney. Loggerhead Turtles are ocean-dwellers, foraging in deeper water for fish, jellyfish and bottom-dwelling animals. The female comes ashore to lay her eggs in a hole dug on the beach in tropical regions during the warmer months.				
<i>Chelonia mydas</i> Green Turtle BC-V, EPBC-V	A large sea-turtle that grows up to 1 m in length. Its heart-shaped shell is olive-green, brown and black, and the scales on the side of the face and limbs have distinctive pale edges. Widely distributed in tropical and sub-tropical seas. Usually found in tropical waters around Australia but also occurs in coastal waters of NSW, where it is generally seen on the north or central coast, with occasional records from the south coast. Ocean-dwelling species spending most of its life at sea. Carnivorous when young but as adults they feed only on marine plant material. Eggs laid in holes dug in beaches throughout their range. Scattered nesting records along the NSW coast.	2	Absent	Low	Low
<i>Dermochelys coriacea</i> Leatherback Turtle BC-E, EPBC-E	A very large sea-turtle up to 3 m long with heavy paddle-shaped limbs lacking claws. Adults are dark brown or black above, sometimes with paler marbling or longitudinal rows of fine dots on the back, while hatchlings are a rich blue-black trimmed with white, and pale below. The adult shell is covered by a thick, smooth, leathery skin. There is a series of seven prominent longitudinal ridges above the shell and four ridges along the lower half of the shell. Throughout the world's tropical and temperate seas and in all coastal waters of Australia. Most sightings are in temperate waters. Large numbers of Leatherback Turtles feed in coastal waters from southern Queensland to the central coast of NSW. Occurs in inshore and offshore marine waters. Rarely breeds in Australia, with the nearest regular nesting sites being the Solomon Islands and Malayan Archipelago. Occasional breeding records from NSW coast, including between Ballina and Lennox Head in northern NSW. Number of sightings in southern waters suggest species actively seeks temperate feeding grounds, rather than occurring only as stray vagrants. Feed on jellyfish.	1	Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
<i>Eretmochelys imbricata</i> Hawksbill Turtle EPBC-V	Hawksbill Turtles have a parrot-like beak. Adults have an olive-green or brown carapace (upper shell) with reddish-brown, brown or black markings in a tortoiseshell pattern. The carapace is highly domed and heart shaped with imbricate (overlapping) scale and is cream to yellowish underneath. Major nesting of Hawksbill Turtles in Australia occurs at Varanus Island and Rosemary Island in Western Australia, and in the northern Great Barrier Reef and Torres Strait, Queensland. The total population of Hawksbill Turtles in Australia is unknown. However, Australia supports the largest hawksbill turtle nesting aggregations worldwide, with estimates of over 4000 females nesting annually in Queensland, over 2500 in the Northern Territory, and ~2000 in Western Australia.	1	Absent	Low	Low
Invertebrates					
<i>Synemon plana</i> Golden Sun Moth BC-E, EPBC-CE	The Golden Sun Moth's NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut. The species' historical distribution extended from Bathurst (central NSW) through the NSW Southern Tablelands, through to central and western Victoria, to Bordertown in eastern South Australia. Occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which groundlayer is dominated by wallaby grasses <i>Austrodanthonia</i> spp. Grasslands dominated by wallaby grasses are typically low and open - the bare ground between the tussocks is thought to be an important microhabitat feature for the Golden Sun Moth, as it is typically these areas on which the females are observed displaying to attract males. Habitat may contain several wallaby grass species, which are typically associated with other grasses particularly spear-grasses <i>Austrostipa</i> spp. or Kangaroo Grass <i>Themeda australis</i> . Adults are short-lived (one to four days) and do not feed - having no functional mouthparts; the larvae are thought to feed exclusively on the roots of wallaby grasses. Males spend their entire adult life patrolling the grassland in search of females; once mated, the females spend their time laying eggs at the bases of wallaby grass tussocks. The flight period is relatively short, typically lasting from six to eight weeks (during November and December in the ACT region, possibly earlier or later in other regions). Males		Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
	fly only in bright sunshine during the warmest part of the day (1000 - 1400 hrs). Adults emerge continuously throughout the flying season.				
Migratory					
<i>Apus pacificus</i> Fork-tailed Swift EPBC-M	The Fork-tailed Swift is a non-breeding visitor to all states and territories of Australia. In NSW, the Fork-tailed Swift is recorded in all regions. Many records occur east of the Great Divide, however, a few populations have been found west of the Great Divide. These are widespread but scattered further west of the line joining Bourke and Dareton. Sightings have been recorded at Milparinka, the Bulloo River and Thurloo Downs. The Fork-tailed Swift is almost exclusively aerial, flying from less than 1m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines (Higgins 1999). They forage aerially, up to hundreds of metres above ground, but also less than 1 m above open areas or over water. They often occur in areas of updraughts, especially around cliffs. They sometimes feed aerially among tree-tops in open forest. They probably roost aerially, but are occasionally observed to land.		Absent	Low	Low
<i>Cuculus optatus</i> Oriental Cuckoo EPBC-M	A regular migrant to Australia, where it spends the non-breeding season (Sept-May) in coastal regions across northern and eastern Australia as well as offshore islands. The species uses a range of vegetated habitats such as monsoon rainforest, wet sclerophyll forest, open woodlands and appears quite often along edges of forests, or ecotones between forest types. This cuckoo feeds arboreally, foraging for invertebrates on loose bark on the trunks and branches of trees, and among the foliage, including in mistletoes. It will forage from the ground, but requires shrubs or trees from which it sallies and returns to consume prey items. Caterpillars are a favoured food item. In NSW it occurs		Marginal	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
	from northern border south to Newcastle, mainly in coastal areas, but inland as far as Armidale and Apsley River.				
<i>Monarcha melanopsis</i> Black-faced Monarch EPBC-M	The Black-faced Monarch is found along the coast of eastern Australia, becoming less common further south. The Black-faced Monarch is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating. Resident in the north of its range, but is a summer breeding migrant to coastal south-eastern Australia, arriving in September and returning northwards in March. The Black-faced Monarch forages for insects among foliage, or catches flying insects on the wing. The Black-faced Monarch builds a deep cup nest of casuarina needles, bark, roots, moss and spider web in the fork of a tree, about 3 m to 6 m above the ground. Only the female builds the nest, but both sexes incubate the eggs and feed the young.		Marginal	Low	Low
<i>Monarcha trivirgatus</i> Spectacled Monarch EPBC-M	Spectacled Monarchs are largely confined to the north east and east coastal and near coastal regions of Australia. The nest is usually built in a vertical fork of a tree, sapling or shrub, and an association with water courses has been noted. Nests are deep and cup-shaped, but vary in overall shape depending on the nest location. In NSW occurs along coast and eastern slopes of Great Dividing Range to northern Hunter Region. Occasional records further south at sites around Newcastle, Central Coast and Sydney.		Marginal	Low	Low
<i>Motacilla flava</i> Yellow Wagtail EPBC-M	The Yellow Wagtail is a regular wet season visitor to northern Australia. Increasing records in NSW suggest this species is an occasional but regular summer visitor to the Hunter River region. The species is considered a vagrant to Victoria, South Australia and southern Western Australia. Habitat requirements for the Yellow Wagtail are highly variable, but typically include open grassy flats near water. Habitats include open areas with low vegetation such as grasslands, airstrips, pastures, sports fields; damp open areas such as muddy or grassy edges of wetlands, rivers, irrigated farmland, dams, waterholes; sewage farms, sometimes utilise tidal mudflats and edges of mangroves.		Marginal	Low	Low
<i>Myiagra cyanoleuca</i>	The Satin Flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. It		Marginal	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
Satin Flycatcher EPBC-M	is also found in New Guinea. The Satin Flycatcher is not a commonly seen species, especially in the far south of its range, where it is a summer breeding migrant. The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. The Satin Flycatcher is a migratory species, moving northwards in winter to northern Queensland and Papua New Guinea, returning south to breed in spring. The Satin Flycatcher takes insects on the wing, foraging actively from perches in the mid to upper canopy.				
<i>Rhipidura rufifrons</i> Rufous Fantail EPBC-M	The Rufous Fantail is found in northern and eastern coastal Australia, being more common in the north. It is also found in New Guinea, the Solomon Islands, Sulawesi and Guam. The Rufous Fantail is found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground. During migration, it may be found in more open habitats or urban areas. Strongly migratory in the south of its range, it moves northwards in winter, and virtually disappears from Victoria and New South Wales at this time. The Rufous Fantail feeds on insects, which it gleans from the middle and lower levels of the canopy. It is a very active feeder and constantly fans tail and flicks wings and body while foraging. The Rufous Fantail builds a small compact cup nest, of fine grasses bound with spider webs, that is suspended from a tree fork about 5 m from the ground. The bottom of the nest is drawn out into a long stem.		Marginal	Low	Low
<i>Gallinago hardwickii</i> Latham's Snipe EPBC-M	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity. Latham's Snipe does not breed within Australian jurisdiction. Latham's Snipe is an omnivorous species that feeds on seeds and other plant material (mainly from species in families such as Cyperaceae, Poaceae, Juncaceae, Polygonaceae, Ranunculaceae and Fabaceae), and on invertebrates including insects (mainly flies and beetles), earthworms and spiders and occasionally molluscs, isopods and centipedes.		Absent	Low	Low

