Tuggerah Station Upgrade

Ecological Impact Assessment Report

Final | 02

18 February 2022

Transport for NSW

Tuggerah Station Upgrade

Project No:	IS399500
Document Title:	Ecological Impact Assessment Report
Revision:	02
Date:	18 February 2022
Client Name:	Transport for NSW
Project Manager:	Tim Colman
Author:	Emma Weatherstone and Matt Consterdine
File Name:	IS399500_Tuggerah Station REF_Ecological Impact Assessment Report

Jacobs Group (Australia) Pty Limited
ABN 37 001 024 095
Level 4, 12 Stewart Avenue
Newcastle West, NSW 2302
PO Box 2147
Dangar, NSW 2309
Australia
T +61 2 4979 2600
www.jacobs.com

Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
01	13/12/2021	Draft	EW and MC	MC	TC	TC
02	18/02/2022	Final	EW and MC	MC	TC	TC

Contents

Tables

Figures

Executive Summary

The Transport Access Program (TAP) is a NSW Government initiative to provide This project is being delivered as part of the Transport Access Program, a NSW Government Initiative to provide a better experience for public transport customers by delivering accessible, modern secure and integrated transport infrastructure.

As part of this program, the Tuggerah Station Upgrade (the Proposal) would aim to provide a station precinct that is accessible to those with a disability, limited mobility, parents/carers with prams, and customers with luggage.

The purpose of this report is to present the findings of an Ecological Impact Assessment undertaken within the Tuggerah Proposal area (referred to as the study area hereafter) to assess the potential impacts of the Proposal on local biodiversity. A discussion on strategies to mitigate any identified impacts is also provided (refer to **Figure 1**).

The key findings of the biodiversity assessment are that there are no native vegetation communities and no important fauna habitat present within the study area. The proposed station upgrade would not impact any native vegetation communities or threatened ecological communities and would not affect native fauna (including their habitats and movement corridors).

There are no predicted significant impacts to threatened biodiversity from the works. While negligible impacts to native biodiversity are predicted, the mitigation measures detailed in **Section 5** would ensure that any impacts that do occur are minimised. Vegetation and habitat clearing would be limited to up to seven planted trees for removal and an additional two trees which may require trimming as shown in **Figure 2** and **Appendix A**. Trees that are to be retained would be protected by implementation of the *Australian Standard 4970-2009 for the Protection of Trees on Development Sites*. The TfNSW *Vegetation Management (Protection and Removal) Guideline* (TfNSW, 2019a) would be followed to ensure that vegetation is protected and managed appropriately.

Six species are classed as a priority weed for the Greater Sydney Region (which includes the Central Coast LGA), including *Araujia sericifera* (Moth Vine), *Asparagus asparagoides* (Bridal creeper), *Cortaderia selloana* (Pampus), *Lantana camara* (Lantana), *Pennisetum clandestinum* (Kikuyu Grass) and *Solanum mauritianum* (Wild Tobacco Bush). Additionally, *Asparagus asparagoides* (Bridal creeper) and *Lantana camara* (Lantana) are also classified as Weeds of National Significance. Further discussion is provided in **Section 3.5**. The study area contains some weed growth and, as such, weeds must be managed during construction. Mitigation measures to limit the spread and germination of weeds are provided in **Section 5**.

1. Introduction

1.1 Proposal description

The NSW Government is improving accessibility at Tuggerah Station. This project is being delivered as part of the Transport Access Program, a NSW Government Initiative to provide a better experience for public transport customers by delivering accessible, modern secure and integrated transport infrastructure.

As part of this program, the Tuggerah Station Upgrade (the Proposal) would aim to provide a station precinct that is accessible to those with a disability, limited mobility, parents/carers with prams, and customers with luggage.

The Proposal would provide:

- Construction of a new pedestrian footbridge north of the existing footbridge with new stairs connecting the Pacific Highway, the commuter car park and the station platforms with canopies for weather protection over the footbridge and all stairs
- Installation of a two-stop lift connecting Platform 1 and the new pedestrian footbridge, and installation of a three-stop lift connecting the Pacific Highway station entrance, Platform 2 and the new pedestrian footbridge
- Removal of the existing non-compliant ramps, stairs and pedestrian footbridge
- Removal of the existing Station Master's office, and construction of a new Station Master's office
- Widening and lengthening of Platforms 1 and 2 to achieve compliant platform widths, improve accessibility and space for station customers and allow for future rolling stock
- Construction of a family accessible toilet on Platform 1 and a unisex ambulant toilet on Platform 1
- Interchange upgrade work including provision of new bike parking facilities at the new station entrances, provision of 15 DDA compliant accessible parking spaces to replace 19 existing non-compliant parking spaces in the commuter car park, new accessible footpaths on both eastern and western side of the station, and upgrade to the existing Pacific Highway southbound bus stop to be DSAPT compliant
- Landscaping work including public domain improvements at the station forecourt areas, new lighting, and enhancement of sightlines between Anzac Road and Bryant Drive
- Ancillary work including station power supply upgrade, replacement of existing 11kV and 66kV overhead power lines with underground cables, construction of new equipment room, provision of new or reinstated tactile pavement markings where required and improvements to station communication systems including CCTV and hearing loops.

1.2 Document purpose

The purpose of this report is to present the findings of an Ecological Impact Assessment undertaken within the Tuggerah study area (refer to **Figure 1. Site locality map**

) to assess the potential impacts of the Proposal on local biodiversity. A discussion on strategies to mitigate any identified impacts is also provided.

1.3 Station location

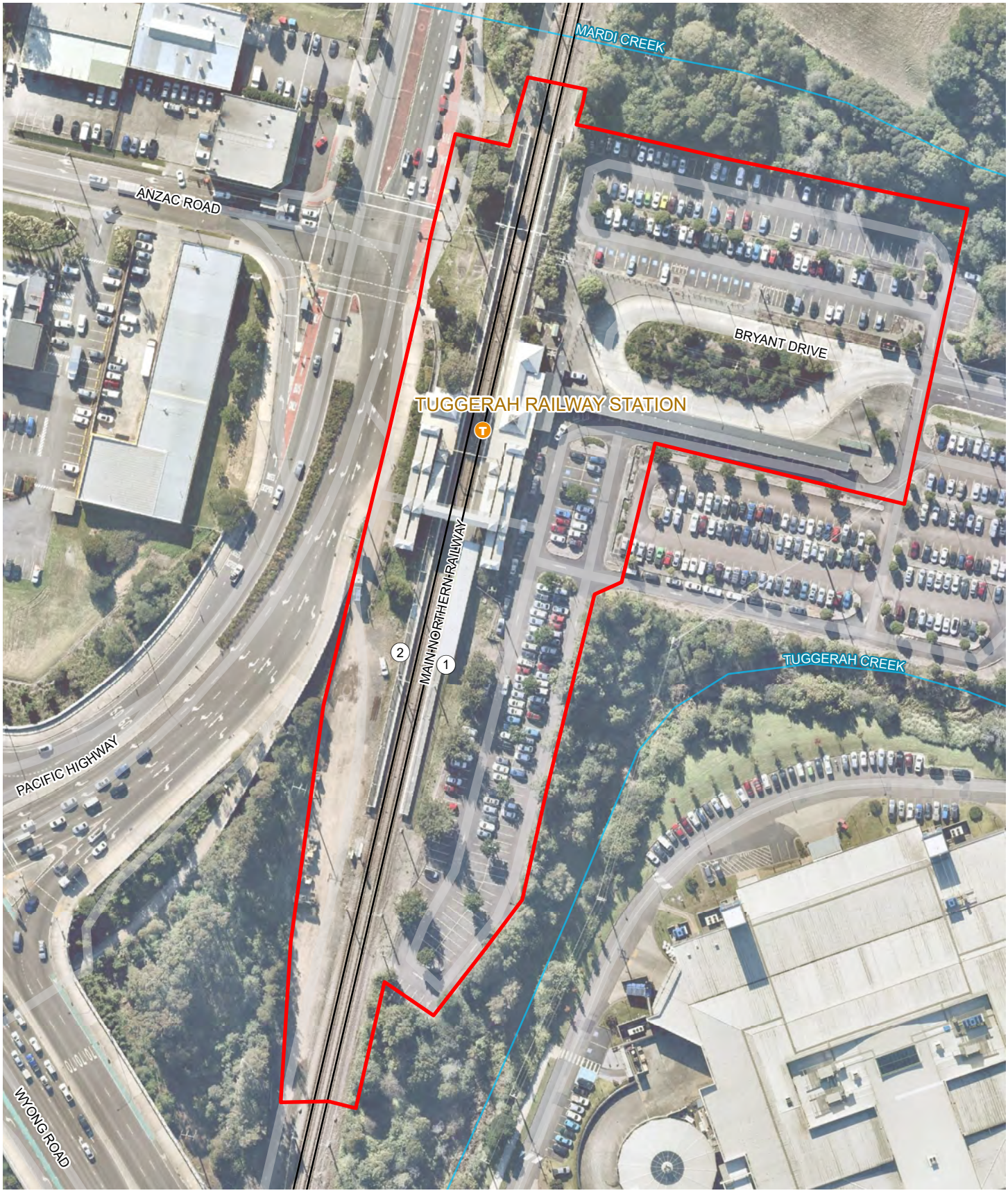
The Proposal is located at Tuggerah on the Central Coast of NSW, approximately 70 kilometres north of the Sydney CBD on the Main Northern (Newcastle) Line, in New South Wales. It sits within the Central Coast Council Local Environment Area (LGA). The station consists of two platforms accessible from both the Pacific Highway and Bryant Drive. Access from one platform to the other is currently via a footbridge with stair access and an alternate ramp passage.

The study area encompasses the existing footbridge, platforms that will be associated with proposed upgrade works, part of the commuter car park to the east of the station and the proposed construction ancillary facility sites located at the northern and southern ends of the station, on both the east and west sides of the rail corridor (refer to **Figure 1**).

1.4 Assessment aims

This Ecological Impact Assessment aims to:

- Identify the occurrence, or likelihood of occurrence of threatened species, populations and communities listed under the *Biodiversity Conservation Act 2016* (BC Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) within the area subject to the activity
- Present data in sufficient detail to allow the potential impact of works at the study area to be quantified
- Provide an assessment of trees to be removed or retained within the study area
- Assess the significance of potential impacts to threatened biodiversity
- Ensure the biodiversity values of the study area are protected from the effects of works (as much as is practicable) and outline a mitigation strategy to minimise impacts to biodiversity as required.



Proposal area

Railway Station

Platform number

Road

Railway

0 25 50 m

1:1,500 at A4

GDA 1994 MGA Zone 55

Data sources

Jacobs 2021
Department Finance, Services and Innovation 2020

Figure 1 Site locality map

2. Methodology

2.1 Personnel

Ecological surveys were conducted in the study area by Jacobs Group Australia. Jacobs ecologists are licensed to conduct field surveys under the *National Parks and Wildlife Act 1974* (Scientific Research Permit SL100044) and hold ethical approval to conduct research by the Department of Primary Industries Animal Care and Ethics Committee (Animal Research Authority (09/1895).

2.2 Desktop assessment

Prior to the commencement of fieldwork, a database search and literature review were completed. Relevant and available documents were reviewed for information on past land uses and presence of vegetation communities and flora and fauna. Relevant databases were searched for records of threatened species within a ten-kilometre radius search area around the study area. This review was used to prepare a list of threatened species and communities likely to occur in the study area and locality. The following sources of information were consulted:

- EPBC Act Protected Matters Search Tool (PMST) (ten-kilometre radius around study area) – Department of Environment (DoE)
- DoE Species Profile and Threats (SPRAT) database
- BioNet – Atlas of NSW Wildlife and Threatened Biodiversity Data Collection (Environment, Energy and Science Group (EESG), 2020)
- Environment, Energy and Science Group (ESSG) Threatened species, populations and communities online search
- PlantNet – (NSW Flora online – https://plantnet.rbgsyd.nsw.gov.au/floraonline.htm). Royal Botanic Gardens
- NSW Department of Primary Industries (Agriculture) noxious weed database
- Aerial photographs (current and historic) and topographic maps
- Available vegetation mapping for the Central Coast area (Office of Environment and Heritage 2013).

