



Newport to Avalon Shared Pathway Preliminary Ecological Assessment

Preliminary Biodiversity Assessment

Prepared for Tract consultants

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Cover photograph: Avalon Beach, NSW

Executive summary

Niche was commissioned by Tract Consultants Pty Ltd, on behalf of Northern Beaches Council (Council) to prepare a Preliminary Biodiversity Assessment for the proposed Newport to Avalon Shared Bike Track project (the project).

The project involves the construction of a shared pathway from Newport Beach to Avalon Beach in NSW. For the most part, the shared pathway would follow existing roads and trails but will bisect some existing reserve land also (see Figure 3). Altogether, the shared pathway will involve the following components:

- Shared paths (suspended)
- Shared paths (on-ground)
- Footpaths (suspended)
- Footpaths (on-ground)

Along with vegetation clearing for these components, buffer areas of 2 metres either side of all shared paths and footpaths will be required for the movement and storage of equipment during construction and will likely impose temporary impacts to local flora in the form of trampling.

Purpose and objectives

The purpose of this report is to identify potential biodiversity constraints and further investigations required for the development of the project.

This assessment has taken into consideration species, populations and ecological communities listed as threatened under the *Biodiversity Conservation Act 2016* (BC Act) and *Fisheries Management Act 1994* (FM Act), and Matters of National Environmental Significance (MNES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Field survey

Niche completed a field survey on the 6th of July, 2018. Dr Cairo Forrest (Ecologist and Accredited Assessor) conducted a survey across the study area and verified existing vegetation with the use of a series of Random Data Points (RDPs), threatened plant surveys and fauna habitat surveys.

Biodiversity constraints

Three native vegetation communities have been mapped within the study area:

- Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817)
- Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney (PCT 1778)
- Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin)Bioregion and South East Corner Bioregion (PCT 898)

PCT 898 is listed as a Threatened Ecological Community (TEC) under the BC Act.

These communities are generally in good condition as a result of bush regeneration and maintenance works carried out by Council.

No threatened flora or fauna species were recorded during the field survey. Threatened flora and fauna are unlikely to be impacted by the project.

Records of six threatened fauna species were found within the subject site (locality), however, no threatened fauna species with a 'low-Moderate' or higher likelihood of occurrence are thought to have limiting habitat within the study area and are therefore unlikely to be significantly impacted by the proposal.

Corridors

The locality provides a wildlife corridor along the coast connecting several reserves, however the project does not fragment this corridor such that wildlife connectivity would be impacted.

Areas of Outstanding Biodiversity Value

Areas of Outstanding Biodiversity Value (AOBVs) are special areas that contain irreplaceable biodiversity values that are important to the whole of NSW, Australia or globally. AOBVs will be a priority for investment in private land conservation. No AOBVs occur within the study area.

Biodiversity Values Map

The Biodiversity Values Map (BVM) identifies land with high biodiversity value, as defined by the *Biodiversity Conservation Regulation 2017*. Whilst one creek (Bilgola Creek) intersecting the Serpentine Rd and running through the study area is mapped on the BVM (Figure 7), no new works will be occurring near this BV such that any direct or indirect impacts to it would be felt. As such, this project will have no impacts on any BVs.

BioBanking sites

Biobank sites have an existing legal commitment to be managed for conservation purposes in-perpetuity and therefore are not available for future urban development or infrastructure unless special legislative provisions are enacted. The study area does not contain any Biobank sites.

Potential impacts

The Project is likely to result in impacts to the following biodiversity values:

- Clearing of 0.03 ha of native vegetation across three PCTs
- Non permanent impacts (trampling) to 0.12 ha of native vegetation within buffer area
- Clearing of 0.01 ha of Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898) TEC and non permanent impacts (trampling) to another 0.02 ha.
- Potential for sediment run-off into drainage lines and into intertidal habitats.

Impact assessment pathways

The project is to be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). A Review of Environmental Factors (REF) or Environmental Impact Statement is required, incorporating a biodiversity impact assessment that applies five-part tests in accordance with Section 7.3 of

the BC Act to determine whether significant impacts on threatened biodiversity are likely. If a significant impact is deemed likely, the proponent can either prepare a Biodiversity Development Assessment Report (BDAR) utilising the Biodiversity Assessment Methodology (BAM) or prepare a Species Impact Statement (SIS)

Given that there are no threatened ecological communities or threatened species likely to be impacted by the proposed works (5-part tests of Significance), and BOS native vegetation thresholds for clearing do not apply to Part 5 assessments, no further studies or offsetting requirements are required for this proposal.

Impacts are also required to be assessed under the EPBC Act. If Commonwealth Assessments of significance find that a TEC or threatened species is likely to be significantly impacted by the proposed works, a Referral to the Commonwealth Department of the Environment and Energy (DoEE) is required. Given that no significant impacts on any MNES are likely as a result of the project, a Referral is not required.

Recommendations

Recommendations would be developed further at the impact assessment stage of the project, but the following should be considered as a minimum:

- Apply the avoid, mitigate and offset principles.
- Ensure any works are consistent with the objectives, recommendations and compensation requirements of the Pittwater Council (2011) Native Fauna Management Plan for Pittwater and Pittwater Council (2012) Pittwater Native Vegetation Management Plan.
- Offsetting under the BC and EPBC Acts are not required as impacts to the one threatened entity within the proposal footprint: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898) TEC, were found to be insignificant by way of a 5-part test (BC Act Assessment of Significance).

Glossary and abbreviations

AOBV	Areas of Outstanding Biodiversity Value, as defined by the BC Act
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
Local population	The population of a particular threatened species that occurs in the locality
Locality	The area within 10 km of the study area
Local occurrence	Refers to the distribution of an ecological community within the study area and continuous with it
Matters of NES	Matters of national environmental significance
OEH	Office of Environment and Heritage
TEC	Threatened ecological community as listed on the BC Act and or EPBC Act. Collective term to describe vulnerable, endangered and critically endangered ecological communities
Threatened biodiversity	Threatened species, populations and ecological communities as listed on the BC and or EPBC Acts
SEPP	State Environment Planning Policy

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1. Introduction

1.1 Context

Niche were commissioned by Tract Consultants Pty Ltd, on behalf of Northern Beaches Council to prepare a preliminary biodiversity assessment for the proposed shared pathway from Newport Beach to Avalon Beach, NSW (the Project).

The Project involves the construction of a shared pathway from Newport Beach to Avalon Beach in NSW. The shared pathway would largely follow existing roads (Serpentine rd and Barrenjoey Rd), but will bisect some existing reserve land also (see Figure 3). Altogether, the shared pathway would involve the construction of the following components:

- Suspended Shared paths for bikes and pedestrians with a total of length 391 m of new build
- Shared path (on-ground) for bikes and pedestrians, with a total length of 748 m of new build
- Suspended Footpaths for pedestrians, with a total length of 171 m of new build
- Footpath (on-ground) for pedestrians, with a total length of 739 m of new build

While the on-ground components of the share path would require clearing of vegetation, the suspended components would likely shade out and restrict water to vegetation beneath them, effectively having the same impact as clearing. For the purposes of this assessment, both on-ground and suspended components of the share path will be assumed to clear the vegetation they impact and will be referred to as the Study Area.

In total, the four components comprising the new build for the shared pathway would result in clearing of 0.48 hectares of native vegetation as well as some areas of pre-existing road verge and manicured gardens.

The widths and lengths and total areas of the four components of the Project, as well as the width and total area of buffer areas required for construction of these components, are summarised in Table 1 below:

Table 1: Specifications of the components of the project

Component	Total length across project (m)	Width (m)	Area (ha)	Width of Buffer area for construction access (m)		Area of Buffer area (ha)	Total area (footprint plus buffer (ha))
				Left side	Right side		
Shared path (on-ground)	748	3	0.22	2	2	0.1	0.32
Shared path (suspended)	391	3	0.12	2	2	0.08	0.2
Footpath (on-ground)	739	1.5	0.11	2	2	0.07	0.18
Footpath (suspended)	171	1.5	0.03	2	2	0.07	0.1

Total	2049	-	0.48	-	-	0.32	0.8
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1.2 Purpose and objectives

The purpose of this report is to identify potential biodiversity constraints and further investigations required for the development of the project.

This assessment has detailed the species, populations and ecological communities listed as threatened under the *Biodiversity Conservation Act 2016* (BC Act) and *Fisheries Management Act 1994* (FM Act), and Matters of National Environmental Significance (MNES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), that may occur or have habitat within the study area.

1.3 The subject site and study area

The Subject site occurs within the Northern Beaches Council local government area in NSW, within a strip of coastal land running from Newport to Avalon alongside Serpentine Road and Barrenjoey Road for the largest proportion of it's length. Some existing walking tracks and minor roads are on the western side and coastal sand dunes are on the eastern side (Figure 1 and Figure 2). The study area is defined in this report as the footprint of the project (Figure 3).

A summary of the major geophysical features of the subject site is presented in Table 2. below.

Table 2. Geophysical context of the subject site

Geographical feature	Description
Bioregion	Sydney Basin
LLS region	Greater Sydney
Local government area	Northern Beaches Council
Watercourses	Bilgola Creek runs from high ground to the east of the study area and empties on to Bilgola beach.
Nearby conservation areas	Little Head Reserve, Bangalley Headland, Avalon Headland, Bilgola South Headland, Bungan Head and Barrenjoey Headland are all local conservation areas.

1.4 Legislative context

The following legislation has been considered in this assessment:

- NSW *Environmental Planning and Assessment Act 1979* (EP&A Act)
- NSW *Biodiversity Conservation Act 2016* (BC Act)
- State Environmental Planning Policy No. 44 – Koala Habitat Protection
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.6.1 EP&A Act

The EP&A Act provides an assessment framework (in concert with the BC Act) for the consideration of impacts to threatened biodiversity. The project is to be assessed under Part 5 of the EP&A Act. A Review of Environmental Factors (REF) or Environmental Impact Statement is required, incorporating a biodiversity impact assessment that applies five-part tests in accordance with Section 7.3 of the BC Act to determine whether significant impacts on threatened biodiversity are likely. If a significant impact is deemed likely,

the proponent can either prepare a Biodiversity Offset Strategy utilising the Biodiversity Assessment Methodology (BAM) or prepare a Species Impact Statement (SIS).

1.6.2 BC Act

In 2016 the NSW Government introduced the *Biodiversity Conservation Act* (BC Act) and *Local Land Services Amendment Act* (LLSA Act), which changes the way projects are assessed with respect to ecological impacts. This new legislation repeals the *Threatened Species Conservation Act 1995* (TSC Act), the *Nature Conservation Trust Act 2001* (NCT Act), parts of the *National Parks and Wildlife Act 1974* (NPWS Act), and the *Native Vegetation Act 2003* (NV Act). The new legislation is supported by the *Biodiversity Conservation Regulations*, a new Biodiversity Assessment Method (BAM), offsetting rules, sensitive biodiversity mapping, credit pricing spreadsheet and other guidance documents.

1.6.3 EPBC Act

The purpose of the EPBC Act is to ensure that actions likely to cause a significant impact on MNES undergo an assessment and approval process. Under the EPBC Act, an action includes a project, undertaking, development or activity. An action that 'has, will have or is likely to have a significant impact on MNES' is deemed to be a controlled action and may not be undertaken without prior approval from the Commonwealth Minister for the Department of Environment (DoE).