Species and Status	Description of habitat ²	BioNet Record s	Presence of habitat	Likelihood of occurrence	Potential for impact?
<i>Gallinago megala</i> Swinhoe's Snipe EPBC-M	Few definite records exist for Swinhoe's Snipe in Australia. The species has been recorded in the north between the Kimberley Divide and Cape York Peninsula. Swinhoe's Snipe breeds in central and southern Siberia. During the non-breeding season Swinhoe's Snipe occurs at the edges of wetlands, such as wet paddy fields, swamps and freshwater streams. The species is also known to occur in grasslands, drier cultivated areas (including crops of rapeseed and wheat) and market gardens (Higgins & Davies 1996). Habitat specific to Australia includes the dense clumps of grass and rushes round the edges of fresh and brackish wetlands. This includes swamps, billabongs, river pools, small streams and sewage ponds. They are also found in drying claypans and inundated plains pitted with crab holes (Higgins & Davies 1996).		Marginal	Low	Low
<p>E BC = listed as Endangered under Schedule 1 of the NSW <i>Biodiversity Conservation Act 2016</i>.</p> <p>E EPBC = listed as Endangered under the Commonwealth <i>Environment Protection & Biodiversity Conservation Act 1999</i>.</p> <p>V BC = listed as Vulnerable under Schedule 2 of the NSW <i>Biodiversity Conservation Act 2016</i>.</p> <p>V EPBC = listed as Vulnerable under the Commonwealth <i>Environment Protection & Biodiversity Conservation Act 1999</i>.</p> <p>M EPBC = listed as Migratory under the Commonwealth <i>Environment Protection & Biodiversity Conservation Act 1999</i>.</p>		<p>CE EPBC = listed as Critically Endangered under the Commonwealth <i>Environment Protection & Biodiversity Conservation Act 1999</i>.</p> <p>CAMBA = Chinese-Australia Migratory Bird Agreement</p> <p>JAMBA = Japan-Australia Migratory Bird Agreement</p>			

APPENDIX E MICROBAT SURVEY REPORT

INTRODUCTION

BACKGROUND

The NSW Department of Education (School Infrastructure NSW) are seeking to redevelop Mosman High School under a SSDA. The proposal is to upgrade Mosman High School to provide a new building on the corner of Military and Belmont Roads with capacity for up to 1,200 students. The proposal will include new building works, associated core infrastructure, new outdoor play areas including roof top play space and associated landscaping works. Future works have also been identified as part of a future Stage 2, which seeks to construct a new building on the existing COLA to accommodate an additional 300 students. It is noted that future Stage 2 works do not form part of this SSDA. An initial masterplan study was completed in 2018 and has since progressed to the concept design phase.

The scope of works assessed within the SSDA includes:

- Demolition of Building B, Building C and part Building E;
- Removal of existing sports court and surrounding retaining walls and nominated trees;
- Construction of a new part 3 / part 4 storey building (Building G) on the corner of Military and Belmont Road providing:
 - Administration and staff facilities;
 - Multipurpose gym / hall;
 - Library;
 - Canteen facilities;
 - General and senior learning units;
 - Science learning unit;
 - Health/PE and performing arts unit; and
 - Learning and admin support unit.
- Associated landscaping works including new outdoor play areas, a roof top play space, and rooftop basketball court; and
- Reinstatement of staff carparking.