The review focused on identifying and listing the threatened flora and fauna species, populations and ecological communities previously recorded near the study area. Following collation of database records and species and community profiles a 'likelihood of occurrence' assessment was prepared with reference to the broad habitats contained within the study area. This was further refined following field surveys and assessment of habitat present.

2.3 Field assessment

A site inspection was undertaken of the study area on 8 October 2021 to identify flora and fauna, determine the nature of vegetation communities, the habitats present, and the likely impact of the works on biodiversity values. The site inspection focused on areas subject to potential disturbance by the Proposal. A traverse was undertaken outside of the rail corridor with opportunistic sightings of flora and fauna made to verify the ecological values and facilitate habitat condition assessments.

The purpose of the field assessment was to:

- Identify flora and fauna species, populations and vegetation communities, detailing suitability of habitat to support threatened species
- Identify and provide mapping of potential threatened and migratory species, populations and ecological communities listed under BC Act, and EPBC Act
- Assess and document important fauna and/or aquatic habitat (including hollow bearing trees, nectar producing plants, logs and bush rock), to be retained, mitigated or avoided

- Record dimensions, rating and status of existing trees likely to be affected by the Proposal and identify Tree Protection Zones (in line with relevant Australian standards)
- Map the distribution and condition of native vegetation communities, where present, with particular regard to identifying threatened ecological communities in the study area
- Identify the extent of weed invasion at each site including noxious weeds and occurrence of dieback
- Locate potential local and regional wildlife corridors and their significance in relation to both study areas
- Identify existing and potential indirect impacts to the ecological values.

The likely presence of threatened species was determined through habitat assessment, taking a precautionary approach likely to include species that are difficult to detect (i.e. cryptic species). A species was assumed to be present if suitable habitat was observed in the study area, and if that species was known to occur regionally. No detailed floristic surveys or fauna surveys were undertaken. Due to the small size and landscaped nature of study area, all trees could be surveyed without the need for parallel survey transects.

2.4 Determining the likelihood of occurrence of threatened species

State and nationally listed threatened species identified from the background review were considered in terms of their likelihood to occur in the habitats present within the study area based on their identified habitat requirements. The results of this review are provided in **Appendix B.** The likelihood of occurrence for threatened species was classified according to the criteria described in **Table 1**.

Table 1. Likelihood of occurrence includes one or more of the following criteria

Likelihood of occurrence	Criteria
Unlikely	Species not recorded during field surveys and fit one or more of the following criteria: ▪ Species highly restricted to certain geographical areas not within the works footprint ▪ Specific habitat requirements are not present in the study area.
Low	Species not recorded during field surveys and fit one or more of the following criteria: ▪ Have not been recorded previously in the study area/surrounds and for which the study area is beyond the current distribution range ▪ Use specific habitats or resources which are not present in the study area ▪ Are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded.
Moderate	Species not recorded during the field surveys that fit one or more of the following criteria: ▪ Have infrequently been recorded previously in the study area/surrounds ▪ Use specific habitats or resources present in the study area but in a poor or modified condition ▪ Are unlikely to maintain sedentary populations, however, may seasonally use resources within the study area opportunistically or during migration ▪ Are cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded.
High	Species recorded during the field surveys or species not recorded that fit one or more of the following criteria: ▪ Have frequently been recorded previously in the study area/surrounds ▪ Use habitat types or resources that are present in the study area that are abundance and/or in good condition within the study area ▪ Are known or likely to maintain resident populations surrounding the study area ▪ Are known or likely to visit the site during regular seasonal movements or migration.

2.5 Significance assessments

Significance assessments should be conducted if threatened species, populations and communities are positively identified or have a moderate or high potential to occur in the study area based on the above assessment criteria.

Threatened biodiversity listed under the NSW BC Act are assessed under Section 7.3 of the Act (known as the 5-part test). For threatened biodiversity listed under the EPBC Act a significance assessment must be completed in accordance with the *Matters of National Environmental Significance Significant Impact Guidelines 1.1* (Department of the Environment 2013).

2.6 Limitations

The list of flora and fauna species recorded from this study should not be seen to be fully comprehensive, but rather an indication of the species present at the time of the survey. A period of several seasons or years is often needed to identify all the species present in an area, especially as some species are only apparent at certain times of the year (e.g. orchids or migratory birds) and require specific weather conditions for optimum detection (e.g. frogs). The conclusions of this report are therefore based upon available data and the field surveys and are therefore merely indicative of the environmental condition of the site at the time of the survey. It should be recognised that site conditions, including the presence of threatened species, can change with time.

A precautionary approach was used with regards to presence of threatened species in areas of suitable habitat where there is insufficient evidence to discount the presence of the species due to seasonal limitations or other constraints. The rail corridor was not accessed during the field survey, so the results are based on observation from outside the corridor and from train station platforms only. The identification of some grass and herbaceous plant species was not able to be confirmed, as close inspection from within the rail corridor was not possible.

The tree assessment was visual and conducted from the ground only. No examination (below ground level) of tree roots was made. The inspection was limited to visual examination of the exterior of the trees without dissection, excavation, probing or coring. No internal inspections or tests were carried out. No tests or samples have been taken form the trees to determine tree health. Due to changing environmental conditions and circumstances in which trees grow, no tree can be considered absolutely safe and the assessments in this report should be used as a guide only. The trees assessed appeared healthy at the time of survey. The tree assessment should be considered preliminary in nature as no detailed tests or samples have been taken and no detailed inspection was undertaken by examining roots or by tree climbing to inspect the trees.

3. Existing Environment

3.1 Vegetation communities and fauna habitat

The study area is located in the urban area of Tuggerah and includes Tuggerah Station situated east of the Pacific Highway and west of Bryant Drive. This is a highly disturbed environment which has been historically cleared to make way for the train station, public roads, carparks and drainage channels. The surrounding land use supports several commercial and industrial properties. Some small areas support vacant modified forested lands including private and crown lands including areas to the east and north east of the rail corridor. The study area also includes the road reserves of the existing Pacific Highway and Wyong Road which comprise roadside plantings dominated by *Casuarina glauca* (Swamp Oak), *Cupaniopsis anacardioides* (Tuckeroo), *Lophostemon confertus* (Brush Box) and *Melaleuca quinquenervia* (Broad-leaved Paperbark).

To the east of Tuggerah Station (on the Newcastle – Central Coast/Sydney train line) much of the land has been paved or asphalted as part of the station infrastructure, commuter carparks and pedestrian paths. *Cupaniopsis anacardioides* (Tuckeroo) is the dominant planted vegetation within the commuter car park.

The original native vegetation in this area has been cleared, where the only existing vegetation consists of planted native and exotic trees adjacent to the rail corridor and within the commuter car park to the east. Additionally, opportunistic vegetation (i.e. weeds) has established in the disturbed areas of the rail corridor and road edges. Photos of the trees within the study area are provided in **Appendix A.** No remnant native vegetation communities are present in the study area. No threatened ecological communities occur within or immediately surrounding the study area.

The planted trees around the train station are a mixture of species commonly planted as street trees in the Central Coast region including *Corymbia maculata* (Spotted Gum), *Callistemon citrinus* (Crimson Bottlebrush) *Casuarina cunninghamiana* (River oak), *Melaleuca linariifolia* (Narrow-leaved Paperbark), *Melaleuca quinquenervia* (Broad-leaved Paperbark) and *Melaleuca styphelioides* (Prickly-leaved Tea Tree) (refer to **Appendix A** for photos).

The ground layer is mulched in sections around the station platform, where vegetation has been planted. However, the remaining understorey vegetation across the study area is exotic. Herbaceous and grass weeds are present growing amongst the ballast on the rail line and the land between the rail and the fences and within the planted vegetation surrounding the station. The ground layer is dominated by species common in disturbed areas including *Paspalum dilatatum* (Paspalum), *Sonchus oleraceus* (Sowthistle), *Verbena bonariensis* (Purpletop Vervain), *Solanum nigrum* (Blackberry Nightshade), *Cortaderia selloana* (Pampus), Bidens pilosa (Cobbler's Pegs), *Digitaria sp.* (Summer Grass), *Pennisetum clandestinum* (Kikuyu Grass), *Sida rhombifolia* (Paddy's Lucern), *Plantago lanceolata* (Plantain), *Cirsium vulgare* (Spear Thistle), *Asparagus asparagoides* (Bridal creeper), *Hypochaeris radicata* (Cat's Ear) and *Conyza bonariensis* (Flea Bane). Other weeds identified within the study area included *Lantana camara* (Lantana), *Araujia sericifera* (Moth Vine), *Solanum mauritianum* (Wild Tobacco Bush) and *Abelia grandiflora* (Glossy Abelia). Located adjacent to the study area, outside of the commuter carpark perimeter fence to the east, the following invasive species was noted; *Cinnamomum camphora* (Camphor laurel), *Cortaderia selloana* (Pampus), *Ligustrum sinense* (Small-leaf Privet), *Phyllostachys aurea* (Fishpole Bamboo) and *Ipomoea purpurea* (common Morning Glory).

Of the exotic species identified within the study area, six species are classed as a priority weed for the Greater Sydney Region (which includes the Central Coast LGA), including *Araujia sericifera* (Moth Vine), *Asparagus asparagoides* (Bridal creeper), *Cortaderia selloana* (Pampus), *Lantana camara* (Lantana), *Pennisetum clandestinum* (Kikuyu Grass) and *Solanum mauritianum* (Wild Tobacco Bush). Additionally, *Asparagus asparagoides* (Bridal creeper) and *Lantana camara* (Lantana) are also classified as Weeds of National Significance. Further discussion is provided in **Section 3.5**.

Planted exotic species within the study area, as part of previous landscaping works, include *Coleonema pulchrum* (Confetti Bush), *Gazania rigens* (Treasure Flower) and *Abelia grandiflora* (Glossy Abelia). Additionally, native

planted trees within the study area, although not native to the Central Coast region, include *Melaleuca bracteata* (Black Tea-tree) and *Lophostemon confertus* (Brush Box).

Habitat for fauna is largely absent (photos are provided in **Appendix A**). The study area lacks important features for shelter such as hollow bearing trees, dense litter layer, woody debris or rocks.

3.1.1 Trees

A total of 38 trees (all previously planted) were recorded within the study area during the field survey, incorporating the area surrounding Tuggerah Station to the east and the west, as well as within the commuter car park to the east. The location of each tree is outlined in **Figure 2**. As these trees are planted (due to previous landscaping works), they do not form part of any local native vegetation community. Additionally, there were no tree hollows or nests identified during surveys, which would provide fauna habitat. Nine of these trees are likely to be impacted by the proposed works, including seven trees which would require removal and two trees which would require trimming. The location of trees to be removed or trimmed is outlined in **Figure 2**.

The proposed seven trees to be removed would include one *Callistemon linearis* (Narrow-Leaved Bottlebrush), one *Corymbia maculata* (Spotted Gum), and five *Callistemon salignus* (Willow Bottlebrush). For the two *Acacia floribunda* trees which would be retained, trimming may be required.

There is remnant vegetation, though largely disturbed containing a high abundance of exotic species, adjacent to the fence line surrounding the commuter carpark east of the study area. The native tree species in this area largely consisted of *Eucalyptus amplifolia* (Cabbage Gum), *Melaleuca quinquenervia* (Broad-leaved Paperbark), *Melaleuca styphelioides* (Prickly-leaved Tea Tree) and *Casuarina glauca* (Swamp She-oak). However, this vegetation is outside of the proposed footprint and will not be impacted by the Proposal.

All trees within the study area contribute to the streetscape and visual amenity of the area providing a visual barrier blocking views of the rail corridor from the commuter carpark and the adjacent industry and commercial buildings (see **Appendix A** for photos).