The EPBC Act identifies MNES as:

- World heritage properties
- National heritage places
- Wetlands of international importance (Ramsar wetlands)
- Threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- Nuclear actions (including uranium mining)
- The Great Barrier Reef Marine Park
- A water resource, in relation to coal seam gas development and large coal mining development.

Listings deemed relevant to the proposal are to be assessed in accordance with relevant guidelines. It is unlikely the project will require Referral to the Commonwealth Department of the Environment and Energy (DoEE) for approval given the low likelihood of impacts to MNES.

1.6.4 Planning controls

State Environmental Planning Policy No. 44 – Koala Habitat Protection

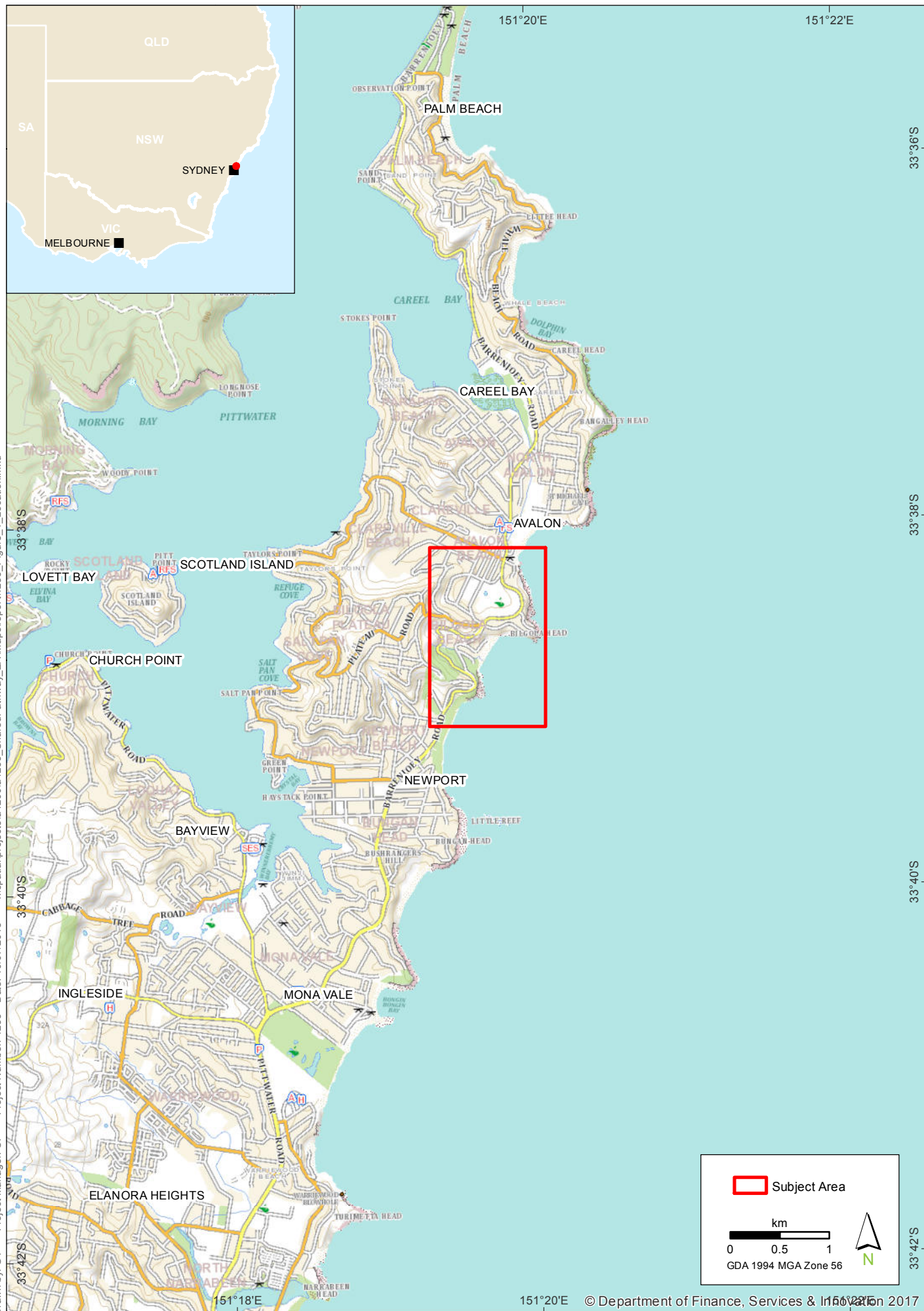
State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline by:

- Requiring the preparation of plans of management before development consent can be granted in relation to areas of core Koala habitat
- Encouraging the identification of areas of core Koala habitat
- Encouraging the inclusion of areas of core Koala habitat in environment protection zones.

While SEPP 44 does not apply under Part 5 of the EP&A Act, consideration has been given to the intent of the SEPP. The Koala would also be independently considered as a listed species under implementation of the BC Act and EPBC Act.

Bionet (Atlas) searches found no Koala sightings within 10 km of the study area and no core Koala habitat exists within the impact area (Study area). Therefore, impacts to Koala are not expected by the proposed works.

Drawn by: GT Project Manager: CF Project Number: 4235 Date: 10/07/2018 T:\spatial\projects\4235\SharedPathway_EA\Map\report\4235_Figure_1_Location.mxd



Location map

Newport to Avalon Shared pathway - Ecological Assessment

FIGURE 1

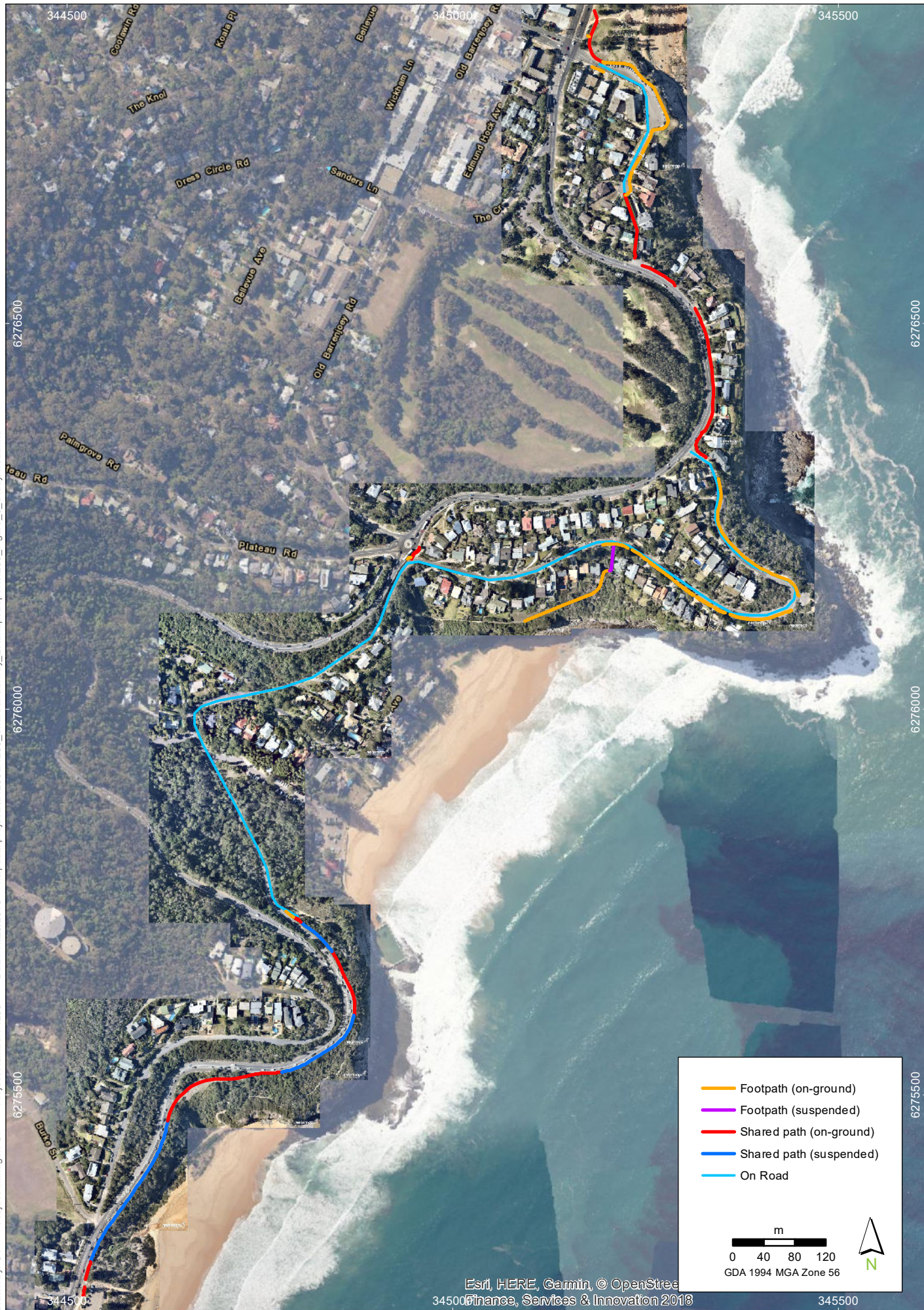


Subject Site

Newport to Avalon Shared pathway - Ecological Assessment

FIGURE 2

Imagery: (c) LPI 2018-08-30



2. Methodology

The following section outlines the methods used to obtain and consolidate information on the biodiversity values present within the study area. This includes desktop based reviews, site inspection and data analysis.

2.1 Database and literature sources

Database searches for a 10 km radius around the study area were conducted in February 2018 to identify threatened biodiversity and migratory species with known or predicted occurrences in the locality. The following databases were used for this purpose:

- BioNet, Atlas of NSW Wildlife (OEH 2018a)
- EPBC Act Protected Matters Report (DoEE 2018a)
- Threatened Species Profiles for threatened species, endangered populations and threatened ecological communities (TECs) listed under the BC Act (OEH 2018b)
- Species Profile and Threats Database (DoEE 2018b)

Key pieces of literature that were reviewed in preparation of this report include:

- Pittwater Council (1995) Habitat and Wildlife Corridors strategy
- Pittwater Council (2011) Native Fauna Management Plan for Pittwater
- Pittwater Council (2012) Pittwater Native Vegetation Management Plan
- Warringah Council (2007) Local Habitat Corridors Strategy.
- Warringah Council (2008) Threatened Bushland Reserves (Duffy Forest Ecological Community) Plan of Management.
- Warringah Council (2005) Vegetation History and Wildlife Corridors.
- OEH Vegetation mapping for the location (2016)

2.2 Site inspection

A field survey was undertaken on 6th July 2018 by Dr Cairo Forest (Ecologist and Accredited Assessor).

The length of the study area was traversed on foot, stopping opportunistically to take notes and photographs at key points along the route, particularly where locations of potential impact to biodiversity were identified.

Data to validate the existing OEH (2016) vegetation mapping was collected with the use of Random Data Points (RDPs). RDPs take a snap shot of the dominant species within view of a given point that can be used to characterise the vegetation community present at that point.

Threatened flora searches were undertaken during the site inspection by undertaking a random meander throughout the proposed footprint and buffer areas.

The presence of the following fauna habitat features was also recorded:

- Hollow bearing trees
- Nests
- Large logs and leaf litter
- Rocky outcrops and caves

Photos of the proposed path and the vegetation communities in the Study Area can be viewed in Appendix 2.

2.3 Threatened flora and fauna likelihood of occurrence

A list of subject threatened flora and fauna within the locality (10 km radius) was determined from database searches (Appendix 1). The list of potentially impacted (affected) species is determined by considering the likelihood of occurrence of these species. One of five categories for 'likelihood of occurrence' (Table 3) were attributed to each species after consideration of criteria such as known records, likely presence or absence of important habitat features in the study area and professional judgement.