Three threatened species of microchiropteran bat were identified as having suitable habitat present within the building structures proposed to be demolished and were considered to have potential to occur. These included:

- Southern Myotis (*Myotis macropus*)
- Little Bent-winged Bat (*Miniopterus australis*)
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*)
 - Formerly known as the Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)

All three species are listed as Vulnerable under the NSW *Biodiversity Conservation Act 2016* (BC Act). None of the species are listed under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

METHODOLOGY

DATABASE ANALYSIS

The following databases were consulted during the preparation of this report:

- OEH BioNet Atlas of NSW Wildlife database (DPIE, 2020a)
- OEH Threatened Species Profile database (DPIE, 2020b)
- EPBC Act Protected Matters Search Tool (DAWE, 2020).

FIELD SURVEY

Roost Search

A daytime inspection of potential roosting habitat within Building B, Building C, and part Building E of the proposal site was undertaken on 16 October 2020. The survey was undertaken by Aleksei Atkin (NGH Ecology Technical Lead) who has had extensive previous experience surveying for microchiropteran bats and their habitats, and in call analysis. Further, Aleksei is a member of the Australasian Bat Society.

An initial assessment of roost spaces was undertaken utilising a 100-watt spotlight and binoculars, and the use of a FLIR E-5 infra-red camera. Notes were collected on the potential for habitat within the structures.

Call Survey and Analysis

One Titley Electronics Anabat Swift ultrasonic detector was positioned within each building's roof near potential entry/exit points. The detectors were left on site for four nights, recording nightly. Calls were downloaded and converted from full spectrum calls to Zero-crossing calls using Wildlife Acoustics Kaleidoscope software, then analysed through AnalookW. Analysis was undertaken by an experienced bat surveyor, and calls were assessed with reference to Bat Calls of New South Wales (Pennay, Law and Reinhold 2004). Reference calls were used for comparison and species confirmation (OEH, 2014).

LIMITATIONS

Several limitations were encountered during the survey. As the survey was conducted diurnally, and recording undertaken over four nights only, the lack of calls or presence of bats flying out could not categorically rule out the presence of bats within the roof structure at other points in time and acts as a snapshot only.

Additionally, placement of the Anabat Swift detector within Building B was considered sub-optimal for the recording of calls from bats potentially occurring within the broader roof space. While the roof cavity was accessed, potential roost spaces exist for bats outside of the area surveyed by the detector.

RESULTS

DATABASE ANALYSIS

OEH BioNet Atlas identified the following threatened microbat species within a 10-km radius of the site:

- Southern Myotis (*Myotis macropus*) – 48 records
- Little Bent-winged Bat (*Miniopterus australis*) – 6 records
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*) – 81 records
- Large-eared Pied Bat (*Chalinolobus dwyeri*) – 2 records
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) – 1 record
- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*) – 10 records
- Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*) – 1 record
- Greater Broad-nosed Bat (*Scoteanax rueppellii*) – 1 record

All species identified are listed as Vulnerable under the BC Act. None are listed under the EPBC Act.

Records of Large Bent-winged Bat and Southern Myotis were the most numerous within 10 km of the site. The nearest records are that of the Large Bent-winged Bat approximately 900 metres east of the site in Balmoral, while the nearest Southern Myotis record is approximately 1.3 km south in Sirius Cove. Little Bent-winged Bat records were closely associated with Large Bent-wing Bats; thus they have been assessed together.

An assessment of all microbat record locations indicate that microbat observations are restricted to coastal fringes with remnant bushland that would provide better quality foraging and roosting habitat such as rock crevices and tree hollows. The proposal site is approximately 830 metres from the nearest coastline and associated remnant bushland, thus indicating low foraging and habitat potential for threatened microbat species.

SPECIES ECOLOGY

Large Bent-winged Bat

The Large Bent-winged Bat (formerly known as the Eastern Bentwing-bat) has chocolate to reddish-brown fur on its back and slightly lighter coloured fur on its belly. It has a short snout and a high 'domed' head with short round ears. The wing membranes attach to the ankle, not to the base of the toe. The last bone of the third finger is much longer than the other finger-bones giving the bent-wing appearance. It weighs up to 20 grams, has a head and body length of about 6 cm and a wingspan of 30 - 35 cm (DPIE, 2020b).

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. This species form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. Large Bent-winged Bats hunt in forested areas, catching moths and other flying insects above the tree tops (DPIE, 2020b).

Large Bent-winged Bats are known to overwinter within drains, culverts and disused buildings in the Sydney region. (Hoye and Spence, 2004). The author of this report has monitored overwintering colonies within culverts beneath the M2 Motorway in northern Sydney, where both Large and Little Bent-winged Bats were present within expansion cracks. These roosts were cool and dark, had a flowing creek within them, had limited disturbance from adjacent roadway, and were surrounded by remnant vegetation. This concurs with the descriptions of overwintering roosts described by Hoye and Spence (2004) and by White (2011). The species is known to fly up to 70 km in one night, at speeds of up to 55 km/h (Hoye and Spence, 2004). Known roosts of these species within the broader locality include Henry Head military bunkers, 11 km east of the site (White, 2011) and Balls Head Coal Loader, approximately 11 km north of the site (Hoye and Spence, 2004).

Little Bent-winged Bat

Little Bent-winged Bats are small dark chocolate brown insectivorous bats with a body length of about 45 mm. The tip of the wing is formed by a particularly long joint of the third finger, folded back and bent under the wing while the bat is at rest. The fur is long and thick, especially over the crown and around the neck, and is slightly lighter in colour on the belly. They have distinctly short muzzles, and short, rounded roughly triangular shaped ears. This species is distinguished from the Common Bent-wing Bat by its smaller size (DPIE, 2020b).

The species typically forages within moist eucalypt forest, rainforest, or dense coastal banksia scrub. Little Bent-winged Bats roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with other Bent-winged Bats, and in winter the two species may form mixed clusters. In NSW, the largest maternity colony is in close association with a large maternity colony of Common Bent-wing Bats (*M. schreibersii*) and appears to depend on the large colony to provide the high temperatures needed to rear its young (DPIE, 2020b).