An assessment of each tree, likely to be removed/impacted, including suggested Tree Protection Zones according to the Australian Standard AS4970-2009 *Protection of Trees on Development Sites*, is provided in **Appendix C.**

3.1.2 Threatened Ecological Communities

A desktop review was undertaken to determine the threatened ecological communities (TEC) which have been previously recorded within the locality and have been mapped in areas surrounding the study area (separated by roads and carparks). The ground truthing survey, which was completed for the Proposal, determined that there were no TECs under either the BC Act or EPBC Act present within the study area.

One endangered ecological community (EEC), Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions, listed as Endangered under the BC Act and EPBC Act, was identified adjacent to the southern boundary of the study area (refer to **Figure 3**). The vegetation located to the north of Bryant drive (between Creek Avenue and Lake Road) and the far eastern end of the commuter car park, is also likely to constitute Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EEC. This area of native vegetation is also potential habitat for threatened *Melaleuca biconvexa* (Biconvex Paperbark) (listed as Vulnerable under the BC and EPC Acts). Importantly, no *Melaleuca biconvexa* (Biconvex Paperbark) were identified within or adjacent to the study area.

The identified TECs are outside of the study area and will not incur direct impacts from the Proposal. Therefore, there are no predicted impacts on listed TECs as a result of the Proposal.

Proposal area
Road
Railway
Tree
Tree for removal
Structural root zone
Tree protection zone

0 25 50 m

1:1,500 at A4

GDA 1994 MGA Zone 55

Data sources

Jacobs 2021
OEH 2021, DCSSS 2021,
Department Finance,
Services and Innovation 2020
NSW Spatial Services 2021

Figure 2 Recorded trees in the Proposal area

Proposal area

Railway Station

Platform number

Road

Railway

Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions - Endangered Ecological Community

Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions - Endangered Ecological Community

0 25 50 m

1:1,500 at A4

GDA 1994 MGA Zone 55

N

Data sources

Jacobs 2021
OEH 2021, DCSSS 2021,
Department Finance,
Services and Innovation 2020
NSW Spatial Services 2021

Figure 3 Endangered ecological communities mapped near the Proposal

3.2 Threatened flora

No threatened species were located during the site inspection. According to the NSW Bionet Atlas database (EESG, 2020), there are 12 previous records of threatened flora species occurring in the locality (within a 10-kilometre radius of the site). Results from the EPBC Act Protected Matters Search Tool (PMST) include 27 threatened flora species. However, due to the historic disturbance that has occurred in the study area and the lack of suitable habitat for threatened flora species (habitat photos are provided in **Appendix A)**, these species are considered unlikely to occur (refer to **Appendix B**). Of the recorded threatened flora species around Tuggerah, *Melaleuca biconvexa* (Biconvex Paperbark) *Maundia triglochinoides*, *Rhodamnia rubescens* (Scrub Turpentine), *Syzygium paniculatum* (Magenta Lilly Pilly) and *Rhodomyrtus psidioides* (Native Guava) have been recorded within one kilometre of the study area (EESG, 2020). *Melaleuca biconvexa* has been recorded approximately 100m north-east of the study area. Importantly, no *Melaleuca biconvexa* were identified within or adjacent to the study area.

The study area does not contain any favourable habitat for these species. No threatened flora species were defined as having a moderate-high likelihood of occurrence; therefore, no significance assessments are required to be undertaken (refer to **Section 2.5**). The list of threatened flora species is detailed further in **Table B-1** of **Appendix B.**

3.3 Threatened fauna

No threatened species or habitat for threatened species were located within the study area during the site inspection. Based on regional records reports, 76 threatened fauna species have been identified from the locality (10-kilometre radius of the site). This includes 53 birds, 18 mammals, one reptile, and four amphibians. Results from the PMST search results include 58 threatened fauna species comprising of 36 birds, eight mammals, six reptile, four amphibians and four fish. These species are listed in **Table B-2** of **Appendix B** which presents an assessment of their likelihood of occurrence in the study area using the criteria described in **Table 1**. Some species such as oceanic and wading birds have been excluded from the assessment due to a lack of any habitat. Numerous threatened fauna species have been recorded in the nearby bushland and Wetland areas of Tuggerah (all within one kilometre of the study area) including, Grey-headed Flying-fox (*Pteropus poliocephalus*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*), Large Bent-winged Bat (*Miniopterus orianae oceanensis*), Little Bent-winged Bat (*Miniopterus australis*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), White-bellied Sea-Eagle (*Haliaeetus leucogaster*), Little Eagle (*Hieraaetus morphnoides*), Bush Stone-curlew (*Burhinus grallarius*), Caspian Tern (*Hydroprogne caspia*), Regent Honeyeater (*Anthochaera phrygia*), Powerful Owl (*Ninox strenua*), Common Greenshank (*Tringa nebularia*), Koala (*Phascolarctos cinereus*), Spotted-tailed Quoll (*Dasyurus maculatus*), Yellow-bellied Glider (*Petaurus australis*) and Green and Golden Bell Frog (*Litoria aurea*).

The Grey-headed Flying-fox (*Pteropus poliocephalus*), has been previously located within 400 m of the study area. Additionally, the Powerful Owl (*Ninox strenua*) has previously been recorded approximately 50 metres south of the study area. Due to the lack of suitable nesting or roosting habitat for both species in the suburban area of Tuggerah, the records would likely have been taken during foraging activities of each species. Both species have large home ranges and cover vast distances during foraging. There is a low potential that both species could visit the trees within the study area on occasion, however no significant foraging habitat is present. Importantly, no suitable breeding habitat is present in the study area. As such, the likelihood of occurrence for the Grey-headed Flying-fox and Powerful Owl within the study area is considered low.

Bats have sensitive and highly evolved acoustic apparatus and this, coupled with their complex habitat requirements and wide-ranging use of landscapes, means that they are vulnerable to disturbance, habitat fragmentation and death or injury caused by a wide range of development projects (Gilmour et. al., 2020). Microbats would likely be deterred from the study area due to the combination of sound created by train movements at the station and the associated overhead powerlines. Additionally, there are no new trainlines being implemented as part of the Proposal and no further fragmentation would be created. Therefore, the Proposal is unlikely to further impact on Microbat species.

The fauna habitats in the study area are considered to be of poor quality (see photos in **Appendix A**). There is no habitat present for the threatened species that were identified from the desktop assessment. These species were considered unlikely to occur and are not considered further in this assessment. No threatened fauna species were defined as having a moderate-high likelihood of occurrence; therefore, no significance impacts are required to be undertaken (refer to **Section 2.5**).

3.4 Migratory species

A total of 75 migratory species, including 22 migratory marine birds, 19 migratory marine species, 27 migratory wetland species and seven migratory terrestrial species, are predicted to occur in the locality based on the EPBC Act Protected Matters Search Tool (see **Appendix B**). Some migratory species that would not use the study area (i.e. marine reptiles, marine mammals, marine birds, etc.) have been excluded from the assessment. Of these, a small selection of woodland birds could potentially fly over the site or use the trees on the site (unlikely). These species include the White-throated Needletail (*Hirundapus caudacutus*), Oriental cuckoo (*Cuculus optatus*), Black-faced Monarch (*Monarcha melanopsis*), Spectacled Monarch (*Monarcha trivirgatus*), Satin Flycatcher (*Myiagra cyanoleuca*) and the Rufous Fantail (*Rhipidura rufifrons*).

While migratory bird species do use the habitats within the locality, the study area would not be classed as an 'important habitat' as defined under the EPBC Act *Policy Statement 1.1 Significant Impact Guidelines* (Department of the Environment 2013), in that the study area does not contain:

- Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species
- Habitat utilised by a migratory species which is at the limit of the species range
- Habitat within an area where the species is declining.

As such, it is unlikely that the works would significantly affect migratory species and this group is not considered any further in this report.

3.5 Weeds of National Significance (WoNS)

Within the study area, six exotic species were listed as Priority Weeds under the *NSW Biosecurity Act 2015* for the Greater Sydney Local Land Service region (refer to **Section 3.1**). Two of these species are also listed as Weeds of National Significance (WONs). Under the *Biosecurity Act*, land managers are required to follow the regional and non-regional duties which have been allocated to each Priority Weed. The weeds of national concern recorded within the study area include:

- *Asparagus asparagoides* (Bridal Creeper)
- *Lantana camara* (Lantana).

Under Schedule 4, Division 5 of the BC Act, a process is eligible for listing as a Key Threatening Processes (KTP) if, in the opinion of the Scientific Committee –

- It adversely affects threatened species or ecological communities, or
- It could cause species or ecological communities that are not threatened to become threatened
- The regulations may prescribe criteria for the determination of matters under Schedule 4, Division 5 of the BC Act.

Weeds compete with native plant species for nutrients, water, sunlight and space. They can form dense areas of vegetation that shade and smother native species and may alter key environmental events such as the frequency of fire. Of the weeds identified within the study area, *Lantana camara* (Lantana) is recognised as a KTP by the BC Act.

Additionally, under the EPBC Act, a process can be listed as a KTP if it could:

- Cause a native species or ecological community to become eligible for inclusion in a threatened list (other than the conservation dependent category); or
- Cause an already listed threatened species or threatened ecological community to become more endangered; or
- Adversely affect two or more listed threatened species or threatened ecological communities.

Novel biota and their impact on biodiversity is listed as a KTP under the EPBC Act. The term 'novel biota' refers to organisms that are new to an ecosystem whether by natural or human introduction, the latter being the primary focus of this KTP. *Asparagus asparagoides* (Bridal Creeper) and *Lantana camara* (Lantana) are both listed under the Novel biota KTP.

Proliferation of weed and pest species is an indirect impact (i.e. not a direct result of proposal activities). Proliferation of weeds is likely to occur during construction, although impacts would be greatest due to vegetation clearing during the construction phase. The most likely causes of weed dispersal and importation associated with the Proposal include earthworks, movement of soil, and attachment of seed (and other propagules) to vehicles and machinery during all phases. Disturbance of native vegetation patch edges may also influence weed proliferation. The study area contains some weed growth and, as such, weeds must be managed during construction. Mitigation measures to limit the spread and germination of weeds are provided in **Section 5**.

4. Potential impacts

Direct biodiversity impacts of the works are predicted to be minimal due to the lack of vegetation and remnant vegetation in the study area. No native vegetation communities are present, and the fauna habitat is of poor quality. Vegetation and habitat clearing would be limited to up to seven planted trees for removal and an additional two trees which may require trimming as shown in **Figure 2** and **Appendix A**. No impacts to remnant native vegetation or fauna habitat are predicted. Direct trauma to native fauna is expected to be minimal as no habitats would be removed. Noise, dust, light and contaminant pollution is predicted to be minimal. The mitigation measures outlined below in **Section 5** would ensure that indirect impacts would be minimised.

The area of proposed works is in a highly disturbed part of the rail corridor that does not contain any native remnant vegetation. There would be no impacts to biodiversity in the vicinity of the study area. The seven trees to be removed add to the local amenity but their removal (if required) is considered unlikely to result in any detrimental ecological impacts as these trees do not contain any hollows and do not provide any significant habitat for fauna species (threatened or otherwise).

The ground layer is mulched in sections around the station platform, where vegetation has been planted, however the remaining sections of ground layer vegetation within and adjacent to the rail corridor is dominated by exotic grass species. As such, proliferation of weed species is likely to be the main potential impact of the works. However, the remnant native vegetation located to the south east, south west and north east already contain exotic species and the works are unlikely to exacerbate their condition and disperse weeds outside of the study area. Standard mitigation measures to address weed species are provided in **Section 5**. Construction activities also have the potential to import new weed species into the study area. The most likely causes of weed dispersal and importation associated with the works include earthworks, movement of soil, and attachment of seed (and other propagules) to vehicles and machinery. However, impacts from importation of weeds are expected to be minimal as there are no native vegetation communities, or high-quality fauna habitat in the study area to be affected. There is also the chance of the introduction and spread of *Phytophthora cinnamomi* (Root rot) from machinery which could detrimentally affect the remaining vegetation along the rail corridor. The mitigation measures outlined below in **Section 5** would ensure that weed and pathogen importation and spread is minimised.