Species that would need to be considered further in formal assessments of significance (BC Act, EPBC Act) were those in the 'Known', 'High' or 'Moderate' categories and where impacts for the species could reasonably occur from the development. Species listed as a 'Low' or 'None' likelihood of occurrence are those for which there is limited or no habitat present within the Study Area.

Table 3: Likelihood of occurrence criteria

Likelihood rating	Threatened flora criteria	Threatened and migratory fauna criteria
Known	The species has been previously observed within the study area.	The species has been previously observed within the study area.
High	It is likely that a species inhabits or utilises habitat within the study area.	It is likely that a species inhabits or utilises habitat within the study area.
Moderate	Potential habitat for a species is likely to occur in the study area. Adequate field survey would determine if there is a 'high' or 'low' likelihood of occurrence for the species within the study area.	Potential habitat for a species is likely to occur in the study area and the species may occasionally utilise that habitat. Species unlikely to be wholly dependent on the habitat present within the study area.
Low	It is unlikely that the species inhabits the study area.	It is unlikely that the species inhabits the study area. If present, the species would likely be a transient visitor. The site is likely to contain only very common habitat for this species which the species would not rely on for its on-going local existence.
None	The habitat within the study area is unsuitable for the species.	The habitat within the study area is unsuitable for the species.

2.4 Limitations

Numerous threatened plant and animal species are cryptic or difficult to detect. For instance, some cryptic plant species are more easily detected at certain times of the year, such as during flowering events. Some fauna can only be detected during certain seasons (e.g. migration patterns or intra-torpor periods). These limitations are reduced by undertaking a habitat assessment, and assuming cryptic species are present if suitable habitat is present within the study area.

Fauna survey was limited to assessment of habitat values. Habitat assessments are conservative and default to an assumed presence where there is insufficient knowledge to determine otherwise. Assumed presence of a species requires the impact of the development/activity on that species to be assessed.

3. Results

3.1 Vegetation communities

Previous vegetation mapping (OEH 2016) has mapped nine native vegetation communities as occurring in the Subject Site:

- Coast Banksia - Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 772)
- Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin)Bioregion and South East Corner Bioregion (PCT 898)
- Lilly Pilly littoral rainforest of the southern Sydney Basin Bioregion and South East Corner Bioregion (PCT 910)
- Spinifex beach strand grassland, Sydney Basin Bioregion and South East Corner Bioregion (PCT 1204)
- Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion (PCT 1214)
- Turpentine - Rough-barked Apple - Forest Oak moist shrubby tall open forest of the Central Coast (PCT 1565)
- Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney (PCT 1778)
- Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817)
- Lilly Pilly - Cabbage Tree Palm littoral rainforest on escarpment slopes and gullies of the Sydney basin (PCT 1833)

The rest of the Subject Site is mapped as either cleared, urban exotic/ native (gardens), weeds and exotics or undifferentiated regenerating shrubs and do not align to any PCT.

The Study Area was mapped by OEH (2016) as containing three native vegetation communities:

- Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817)
- Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney (PCT 1778)
- Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin)Bioregion and South East Corner Bioregion (PCT 898)

Field validation confirmed that the existing mapping (OEH 2016) was accurate and the presence of these three vegetation communities, and non-native areas dominated by exotic vegetation / exotic and native plantings within the study area (Table 4).

The key dominant species recorded within the vegetation communities in the study area are provided below:

- **Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT1817):** The overstorey and midstorey are dominated by *Banksia integrifolia* and *Acacia longifolia* while the dominant understorey and

ground cover species are *Dianella caerulea*, *Lomandra longifolia*, *Lomandra multiflora*, *Hibbertia empetrifolia* and *Westringia fruticosa*.

- **Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney (PCT 1778):** The overstorey and midstorey are dominated by *Banksia integrifolia*, young *Eucalyptus botryoides*, *Glochidion ferdinandi*, *Pittosporum undulatum*, young *Allocasuarina littoralis* and *Breynia oblongifolia*. The dominant understorey and groundcover species are *Dianella caerulea*, *Pteridium esculentum*, *Lomandra longifolia* and *Entolasia stricta*.
- **Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898):** The overstorey and midstorey are dominated by *Banksia integrifolia* subsp. *integrifolia*, *Westringia fruticosa* and *Acacia sophorae*. The understorey is dominated by *Pimelea linifolia*, *Hibbertia vestita*, *Pultenaea maritime*, *Westringia fruticosa*, *Poa poiformis*, *Zoysia macarantha* and *Cynodon dactylon*.

Table 4: Native vegetation communities found within the study area

Plant Community Type Name (Vegetation Community)	Plant Community Type (PCT) Number	Threatened Ecological Community	Area (ha)
Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast	1817	No	0.02
Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney	1778	No	0.00001
Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion	898	Yes	0.011
Exotic vegetation / garden plantings (exotic / native) & Cleared land	N/A	-	0.25
Total			0.28

3.2 Threatened ecological communities

One threatened ecological community (TEC) as listed under the BC Act occurs within the study area: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898).



Vegetation Mapping and survey effort

Newport to Avalon Shared pathway - Ecological Assessment

FIGURE 4

Imagery: (c) LPI 2018-08-30

3.1 Threatened Flora

A total of 28 threatened flora listed on the BC and/or EPBC Act were identified as subject species in this assessment (Appendix 1). This list was derived from the database searches within the locality (10km radius), outlined in section 2.1.

Only seven threatened flora species have been previously recorded within the Subject Site: *Asterolasia elegans*, *Callistemon linearifolius*, *Chamaesyce psammogeton*, *Eucalyptus nicholii*, *Genoplesium bauri*, *Persoonia hirsuta* and *Syzygium paniculatum* (Figure 5).

No threatened flora were recorded in the Study Area during the site survey and suitable habitat does not occur. Threatened flora will not be considered further with respect to this proposal.

3.2 Threatened Fauna

A total of 95 threatened or migratory fauna listed on the BC and/or EPBC Act were identified as subject species in this assessment (Appendix 1). This list was derived from the database searches within the locality (10km radius), outlined in section 2.1 and included five amphibian species, 53 bird species, two freshwater fish species, 21 terrestrial mammal species, seven marine mammal species and seven reptile species.

Thirty threatened fauna species have been previously recorded within 10km of the Study Area (Figure 6).

After consideration of the habitats present within the study area and previous records of threatened species sightings, eleven species were considered to have a 'Low-Moderate' or higher likelihood of occurrence, within the Study Area:

- *Ninox strenua* (Powerful Owl)
- *Haliaeetus leucogaster* (White bellied sea eagle)
- *Gallinago hardwickii* (Latham's Snipe)
- *Pandion cristatus*, *Pandion haliaetus* (Eastern Osprey)
- *Rostratula australis* (Australian Painted Snipe)
- *Miniopterus australis* (Little Bentwing-bat)
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)
- *Mormopterus norfolkensis* (Eastern Freetail-bat)
- *Myotis macropus* (Southern Myotis)
- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)

The remaining threatened fauna species with potential habitat or previous recordings within 10 km of the Study Area were given a 'Low' or 'No' likelihood of occurrence (Appendix 1).

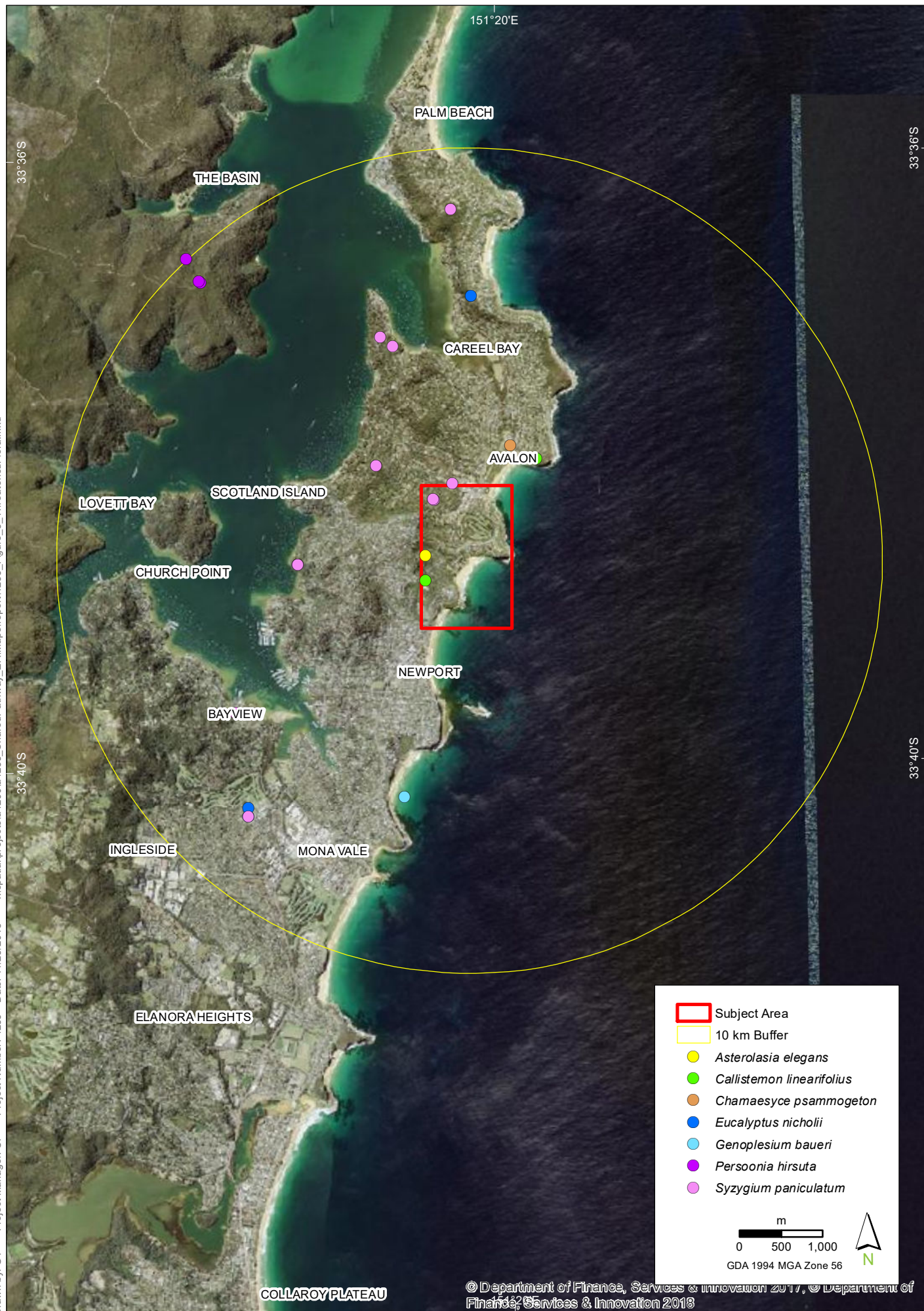
Of these eleven species, all were determined to have a 'low' likelihood of being significantly impacted by the proposal. While these threatened species may use the study area as marginal foraging habitat, the Study Area would not provide any limiting habitat for these species (i.e., Given that no trees with hollows were found within the Study Area, there are no suitable roosting sites for the Powerful Owl or tree roosting microbat species. The Study Area also lacks caves and man made structures required as roosting habitat for the cave dwelling microbat species. Furthermore, no White-bellied Sea-eagle / Osprey nests were observed within the Study Area during the site inspection). As such, impacts to the Study Area will not remove any limiting habitat for these species and therefore would not result in a significant impact. Moreover, there are areas of equal or better habitat for these species to forage within adjacent to the Study Area and much larger woodland areas suitable for foraging and roosting.