Southern Myotis

This species is now most often referred to as *Myotis macropus* or the Southern Myotis but has previously been called the Large-footed Myotis *M. adversus*. It has disproportionately large feet; more than 8 mm long, with widely spaced toes which are distinctly hairy and with long, curved claws. It has dark-grey to reddish brown fur above and is paler below. It weighs up to 15 grams and has a wingspan of about 28 cm (DPIE, 2020b).

The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. They 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. This species forage over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December (DPIE, 2020b).

The Southern Myotis is known to be relatively disturbance-tolerant, and has been identified in high-impact areas such as immediately adjacent to active construction areas. The bats remained in situ throughout the year, despite the presence of excavation, concrete pouring and concrete cutting occurring within approximately two metres of the individuals. This finding indicates that where the species has established colonies in proximity to constant disturbance (such as beneath a road). Additionally, the species is known to roost in concrete piers within the Sydney Basin, utilising small lift point holes. Figure E-1 below provides an example of the species within one of these lift points.



Figure E-1 Southern Myotis within concrete pier (Gonsalves and Law 2015, pp 23)

SURVEY

Weather

Table E-1 Survey dates and conditions (Sydney Harbour weather station ID: 066196)

Date	Weather	Moon Phase	Survey Method
16 October 2020	17.4° at 3:00pm	Waning Crescent (1.1%)	Daytime roost survey Call recording
17 October 2020	19.9° at 3:00pm	New Moon (0.2%)	Call recording
18 October 2020	21.3° at 3:00pm	Waxing Crescent (2.7%)	Call recording
19 October 2020	18.0° at 3:00pm	Waxing Crescent (8.3%)	Call recording

Roof Inspection

Roof inspection was undertaken during the install of ultrasonic detectors. Roofs were inspected externally to identify any points of potential access and egress. All roofs were found to contain spaces between the tile or metal roof cladding that would be suitable to allow for microbat ingress and egress. Inspections were undertaken internally within roof cavities (where accessible) utilising both a FLIR thermal camera and spotlight and binoculars, however due to the height of roof spaces and confined spaces, limited

visibility was available. Roofs were found to contain suitable cavities for microbat roosting; however, would likely be subject to significant temperature shifts throughout the day.

Ultrasonic Call Detection

Ultrasonic call survey was undertaken over a period of four nights within Building B and Building C. The void space within Building E was not accessible at time of survey. Detectors activated one hour prior to sunset, and deactivated one hour after sun rise. Refer to Figure E-2 for location context of the ultrasonic detector placement.



Figure E-2 Ultrasonic detector placement within roof structure

A total of four sound files were recorded over two nights in Building C, while large volumes of sound files were recorded within the roof space of Building B. Of these sound files, three were confirmed to constitute bat calls, all recorded within one minute of each other and identified to species level as Gould's Wattled Bat *Chalinolobus gouldii*, a non-threatened bat species (refer to Figure E-3). The remainder of sound files were not bat calls (and are considered likely to be Brushtail Possum *Trichosurus vulpecula* scratchings, as multiple scats of the species were identified during the survey). The call sequence indicated foraging calls, and occurred at 0140 hrs. The lack of any large volume of social and/or foraging calls during the dusk period indicates that at the time of survey, no bat colonies were present within the roof structures.

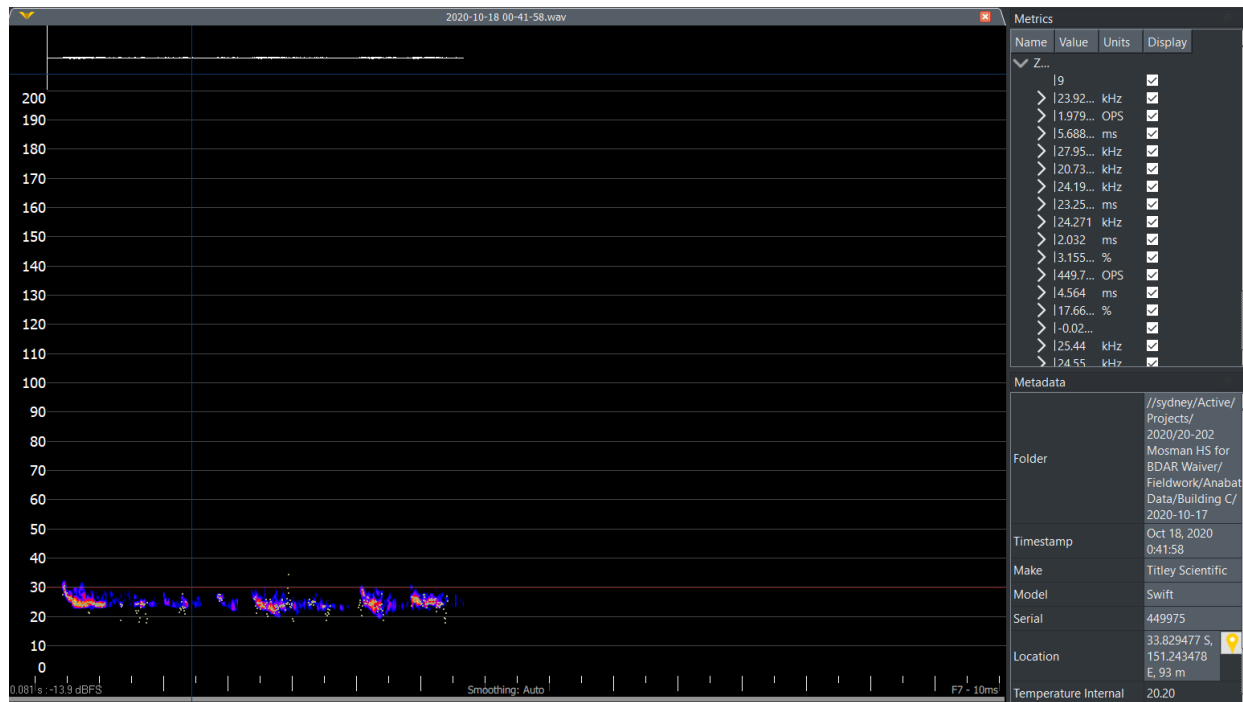


Figure E-3 Gould's Wattled Bat calls identified in the vicinity of Building C

IMPACT ASSESSMENT

HABITAT ASSESSMENT

While the roof spaces would contain potential roosting habitat for microchiropteran bats, it is considered unlikely that the conditions within the roof spaces would be suitable for long-term roosting. Due to heat fluctuations within the roofs, the cavities would be considered unlikely to support a permanent colony of any of the potentially occurring threatened species, which are typically associated with larger concrete structures in proximity to waterways, which buffer the ambient temperature to maintain stability. It is considered unlikely that permanent colonies of bats would exist within the roof structures, however they may be utilised on occasion as part of a broader range of roost habitats across the landscape. It is considered likely that the occurrences of the Large Bent-winged Bat, Little Bent-winged Bat and Southern Myotis within the locality would be more closely associated with disused concrete structures such as those at middle head, and wharves and bridges in proximity to waterways. This is supported by a combined Test of Significance for these species in Appendix A.4.