There are no predicted significant impacts to threatened biodiversity from the works. While the threatened Grey-headed Flying-fox (*Pteropus poliocephalus*), Powerful Owl (*Ninox strenua*), microbats and woodland bird species could theoretically utilise the study area as foraging habitat on rare occasion, the area of available foraging habitat within the study area is very small and is considered very low quality. No significant impacts to threatened species, populations or ecological communities are predicted and further assessment under s.7.3 of the *Biodiversity Conservation Act*, *2016* is not required.

5. Avoidance and Mitigation Measures

Prior to the commencement of construction, the following vegetation management measures would be implemented according to the *TfNSW Vegetation Management (Protection and Removal) Guideline* (TfNSW, 2019a):

- All works to be undertaken in accordance with the *TfNSW Fauna Management Guideline* (TfNSW, 2019b)
- Review the Ecological Impact Assessment (this document) to identify the type and location of vegetation on the site (planted vegetation located around the Proposal area, including adjacent to the station platforms)
- Incorporate specific vegetation management measures identified in the Ecological Impact Assessment into the site induction, toolbox talk and pre-start meetings
- Incorporate specific vegetation management measures identified in the Ecological Impact Assessment into the Construction Environmental Management Plan and environmental control maps
- Refer to the *TfNSW Weed Management and Disposal Guide* (TfNSW, 2019c) if weeds have been identified on the site and require specific management
- Remove any noxious and environmental weeds if present before pre-clearing commences (e.g. *Asparagus asparagoides* (Bridal Creeper) and *Lantana camara* (Lantana))
- Weed hygiene protocols, eradication and removal will be managed and implemented
- Review the requirements for the management of weeds within the Proposal area, particularly as they relate to prohibited matter weeds, identified priority weeds for the region, the relevant Regional Strategic Weed Management Plan and weed management strategies of local authorities
- Incorporate specific weed management measures and awareness into the site inductions, toolbox talks and pre-starts to ensure that the relevant employees are aware of the requirements.

Specific vegetation management measures, prior to the commencement of construction, would include the following:

- Conduct a site inspection and mark vegetation to be removed and fenced (through installation of Tree Protection Zones (TPZ)), and mark vegetation to be protected as identified in this report
- Install highly visible barriers around the perimeter of the construction site
- Install signs clearly identifying areas of protected native vegetation
- Install branch and trunk protection where construction works are in very close proximity to trees
- Locate construction parking, compounds, stockpiles and chemical storage away from vegetated areas (including tree protection zones) and in areas which do not necessitate any more clearing of vegetation than necessary
- Any trimming of trees or works within a TPZ is to be undertaken by a qualified arborist.

During construction, the following vegetation management measures would be implemented according to the *TfNSW Vegetation Management (Protection and Removal) Guideline* (TfNSW, 2019a):

- Use only defined access tracks and entry/exit points for all vehicle movements
- Use only designated areas for parking, stockpiles, materials and waste storage
- Do not store materials or park equipment/vehicles within tree protection zones
- Under boring may be used for the vegetation to be retained to minimise damage to the root systems
- Revegetate or mulch disturbed areas, particularly batter slopes at the earliest opportunity
- Mulch and reuse cleared vegetation on site for site stabilisation and/or landscaping where appropriate

- Undertake regular inspections of vegetation management measures to ensure they are in place and effective
- Monitor the health of retained vegetation and seek advice from an arborist if vegetation shows signs of stress (e.g. discolouration, die back)
- Any additional trees that are found to require removal and/or trimming during construction would be subject to further assessment, offsetting and approval from TfNSW.

After construction, the following vegetation management measures should be implemented according to the *TfNSW Vegetation Management (Protection and Removal) Guideline* (TfNSW, 2019a):

- Stabilise all disturbed areas, implement landscaping and remove vegetation protection measures
- Ensure a maintenance program is in place for any landscaping or revegetation.

5.1 Application of the TfNSW Vegetation Offsets Guide

As vegetation clearing may be required, and the impact of the proposed clearing is not deemed 'significant' for the purposes of section 111 of the EP&A Act, the *TfNSW Vegetation Offsets Guide* (TfNSW, 2019d) would apply. The trees to be potentially removed do not form part of a native vegetation community but do provide amenity value for station users. As such, offsets for individual trees would need to be applied (this offset requirement applies to remnant, regrowth, planted, native and exotic trees alike). The *TfNSW Vegetation Offsets Guide* (TfNSW, 2019d) categorises trees by size (based on diameter at breast height (DBH)). The categories are:

- Large mature trees – has a DBH of greater than 60cm
- Medium tree – has a DBH between 15 and 60cm
- Small young tree – has a DBH less than 15cm.

The offsets required for removal of the tree categories in line with the *TfNSW Vegetation Offset Calculator DMS-SD-067* are:

- Large mature trees: Plant minimum of 8 trees
- Medium tree: Plant minimum of 4 trees
- Small young tree: Plant minimum of 2 trees.

Details of the trees to be removed and the required offset is outlined in **Table 2**. Potential trimming of two *Acacia floribunda* trees (tree 45 and 46) would not require an offset.

Table 2. Trees likely to be removed and required offset according to the TfNSW Vegetation Offsets Guide (TfNSW, 2019d)

Tree No.	Species	Common name	Dbh (cm)	Offset requirement
38	*Callistemon linearis*	Narrow-Leaved Bottlebrush	25	4 trees
39	*Callistemon salignus*	Willow Bottlebrush	20	4 trees
40	*Callistemon salignus*	Willow Bottlebrush	25	4 trees
41	*Callistemon salignus*	Willow Bottlebrush	25	4 trees
42	*Callistemon salignus*	Willow Bottlebrush	25	4 trees
43	*Callistemon salignus*	Willow Bottlebrush	20	4 trees
44	*Corymbia maculata*	Spotted Gum	55	4 trees
			Total	28 trees

6. Conclusion

The key findings of the biodiversity assessment are that there are no native vegetation communities and no important fauna habitat present within the study area. The proposed upgrades would not impact any native vegetation communities and would not affect native fauna (including their habitats and movement corridors).

There were no EECs or threatened species identified within the Proposal area. Whilst patches of Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions EEC and Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EEC are located in areas adjacent to the study area, these vegetation patches will not be impacted by the Proposal. Several records of *Melaleuca biconvexa* (vulnerable listing under NSW BC Act and Commonwealth EPBC Act) occur in Swamp Sclerophyll Forest to the north of the study area. These specimens and their habitat will not be affected by the proposal.

There are no predicted significant impacts to threatened biodiversity from the works. While negligible impacts to native biodiversity are predicted, the mitigation measures detailed in **Section 5** would ensure that any impacts that do occur are minimised. Trees that are to be retained would be protected by implementation of the *Australian Standard 4970-2009 for the Protection of Trees on Development Sites*. The TfNSW *Vegetation Management (Protection and Removal) Guideline* (TfNSW, 2019a) would be followed to ensure that vegetation is protected and managed appropriately.

As removal of trees is required, and the impact of the potential removal is not deemed 'significant' for the purposes of section 111 of the EP&A Act (see Section 5.1) the TfNSW *Vegetation Offsets Guide* (TfNSW, 2019d) applies. The seven trees which need to be removed do not form part of a native vegetation community but do provide streetscape amenity. As such, offsets for individual trees would be applied according to the TfNSW *Vegetation Offsets Guide* (TfNSW, 2019d) (see **Section 5.1**). A minimum of 28 trees are required to be planted to offset the removal of seven trees.

7. References

Department of Agriculture, Water and the Environment (DoAWE) (2021). *Protected Matters Search Tool*. http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf

Department of Agriculture, Water and the Environment (DoAWE) (2021). *Species Profile and Threats Database*. Commonwealth of Australia. http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Department of Environment and Climate Change (2007). *Threatened species assessment guidelines. The assessment of significance*, Department of Environment and Climate Change, Hurstville.

Department of the Environment (2013). *Matters of National Environmental Significance Significant Impact Guidelines 1.1*, Commonwealth Government Department of the Environment, Canberra.

Department of Planning, Industry and Environment (2008). *Wyong LGA Vegetation Map, 2008*. VIS_ID 3807. https://datasets.seed.nsw.gov.au/dataset/wyong-lga-vegetation-map-2008-vis_id-380736cb4

Gilmour, L., Holderied, M. W., Pickering, S., & Jones, G. (2020). *Comparing acoustic and radar deterrence methods as mitigation measures to reduce human-bat impacts and conservation conflicts*. PloS one, 15(2), e0228668. https://doi.org/10.1371/journal.pone.0228668

NSW Department of Primary Industries (2021). *NSW Weed Wise*. https://weeds.dpi.nsw.gov.au/

NSW Environment, Energy and Science Group (2020). *BioNet Atlas of NSW Wildlife*. http://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx

NSW Environment, Energy and Science Group (2021). *Threatened Species Profiles*. NSW Department of Environment and Heritage. http://www.environment.nsw.gov.au/threatenedSpeciesApp/

NSW Government, Greater Sydney Local Land Services (2021). *Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022 Developed in partnership with the Greater Sydney Regional Weed Committee – Revised July 2021*. https://www.lls.nsw.gov.au/__data/assets/pdf_file/0010/722368/Greater-Sydney-RSWMP-Revised-July-2021.pdf

NSW Scientific Committee (2011). *Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing*. http://www.environment.nsw.gov.au/determinations/SwampOakFloodplainEndSpListing.htm

NSW Scientific Committee. (2019). *Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act*. https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2011-2012/swamp-oak-floodplain-forest-of-the-nsw-north-coast-minor-amendment-determination

Royal Botanic Gardens (2021). *PlantNet* https://plantnet.rbgsyd.nsw.gov.au/

Transport for NSW (TfNSW) (2019a). *Vegetation Management (Protection and Removal) Guideline Transport for NSW, Sydney*.

Transport for NSW (TfNSW) (2019b). *Fauna Management Guideline, Transport for NSW, Sydney*.

Transport for NSW (TfNSW) (2019c). *Weed Management and Disposal Guide, Transport for NSW, Sydney*.

Transport for NSW (TfNSW) (2019d). *Vegetation Offsets Guide 9TP-SD-087/1.0*. Prepared by Transport for NSW, Sydney.

Appendix A. Site Photographs

Facing south-east from the Pacific Highway showing the northbound platform, the western side station entrance and the current bridge access. Planted native trees in foreground Corymbia maculata, Melaleuca quinquenervia and Melaleuca bracteata (however endemic to northern Australia) (all to be removed).

Facing north-east from the Pacific Highway showing the western side station entrance and the current bridge access.

Facing east from the Pacific Highway showing the western side station entrance and the current bridge access. Planted native tree Corymbia maculata (to be removed).

Facing west from the northern end of the commuter carpark on the eastern side showing planted native vegetation, Cupaniopsis anacardioides (to be retained) and Melaleuca linariifolia (to be retained).

Facing north on the northbound station platform showing planted native vegetation to the right, Casuarina cunninghamiana (to be retained) and the current bridge access.