No threatened fauna were observed in the Study Area or broader Subject Site during the site survey.

3.4.1 Koala

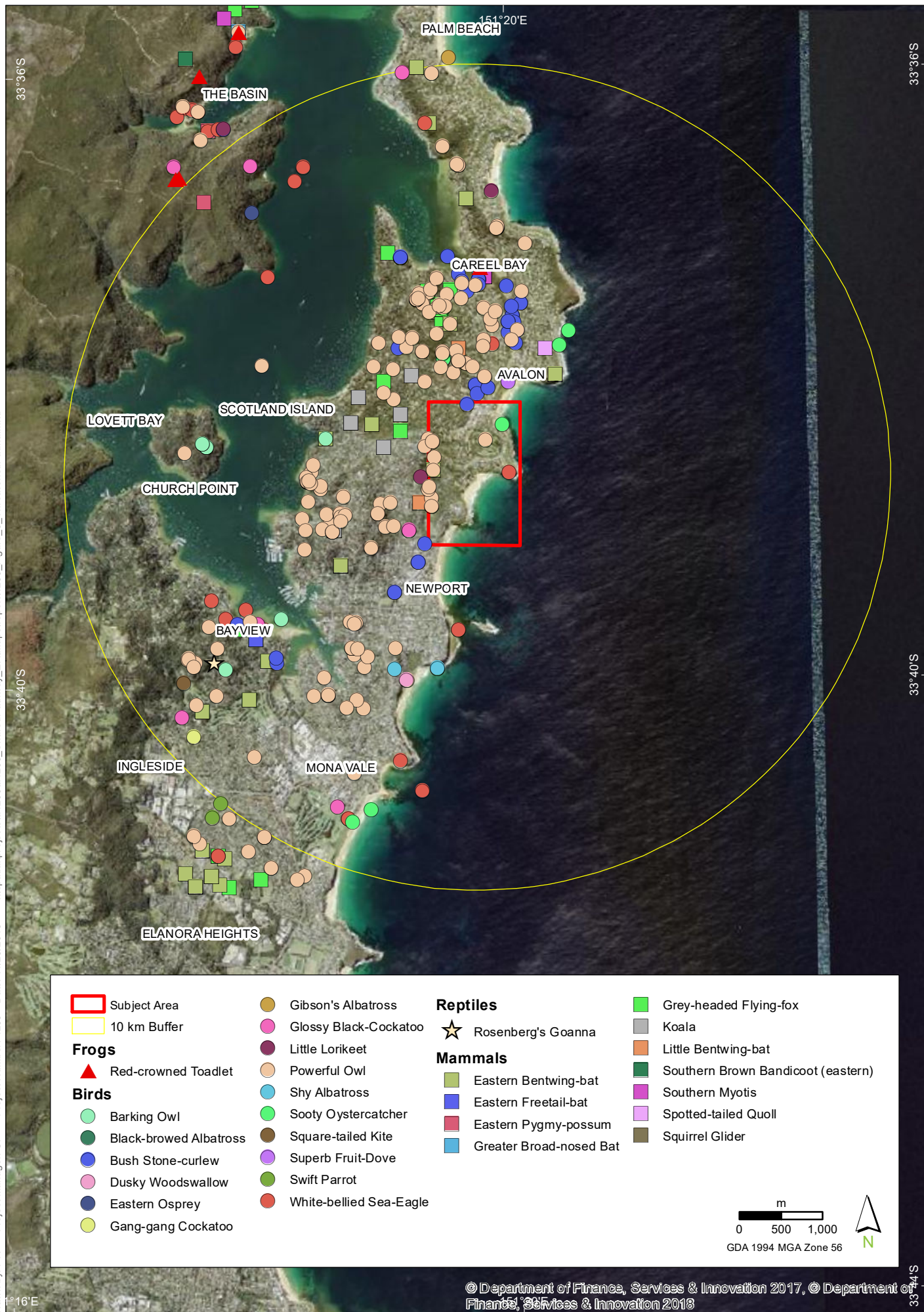
Five Koala records were found within the 10km of the study area (Figure 6). Whilst Bionet (Atlas) data base searches found Koala records and habitat within 10km of the study area, these records and habitat are located in Woodland (Coastal Enriched Sandstone Dry Forest (PCT 1776)) further west of the Study Area (approximately 200m outside the Subject Site and approximately 1 km from the Study Area). Moreover, the overstorey Eucalypts that are required to provide feed/ habitat for Koala are not present within the Study Area.

It is unlikely Koalas occur within the study area and therefore, impacts to the Koala are very unlikely and will not be considered further in this assessment.



Threatened flora within 10km of the study area

Newport to Avalon Shared pathway - Ecological Assessment



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Bionet 10 km Threatened Species Search - Fauna

Newport to Avalon Shared pathway - Ecological Assessment

FIGURE 6

3.3 Corridors

The study area occurs within a coastal wildlife corridor that was recognised by Pittwater Council (now Northern Beaches Council) as running along the beaches and headlands from Newport Beach to Avalon Beach. This corridor includes several nature reserves (Little Head Reserve, Bangalley Headland, Avalon Headland, Bilgola South Headland, Bungan Head and Barrenjoey Headland) that are connected by thin strips of coastal vegetation along beaches and cliff lines. Threatened fauna such as White-bellied Sea Eagle, Glossy Black-cockatoo, Bentwing-bats, Grey-headed Flying-fox, Long-nosed Bandicoots and Squirrel Gliders occur in some of these reserves. This wildlife corridor also links to larger patches of bushland to the west along several creek lines.

3.4 Areas of Outstanding Biodiversity Value

The BC Act gives the Minister for the Environment the power to declare Areas of Outstanding Biodiversity Value (AOBV). AOBVs are special areas that contain irreplaceable biodiversity values that are important to the whole of NSW, Australia or globally. AOBVs will be a priority for investment in private land conservation.

Areas of declared critical habitat under the TSC Act have become the first AOBVs in NSW with the commencement of the BC Act, i.e. Little Penguin and Wollemi Pine declared areas.

No AOBVs occur within the study area.

3.5 Biodiversity Values Map

The Biodiversity Values Map (BV Map) identifies land with high biodiversity value, as defined by the Biodiversity Conservation Regulation 2017. Certain development applications will require entry into the Biodiversity Offsets Scheme (BOS) if they occur on land mapped on the BV Map. This is not applicable to Part 5 assessments, however, it is noted Bilgola Creek is identified on the BV Map and intersects Serpentine Road within the Study Area (Figure 7).

3.6 BioBank sites

Biobank sites have an existing legal commitment to be managed for conservation purposes in-perpetuity and therefore are not available for future urban development or infrastructure, unless special legislative provisions are enacted to remove or alter the Biobank site. The study area or even the broader study area does not contain any sites registered as a Biobank Site under the TSC Act.



Biodiversity Values Map

Newport to Avalon Shared pathway - Ecological Assessment

FIGURE 7

Imagery: (c) LPI 2018-08-30

4. Potential Impacts

4.1 Overview

The potential impacts discussed in this section are based on database research, existing mapping and a site visit including detailed on ground mapping and collection of data on biodiversity values within the Study Area (using RDPs).

4.1 Vegetation and threatened ecological communities

A total of approximately 0.03 ha of native vegetation will be permanently impacted as a result of the Project through clearing (see Table 5), however, most of this clearing will involve the removal of only shrubs and the ground layer along the edge of existing trails and roads. Overstorey trees will be pruned back where they impede construction but retained wherever possible.

The Project has the potential to cause indirect impacts to a further 0.12 ha of native bushland if a buffer area of 2 metres of vegetation around the proposed paths is to be assumed vulnerable. Whilst temporary impacts such as inadvertent trampling and sedimentation to native vegetation adjacent to the areas of vegetation being cleared are a possible outcome of the proposed construction works, these impacts can also be avoided by implementing the avoidance and mitigation strategies outlined in section 5.2 of this report.

A total of 0.01 ha of the TEC: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898) will be cleared and another 0.02 ha temporarily impacted (trampled) within the construction buffer area during construction works.

A breakdown of these impacts is detailed in Table 5 below. Representative pictures of vegetation communities to be impacted by the project are shown in Appendix 3.

Table 5: Native vegetation communities impacted by the project footprint and buffer areas

Plant Community Type Name (Vegetation Community)	Plant Community Type Number	Threatened Ecological Community	Path Type interesting	Area directly cleared (ha)	Total area of clearing (ha)	Buffer area (non permanent impacts of construction process) (ha)	Total area of Buffer area impacts (ha)	Total area of impacts (clearing and non permanent construction impacts) (ha)	Total area of permanent and non permanent impacts (ha)
Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast	1817	No	Shared path (on-ground)	0.01	0.02	0.04	0.1	0.05	0.12
			Shared path (suspended)	0.01		0.05		0.06	
			Footpath (on-ground)	0		0.01		0.01	
Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney	1778	No	Footpath (on-ground)	0.00001	0.00001	0.00005	0.00005	0.00006	0.00006
Kangaroo Grass sod tussock grassland of	898	Yes	Shared path (on-ground)	0	0.011	0.01	0.024	0.01	0.031

Plant Community Type Name (Vegetation Community)	Plant Community Type Number	Threatened Ecological Community	Path Type interesting	Area directly cleared (ha)	Total area of clearing (ha)	Buffer area (non permanent impacts of construction process) (ha)	Total area of Buffer area impacts (ha)	Total area of impacts (clearing and non permanent construction impacts) (ha)	Total area of permanent and non permanent impacts (ha)
coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion			Shared path (suspended)	0.01		0.01		0.02	
			Footpath (on-ground)	0.001		0.004		0.001	
Exotic / plantings/ cleared	N/A	-	Shared path (on-ground)	0.13	0.25	0.29	0.74	0.42	0.99
			Shared path (suspended)	0.11		0.43		0.54	
			Footpath (suspended)	0.01		0.02		0.03	
Total					0.28		0.86		2.0

The project will impact on one TECs listed under the BC Act: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898). A total of 0.1 hectares of this TEC will be cleared under the current proposed footprint, with another likely to be temporarily impacted (trampled) during the construction phase in buffer areas.

4.2 Threatened species

The proposal is unlikely to impact on habitat for any threatened species. Threatened flora were not recorded in the Study Area during targeted surveys, despite several threatened species having been recorded in the general location previously.

Of the eleven threatened fauna species that have been recorded previously or have potential habitat within the Study Area or broader Subject Site, none are likely to be significantly impacted by the proposed project. All threatened fauna species with a low-moderate or higher likelihood of occurrence in the Study Area or surrounding land had a low likelihood of impacts occurring to them as a result of the Project as no limiting habitat will be removed (See Appendix 1). As such, assessments of significance (BC Act and EPBC Act) were not deemed necessary for any threatened fauna species that may occur within the Study Area or broader Subject Site.

Moreover, the vegetation directly adjacent to the Study Area is of equal or better quality (less disturbed) than within the Study Area and would provide any threatened fauna with equivalent or better foraging and nesting opportunities.

4.3 Biodiversity Values Map

The Serpentine Road already crosses Bilgola Creek (ephemeral creek) (Figure 7) and no new works will be occurring near this BV such that any direct or indirect impacts to it would occur. As such, this project will have no impacts on any BVs. Furthermore, consideration of the BV Map is not required for Part 5 assessments.