ULTRASONIC CALL DETECTION

The call detection survey identified the presence of one species of non-threatened bat, likely foraging within or in proximity to the roof cavity of Building C. While this result shows the presence of habitat for microbats, the lack of large volumes of calls around dusk or throughout the survey period indicates that the buildings do not support colonies of roosting microbats.

CONCLUSION

As the conditions within the roof cavities are considered sub-optimal for the roosting of microchiropteran bats other than on an occasional basis, it is considered unlikely that permanent colony of roosting bats occurs within the buildings. While these structures may be utilised on an occasional basis, it is considered unlikely that the structures would support threatened microchiropteran bats, and as such, impacts to the Large Bent-winged Bat, Little Bent-winged Bat and Southern Myotis are not considered significant such that populations of these species would no longer be viable within the locality.

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APPENDIX F TESTS OF SIGNIFICANCE

F.1 WALLANGARRA WHITE GUM (*EUCALYPTUS SCOPARIA*)

TEST OF SIGNIFICANCE (FIVE-PART TEST)

Under the *Biodiversity Conservation Act 2016*, the threatened species 'Test of Significance' (ToS) is used to determine if a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. It is sometimes also referred to as the 'five-part test'. One ToS was carried out for the purposes of this assessment for the Wallangarra White Gum (*Eucalyptus scoparia*).

Wallangarra White Gum (*Eucalyptus scoparia*)

- (a) **in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction;**

In NSW, the Wallangarra White Gum (*Eucalyptus scoparia*) is known from only three locations near Tenterfield, northern NSW. Although its native range is relatively narrow, it is widely cultivated and has been planted as ornamental tree cover in various areas across the state.

The proposal will involve the removal of one (1) *E. scoparia* individual. This would not have an adverse effect on the life cycle of the species to a degree that is likely to place it at risk of extinction as the proposal will not impact the species within its natural range.

- (b) **in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

- (i) **is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

Eucalyptus scoparia is not an Ecological Community, this does not apply.

- (ii) **is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Eucalyptus scoparia is not an Ecological Community, this does not apply.

- (c) **in relation to the habitat of a threatened species or ecological community:**

- (i) **the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**

The *Eucalyptus scoparia* individual is a planted ornamental tree within the proposal site and does not form part of a larger plant community type (PCT) within the locality. Due to its isolated siting within the proposal without any existing understorey nor groundcover, removal of the *E. scoparia* individual would not impact any existing habitat.

- (ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**

The proposed works would not further fragment or isolate an area of habitat as the proposal occurs in a highly modified area within metropolitan Sydney.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

The habitat occurring within the proposal site is not considered important to the long-term survival of the species, as it occurs outside of the species range and does not contribute genetic material to the natural population of the species. As such it is considered unlikely that the removal of the *Eucalyptus scoparia* individual will place the long-term survival of the species at risk.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)

The proposal site does not fall in any areas of outstanding biodiversity value.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process

Removal of the planted *Eucalyptus scoparia* individual is unlikely to contribute to or increase the impacts of key threatening processes as a result of the proposal. No habitat features were identified within the individual tree.

Conclusion

The proposed action to remove one (1) Wallangarra White Gum is unlikely to cause significant impacts to the broader species population.

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F.2 MAGENTA LILLY PILLY (*SYZYGium PANICULATUM*)

TEST OF SIGNIFICANCE (FIVE-PART TEST)

Under the *Biodiversity Conservation Act 2016*, the threatened species 'Test of Significance' (ToS) is used to determine if a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. It is sometimes also referred to as the 'five-part test'. One ToS was carried out for the purposes of this assessment for the Magenta Lilly Pilly (*Syzygium paniculatum*).

Magenta Lilly Pilly (*Syzygium paniculatum*)

- (a) **in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction;**

The Magenta Lilly Pilly is a rainforest tree with a total population of around 1,200 plants spread across a 400-km stretch of coastal NSW between Lansdowne and Conjola State Forest. Although its native range is relatively narrow, it is widely cultivated and has been planted as ornamental tree cover in various areas across the state.

The proposal will involve the removal of three (3) planted *S. paniculatum* individuals. This would not have an adverse effect on the life cycle of the species to a degree that is likely to place it at risk of extinction.

- (b) **in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

- (i) **is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

Syzygium paniculatum is not an Ecological Community, this does not apply.

- (ii) **is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Syzygium paniculatum is not an Ecological Community, this does not apply.

- (c) **in relation to the habitat of a threatened species or ecological community:**

- (i) **the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**

The *Syzygium paniculatum* individuals are planted ornamental trees within the proposal site and do not form part of a larger plant community type (PCT) within the locality. Due to its siting within isolated planter boxes, removal of the *S. paniculatum* individuals would not impact any existing habitat.

- (ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**

The proposed works would not further fragment or isolate an area of habitat as the proposal occurs in a highly modified area within metropolitan Sydney.

- (iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality**

It is considered unlikely that the removal of the *Syzygium paniculatum* individuals will place the long-term survival of the species at risk.

- (d) **whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)**

The proposal site does not fall in any areas of outstanding biodiversity value.

- (e) **whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process**

Removal of the three (3) planted *Syzygium paniculatum* individuals is unlikely to contribute to or increase the impacts of key threatening processes as a result of the proposal. No habitat features were identified within either tree.

Conclusion

The proposed action to remove three (3) Magenta Lilly Pilly individuals is unlikely to cause significant impacts to the broader species population.