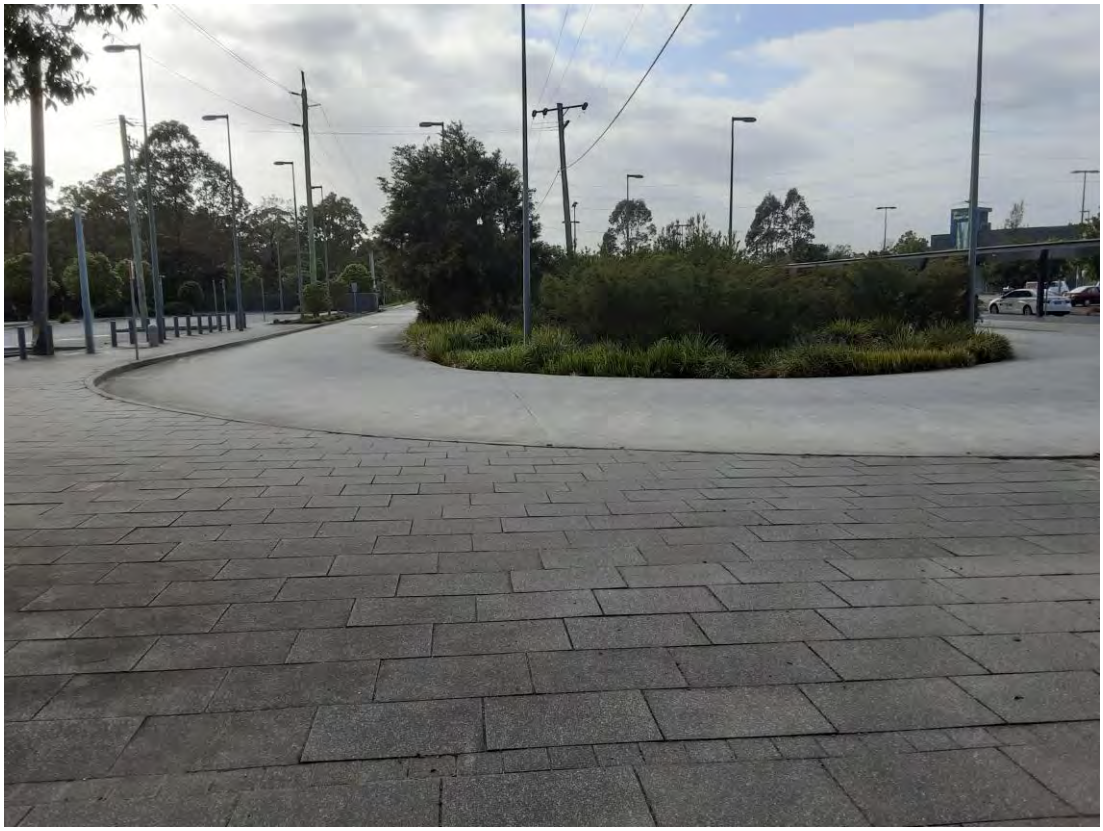
Facing south on the northbound station platform showing planted native vegetation to the right of the station (Corymbia maculata) (to be removed) and to the left of the station (Melaleuca linariifolia) (to be retained) and the current bridge access.

Facing south east on the northbound station platform showing planted native vegetation, Melaleuca linariifolia (to be retained).

Facing south west on the southern end of the eastern side of the station showing three Casuarina cunninghamiana (to be retained).

Facing south adjacent to the northbound station platform and the Pacific Highway near the station entrance showing planted native vegetation Corymbia maculata and Callistemon salignus (to be removed).

Facing south adjacent to the Pacific Highway showing the current access road from the Pacific Highway to the rail corridor, planted native vegetation, Acacia floribunda (to be trimmed, but retained), and exotic groundcover inside rail corridor.



Facing east on the eastern side of the station showing the bus bay and round about containing Melaleuca styphelioides, Melaleuca bracteata (to be retained). Roundabout also contains planted Lomandra longifolia, Dianella caerulea and Westringia fruticosa.

Appendix B. Likelihood of occurrence assessment for threatened and migratory species

The following assessment identifies the list of threatened flora and fauna species recorded from the locality and compares the preferred habitat of these species with the habitats identified in the study area to make an assessment of the likelihood of the species being present in the study area (i.e. subject species). The criteria used in the assessment are detailed in **Table 1**.

Table B-1: Likelihood of occurrence for threatened and migratory Flora species

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Acacia bynoeana	Bynoe's Wattles	V	E	Found in central eastern NSW, from the Hunter District south to the Southern Highlands and west to the Blue Mountains. It has recently been found in the Colymea and Parma Creek areas west of Nowra. Occurs in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood (*Corymbia gummifera*), Scribbly Gum (*Eucalyptus haemastoma*), Drooping Red Gum (*E. parramattensis),* Old Man Banksia (*Banksia serrata*) and Small-leaved Apple (*Angophora bakeri*).	Unlikely – no suitable habitat was recorded within the study area.
Angophora inopina	Charmhaven Apple	V	V	Endemic to the Central Coast region of NSW. Occurs most frequently in four main vegetation communities: (i) *Eucalyptus haemastoma–Corymbia gummifera–Angophora inopina* woodland/forest; (ii) *Hakea teretifolia–Banksia oblongifolia* wet heath; (iii) *Eucalyptus resinifera–Melaleuca sieberi–Angophora inopina* sedge woodland; (iv) *Eucalyptus capitellata–Corymbia gummifera–Angophora inopina* woodland/forest.	Unlikely – no suitable habitat was recorded within the study area.
Asterolasia elegans	Asterolasia elegans	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 reserve. Found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest.	Unlikely – no suitable habitat was recorded within the study area.
Caladenia tessellata	Thick Lip Spider Orchid	V	E	The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. It was also recorded in the Huskisson area in the 1930s. The species occurs on the coast in Victoria from east of Melbourne to almost the NSW border. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	Unlikely – no suitable habitat was recorded within the study area.
Corunastylis insignis	Wyong Midge Orchid	CE	CE	Recorded from four localities between Chain Valley Bay and Wyong in Wyong local government area. A small population also occurs within Lake Macquarie LGA. Grows in patches of Themeda triandra (Kangaroo Grass), which can be ephemeral. Other associated species include, but are not limited to, *Mirbelia speciosa, Ptilothrix deusta*, *Leptospermum trinervium* and *Leptospermum juniperinum* in wet (seasonal) heath settings, *Banksia spinulosa* and *Xanthorrhoea latifolia*, and *Xanthorrhoea media*.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Corunastylis sp. Charmhaven	Wyong Midge Orchid	CE	CE	Corunastylis sp. Charmhaven (NSW896673) is currently only known from the Wyong Shire of NSW where it is restricted to a few locations in the Charmhaven, Warnervale and Tooheys Road (Bushells Ridge) areas. It occurs within low woodland to heathland with a shrubby understorey and ground layer. Dominants include Black She-oak (*Allocasuarina littoralis)*, Prickly Tea-tree (*Leptospermum juniperinum*), Prickly-leaved Paperbark (*Melaleuca nodosa*), Narrow-leaved Bottlebrush (*Callistemon linearis*) and Zig-zag Bog-rush (*Schoenus brevifolius*).	Unlikely – no suitable habitat was recorded within the study area.
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V	The Leafless Tongue Orchid has been recorded from as far north as Gibraltar Range National Park south into Victoria around the coast as far as Orbost. The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*).	Unlikely – no suitable habitat was recorded within the study area.
Cynanchum elegans	White-flowered Wax Plant	E	E	Occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest; Coastal Tea-tree *Leptospermum laevigatum* – Coastal Banksia *Banksia integrifolia subsp. integrifolia* coastal scrub; Forest Red Gum *Eucalyptus tereticornis* aligned open forest and woodland; Spotted Gum *Corymbia maculata* aligned open forest and woodland; and Bracelet Honeymyrtle *Melaleuca armillaris* scrub to open scrub.	Unlikely – no suitable habitat was recorded within the study area.
Diuris praecox	Rough Doubletail	V	V	Grows on hills and slopes of near-coastal districts in open forests which have a grassy to fairly dense understorey.	Unlikely – no suitable habitat was recorded within the study area.
Epacris purpurascens var. purpurascens	Epacris purpurascens var. purpurascens	-	V	Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Found in a range of habitat types, most of which have a strong shale soil influence.	Unlikely – no suitable habitat was recorded within the study area.
Eucalyptus camfieldii	Camfield's 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. Associated species frequently include stunted species of *E. oblonga* Narrow-leaved Stringybark, *E. capitellata* Brown Stringybark and *E. haemastoma* Scribbly Gum.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Euphrasia arguta	Euphrasia arguta	CE	CE	Historically, Euphrasia arguta has only been recorded from relatively few places within an area extending from Sydney to Bathurst and north to Walcha. Was rediscovered in the Nundle area of the NSW north western slopes and tablelands in 2008. Historic records of the species noted the following habitats: 'in the open forest country around Bathurst in sub humid places', 'on the grassy country near Bathurst', and 'in meadows near rivers'. Plants from the Nundle area have been reported from eucalypt forest with a mixed grass and shrub understorey; here, plants were most dense in an open disturbed area and along the roadside, indicating the species had regenerated following disturbance.	Unlikely – no suitable habitat was recorded within the study area.
Genoplesium baueri	Bauer's Midge Orchid	E	E	The species has been recorded from locations between Ulladulla and Port Stephens. About half the records were made before 1960 with most of the older records being from Sydney suburbs including Asquith, Cowan, Gladesville, Longueville and Wahroonga. No collections have been made from those sites in recent years. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments. Grows in dry sclerophyll forest and moss gardens over sandstone.	Unlikely – no suitable habitat was recorded within the study area.
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	V	V	Sporadically distributed throughout the Sydney Basin with sizeable populations around Picton, Appin and Bargo (and possibly further south to the Moss Vale area) and in the Hunter at in the Cessnock - Kurri Kurri area. Separate populations are also known from Putty to Wyong and Lake Macquarie on the Central Coast.	Unlikely – no suitable habitat was recorded within the study area.
Macadamia integrifolia	Macadamia Nut	V	-	Not known to occur naturally in the wild in NSW. The Macadamia Nut grows in remnant rainforest preferring partially open areas such as rainforest edges. The Macadamia Nut prefers to grow in mild frost-free areas with a reasonably high rainfall. There have been records of planted specimens bearing fruit as far south as Sydney.	Unlikely – no suitable habitat was recorded within the study area.
Maundia triglochinoides	-	-	V	Restricted to coastal NSW and extending into southern Queensland. The current southern limit is Wyong; former sites around Sydney are now extinct. Grows in swamps, lagoons, dams, channels, creeks or shallow freshwater 30 - 60 cm deep on heavy clay, low nutrients. Flowering occurs during warmer months. Associated with wetland species e.g. *Triglochin procerum*.	Unlikely – species has been recorded within the locality, however, no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Melaleuca biconvexa	Biconvex Paperbark	V	V	Found only in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Low – records within close proximity of the Proposal, however, there is no suitable habitat within the study area and this species was not identified during surveys.
Melaleuca deanei	Deane's Melaleuca	V	V	Deane's Paperbark occurs in two distinct areas, in the Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas respectively. There are also more isolated occurrences at Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. The species occurs mostly in ridgetop woodland, with only 5 per cent of sites in heath on sandstone. Flowers appear in Summer but seed production appears to be small and consequently the species exhibits a limited capacity to regenerate.	Unlikely – no suitable habitat was recorded within the study area.
Persicaria elatior	Tall Knotweed	V	V	Tall Knotweed has been recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	Unlikely – no suitable habitat was recorded within the study area.
Persoonia hirsuta	Hairy Geebung,	E	E	*Persoonia hirsuta* has a scattered distribution around Sydney. The species is distributed from Singleton in the north, along the east coast to Hilltop in the south west, Dombarton in the south east and the Blue Mountains to the west. *Persoonia hirsuta* has a large area of occurrence, but occurs in small populations or isolated individuals, increasing the species' fragmentation in the landscape. The Hairy Geebung is found in clayey and sandy soils in dry sclerophyll open forest, woodland and heath, primarily on the Mittagong Formation and on the upper Hawkesbury Sandstone.	Unlikely – no suitable habitat was recorded within the study area.
Prostanthera askania	Tranquility Mintbush	E	E	Occurs over a very restricted geographic range (of less than 12 km) in the upper reaches of creeks that flow into Tuggerah Lake or Brisbane Water within the Wyong and Gosford local government areas. Eight populations are known from the catchments of Ourimbah Creek, Narara Creek, Dog Trap Gully, Chittaway Creek and Berkeley Creek. A further two populations are known from the Erina Creek–Fires Creek catchment. The species may also have occurred in West Gosford. Occurs adjacent to, but not immediately in, drainage lines on flat to moderately steep slopes formed on Narrabeen sandstone and alluvial soils derived from it. Occurs in moist sclerophyll forest and warm temperate rainforest communities, and the ecotone between them. These communities are generally tall forests with a mesic understorey; Sydney Blue Gum *Eucalyptus saligna* and Turpentine *Syncarpia glomulifera* are usually present, though canopy species present can be highly variable.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Prostanthera junonis	Somersby Mintbush	E	E	Has a north-south range of approximately 19 km on the Somersby Plateau in the Gosford and Wyong local government areas. The species is restricted to the Somersby Plateau. It occurs on both the Somersby and Sydney Town soil landscapes on gently undulating country over weathered Hawkesbury sandstone within open forest/low woodland/open scrub. It occurs in both disturbed and undisturbed sites.	Unlikely – no suitable habitat was recorded within the study area.
Rhizanthella slateri	Eastern Underground Orchid	E	V	Occurs from south-east Queensland to south-east NSW. In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest.	Unlikely – no suitable habitat was recorded within the study area.
Rhodamnia rubescens	Scrub Turpentine	CE	-	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of *R. rubescens* typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. This species is characterised as highly to extremely susceptible to infection by Myrtle Rust.	Unlikely – species has been recorded within the locality, however, no suitable habitat was recorded within the study area.
Rhodomyrtus psidioides	Native Guava	CE	-	Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines.	Unlikely – species has been recorded within the locality, however, no suitable habitat was recorded within the study area.
Rutidosis heterogama	Heath Wrinklewort	V	V	Recorded from near Cessnock to Kurri Kurri with an outlying occurrence at Howes Valley. On the Central Coast it is located north from Wyong to Newcastle. There are north coast populations between Wooli and Evans Head in Yuraygir and Bundjalung National Parks. It also occurs on the New England Tablelands from Torrington and Ashford south to Wandsworth southwest of Glen Innes. Grows in heath on sandy soils and moist areas in open forest and has been recorded along disturbed roadsides.	Unlikely – no suitable habitat was recorded within the study area.
Syzygium paniculatum	Magenta Lily Pilly	V	E	The Magenta Lilly Pilly is found only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	Unlikely – species has been recorded within the locality, however, no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Tetratheca juncea	Black-eyed Susan	V	V	Confined to the northern portion of the Sydney Basin bioregion and the southern portion of the North Coast bioregion in the local government areas of Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes and Cessnock. It is usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also been recorded in heathland and moist forest. The majority of populations occur on low nutrient soils associated with the Awaba Soil Landscape. While the species has a preference for cooler southerly aspects, it has been found on slopes with a variety of aspects. It generally prefers well-drained sites and occurs on ridges, although it has also been found on upper slopes, mid-slopes and occasionally in gullies.	Unlikely – no suitable habitat was recorded within the study area.
Thelymitra adorata	Wyong Sun Orchid	CE	CE	Occurs from 10-40 m a.s.l. in grassy woodland or occasionally derived grassland in well-drained clay loam or shale derived soils. The vegetation type in which the majority of populations occur (including the largest colony) is a Spotted Gum - Ironbark Forest with a diverse grassy understorey and occasional scattered shrubs.	Unlikely – no suitable habitat was recorded within the study area.
Thesium australe	Austral Toadflax	V	V	Found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (*Themeda australis*).	Unlikely – no suitable habitat was recorded within the study area.