4.4 Corridors

Impacts of the Project on the 'local' wildlife corridor will be minimal for the following reasons:

- Only a small proportion of the wildlife corridor will be impacted / cleared (less than 1%)
- Clearing will take place for the most part along the edge of existing roads and residential properties, as well as along the corridor rather than across it and will therefore not fragment the corridor and reduce connectivity
- Compensatory planting will be conducted wherever there is a net loss of overstorey and midstorey trees as detailed in section 5.2 below.
- Fauna will have ample area of equivalent or better vegetation adjacent to the Study Area to continue to move freely during the construction phase of the project and after its completion.

5. Recommendations

5.1 Overview

Recommendations would be developed further at the stage of the Biodiversity Impact Assessment, but the following should be considered as a minimum:

- Avoid, mitigate and offset principles should be applied as detailed in Section 5.2.
- As far as possible, ensure any works are consistent with the objectives, recommendations and compensation requirements of the Northern Beaches Bushland strategies (<https://www.northernbeaches.nsw.gov.au/council/publications/strategies-and-plans>) which include:
 - Habitat and Wildlife Corridors strategy (1995)(former Pittwater Council document)
 - Native Fauna Management Plan for Pittwater (2011) (former Pittwater Council document)
 - Pittwater Native Vegetation Management Plan (2012) (former Pittwater Council document)

5.2 Avoid, mitigate offset

Conceptually, the best approach to managing the impacts of development on biodiversity starts by examining the potential for impact avoidance. Once exhausted, impact minimisation represents the next level of consideration. The last and least preferable option is the use of biodiversity offsets. The following sections provide a broad narrative for the consideration of this conceptual framework.

5.2.1 Impact avoidance

The following recommendations should be considered to avoid impacts to flora, fauna and their habitats.

- Clearing be restricted to the vegetation occurring within the development footprint. Surrounding bushland areas should not be impacted as part of the project.
- Adjusting the footprint of the path if possible, to avoid impacting the Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin) Bioregion and South East Corner Bioregion TEC.
- A pre-clearing survey be undertaken to ensure all hollow-bearing trees occurring outside the clearing footprint are marked and protected.
- An appropriately skilled ecologist be on site during clearing operations to ensure habitat trees outside the development footprint are protected from construction impacts. The ecologist would also check any hollows for resident fauna prior to any felling that might be required, to minimise the risk of resident fauna being harmed during the clearing process by safely removing and translocating them.

5.2.2 Impact minimisation

The following recommendations should be considered at the impact assessment stage to minimise impacts to flora, fauna and their habitats.

- A Flora and Fauna Management Plan be prepared with reference to the Roads and Maritime's Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA, 2011) and implemented as part of the CEMP. It would include, but not be limited to:
 - plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas
 - requirements set out in the Landscape Guideline (RTA, 2008)
 - pre-clearing survey requirements
 - procedures for unexpected threatened species finds and fauna handling
 - procedures addressing relevant matters specified in the Policy and guidelines for fish habitat conservation and management (DPI Fisheries, 2013)

- Protocols to manage weeds and pathogens.
- Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal should be investigated during detailed design and implemented where practicable and feasible.
- If unexpected threatened fauna or flora species are discovered, stop works immediately and follow the RMS Unexpected Threatened Species Find Procedure in the RMS Biodiversity Guidelines Guide 1 (Pre-clearing process) (RTA 2011a).
- To prevent the spread of weed seed, all weed material removed should be disposed of in a suitable waste facility and not mulched on site. This is to avoid the reintroduction and further spread of weeds in the area. Weed management should be undertaken in accordance with RMS Biodiversity Guidelines - Guide 6 (Weed management) (RTA 2011a).
- Machinery be washed following best practice hygiene protocols prior to being brought to site to prevent the spread of weed seed, pathogens and fungi. Hygiene protocols should be undertaken in accordance with the requirements of the RMS Biodiversity Guidelines - Guide 7 (Pathogen management) (RTA 2011a).
- Sediment barriers should be placed along the edge of any drainage lines that are in close proximity to works to avoid run off into coastal waters which could impact intertidal flora and fauna.
- Buffer areas required for construction (moving machinery through) that will be trampled should be restored (revegetated) to their natural state using local species to maintain local provenance.

5.2.3 Connectivity strategy

Given clearing is unlikely to impact the function of the broader area as a wildlife corridor, measures such as the installation of wildlife exclusion fencing, glider poles or other permanent structures are not recommended. Revegetation and compensatory plantings on temporarily cleared and impacted areas using local species is recommended post clearing to provide cover within the study area for smaller animals that might be exposed to high rates of predation whilst exposed. Northern Beaches Council have advised that compensatory planting and revegetation efforts will be undertaken.

5.2.4 Offsetting

Offsetting is required under the BC and EPBC Acts when impacts to native vegetation and threatened species breach thresholds discussed below:

BC Act

Given the Project is likely to be assessed under Part 5 of the EP&A Act, offsets would be required if it was to have a significant impact on threatened biodiversity (determined through application of the 5-part test under the BC Act). While no threatened species are expected to be impacted, 0.01 ha of a single TEC (Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898)) will be permanently impacted and another 0.02 ha may be impacted in buffer areas during construction works. A 5-part test (Assessment of Significance, under the BC Act) was completed for this TEC and concluded that the proposal would impart an insignificant impact on it (Appendix 3).

EPBC Act

Offsetting under the EPBC Act is required if the residual impacts of the proposal are significant as defined in the significant impact guidelines (DEWHA 2012).

No EPBC Assessments of significance were required as no threatened species are expected to be impacted and the only TEC to be impacted (Kangaroo Grass sod tussock grassland of coastal areas of the Sydney

Basin Bioregion and South East Corner Bioregion (PCT 898)) is not listed under the EPBC Act. As such, a referral to the Commonwealth and offsetting requirements are not required for this Project.

6. Conclusion

The project has the potential to permanently impact a total of 0.03 ha and temporarily impact (trample) another 0.12 ha of the following native vegetation communities:

- Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817)
- Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney (PCT 1778)
- Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898)

Temporary impacts such as trampling of vegetation, accidental damage to vegetation outside clearing limits and sedimentation, will be avoided by undertaking avoidance and mitigation strategies detailed in section 5.2 of this report.

Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898) is listed as a TEC under the BC Act. The Project will permanently impact 0.01 ha and temporarily impact (trampling) another 0.02 ha of this TEC.

None of the vegetation to be impacted is listed as a TEC under the EPBC Act.

No threatened flora were recorded within the Study Area. Threatened flora are unlikely to be impacted by the Project.

The Study Area may offer some marginal foraging habitat, however, this is unlikely to affect threatened fauna in the area as the areas to be permanently altered represent a very small proportion of the surrounding habitat, are largely thin strips adjacent to existing roads and active regeneration and compensatory planting will take place after the construction phase.

Minor impacts associated with the Project to one single TEC (Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898)) listed under the BC Act, are expected under the current proposed footprint. If this impact can not be avoided by alteration to the path, a 5-part test (BC Act Assessment of Significance) will need to be completed for this impact. Given the marginal impact to this TEC however (0.01 ha of permanent and 0.02 ha of temporary impact), it is likely that this will not be a significant impact that would trigger a BDAR and require offsetting.

No EPBC Act assessments of significance are deemed necessary for this project. Furthermore, an EPBC Act Referral is not required for the Project.

Recommendations would be developed further at the impact assessment stage of the project, but the following should be considered as a minimum:

- Avoid, mitigate and offset principles should be applied
- Ensure any works are consistent with the objectives, recommendations and compensation requirements of the Northern Beaches Bushland and Biodiversity Strategies (<https://www.northernbeaches.nsw.gov.au/council/publications/strategies-and-plans>).
- Offsetting under the BC and EPBC Acts is not required given a 5-part test for the one TEC impacted by the proposal (Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898)) concluded that the proposal would not have a

significant impact on this TEC. Nevertheless, if impacts to this TEC can be avoided, it is strongly advised.

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- Warringah Council (2005) Vegetation History and Wildlife Corridors.