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F.3 GREY-HEADED FLYING-FOX (*PTEROPUS POLIOCEPHALUS*)

TEST OF SIGNIFICANCE (FIVE-PART TEST)

Under the *Biodiversity Conservation Act 2016*, the threatened species 'Test of Significance' (ToS) is used to determine if a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. It is sometimes also referred to as the 'five-part test'. One ToS was carried out for the purposes of this assessment for the Grey-headed Flying-fox (*Pteropus poliocephalus*).

Grey-headed Flying-fox (*Pteropus poliocephalus*)

- (a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction;

Grey-headed Flying-foxes (*Pteropus poliocephalus*) occur on the east coast of Australia from Rockhampton in Queensland to Melbourne in Victoria (Tidemann 1998). They utilise a range of vegetation communities such as rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. They are also commonly found in disturbed and urban areas (Eby 1995). Grey-headed Flying-foxes are highly mobile and have been recorded travelling 40km in a night from their roosts to foraging areas (Eby 1991). On a seasonal basis they can move over hundreds of kilometres (Eby 1991).

Grey-headed Flying-foxes roost in large aggregations called camps. These camps are generally located within 20kms to a regular food source, are in close proximity to a water body and in vegetation with a dense canopy (OEH 2017). Camps can have tens of thousands of individuals in them and are sites for mating, birthing, and rearing young. Mating occurs in early autumn with young usually being born in October. Adult females usually conceive one offspring annually, which contributes to their low maximum rate of population growth (Parry-Jones 2000).

The diet of Grey-headed Flying-foxes comprises primarily nectar and pollen of native trees, particularly eucalypts (genera *Eucalyptus*, *Corymbia* and *Angophora*), melaleuca and banksia and fleshy fruits of rainforest trees and vines (Duncan et al. 1999). The species has no adaptations for withstanding food shortages and migrates in response to changes in food abundance (Eby & Lunney 2002).

The Grey-headed Flying fox is listed as vulnerable under the *Biodiversity Conservation Act 2016* and the *Environmental Protection and Biodiversity Conservation Act 1999*. Key threats for the species include habitat loss and fragmentation, biological factors, exploitation, competition and hybridisation and pollutants, electrocution, and pathogens.

The proposal will involve the removal of eleven trees, some of which might form occasional foraging habitat for Grey-headed Flying-foxes. Given the small number of trees source trees being removed, the location of these trees in a highly modified area, and the high mobility of Grey-headed Flying-foxes it is considered unlikely that the removal of these potential foraging trees will impact on Grey-Headed Flying-fox populations.

- (b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:
- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Pteropus poliocephalus is not an Ecological Community, this does not apply.

- (ii) **is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Pteropus poliocephalus is not an Ecological Community, this does not apply.

(c) in relation to the habitat of a threatened species or ecological community:

- (i) **the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**

It is possible that some Grey-headed Flying-foxes might be utilising the trees to be removed as occasional foraging habitat, though it is considered unlikely that the removal of these trees will impact on Grey-headed Flying-foxes given that up to eleven trees will be lost as a result of the proposal, the high mobility of Grey-headed Flying-foxes and areas of foraging habitat of greater quality occurring within 1km of the proposal area.

- (ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**

The proposed works would not further fragment or isolate an area of habitat as the proposal occurs in a highly modified area.

- (iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality**

It is considered unlikely that the removal of potential foraging trees in the proposal area will place the long-term survival of the species at risk.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)

The proposal site does not fall in any areas of outstanding biodiversity value.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process

It is unlikely that the proposal activities will contribute to or increase the impacts of key threatening processes as the proposal activities involve the removal of occasional foraging habitat trees in a modified area.

Conclusion

A Test of Significance was conducted due to several records of Grey-headed Flying-foxes occurring within close proximity to the proposal area. It is considered unlikely that the removal of trees within the proposal area will negatively impact on the species due to the small number of trees being removed which might constitute occasional foraging habitat and due to the high mobility of the species.

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F.4 MICROBATS: LARGE BENT-WINGED BAT (*MINIOPTERUS ORIANAE OCEANENSIS*), LITTLE BENT-WINGED BAT (*MINIOPTERUS AUSTRALIS*), SOUTHERN MYOTIS (*MYOTIS MACROPUS*)

TEST OF SIGNIFICANCE (FIVE-PART TEST)

Potential impacts to threatened fauna under the BC Act are considered for three microbat species: (1) Large Bent-winged Bat (*Miniopterus orianae oceanensis*); (2) Little Bent-winged Bat (*Miniopterus australis*); and (3) Southern Myotis (*Myotis Macropus*). Under the BC Act, the 'test of significance' is used to determine if a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. For the purpose of this assessment, the Large Bent-winged Bat and Little Bent-winged Bat will be assessed concurrently as their roosting and overwintering behaviours greatly overlap in relation to the scope of proposed work and its potential impact on these species.

The three microbat species are all small echolocating bats where the largest species, the Large Bent-winged Bat, weighs up to 20 grams with a wingspan of 30-35 centimetres. This species, as well as the Little Bent-winged Bat, possesses a characteristically long third digit joint which folds back and rests bent while the bat is at rest. Both Bent-wing species have chocolate brown fur with slightly lighter colouring on their bellies. Both species have short snouts and rounded ears but are separated by size difference where the body length of the Little Bent-winged Bat measures around 45 millimetres while the Large Bent-winged Bat measures around 60 millimetres. Notably, both species are known to share roosting sites with one another and closely associate to form large maternity colonies that produce offspring in early summer.

The Southern Myotis weighs up to 15 grams with a wingspan of about 28 centimetres. It is one of only two Australia's fishing bats, and forages by trawling its disproportionately large feet along the surface of water. Using this strategy, it captures prey including aquatic invertebrates and small fish. The species generally roost in groups of 10-15 individuals in areas close to water, in caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and dense foliage. In NSW, females produce one offspring per year usually in early summer.

Four nights of ultrasonic call survey were conducted to determine whether large volumes of bat calls were present within the roof structures of those within Mosman High School proposed to be demolished. No calls from either species during the survey. While a small number of non-threatened Gould's Wattled Bat (*Chalinolobus gouldi*) were detected, this test of significance was completed to assess potential foraging and roosting habitat for the three threatened species.