* Distribution and habitat requirement information adapted from:

- Australian Government Department of the Environment http://www.environment.gov.au/biodiversity/threatened/index.html
- NSW Office of Environment and Heritage http://www.environment.nsw.gov.au/threatenedspecies/
- Department of Primary Industries – Threatened Fish and Marine Vegetation http://pas.dpi.nsw.gov.au/Species/All_Species.aspx

+ Data source includes

- Number of records from the NSW Office of Environment and Heritage Wildlife Atlas record data; and
- Identified from the Protected Matters Search Tool (PMST) http://www.environment.gov.au/epbc/pmst/index.html

Key:

- EP = endangered population
- CE = critically endangered
- E = endangered
- V = vulnerable
- M = migratory

Table B-2 Likelihood of occurrence for threatened and migratory fauna species

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Birds					
Anthochaera phrygia	Regent Honeyeater	CE	CE	The Regent Honeyeater that has a patchy distribution between south-east Queensland and central Victoria. It mostly inhabits inland slopes of the Great Dividing Range, in areas of low to moderate relief with moist, fertile soils. It is most commonly associated with box-ironbark eucalypt woodland and dry sclerophyll forest, but also inhabits riparian vegetation such as sheoak (Casuarina spp) where it feeds on needle-leaved mistletoe and sometimes breeds. It sometimes utilises lowland coastal forest, which may act as a refuge when its usual habitat is affected by drought. It also uses a range of disturbed habitats within these landscapes including remnant patches in farmland and urban areas and roadside vegetation. It feeds primarily on the nectar of eucalypts and mistletoes and, to a lesser extent, lerps and honeydew; it prefers taller and larger diameter trees for foraging. It is nomadic and partly migratory with its movement through the landscape being governed by the flowering of select eucalypt species. There are four known key breeding areas: three in NSW and one in Victoria. Breeding varies between regions and corresponds with flowering of key eucalypt and mistletoe species. It usually nests in horizontal branches or forks in tall mature eucalypts and Sheoaks.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area.
Artamus cyanopterus cyanopterus	Dusky Woodswallow	-	V	Dusky woodswallows are widespread in eastern, southern and south western Australia. The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. Found in open forests and woodlands, and may be seen along roadsides and on golf courses. Nomadic; south-eastern population migrates north in autumn.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area.
Botaurus poiciloptilus	Australasian Bittern	E	E	Occurs from south-east Queensland to south-east South Australia, Tasmania and the southwest of Western Australia. The Australasian Bittern's preferred habitat is comprised of wetlands with tall dense vegetation, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. It favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and reeds (eg Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, Bolboschoenus) or cutting grass (Gahnia) growing over a muddy or peaty substrate.	Unlikely – no suitable habitat was recorded within the study area.
Burhinus grallarius	Bush Stone-curlew	-	E	Open forests and woodlands with a sparse grassy ground layer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch.	Low – may use planted trees within the study area. Species has been recorded within the broader locality; however, no suitable habitat was identified within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Callocephalon fimbriatum	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 – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area.
Calyptorhynchus lathami	Glossy Black-Cockatoo	-	V	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (Allocasuarina littoralis) and Forest Sheoak (A. torulosa) are important foods.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area.
Chthonicola sagittata	Speckled Warbler	-	V	The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. There has been a decline in population density throughout its range, with the decline exceeding 40% where no vegetation remnants larger than 100ha survive. The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy.	Unlikely – no suitable habitat was recorded within the study area.
Daphoenositta chrysoptera	Varied Sittella	-	V	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. The Varied Sittella's population size in NSW is uncertain but is believed to have undergone a moderate reduction over the past several decades. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy.	Low – may use planted trees within the study area. Species has been recorded within the broader locality; however, no suitable habitat was identified within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Ephippiorhynchus asiaticus	Black-necked Stork	-	E	The species Ephippiorhynchus asiaticus comprises two subspecies, E. a. asiaticus in India and south-east Asia, and E. a. australis in Australia and New Guinea. In Australia, Black-necked Storks are widespread in coastal and subcoastal northern and eastern Australia, as far south as central NSW. In NSW, the species becomes increasingly uncommon south of the Clarence Valley, and rarely occurs south of Sydney. Since 1995, breeding has been recorded as far south as Buladelah. Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers are the key habitat in NSW for the Black-necked Stork. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries. Storks usually forage in water 5-30cm deep for vertebrate and invertebrate prey. Black-necked Storks build large nests high in tall trees close to water.	Unlikely – no suitable habitat was recorded within the study area.
Epthianura albifrons	White-fronted Chat	-	V	The White-fronted Chat is found across the southern half of Australia, from southernmost Queensland to southern Tasmania, and across to Western Australia as far north as Carnarvon. Found mostly in temperate to arid climates and very rarely sub-tropical areas, it occupies foothills and lowlands up to 1000 m above sea level. In NSW, it occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. Along the coastline, it is found predominantly in saltmarsh vegetation but also in open grasslands and sometimes in low shrubs bordering wetland areas. Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs.	Unlikely – no suitable habitat was recorded within the study area.
Falco hypoleucos	Grey Falcon	V	E	Sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	Low – may use planted trees within the study area. Species has been recorded within the broader locality; however, no suitable habitat was identified within the study area.
Falco subniger	Black Falcon	-	V	Widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referrable to the Brown Falcon. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres. The Black Falcon occurs as solitary individuals, in pairs, or in family groups of parents and offspring	Unlikely – no suitable habitat was recorded within the study area.
Fregetta grallaria grallaria	White-bellied Storm-Petrel	V	V	A wide oceanic distribution in the south Pacific and Atlantic Oceans, ranging into tropical waters from various breeding grounds. Known to breed at various island groups including Lord Howe Island. In Australia breeds only on offshore islands in the Lord Howe Island group. Nest consists of a chamber usually located amongst large rocks. Vagrant birds occur in coastal NSW waters, particularly after storm events.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Glossopsitta pusilla	Little Lorikeet	-	V	In NSW it is found from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. The species forages primarily in the canopy of dry open eucalypt forest and woodland but also utilises paperbark (Melaleuca sp.) dominated forests. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country (eg paddocks, roadside remnants) and urban trees also help sustain viable populations of the species. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited; riparian trees are often chosen, including non-eucalypt species such as she-oaks.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area.
Grantiella picta	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. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area.
Haematopus longirostris	Pied Oystercatcher	-	E	The species is distributed around the entire Australian coastline, although it is most common in coastal Tasmania and parts of Victoria, such as Corner Inlet. In NSW the species is thinly scattered along the entire coast, with fewer than 200 breeding pairs estimated to occur in the State. Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. The chisel-like bill is used to pry open or break into shells of oysters and other shellfish. Nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones.	Unlikely – no suitable habitat was recorded within the study area.
Hieraaetus morphnoides	Little Eagle	-	V	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used.	Low – may use planted trees within the study area. Species has been recorded within the broader locality; however, no suitable habitat was identified within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Irediparra gallinacea	Comb-crested Jacana	-	V	The Comb-crested Jacana occurs on freshwater wetlands in northern and eastern Australia, mainly in coastal and subcoastal regions, from the north-eastern Kimberley Division of Western Australia to Cape York Peninsula then south along the east coast to the Hunter region of NSW, with stragglers recorded in south-eastern NSW (possibly in response to unfavourable conditions further north). Beyond Australia, the Comb-crested Jacana occurs from Borneo and the Phillippines, south and east through Sulawesi, the Moluccas and Lesser Sunda Islands, to the Aru Islands, New Guinea and New Britain. Inhabit permanent freshwater wetlands, either still or slow-flowing, with a good surface cover of floating vegetation, especially water-lilies, or fringing and aquatic vegetation. Forage on floating vegetation, walking with a characteristic bob and flick. They feed primarily on insects and other invertebrates, as well as some seeds and other vegetation.	Unlikely – no suitable habitat was recorded within the study area.
Ixobrychus flavicollis	Black Bittern	-	V	The Black Bittern has a wide distribution, from southern NSW north to Cape York and along the north coast to the Kimberley region. The species also occurs in the south-west of Western Australia. In NSW, records of the species are scattered along the east coast, with individuals rarely being recorded south of Sydney or inland. Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves.	Unlikely – no suitable habitat was recorded within the study area.
Lathamus discolor	Swift Parrot	CE	E	The swift parrot breeds in Tasmania during the summer and the entire population migrates north to mainland Australia for the winter. Whilst on the mainland the swift parrot disperses widely to forage on flowers and psyllid lerps in eucalypt species, with the majority being found in Victoria and NSW. In NSW they forage in forests and woodlands throughout the coastal and western slopes regions each year. Coastal regions tend to support larger numbers of birds when inland habitats are subjected to drought. Non-breeding birds preferentially feed in inland box-ironbark and grassy woodlands, and coastal swamp mahogany (*E. robusta*) and spotted gum (*Corymbia maculata*) woodland when in flower; otherwise often in coastal forests. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as *Eucalyptus robusta, Corymbia maculata, C. gummifera, E. sideroxylon,* and *E. albens*. Commonly used lerp infested trees *include E. microcarpa, E. moluccana* and *E. pilularis*.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area.
Limosa lapponica baueri	Bar-tailed Godwit, Western Australia	V	-	The bar-tailed godwit (both subspecies combined) has been recorded in the coastal areas of all Australian states. During the non-breeding period, the distribution of bar-tailed godwit (western Alaskan) is predominately New Zealand, northern and eastern Australia. The migratory bar-tailed godwit (western Alaskan) does not breed in Australia. The bar-tailed godwit (western Alaskan) occurs mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Ninox connivens	Barking Owl	-	V	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile riparian soils. Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as Acacia and Casuarina species.	Unlikely – no suitable habitat was recorded within the study area.
Ninox strenua	Powerful Owl	-	V	In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing. Now at low densities throughout most of its eastern range, rare along the Murray River and former inland populations may never recover. The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood Acacia melanoxylon, Rough-barked Apple Angophora floribunda, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species.	Low – may use planted trees within the study area. Species has been recorded within the broader locality; however, no suitable habitat was identified within the study area.