Appendix 1: Threatened biodiversity likelihood of occurrence table

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
<i>Amphibians</i>						
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	The Giant Burrowing Frog has been recorded breeding in a range of water bodies associated with sandy environments of the coast and adjacent ranges from the Sydney Basin south the eastern Victoria. It breeds in hanging swamps, perennial non-flooding creeks and occasionally permanent pools, but permanent water must be present to allow its large tadpoles time to reach metamorphosis.	Low-no habitat	Low
<i>Litoria aurea</i>	Green and Golden Bell Frog	E	V	Inhabits a very wide range of water bodies including marshes, dams and streams, particularly those containing emergent vegetation such as bullrushes or spikerushes. It also inhabits numerous types of man-made water bodies including quarries and sand extraction sites. Optimum habitat includes water-bodies that are un-shaded, free of predatory fish such as Plague Minnow, have a grassy area nearby and diurnal sheltering sites available.	Low-no habitat	Low
<i>Litoria littlejohni</i>	Littlejohn's Tree Frog	V	V	Occurs in wet and dry sclerophyll forests and heathland associated with sandstone outcrops between 280 and 1000 m on the eastern slopes of the Great Dividing Range from the Central Coast down into Victoria. Individuals have been collected from a wide range of water bodies that includes semi-permanent dams, permanent ponds, temporary pools and permanent streams, with calling occurring from fringing vegetation or on the banks. Individuals have been observed sheltering under rocks on high exposed ridges during summer and within deep leaf litter adjacent to the breeding site. Calling occurs in all months of the year, often in association with heavy rains. The tadpoles are distinctive, being large and very dark in colouration.	Low-no habitat	Low
<i>Mixophyes balbus</i>	Stuttering Frog	E	V	Associated with streams in dry sclerophyll and wet sclerophyll forests and rainforests of more upland areas of the Great Dividing Range of NSW and down into Victoria. Breeding occurs along forest streams	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
				with permanent water where eggs are deposited within nests excavated in riffle zones by the females and the tadpoles swim free into the stream when large enough to do so. Outside of breeding, individuals range widely across the forest floor and can be found hundreds of metres from water.		
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V	-	Occurs on wetter ridge tops and upper slopes of sandstone formations on which the predominant vegetation is dry open forests and heaths. This species typically breeds within small ephemeral creeks that feed into larger semi-perennial streams. After rain these creeks are characterised by a series of shallow pools lined by dense grasses, ferns and low shrubs and usually contain leaf litter for shelter. Eggs are terrestrial and laid under litter, vegetation or rocks where the tadpoles inside will reach a relatively late stage of development before waiting for flooding waters before hatching will occur.	Low-no habitat	Low
Birds						
<i>Actitis hypoleucos</i>	Common Sandpiper	-	M, MA	Utilises a wide range of coastal wetlands and some inland wetlands, mostly found around muddy margins or rocky shores. Forages in shallow water and on soft mud, roosts on rocks or vegetation such as mangroves. Northern hemisphere breeding.	Low-no habitat	Low
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	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. 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.	Low-no habitat	Low
<i>Apus pacificus</i>	Fork-tailed Swift	-	M	The Fork-tailed Swift is almost exclusively aerial, flying from less than one metre to at least 300 m above ground and probably much higher.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
<i>Ardea alba</i>	Great Egret	-	M	Great Egrets prefer shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands.	Low-no habitat	Low
<i>Ardea ibis</i>	Cattle Egret	-	M	The Cattle Egret is found in grasslands, woodlands and wetlands, and is not common in arid areas. It also uses pastures and croplands, especially where drainage is poor.	Low-no habitat	Low
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V	-	Often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests.	Low-no habitat	Low
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	The Australasian Bittern is widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes and spikerushes.	Low-Moderate no habitat	Low
<i>Burhinus grallarius</i>	Bush Stone-curlew	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 ground layer and fallen timber. Largely nocturnal, being especially active on moonlit nights.	Low-no habitat	Low
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	-	M	Prefers muddy edges of shallow or brackish wetlands, with inundated or emergent sedges, saltmarsh or other low vegetation. Also found foraging in sewage ponds and flooded paddocks. Northern hemisphere breeding.	Low-no habitat	Low
<i>Calidris canutus</i>	Red Knot	-	M, E	Usually found foraging in soft substrate near the edge of the water on intertidal mudflats. Also have been recorded at nearby lakes, sewage ponds and floodwaters. Roosts on sandy beaches, spits and islands. Northern hemisphere breeding.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
<i>Calidris ferruginea</i>	Curlew Sandpiper	E	CE, M	It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes the inland. Northern hemisphere breeding.	Low-no habitat	Low
<i>Calidris melanotos</i>	Pectoral Sandpiper	-	M	Prefers shallow fresh to saline wetlands, found at coastal lagoons, estuaries, bays, swamps, inundated grasslands, saltmarshes and artificial wetlands. Northern hemisphere breeding.	Low-no habitat	Low
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	-	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine snow gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed.	Low-no habitat	Low
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai local government areas	EP	-	The population is believed to be largely confined to an area bounded by Thornleigh and Wahroonga in the north, Epping and North Epping in the south, Beecroft and Cheltenham in the west and Turramurra/South Turramurra to the east. Usually frequents forested areas with old growth attributes required for nesting and roosting purposes.	Low-no habitat	Low
<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	V	-	Inhabits forest with low nutrients, characteristically with key Allocasuarina spp. Tends to prefer drier forest types with a middle stratum of Allocasuarina below Eucalyptus or Angophora. Often confined to remnant patches in hills and gullies. Breed in hollows stumps or limbs, either living or dead. Endangered population in the Riverina.	Low-no habitat	Low
<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo, Riverina population	EP	-	Inhabits forest with low nutrients, characteristically with key Allocasuarina spp. Tends to prefer drier forest types with a middle stratum of Allocasuarina below Eucalyptus or Angophora. Often	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
				confined to remnant patches in hills and gullies. Breed in hollows stumps or limbs, either living or dead. Endangered population in the Riverina.		
<i>Cuculus optatus</i> , <i>Cuculus saturatus</i>	Oriental Cuckoo	-	M, MA	Mainly inhabits coniferous, deciduous and mixed forests. Breeds in northern hemisphere. Brood parasite, laying eggs in nests of other birds.	Low-no habitat	Low
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E	E	Found in coastal woodlands, dense scrub and heathlands, particularly where it borders taller woodlands.	Low	Low
<i>Diomedea antipodensis</i>	Antipodean Albatross	V	V, M, MA	The species ranges across the southern Pacific Ocean, east to the coast of Chile and west to eastern Australia. The Antipodean Albatross breeds biennially in colonies on ridges, slopes and plateaus of isolated subantarctic islands, usually in vegetation such as grass tussocks. This species regularly occurs in small numbers off the NSW south coast from Green Cape to Newcastle during winter where they feed on cuttlefish.	Low-no habitat	Low
<i>Diomedea exulans</i>	Wandering Albatross	E	V, M, MA	The Wandering Albatross is marine, pelagic and aerial. The Wandering Albatross visits Australian waters from Fremantle, Western Australia to northern New South Wales between June and September each year.	Low-no habitat	Low
<i>Diomedea gibsoni</i> , <i>Diomedea antipodensis gibsoni</i>	Gibson's Albatross	V	V, M, MA	The species is regularly encountered on trans-Tasman shipping routes and at seas off Sydney, and regularly occurs off the NSW coast usually between Green Cape and Newcastle. This species is known only to breed on the Adams, Disappointment and Auckland Islands in the subantarctic Auckland Island group. Potential forage in NSW waters during the winter is considered significant for the species.	Low-no habitat	Low
<i>Eudyptula minor</i>	Little Penguin in the Manly Point area	EP	-	This endangered population occurs from just north of Smedley's Point to Cannae Point, North Sydney Harbour and Manly. Only known breeding population on the mainland in NSW. A range of nest sites are utilised by the penguins at Manly including under rocks on the foreshore, under seaside houses and structures, such as stairs, in	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
				wood piles and under overhanging vegetation including lantana and under Coral Tree roots.		
<i>Gallinago hardwickii</i>	Latham's Snipe	-	M	Latham's Snipe is a non-breeding migrant to the south east of Australia including Tasmania, passing through the north and New Guinea on passage. Latham's Snipe breed in Japan and on the east Asian mainland. Seen in small groups or singly in freshwater wetlands on or near the coast, generally among dense cover. They are found in any vegetation around wetlands, in sedges, grasses, lignum, reeds and rushes and also in saltmarsh and creek edges on migration.	Low-Medium	Low
<i>Glossopsitta pusilla</i>	Little Lorikeet	V	-	Distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range in NSW, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts. Most breeding records come from the western slopes.	Low-no habitat	Low
<i>Grantiella picta</i>	Painted Honeyeater	V	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.	Low-no habitat	Low
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V	-	In NSW the Sooty Oystercatcher occupies rocky headlands, reefs and offshore islands along the entire coast, apparently as a single continuous population.	Low-no habitat	Low
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	MA	Inhabits coastal and near coastal areas, building large stick nests, and feeding mostly on marine and estuarine fish and aquatic fauna.	High	Low
<i>Hieraaetus morphnoides</i>	Little Eagle	V	-	Most abundant in lightly timbered areas with open areas nearby. Often recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. May nest in farmland, woodland and forest in tall trees.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	M, MA	An aerial species found in feeding concentrations over cities, hilltops and timbered ranges.	Low-no habitat	Low
<i>Lathamus discolor</i>	Swift Parrot	E	CE	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.	Low-no habitat	Low
<i>Limosa lapponica baueri</i>	Bar-tailed Godwit	-	M, V	Bar-tailed Godwit (spp baueri) is the eastern Australian / New Zealand sub species. Mainly found in coastal habitats such as intertidal sand flats, mudflats, estuaries, inlets, coastal lagoons and bays. Often found around beds of seagrass and saltmarsh. Northern hemisphere breeding.	Low-no habitat	Low
<i>Limosa lapponica menzbieri</i>	Bar-tailed godwit	-	M, CE	Bar-tailed Godwit (spp menzbieri) is the western Australian sub species. Mainly found in coastal habitats such as intertidal sand flats, mudflats, estuaries, inlets, coastal lagoons and bays. Often found around beds of seagrass and saltmarsh. Northern hemisphere breeding.	Low-no habitat	Low
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-	Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by Woollybutt, Spotted Gum, River Peppermint or Gully Gum. Individuals appear to occupy large hunting ranges of more than 100km ² . They require large living trees for breeding, particularly near water with surrounding woodland-forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs.	Low-no habitat	Low
<i>Macronectes giganteus</i>	Southern Giant Petrel	E	E	The Southern Giant Petrel has a circumpolar pelagic range from Antarctica to approximately 20 S and is a common visitor off the coast of NSW. Over summer, the species nests in small colonies amongst open vegetation on antarctic and subantarctic islands, including Macquarie and Heard Islands and in Australian Antarctic territory.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
<i>Macronectes halli</i>	Northern Giant-petrel	V	V	Breeding in Australian territory is limited to Macquarie Island and occurs during spring and summer.	Low-no habitat	Low
<i>Monarcha melanopsis</i>	Black-faced Monarch	-	M	Found along the coast of eastern Australia, becoming less common further south. Inhabits rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating.	Low-no habitat	Low
<i>Monarcha trivirgatus</i>	Spectacled Monarch	-	M	Coastal north-eastern and eastern Australia, including coastal islands, from Cape York, Queensland to Port Stephens, New South Wales. Prefers thick understorey in rainforests, wet gullies and waterside vegetation, as well as mangroves.	Low-no habitat	Low
<i>Motacilla flava</i>	Yellow Wagtail	-	M	Breeds in temperate Europe and Asia. 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.	Low-no habitat	Low
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	-	M	The Satin Flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. Found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	Low-no habitat	Low
<i>Ninox connivens</i>	Barking Owl	V	-	Generally found in open forests, woodlands, swamp woodlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country.	Low-no habitat	Low
<i>Ninox strenua</i>	Powerful Owl	V	-	Occupies wet and dry eucalypt forests and rainforests. Can occupy both un-logged and lightly logged forests as well as undisturbed forests where it usually roosts on the limbs of dense trees in gully	Medium-High	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
				areas. It is most commonly recorded within turpentine tall open forests and black she-oak within open forests. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm.		
<i>Numenius madagascariensis</i>	Eastern Curlew	-	CE, MA, M	A primarily coastal distribution. Found in all states, particularly the north, east, and south-east regions including Tasmania. Rarely recorded inland. Mainly forages on soft sheltered intertidal sand flats or mudflats, open and without vegetation or cover. Breeds in the northern hemisphere.	Low-no habitat	Low
<i>Pandion cristatus</i> , <i>Pandion haliaetus</i>	Eastern Osprey	V	M, MA	Ospreys are found right around the Australian coast line, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	Low-Medium	Low
<i>Phoebastria fusca</i>	Sooty Albatross	V	-	In Australian waters, this species is generally recorded in winter off the south coast from Tasmania to Western Australia, while there are occasional sightings off the NSW coast, north of Grafton. This pelagic or ocean-going species inhabits subantarctic and subtropical marine waters, spending the majority of its time at sea, and rarely occurs in continental shelf waters.	Low-no habitat	Low
<i>Pterodroma neglecta neglecta</i>	Kermadec Petrel (west Pacific subspecies)	V	V	Typically nests on the surface in loose colonies among rocks and vegetation. On Ball's Pyramid it nests only on steep cliffs above 400 m. On Phillip I. it nests under stands of African Olive. This species is marine and highly pelagic, rarely approaching land except at colonies.	Low-no habitat	Low
<i>Ptilinopus superbus</i>	Superb Fruit-dove	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	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
				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.		
<i>Rhipidura rufifrons</i>	Rufous Fantail	-	M	Found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. Inhabits tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	Low-no habitat	Low
<i>Rostratula australis</i>	Australian Painted Snipe	E	E, MA	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. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.	Low-Medium	Low
<i>Sternula albifrons</i>	Little Tern	E	M	In Australia, Little Terns inhabit sheltered coastal environments, including lagoons, estuaries, river mouths and deltas, lakes, bays, harbours and inlets, especially those with exposed sandbanks or sand-spits, and also on exposed ocean beaches.	Low-no habitat	Low
<i>Sternula nereis nereis</i>	Fairy Tern	-	V	Distribution includes the southern half of NSW coast. Fairy Terns utilise a variety of habitats including offshore, islands in estuaries or lakes, wetlands, beaches and spits.	Low-no habitat	Low
<i>Thalassarche cauta (sensu stricto), Thalassarche cauta cauta</i>	Shy Albatross, Tasmanian Shy Albatross	V	V, M, MA	The Shy Albatross is a marine species occurring in subantarctic and subtropical waters, reaching the tropics in the cool Humboldt Current off South America.	Low-no habitat	Low
<i>Thalassarche chrysostoma</i>	Grey-headed Albatross	-	E, M, MA	The Grey-headed Albatross is marine, pelagic and migratory. In Australian territory, Grey-headed Albatross breed on the southern and western flanks of Petrel Peak, Macquarie Island. Birds disperse widely across the Southern Ocean, at more southerly latitudes in	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
				summer than in winter, when they frequent the waters off southern Australia and New Zealand.		
<i>Thalassarche melanophris</i>	Black-browed Albatross	V	V, M, MA	The Black-browed Albatross has a circumpolar range over the southern oceans, and are seen off the southern Australian coast mainly during winter. Inhabits antarctic, subantarctic, subtropical marine and coastal waters over upwellings and boundaries of currents.	Low-no habitat	Low
<i>Tringa nebularia</i>	Common Greenshank	-	M	Variety of inland wetlands and sheltered coastal habitats of varying salinity. Found on mudflats, saltmarsh, mangroves in embayments, harbours, deltas and lagoons. Breeds in northern hemisphere.	Low-no habitat	Low
<i>Tyto novaehollandiae</i>	Masked Owl	V	-	Inhabits a diverse range of wooded habitat that provide tall or dense mature trees with hollows suitable for nesting and roosting. Mostly recorded in open forest and woodlands adjacent to cleared lands. Nest in hollows, in trunks and in near vertical spouts or large trees, usually living but sometimes dead. Nest hollows are usually located within dense forests or woodlands. Masked Owls prey upon hollow-dependent arboreal marsupials, but terrestrial mammals make up the largest proportion of the diet.	Low-no habitat	Low
Fish						
<i>Macquaria australasica</i>	Macquarie Perch	E (FM Act)	E	Macquarie perch 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. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries	Low-no habitat	Low