The 'five-part test' as described in Section 7.3 of the BC Act 2016, has been carried out for the following:

Five-part test	Large Bent-winged Bat and Little Bent-winged Bat	Southern Myotis	Likely significant impact?
<i>(a) in the case of a Threatened Species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction</i>	<p>The proposed work is not considered likely to impact on the life cycle of the local population of these species. The potential habitat within the roof structures of the school buildings are not considered likely to support large colonies. It is considered likely that the species would overwinter in better quality locations such as Bradleys Head or Middle Harbour. These species would utilise the building on occasion while foraging, if at all, due to the distance from coastal fringes and associated remnant bushland. The species would not utilise the site as a maternity roost due to incorrect roost conditions for this activity. This is supported by survey results which did not record calls from either species, nor were any roosts and/or colonies observed.</p> <p>Due to the absence of appropriate habitat, the work is not expected to cause a reduction in the available area of potential breeding or roosting habitat in the long-term. No habitat for these species would be directly impacted as a result of the proposal. As such, the life cycle of these species is not considered to be impacted such that their local populations are likely to be placed at risk of extinction.</p>	<p>The proposed work is not considered likely to impact on the life cycle of the local population of this species. As this species forages and roosts near waterbodies, and the subject site is not in the vicinity of any such bodies, it is considered likely that the species would overwinter in better quality locations such as Bradleys Head or Middle Harbour. These species may utilise the building on occasion while foraging, if at all, due to the distance from coastal fringes and associated remnant bushland. The species would not utilise the site as a maternity roost due to incorrect roost conditions for this activity. This is supported by survey results which did not record calls from either species, nor were any roosts and/or colonies observed.</p> <p>Due to the absence of appropriate habitat, the work is not expected to cause a reduction in the available area of potential breeding or roosting habitat in the long-term. No habitat for these species would be directly impacted as a result of the proposal. As such, the life cycle of the species is not considered to be impacted such that the local population is likely to be placed at risk of extinction.</p>	No
<i>(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:</i> <i>(i) is likely to have an adverse effect on the extent of the ecological</i>	Not applicable	Not applicable	No

Five-part test	Large Bent-winged Bat and Little Bent-winged Bat	Southern Myotis	Likely significant impact?
<p><i>community such that its local occurrence is likely to be placed at risk of extinction, or</i></p> <p><i>(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction</i></p>			
<p><i>(c) in relation to the habitat of a threatened species or ecological community:</i></p> <p><i>(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and</i></p> <p><i>(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and</i></p> <p><i>(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality</i></p>	<p>Surveys did not identify any roosts nor colonies within the buildings. While there is potential space for such groups, the highly variable temperature of building roofs are not habitable conditions for this species. As such, while the buildings are proposed to be demolished, the already low habitat potential does not provide habitat importance to these species. Therefore, the proposed work is also unlikely to fragment or isolate this habitat area for these species.</p> <p>The subject site provides suboptimal habitat conditions for overwinter roosting due to highly variable temperatures. The species likely utilises the Sydney Harbour coastlines for foraging and/or roosting as suggested by BioNet results. No calls from either species were recorded. Thus, the subject site is not considered to be important to the long-term survival of these species in the locality.</p>	<p>Surveys did not identify any roosts nor colonies within the buildings. While there is potential space for such groups, the highly variable temperature of building roofs are not habitable conditions for this species. As such, while the buildings are proposed to be demolished, the already low habitat potential does not provide habitat importance to these species. Therefore, the proposed work is also unlikely to fragment or isolate this habitat area for these species.</p> <p>The subject site provides suboptimal habitat conditions for overwinter roosting due to highly variable temperatures. The species likely utilises the Sydney Harbour coastlines for foraging and/or roosting as suggested by BioNet results. No calls from either species were recorded. Thus, the subject site is not considered to be important to the long-term survival of these species in the locality.</p>	No

Five-part test	Large Bent-winged Bat and Little Bent-winged Bat	Southern Myotis	Likely significant impact?
<i>(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)</i>	The proposed work would not have an adverse effect on any declared areas of outstanding biodiversity value.	The proposed work would not have an adverse effect on any declared areas of outstanding biodiversity value.	No
<i>(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.</i>	The proposed work does not constitute any key threatening processes during construction and would not increase the impact any processes upon operation.	The proposed work does not constitute any key threatening processes during construction and would not increase the impact any processes upon operation.	No

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APPENDIX G ASSESSMENTS OF SIGNIFICANCE

G.1 WALLANGARRA WHITE GUM (*EUCALYPTUS SCOPARIA*)

Assessment of Significance (AoS) - Wallangarra White Gum (*Eucalyptus scoparia*)

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the threatened species 'Assessment of Significance' (AoS) is used to determine if a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats as matters of national environmental significance.

An AoS was completed to determine the significance of impact to the Wallangarra White Gum (*Eucalyptus scoparia*) which is listed as Vulnerable under the EPBC Act.

The proposal site contains two (2) Wallangarra White Gums (*Eucalyptus scoparia*). These individuals are outside their natural range near Tenterfield in northern NSW (OEH 2019) and are planted ornamental trees within the proposal site.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

1. lead to a long-term decrease in the size of an important population of a species

The proposed actions involve the removal of one (1) planted Wallangarra White Gum. Given the location of this planted tree within a highly modified environment and out of its natural range, it is considered unlikely that the proposed action will impact on the broader population.

2. reduce the area of occupancy of an important population

The proposed actions are unlikely to reduce the area of occupancy of an important population as the proposal area is out of the species' natural range.

3. existing important population into two or more populations

It is unlikely that the proposed actions will fragment an existing important population into two or more populations as one (1) planted individual is being removed from the proposal area which occurs out of the species' natural range.

4. adversely affect habitat critical to the survival of a species

The proposal area is out of the species' natural range so impacts to the availability or quality of habitat does not apply.

5. disrupt the breeding cycle of an important population

It is unlikely that the proposed actions will disrupt the breeding cycle of important populations as one (1) planted individual is being removed from the proposal area which occurs out of the species' natural range.

6. modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposal area is out of the species' natural range so impacts to the availability or quality of habitat does not apply.

7. result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

It is unlikely that the proposed actions will result in invasive species that are harmful to the Wallangarra White Gum.

8. introduce disease that may cause the species to decline, or

It is unlikely that the proposed actions will introduce disease that may cause the species to decline.