Pachyptila turtur subantarctica	Fairy Prion (southern)	V	-	Fairy Prions (including other subspecies) are often beachcast on the south-eastern coast of Australia and are commonly seen offshore over the continental shelf and over pelagic waters. The southern subspecies of the Fairy Prion is a marine bird, found mostly in temperate and subantarctic seas. On Macquarie Island and adjacent islets, the burrows of Fairy Prions are usually in crevices, in hollows beneath cushions of Colobanthus muscoides or in burrows in peaty soil held together by a thick cover of Cotula plumosa.	Unlikely – no suitable habitat was recorded within the study area.
Pandion cristatus	Eastern Osprey	M	V	The Osprey has a global distribution with four subspecies previously recognised throughout its range. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	Unlikely – no suitable habitat was recorded within the study area.
Petroica phoenicea	Flame Robin	-	V	The Flame Robin ranges from near the Queensland border to south east South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgelands at high altitudes.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Pterodroma leucoptera leucoptera	Gould's Petrel	E	V	Breeds on both Cabbage Tree Island, 1.4 km offshore from Port Stephens and on nearby Boondelbah island. The range and feeding areas of non-breeding petrels are unknown. The first arrival of Gould's petrel on cabbage tree Island occurs from mid to late September. Principal nesting habitat is located within two gullies which are characterised by steeply, sloping rock scree with a canopy of Cabbage Tree Palms. They nest predominantly in natural rock crevices among the rock scree and also in hollow fallen palm trunks, under mats of fallen palm fronds and in cavities among the buttresses of fig trees.	Unlikely – no suitable habitat was recorded within the study area.
Pterodroma neglecta neglecta	Kermadec Petrel (west Pacific subspecies)	V	V	Ranges over subtropical and tropical waters of the South Pacific. Balls Pyramid (near Lord Howe Island) and Phillip Island (near Norfolk Island) are the only known breeding sites in Australian waters. Breeds on islands across the South Pacific. In Australia it breeds on Ball's Pyramid and Phillip Island (near Norfolk Island). Nests in a crevice amongst rocks. Diet is squid and crustaceans. Vagrant birds occur in coastal NSW waters, particularly after storm events.	Unlikely – no suitable habitat was recorded within the study area.
Ptilinopus magnificus	Wompoo Fruit-Dove	-	V	Occurs along the coast and coastal ranges from the Hunter River in NSW to Cape York Peninsula. It is rare south of Coffs Harbour. Occurs in, or near rainforest, low elevation moist eucalypt forest and brush box forests. Feeds on a diverse range of tree and vine fruits and is locally nomadic - following ripening fruit. Thought to be an effective medium to long-distance vector for seed dispersal.	Unlikely – no suitable habitat was recorded within the study area.
Rostratula australis	Australian Painted Snipe	E	E	Most records are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. 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.	Unlikely – no suitable habitat was recorded within the study area.
Sternula nereis nereis	Australian Fairy Tern	V	-	Within Australia, the Fairy Tern occurs along the coasts of Victoria, Tasmania, South Australia and Western Australia; occurring as far north as the Dampier Archipelago near Karratha. The subspecies has been known from New South Wales (NSW) in the past, but it is unknown if it persists there. The Fairy Tern (Australian) nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation. The subspecies has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline. The bird roosts on beaches at night.	Unlikely – no suitable habitat was recorded within the study area.
Stictonetta naevosa	Freckled Duck	V	-	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Thinornis cucullatus cucullatus	Eastern Hooded Plover	V	CE	The Hooded Plover is endemic to southern Australia and is nowadays found mainly along the coast from south of Jervis Bay, NSW, south through Victoria and Tasmania to the western side of the Eyre Peninsula (South Australia). The range of the Hooded Plover has declined in eastern Australia since European settlement. Southern coastal Queensland and northern NSW were probably once part of the range of the Hooded Plover, but the species has not been recorded there since the 1920s. In the late 1920s and early 1930s the species was recorded from Port Stephens but are now considered locally extinct. It has not been seen in the Sydney area since the 1940s. Presently the Hooded Plover occurs in NSW north to Sussex Inlet. Occasionally, individual birds are sighted slightly further north to the Shoalhaven River and Comerong Beach and one bird was sighted at Lake Illawarra in March 2001. In south-eastern Australia Hooded Plovers prefer sandy ocean beaches, especially those that are broad and flat, with a wide wave-wash zone for feeding, much beachcast seaweed, and backed by sparsely vegetated sand-dunes for shelter and nesting. Occasionally Hooded Plovers are found on tidal bays and estuaries, rock platforms and rocky or sand-covered reefs near sandy beaches, and small beaches in lines of cliffs. They regularly use near-coastal saline and freshwater lakes and lagoons, often with saltmarsh.	Unlikely – no suitable habitat was recorded within the study area.
Tyto novaehollandiae	Masked Owl	-	V	Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution. Dry eucalypt forests and woodland, typically prefers open forest with low shrub density. Requires old trees for roosting and nesting.	Low – may use planted trees within the study area. Species has been recorded within the broader locality; however, no suitable habitat was identified within the study area.
Tyto tenebricosa	Sooty Owl	-	V	Occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands. Territories are occupied permanently. Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Mammals					
Cercartetus nanus	Eastern Pygmy-possum	-	V	Found in a broad range of habitats from rainforest through to wet and dry sclerophyll forest and woodland to heath, but in most areas woodlands and heath appear to be preferred.	Unlikely – no suitable habitat was recorded within the study area.
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Forages over a broad range of open forest and woodland habitats, this species is a cave roosting bat which favours sandstone escarpment habitats for roosting, in the form of shallow overhangs, crevices and caves.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area
Dasyurus maculatus	Spotted-tailed Quoll	E	V	Wet and dry sclerophyll forests and rainforests, and adjacent open agricultural areas. Generally associated with large expansive areas of habitat to sustain territory size. Requires hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites.	Unlikely – species has been recorded within the broader locality however, no suitable habitat was identified within the study area.
Falsistrellus tasmaniensis	Eastern False Pipistrelle	-	V	Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	-	V	Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roosts mainly in tree hollows but will also roost under bark or in human-made structures.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Miniopterus australis	Little Bent-wing Bat	-	V	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area
Miniopterus orianae oceanensis	Large Bent-winged 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. Populations disperse within about 300 km range of maternity caves. Hunt in forested areas, catching moths and other flying insects above the treetops.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area
Myotis macropus	Southern Myotis	-	V	Generally roost in groups close to water in caves, mine shafts, hollow-bearing trees, and storm water channels, buildings, under bridges and in dense foliage. Forages over streams and pools catching insects and small fish.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area
Petaurus australis	Yellow-bellied Glider	-	V	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south.	Unlikely – species has been recorded within the broader locality however, no suitable habitat was identified within the study area.
Petaurus norfolcensis	Squirrel Glider	-	V	The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Petauroides volans	Greater Glider	V	-	The Greater Glider occurs in eucalypt forests and woodlands along the east coast of Australia from north-east Queensland to the Central Highlands of Victoria from sea level to 1200 m altitude. It feeds exclusively on eucalypt buds, flowers and mistletoe and favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. It roosts in tree hollows, with a particular selection for large hollows in large, old trees. Individuals use multiple hollows and a relatively high abundance of tree hollows (at least 4-8 suitable hollows per hectare) seems to be needed for the species to persist. Individuals occupy relatively small home ranges with an average size of 1 to 3 ha, but the species has relatively low persistence in small forest fragments and disperses poorly across vegetation that is not native forest. Forest patches of at least 160 km2 may be required to maintain viable populations.	Unlikely – no suitable habitat was recorded within the study area.
Petrogale penicillata	Brush-tailed Rock-wallaby	V	E	This species prefers rocky habitats, including loose boulder-piles, rocky outcrops, steep rocky slopes, cliffs, gorges and isolated rock stacks. It also utilises tree limbs. While it appears that most Brush-tailed Rock-wallaby colonies are on north-facing slopes and cliff lines, colonies have been found on south-facing cliffs in Kangaroo Valley, in the Macleay River Gorge, in the Warrumbungles and at Mt Kaputar, although usually in lower densities. Rocky outcrops appear crucial to current habitat selection by rock-wallabies; however, vegetation structure and composition is also considered to be an important factor. In many parts of their range, including at the Warrumbungles, rock-wallabies are closely associated with dense arboreal cover, especially fig trees. The vegetation on and below the cliff appear to be important to this species as a source of food and shelter and in some cases may provide some protection from predation. A range of vegetation types are associated with Brush-tailed Rock-wallaby habitat, including dense rainforest, wet sclerophyll forest, vine thicket, dry sclerophyll forest, and open forest.	Unlikely – no suitable habitat was recorded within the study area.
Phascolarctos cinereus	Koala	V	V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	Unlikely – species has been recorded within the broader locality however, no suitable habitat was identified within the study area.
Phoniscus papuensis	Golden-tipped Bat	-	V	The Golden-tipped Bat is distributed along the east coast of Australia in scattered locations from Cape York Peninsula in Queensland to south of Eden in southern NSW. It also occurs in New Guinea. Found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m. Also recorded in tall open forest, Casuarina-dominated riparian forest and coastal Melaleuca forests. Roost mainly in rainforest gullies on small first- and second-order streams in usually abandoned hanging Yellow-throated Scrubwren and Brown Gerygone nests modified with an access hole on the underside. Bats may also roost under thick moss on tree trunks, in tree hollows, dense foliage and epiphytes.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Potorous tridactylus	Long-nosed Potoroo	V	V	The long-nosed potoroo is found on the south-eastern coast of Australia, from Queensland to eastern Victoria and Tasmania, including some of the Bass Strait islands. Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. The fruit-bodies of hypogeous (underground-fruiting) fungi are a large component of the diet of the Long-nosed Potoroo. They also eat roots, tubers, insects and their larvae and other soft-bodied animals in the soil.	Unlikely – no suitable habitat was recorded within the study area.
Pseudomys novaehollandiae	New Holland mouse	V	-	Distribution is fragmented across all eastern states of Australia, where it inhabits open heath lands, open woodlands with heath understorey and vegetated sand dunes.	Unlikely – no suitable habitat was recorded within the study area.
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	-	V	Occurs in many forest types. Roosts in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area
Scoteanax rueppellii	Greater Broad-nosed Bat	-	V	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings.	Low – may forage in planted trees within the study area. Species has been recorded within the broader locality however, no suitable habitat was identified within the study area