<i>Prototroctes maraena</i>	Australian Grayling	-	V	Historically, this species occurred in coastal streams from the Grose River Valley, southwards through NSW, Vic. and Tas. It also occasionally occurred high upstream in the Snowy R. A single juvenile specimen was collected from Lake Macquarie in 1974. This species spends only part of its lifecycle in freshwater. The Tambo River population inhabits a clear, gravel-bottomed stream with alternating pools and riffles, and granite outcrops. It has also been associated	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
				with clear, gravel-bottomed habitats in the Mitchell & Wonnangatta Rivers but was present in a muddy-bottomed, heavily silted habitat in the Tarwin R.		
Mammals						
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V	-	Inhabits rainforest through to sclerophyll forest and tree heath. Banksias and myrtaceous shrubs and trees are a favoured food source. Will often nest in tree hollows, but can also construct its own nest. Because of its small size it is able to utilise a range of hollow sizes including very small hollows. Individuals will use a number of different hollows and an individual has been recorded using up to 9 nest sites within a 0.5 ha area over a 5 month period.	Low-no habitat	Low
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Located in a variety of drier habitats, including the dry sclerophyll forests and woodlands to the east and west of the Great Dividing Range. Can also be found on the edges of rainforests and in wet sclerophyll forests. This species roosts in caves and mines in groups of between 3 and 37 individuals.	Low-no habitat	Low
<i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll	V	E	Spotted-tailed Quoll are found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. Only in Tasmania is it still considered common. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Low-no habitat	Low
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	-	Inhabit sclerophyll forests, preferring wet habitats where trees are more than 20 m high. Two observations have been made of roosts in stem holes of living eucalypts. There is debate about whether or not this species moves to lower altitudes during winter, or whether they remain sedentary but enter torpor. This species also appears to be highly mobile and records showing movements of up to 12 km between roosting and foraging sites.	Low-no habitat	Low
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	E	E	Prefers sandy soils with scrubby vegetation and-or areas with low ground cover that are burn from time to time. A mosaic of post fire vegetation is important for this species.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
<i>Miniopterus australis</i>	Little Bentwing-bat	V	-	Coastal north-eastern NSW and eastern Queensland. The Little Bentwing-bat is an insectivorous bat that roost in caves, in old mines, in tunnels, under bridges, or in similar structures. They breed in large aggregations in a small number of known caves and may travel hundreds of kilometres from feeding home ranges to breeding sites. They have a preference for moist eucalypt forest, rainforest or dense coastal banksia scrub where it forages below the canopy for insects.	High	Low
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V	-	Eastern Bentwing-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.	High	Low
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V	-	Most records are from dry eucalypt forests and woodlands to the east of the Great Dividing Range. Appears to roost in trees, but little is known of this species' habits.	Medium-High	Low
<i>Myotis macropus</i>	Southern Myotis	V	-	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage.	Medium-High	Low
<i>Petauroides volans</i>	Greater Glider population in the Eurobodalla local government area	EP	-	This population of Greater Gliders on the south coast of NSW is bounded by the Moruya River to the north, Coila Lake to the south and the Princes Highway and cleared land exceeding 700 m in width to the west. The Greater Glider occurs in eucalypt forests and woodlands.	Low-no habitat	Low
<i>Petauroides volans</i>	Greater Glider	-	V	The Greater Glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	-	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range. Requires abundant hollow bearing trees and a mix of eucalypts, banksias and acacias. There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well as hollow stumps. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked. Endangered population in the Wagga Wagga LGA.	Low-no habitat	Low
<i>Petaurus norfolcensis</i>	Squirrel Glider in the Wagga Wagga local government area	EP	-	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range. Requires abundant hollow bearing trees and a mix of eucalypts, banksias and acacias. There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well as hollow stumps. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked. Endangered population in the Wagga Wagga LGA.	Low-no habitat	Low
<i>Petaurus norfolcensis</i>	Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill	EP	-	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range. Requires abundant hollow bearing trees and a mix of eucalypts, banksias and acacias. There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well as hollow stumps. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked. Endangered population in the Wagga Wagga LGA.	Low-no habitat	Low
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E	V	Found in rocky areas in a wide variety of habitats including rainforest gullies, wet and dry sclerophyll forest, open woodland and rocky outcrops in semi-arid country. Commonly sites have a northerly aspect with numerous ledges, caves and crevices.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
<i>Phascolarctos cinereus</i>	Koala	V	V	Inhabits eucalypt forests and woodlands. The suitability of these forests for habitation depends on the size and species of trees present, soil nutrients, climate and rainfall.	Low-no habitat	Low
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo	V	V	Inhabits coastal heath and wet and dry sclerophyll forests. Generally found in areas with rainfall greater than 760 mm. Requires relatively thick ground cover where the soil is light and sandy.	Low-no habitat	Low
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	-	V	The New Holland Mouse currently has a disjunct, fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes.	Low-no habitat	Low
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Bats commute daily to foraging areas, usually within 15 km of the day roost although some individuals may travel up to 70 km.	Low-no habitat	Low
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V	-	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.	Medium-High	Low
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	-	Prefer moist gullies in mature coastal forests and rainforests, between the Great Dividing Range and the coast. They are only found at low altitudes below 500 m. In dense environments they utilise natural and human-made opening in the forest for flight paths. Creeks and small rivers are favoured foraging habitat. This species roosts in hollow tree trunks and branches.	Low-medium	Low
Marine mammals						
<i>Arctocephalus forsteri</i>	New Zealand Fur-seal	V	-	Prefers rocky parts of islands with jumbled terrain and boulders.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
<i>Arctocephalus pusillus</i>	Australian Fur-seal	V	-	Prefers rocky parts of islands with flat, open terrain. They occupy flatter areas than do New Zealand Fur-Seals where they occur together.	Low-no habitat	Low
<i>Balaenoptera musculus</i>	Blue Whale	E	E	Breeds in warm water at low latitudes, preferring open seas rather than coastal waters.	Low-no habitat	Low
<i>Dugong dugon</i>	Dugong	E	-	Extends south from warmer coastal and island waters of the Indo-West Pacific to northern NSW, where it's known from incidental records only. Major concentrations of Dugongs occur in wide shallow protected bays, wide shallow mangrove channels and in the lee of large inshore islands. Will also occupy deeper waters if their seagrass food is available.	Low-no habitat	Low
<i>Eubalaena australis</i>	Southern Right Whale	E	E	Migrate between summer feeding grounds in Antarctica and winter breeding grounds around the coasts of southern Australia, New Zealand, South Africa and South America. They feed in the open ocean in summer. They move inshore in winter for calving and mating.	Low-no habitat	Low
<i>Megaptera novaeangliae</i>	Humpback Whale	V	V	The population of Australia's east coast migrates from summer cold-water feeding grounds in subantarctic waters to warm-water winter breeding grounds in the central Great Barrier Reef.	Low-no habitat	Low
<i>Physeter macrocephalus</i>	Sperm Whale	V	-	Wide, but patchy distribution from the tropics to the edge of the polar pack-ice in both hemispheres. Concentrations of Sperm Whales tend to occur where the seabed rises steeply from a greater depth, beyond the continental shelf.	Low-no habitat	Low
Reptiles						
<i>Caretta caretta</i>	Loggerhead Turtle	E	-	Loggerhead turtles have a worldwide tropical and subtropical distribution. In Australia, they occur in coral reefs, bays and estuaries in tropical and warm temperate waters off the coast of Queensland, Northern Territory, Western Australia and New South Wales.	Low-no habitat	Low
<i>Chelonia mydas</i>	Green Turtle	V	V	Green Turtles occur in seaweed-rich coral reefs and inshore seagrass pastures in tropical and subtropical areas of the Indo-Pacific region.	Low-no habitat	Low
<i>Dermochelys coriacea</i>	Leathery Turtle	V	E	Occurs in inshore and offshore marine waters. Rarely breeds in Australia, with the nearest regular nesting sites being the Solomon	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
				Islands and Malayan Archipelago. Occasional breeding records from NSW coast, including between Ballina and Lennox Head in northern NSW.		
<i>Eretmochelys imbricata</i>	Hawksbill Turtle	-	V, M, MA	Hawksbill Turtles spend their first five to ten years drifting on ocean currents. Hawksbill Turtles have been seen in temperate regions as far south as northern NSW.	Low-no habitat	Low
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	E	V	Occurs almost exclusively in association with communities occurring on Triassic sandstone within the Sydney Basin. Typically found among exposed sandstone outcrops with vegetation types ranging from woodland to heath. Within these habitats they spend most of the year sheltering in and under rock crevices and exfoliating rock. However, some individuals will migrate to tree hollows to find shelter during hotter parts of summer.	Low-no habitat	Low
<i>Natator depressus</i>	Flatback Turtle	-	V, M, MA	Post-hatchling and juvenile Flatback Turtles do not have the wide dispersal phase in the oceanic environment like other sea turtles. Adults inhabit soft bottom habitat over the continental shelf of northern Australia.	Low-no habitat	Low
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V	-	Rosenberg's Goanna occurs on the Sydney Sandstone in Wollemi National Park to the north-west of Sydney, in the Goulburn and ACT regions and near Cooma in the south. Found in heath, open forest and woodland, associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat and feeds on carrion, birds, eggs, reptiles and small mammals. They shelter in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	Low-no habitat	Low
Plants						
<i>Asterolasia elegans</i>		E	E	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	Low-not detected during field surveys	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
				reserve. Occurs on Hawkesbury sandstone in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest.		
<i>Astrotricha crassifolia</i>	Thick-leaf Star-hair	V	V	Occurs near Patonga (Gosford LGA), and in Royal NP and on the Woronora Plateau (Sutherland and Campbelltown LGAs). There is also a record from near Glen Davis (Lithgow LGA). Also in Victoria. Occurs in dry sclerophyll woodland on sandstone.	Low-no habitat	Low
<i>Boronia umbellata</i>	Orara Boronia	V	V	Grows as an understorey shrub in and around gullies in wet open forest.	Low-no habitat	Low
<i>Caladenia tessellata</i>	Thick-lip Spider Orchid	E	V	The Tessellated Spider Orchid is found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. Known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct.	Low-no habitat	Low
<i>Callistemon linearifolius</i>	Netted Bottle Brush	V	-	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. Grows in dry sclerophyll forest on the coast and adjacent ranges.	Low-not detected during field surveys	Low
<i>Chamaesyce psammogeton</i>	Sand Spurge	E	-	Found sparsely along the coast from south of Jervis Bay (at Currarong, Culburra and Seven Mile Beach National Park) to Queensland (and Lord Howe Island). Populations have been recorded in Wamberal Lagoon Nature Reserve, Myall Lakes National Park and Bundjalung National Park. Grows on fore-dunes and exposed headlands, often with Spinifex sericeus.	Low-not detected during field surveys	Low
<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid	V	V	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum, Silvertop Ash, Red Bloodwood and Black She-oak and appears to prefer open areas in the understorey of this community.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E	E	Recorded from rainforest gullies scrub and scree slopes from the Gloucester district to the Wollongong area and inland to Mt Dangar.	Low-no habitat	Low
<i>Eucalyptus camfieldii</i>	Heart-leaved Stringybark	V	V	Restricted distribution in a narrow band with the most northerly records in the Raymond Terrace Area south to Waterfall. Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. 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.	Low-no habitat	Low
<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V	V	Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock. Seedling recruitment is common, even in disturbed soils, if protected from grazing and fire.	Low-not detected during field surveys	Low
<i>Genoplesium baueri</i>	Bauer's Midge Orchid	E	E	Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March. Has been recorded between Ulladulla and Port Stephens. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded in Berowra Valley Regional Park, Royal National Park and Lane Cove National Park and may also occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments.	Low-no habitat	Low
<i>Grevillea caleyi</i>	Caley's Grevillea	CE	CE	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 sites occur on the ridgetop between elevations of 170 to 240 m, in association with laterite soils and a vegetation community of open forest, generally dominated by Silvertop Ash and Red Bloodwood. Commonly found in the endangered Duffys forest ecological community.	Low-no habitat	Low
<i>Grevillea shiressii</i>	Grevillea shiressii	V	V	Grows along creek banks in wet sclerophyll forest with a moist understorey in alluvial sandy or loamy soils.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
<i>Haloragodendron lucasii</i>		E	E	Occurs on Hawkesbury Sandstone in moist sandy loam soil. The species prefers sheltered aspects and inhabits gentle slopes below cliff lines near creeks in low open woodland or open forest. Its distribution is correlated with high soil moisture and phosphorus levels.	Low-no habitat	Low
<i>Kunzea rupestris</i>	Kunzea rupestris	V	V	Grows in shallow depressions on large flat sandstone rock outcrops. Characteristically found in short to tall shrubland or heathland.	Low-no habitat	Low
<i>Lasiopetalum joyceae</i>		V	V	Has a restricted range occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. It is currently known from 34 sites between Berrilee and Duffys Forest. Seventeen of these are reserved. Grows in heath on sandstone.	Low-no habitat	Low
<i>Leptospermum deanei</i>	Deane's Tea-tree	V	V	Woodland on lower hill slopes or near creeks. Sandy alluvial soil or sand over sandstone. Occurs in riparian scrub, woodland and open forest.	Low-no habitat	Low
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	V	Grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. Scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north.	Low-no habitat	Low
<i>Melaleuca deanei</i>	Deane's Melaleuca	V	V	Grows in wet heath on sandstone in coastal districts from Berowra to Nowra.	Low-no habitat	Low
<i>Microtis angusii</i>	Angus's Onion Orchid	E	E	It is not easy to define the preferred natural habitat of this orchid as the Ingleside location is highly disturbed. The dominant species occurring on the site are introduced weeds Coolatai grass and Acacia saligna. The Ingleside population occurs on soils that have been modified but were originally those of the restricted ridgetop lateritic soils in the Duffys forest - Terrey Hills - Ingleside and Belrose areas. These soils support a specific and distinct vegetation type, the Duffys forest Vegetation Community which is listed as an EEC under the TSC Act and ranges from open forest to low open forest and rarely woodland.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
<i>Persoonia hirsuta</i>	Hairy Geebung	E	E	Distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. A large area of occurrence, but occurs in small populations, increasing the species' fragmentation in the landscape. Found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. Usually present as isolated individuals or very small populations. Probably killed by fire (as other <i>Persoonia</i> spp. are) but will regenerate from seed.	Low-no habitat	Low
<i>Pimelea curviflora</i> var. <i>curviflora</i>		V	V	Confined to the coastal area of Sydney between northern Sydney in the south and Maroota in the north-west. Former range extended south to the Parramatta River and Port Jackson region including Five Dock, Bellevue Hill and Manly. Occurs on shale-lateritic soils over sandstone and shale-sandstone transition soils on ridgetops and upper slopes amongst woodlands.	Low-no habitat	Low
<i>Prostanthera askania</i>	Tranquility Mintbush	E	E	Occurs adjacent to drainage lines on flat to moderately steep slopes formed on Narrabeen sandstone, and in moist sclerophyll forest and warm temperate rainforest communities. These communities are generally tall forests with a mesic understorey. Appears in some locations to propagate vegetatively by stem-layering where prostrate branches take root where they remain in contact with the soil.	Low-no habitat	Low
<i>Prostanthera junonis</i>	Somersby Mintbush	E	E	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.	Low-no habitat	Low
<i>Prostanthera marifolia</i>	Seaforth Mintbush	CE	CE	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.	Low-no habitat	Low
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E	V	Found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State forest. On the south coast the species occurs on grey	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Likelihood of impacts from project
				soils over sandstone, restricted mainly to remnant stands of littoral rainforest. On the central coast it occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.		
<i>Tetratheca glandulosa</i>	Tetratheca glandulosa	V	-	Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gynea, 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.	Low-no habitat	Low
<i>Thesium australe</i>	Austral Toadflax	V	V	Grows 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. Grows on Kangaroo Grass tussocks but has also been recorded within the exotic Coolatai Grass.	Low-no habitat	Low