9. interfere substantially with the recovery of the species.

It is unlikely that the proposed actions will interfere with the recovery of the species as one (1) individual is being removed from the proposal area which occurs out of the species' natural range.

Conclusion

The proposed action to remove one (1) Wallangarra White Gum is unlikely to cause significant impacts to the broader species population.

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G.2 MAGENTA LILLY PILLY (*SYZYGIUM PANICULATUM*)

Assessment of Significance (AoS) - Magenta Lilly Pilly (*Syzygium paniculatum*)

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the threatened species 'Assessment of Significance' (AoS) is used to determine if a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats as matters of national environmental significance.

An AoS was carried out for the purposes of this assessment for the Magenta Lilly Pilly (*Syzygium paniculatum*) which is listed as Vulnerable under the EPBC Act.

The proposal site contains three (3) Magenta Lilly Pilly individuals. These individuals are outside their natural range of coastal NSW between Lansdowne and Conjola State Forest (OEH 2019), and are planted ornamental trees in isolated planter boxes within the proposal site.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

1. lead to a long-term decrease in the size of an important population of a species

The proposed actions involve the removal of three (3) Magenta Lilly Pilly (*Syzygium paniculatum*) individuals. Given the location of this planted tree within a highly modified environment and out of its natural range, it is considered unlikely that the proposed action will impact on the broader population.

2. reduce the area of occupancy of an important population

The proposed actions are unlikely to reduce the area of occupancy of an important population as the proposal area is out of the species' natural range.

3. existing important population into two or more populations

It is unlikely that the proposed actions will fragment an existing important population into two or more populations as three (3) planted individuals are being removed from the proposal area which occurs out of the species' natural range.

4. adversely affect habitat critical to the survival of a species

The proposal area is out of the species' natural range so impacts to the availability or quality of habitat does not apply.

5. disrupt the breeding cycle of an important population

It is unlikely that the proposed actions will disrupt the breeding cycle of important populations as three (3) planted individuals are being removed from the proposal area which occurs out of the species' natural range.

6. modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposal area is out of the species' natural range so impacts to the availability or quality of habitat does not apply.

7. result in invasive species that are harmful to a vulnerable species becoming

established in the vulnerable species' habitat

It is unlikely that the proposed actions will result in invasive species that are harmful to the Magenta Lilly Pilly.

8. introduce disease that may cause the species to decline, or

It is unlikely that the proposed actions will introduce disease that may cause the species to decline.

9. interfere substantially with the recovery of the species.

It is unlikely that the proposed actions will interfere with the recovery of the species as three (3) individuals are being removed from the proposal area which occurs out of the species' natural range.

Conclusion

The proposed action to remove three (3) Magenta Lilly Pilly individuals within isolated planter boxes is unlikely to cause significant impacts to the broader species population.

References

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G.3 GREY-HEADED FLYING FOX (*PTEROPUS POLIOCEPHALUS*)

Assessment of Significance (AoS) - Grey-Headed Flying-Fox (*Pteropus poliocephalus*)

Under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), the threatened species 'Assessment of Significance' (AoS) is used to determine if a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats as matters of national environmental significance.

An AoS was completed to determine the significance of impact to the Grey-headed Flying-fox (*Pteropus poliocephalus*) which is listed as vulnerable under the EPBC Act.

Grey-headed Flying-foxes occur on the east coast of Australia from Rockhampton in Queensland to Melbourne in Victoria (Tidemann 1998). There are no separate or distinct populations due to the constant genetic exchange and movement between camps throughout their entire geographic range, indicating one single interbreeding population (Webb & Tidemann 1995). Due to the high mobility of the species and no critical habitat such as camps being impacted from the proposed actions, it is unlikely that the proposal will impact on the Grey-headed Flying-fox population.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

1. lead to a long-term decrease in the size of an important population of a species

The proposed actions will involve the removal of up to eleven (11) trees which may constitute occasional foraging habitat for Grey-headed Flying-foxes. Given the small number of trees being removed, the location of these trees in a highly modified area, and the high mobility of Grey-headed Flying-foxes it is considered unlikely that the removal of these potential foraging trees will impact on Grey-Headed Flying-fox populations.

2. reduce the area of occupancy of an important population

The proposed actions are unlikely to reduce the area of occupancy of an important population as Grey-headed Flying-foxes are a highly mobile species and they utilise a broad range of habitats (Eby 1991).

3. fragment an existing important population into two or more populations

Grey-headed Flying-foxes are highly mobile and no camps occur within the proposal area, thus it is unlikely that the proposed actions will fragment an existing important population into two or more populations.

4. adversely affect habitat critical to the survival of a species

The trees to be removed as a result of the proposal may form occasional foraging habitat for Grey-headed Flying-foxes, though the removal of this habitat is unlikely to be critical to their survival as they are known to forage in a range of vegetation communities and will migrate in response to changes in food abundance (Eby & Lunney 2002). Furthermore, no camps are present in the proposal area, so it is considered unlikely that the habitat is being utilised for roosting or breeding.

5. disrupt the breeding cycle of an important population

It is unlikely that the proposed actions will disrupt the breeding cycle of important populations of Grey-headed Flying-foxes as no camps, which is where breeding takes place, occurs within the proposal area.

6. modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed action involves the removal of up to 11 trees which may constitute occasional foraging habitat for the species. Given the location of these trees within a highly modified environment, the high mobility of the species and the presence of foraging habitat of greater quality in the surrounding area, it is considered unlikely that the removal of these trees will impact on Grey-headed Flying-fox populations.

7. result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

It is unlikely that the proposed actions will result in invasive species that are harmful to Grey-headed Flying-foxes or their habitat from becoming established.

8. introduce disease that may cause the species to decline, or

It is unlikely that the proposed actions will introduce disease that may cause the species to decline.

9. interfere substantially with the recovery of the species.

It is unlikely that the proposed actions will interfere with the recovery of the species as no direct or indirect impacts are likely to occur.

Conclusion

An Assessment of Significance was conducted due to several records of Grey-headed Flying-foxes occurring within close proximity to the proposal area. It is considered unlikely that the removal of trees within the proposal area will negatively impact on the Grey-headed Flying-fox population due to several factors including the high mobility of the species and the lack of critical habitat being impacted from proposal actions.

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