Key: CE = Critically Endangered; E, E1 = Endangered; EP = Endangered Population; V = Vulnerable; M = Migratory.

Note: Fauna that are exclusively dependant on marine environments, including near shore environments, were not included in the assessment due to lack of suitable habitat.

Habitat descriptions taken from the relevant profiles on the OEH Threatened Species website unless otherwise stated.

Appendix 2. Photos of the study area



Plate 1: Starting point of shared pathway project at Newport beach (existing dirt walking trail)



Plate 2: Starting point of shared pathway project at Newport beach (existing dirt walking trail) with Newport beach in view



Plate 3: Existing stairs running up through Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817) vegetation community



Plate 4: Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817) vegetation community



Plate 5: Existing walking trail through Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817)



Plate 6: 1817: Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817) which will be impacted by a shared path (on-ground).



Plate 7: Existing boardwalk running through Lilly Pilly - Cabbage Tree Palm littoral rainforest on escarpment slopes and gullies of the Sydney basin (PCT 1833)



Plate 8: Manecured garden area where shared path (omn-ground) will run through (impact).



Plate 9: Occasional weeds found along existing trails and road side (asparagus fern)



Plate 10: On-road section of the project along the Serpentine Rd with road side exotic plantings, running through a residential area.



Plate 11: On-road section of the project along the Serpentine Rd with road side native plantings, running through a residential area.



Plate 12: On-road section of the project along the Serpentine Rd, running through a residential area next to drive ways/ lawn.



Plate 13: Serpentine Rd running past Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney (PCT 1778)



Plate 14: Serpentine Road where a footpath (on-ground) is to be constructed impacting the local Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817) vegetation community



Plate 15: Steep hill along the Serpentine Rd with drive ways on the road verge.



Plate 16: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (TEC).



Plate 17: On road section of the project running past the Coast Banksia - Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 772) vegetation community.



Plate 18: On road section of the project running past residential area along Barrenjoey Rd where a shared path (on-ground) is to be constructed.



Plate 19: Corner of The Serpentine Rd and Barrenjoey rd.



Plate 20: Project ending point at Avaon Beach

Appendix 3 – Assessments of Significance (Five Part Test) BC Act

The following threatened biodiversity listed on the BC Act are known to occur or considered likely to occur in the study area:

- PCT 898: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (KGSTG)

The potential impact of the proposal this threatened ecological community have been assessed via the application of the Five Part Test under the BC Act.

PCT 898: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (KGSTG)	
a) In the case of a threatened species, whether the action proposed 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	n/a
b) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed: <ul style="list-style-type: none"> 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 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 	<p>The action proposed will not have an adverse effect on either the extent or composition of (KGSTG) such that its local occurrence is placed at risk of extinction as:</p> <ul style="list-style-type: none"> • No patches of KGSTG will be cleared completely, or even significantly of vegetation. • Only a maximum of 0.1 ha of KGSTG will be cleared with temporary trampling impacts to another 0.2 ha that the community will likely recover from • There is approximately 5 ha of KGSTG within the vicinity of the Study Area which, therefore the impact area of the project represents less than 1% of the local occurrence this community.
c) In relation to the habitat of a threatened species, population or ecological community: <ul style="list-style-type: none"> i. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and ii. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and iii. The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality. 	<p>Extent of impact on habitat</p> <p>Only 0.1 ha of KGSTG would be removed by the proposal, with a maximum of another 0.2 ha temporarily impacted through trampling during construction. This represents less than 1% percent of the local occurrence of KGSTG this proposal will impact.</p> <p>Habitat fragmentation</p> <p>No further habitat fragmentation would occur as the patch of KGSTG to be impacted is already isolated from other patches along the coast.</p> <p>Importance of habitat to be impacted</p> <p>The area of KGSTG represents a small patch of this community and is typical of the patches that exist along the coast. Given this is only a small to typically sized representative patch of this community, the minor impact to it is unlikely to have long-term negative consequences for the local occurrence of KGSTG.</p>

PCT 898: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (KGSTG)

d) Whether the action proposed is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)	No areas of outstanding biodiversity value would be affected by the proposed works either directly or indirectly. No areas identified as priority conservation lands were identified within the footprint of the project or near surrounds. Priority conservation lands are identified as the lands that can contribute most to the long-term recovery and maintenance of threatened biodiversity (DECCW 2010).
e) Whether the action proposed constitutes or is part of a Key Threatening Process (KTP) or is likely to result in the operation of, or increase the impact of, a KTP	<p>The proposal has the potential to increase the impact of the following KTPs listed in NSW:</p> <ul style="list-style-type: none"> • Clearing of native vegetation'. A total of 0.1 ha of KGSTG will be removed by the proposal. This is only a very small fraction of the total area of this community within the vicinity of the project (<1 %). • Invasion of native plant communities by exotic weeds (e.g, perennial grasses) – there is a risk that weeds may be introduced into the community during the removal / pruning of trees by workers. The proposal is not likely to exacerbate the occurrence of exotic weeds, provided weed management is undertaken during clearing to minimise introduction and spread of weed species, in accordance with Guide 6 of the Roads and Maritime Biodiversity Guidelines (RTA 2011).
Conclusion	The local occurrence of KGSTG is unlikely to be significantly affected by the proposed works.

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