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Reptiles					
Caretta caretta	Loggerhead Turtle	E	E	Loggerhead Turtles are found in tropical and temperate waters off the Australian coast. In NSW they are seen as far south as Jervis Bay and have been recorded nesting on the NSW north coast and feeding around Sydney. Loggerhead Turtles are ocean-dwellers, foraging in deeper water for fish, jellyfish and bottom-dwelling animals. The female comes ashore to lay her eggs in a hole dug on the beach in tropical regions during the warmer months.	Unlikely – no suitable habitat was recorded within the study area.
Chelonia mydas	Green Turtle	V	V	Widely distributed in tropical and sub-tropical seas. Usually found in tropical waters around Australia but also occurs in coastal waters of NSW, where it is generally seen on the north or central coast, with occasional records from the south coast. Ocean-dwelling species spending most of its life at sea. Carnivorous when young but as adults they feed only on marine plant material.	Unlikely – no suitable habitat was recorded within the study area.
Dermochelys coriacea	Leatherback Turtle	E	E	The Leatherback Turtle is a pelagic feeder, found in tropical, subtropical and temperate waters throughout the world. Large body size, high metabolism, a thick adipose tissue layer and regulation of blood flow allow them to utilise cold water foraging areas unlike other sea turtle species. For this reason this species is regularly found in the high latitudes of all oceans including the South Pacific Ocean in the waters offshore from NSW, Victoria, Tasmania and Western Australia. It has been recorded feeding in the coastal waters of all Australian States. Adults feed mainly on pelagic soft-bodied creatures such as jellyfish and tunicates.	Unlikely – no suitable habitat was recorded within the study area.
Eretmochelys imbricata	Hawksbill Turtle	V	-	Hawksbill turtles typically occur in tidal and sub-tidal coral and rocky reef habitats throughout tropical waters, extending into warm temperate areas as far south as northern New South Wales. In Australia the main feeding area extends along the east coast, including the Great Barrier Reef. Sponges make up a major part of the diet of hawksbill turtles, although they also feed on seagrasses, algae, soft corals and shellfish.	Unlikely – no suitable habitat was recorded within the study area.
Hoplocephalus bungaroides	Broad-headed Snake	V	E	The Broad-headed Snake is largely confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 km of Sydney. Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in crevieces or hollows in large trees within 500m of escarpments in summer. Feeds mostly on geckos and small skinks; will also eat frogs and small mammals occasionally.	Unlikely – no suitable habitat was recorded within the study area.
Natator depressus	Flatback Turtle	V	-	The Flatback Turtle occupies the tropical and warm temperate waters of northern Australia from the Kimberly region, Western Australia, to Torres Strait, and less commonly along the coast of Queensland and is an occasional visitor into northern NSW. Records of Flatback Turtles in NSW are infrequent. The oldest record in NSW is from 1980. Since then, the species has been recorded on less than 20 occasions. Records of the species exist from Port Macquarie, Coffs Harbour, Port Stephens, Central Coast, Sydney and Jervis Bay. Adult Flatback Turtles inhabit shallow, soft - bottomed areas, close to the shore and away from reefs, rarely venturing beyond the continental shelf. They are carnivorous, feeding mainly on soft - bodied invertebrates such as soft corals, molluscs and jellyfish.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Frogs					
Crinia tinnula	Wallum Froglet	-	V	Wallum Froglets are found along the coastal margin from Litabella National Park in south-east Queensland to Kurnell in Sydney. Wallum Froglets are found in a wide range of habitats, usually associated with acidic swamps on coastal sand plains. They typically occur in sedgelands and wet heathlands. They can also be found along drainage lines within other vegetation communities and disturbed areas, and occasionally in swamp sclerophyll forests. The species breeds in swamps with permanent water as well as shallow ephemeral pools and drainage ditches. Breeding is thought to peak in the colder months, but can occur throughout the year following rain. Eggs of 1.1-1.2mm are deposited in water with a pH of <6 and tadpoles take 2-6 months to develop into frogs. Wallum Froglets shelter under leaf litter, vegetation, other debris or in burrows of other species. Shelter sites are wet or very damp and often located near the water's edge. Males may call throughout the year and at any time of day, peaking following rain.	Unlikely – no suitable habitat was recorded within the study area.
Heleioporus australiacus	Giant Burrowing Frog	V	V	The Giant Burrowing Frog is distributed in south eastern NSW and Victoria, and appears to exist as two distinct populations: a northern population largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. Individual frogs occupy a series of burrow sites, some of which are used repeatedly. The home ranges of both sexes appear to be non-overlapping suggesting exclusivity of non-breeding habitat. Home ranges are approximately 0.04 ha in size.	Unlikely – no suitable habitat was recorded within the study area.
Litoria aurea	Green and Golden Bell Frog	V	E	Since 1990 there have been approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range; however they are widely separated and isolated. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). There is only one known population on the NSW Southern Tablelands. Ephemeral and permanent freshwater wetlands, ponds, dams with an open aspect and fringed by Typha and other aquatics, free from predatory fish.	Unlikely – species has been recorded within the broader locality however, no suitable habitat was identified within the study area.
Litoria brevipalmata	Green-thighed Frog	-	V	Isolated localities along the coast and ranges from just north of Wollongong to south-east Queensland. Green-thighed Frogs occur in a range of habitats from rainforest and moist eucalypt forest to dry eucalypt forest and heath, typically in areas where surface water gathers after rain. It prefers wetter forests in the south of its range, but extends into drier forests in northern NSW and southern Queensland.	Unlikely – no suitable habitat was recorded within the study area.
Mixophyes balbus	Stuttering Frog	E	V	Occur along the east coast of Australia from southern Queensland to north-eastern Victoria. Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Mixophyes iteratus	Giant Barred Frog	E	E	Found along freshwater streams with permanent or semi-permanent water, generally (but not always) at lower elevation. Moist riparian habitats such as rainforest or wet sclerophyll forest are favoured for the deep leaf litter that they provide for shelter and foraging, as well as open perching sites on the forest floor. However, Giant Barred Frogs will also sometimes occur in other riparian habitats, such as those in drier forest or degraded riparian remnants, and even occasionally around dams.	Unlikely – no suitable habitat was recorded within the study area.
Uperoleia mahonyi	Mahony's Toadlet	-	E	Endemic to the mid-north coast of New South Wales (NSW) and to date has been found between Kangy Angy and Seal Rocks. Inhabits ephemeral and semi-permanent swamps and swales on the coastal fringe of its range. Known records occur in heath or wallum habitats almost exclusively associated with leached (highly nutrient impoverished) white sand. Also is known to occur in wallum heath, swamp mahogany-paperbark swamp forest, heath shrubland and Sydney red gum woodland. Known records are associated with shallow ephemeral/semi-permanent water bodies with limited flow of water. Aquatic vegetation at breeding sites includes sedges (Shoenoplectus spp., Baumea spp. and Lepironia articulata) and Broadleaf Cumbungi (Typha orientalis). Females have been recorded up to 400m from water-bodies indicating moderate dispersal distances and use of multiple habitat types.	Unlikely – no suitable habitat was recorded within the study area.
Fish					
Epinephelus daemelii	Black Rockcod	V	V	In Australia, the distribution of black cod ranges from southern Queensland through NSW to northern Victoria. However, records from Queensland and Victoria are rare, and the NSW coastline forms the species' main range, both in Australia and internationally. It generally inhabits near-shore reefs at depths down to 50 m from southern Queensland through NSW to northern Victoria. Small juvenile black cod are often found in coastal rock pools while slightly older juveniles are often found in estuary systems. The use of estuaries may be an important part of the ecology of juvenile black cod in NSW waters.	Unlikely – no suitable habitat was recorded within the study area.
Hippocampus whitei	White's Seahorse	E	-	White's Seahorse, also known as the Sydney Seahorse, is a medium-sized seahorse that is endemic to the east coast of Australia. Favouring shallow-water estuarine habitats, it is currently known to occur in eight estuaries on the NSW Coast, but is most abundant in Port Stephens, Sydney Harbour and Port Hacking. Its northern limit is Hervey Bay in Queensland and it has been historically recorded as far south as St Georges Basin in NSW. It can be found occurring in coastal embayments and estuaries. It is known to occur from depths of 1 m to 18 m. Habitats that are considered important habitat for the White's Seahorse include natural habitats such as sponge gardens, seagrass meadows and soft corals.	Unlikely – no suitable habitat was recorded within the study area.
Macquaria australasica	Macquarie Perch	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/Nepean and Shoalhaven catchments. Macquarie Perch occur in waters with lots of cover such as aquatic vegetation, snags, boulders and overhanging banks.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Prototroctes maraena	Australian Grayling	V	-	The Australian Grayling occurs in streams and rivers on the eastern and southern flanks of the Great Dividing Range, from Sydney, southwards to the Otway Ranges of Victoria and in Tasmania. The species is found in fresh and brackish waters of coastal lagoons, from Shoalhaven River in NSW to Ewan Ponds in South Australia. The Australian Grayling is diadromous, spending part of its lifecycle in freshwater and at least part of the larval and/or juvenile stages in coastal seas. Adults (including pre spawning and spawning adults) inhabit cool, clear, freshwater streams with gravel substrate and areas alternating between pools and riffle zones.	Unlikely – no suitable habitat was recorded within the study area.
Migratory birds					
Actitis hypoleucos	Common Sandpiper	M	-	Found along all coastlines of Australia and in many areas inland, the Common Sandpiper is widespread in small numbers. The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats.	Unlikely – no suitable habitat was recorded within the study area.
Anous stolidus	Common Noddy	M	-	In Australia, the Common Noddy occurs mainly in ocean off the Queensland coast, but the species also occurs off the north-west and central Western Australia coast. The species is also rarely encountered off the coast of the Northern Territory, where only one breeding location with about 100-130 birds is known. During the non-breeding period, the species occurs in groups throughout the pelagic zone (open ocean).	Unlikely – no suitable habitat was recorded within the study area.
Apus pacificus	Fork-tailed Swift	M	-	Recorded in all regions of NSW. The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher.	Unlikely – no suitable habitat was recorded within the study area.
Ardenna carneipes	Flesh-footed Shearwater	M	V	Ranges throughout the Pacific and Indian Oceans. There are two main breeding areas in the world: one in the South West Pacific includes Lord Howe Island and New Zealand; the other along the coast of Western Australia. Nest on Lord Howe Island on sandy soils from Ned's Beach to Clear Place, with smaller colonies below Transit Hill and at Old Settlement Beach. Eggs are laid at the end of a burrow 1 - 2 metres in length.	Unlikely – no suitable habitat was recorded within the study area.
Ardenna grisea	Sooty Shearwater	M	-	In Australia, the Sooty Shearwater breeds on islands off New South Wales (NSW) and Tasmania. The Sooty Shearwater forages in pelagic (open ocean) sub-tropical, sub-Antarctic and Antarctic waters. The Sooty Shearwater breeds mainly on subtropical and sub-Antarctic islands, as well as on the mainland of New Zealand.	Unlikely – no suitable habitat was recorded within the study area.
Ardenna tenuirostris	Short-tailed Shearwater	M	-	In summer months, the Short-tailed Shearwater is the most common shearwater along the south and south-east coasts of Australia. The Short-tailed Shearwater is found in coastal waters.	Unlikely – no suitable habitat was recorded within the study area.
Arenaria interpres	Ruddy Turnstone	M	-	Coastline and only occasionally inland. They are mainly found on exposed rocks or reefs, often with shallow pools, and on beaches.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Calidris acuminata	Sharp-tailed Sandpiper	M	-	The Sharp-tailed Sandpiper spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Many inland records are of birds on passage. Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation; this includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving back during the wet season. Sometimes they occur on rocky shores and rarely on exposed reefs.	Unlikely – no suitable habitat was recorded within the study area.
Calidris alba	Sanderling	M	-	The Sanderling occurs in coastal areas around Australia. Inland records have occurred in most states of singles or small groups, birds probably on migration. In NSW they occur from Hastings Point, in the Tweed area, south to Shoalhaven Heads and Comerong Island. Sanderlings have been recorded further south, though rarely. Records are known from Jervis Bay, Moruya, Tuross Head and Brou Lake.	Unlikely – no suitable habitat was recorded within the study area.
Calidris canutus	Red Knot	M, E	-	Common in all the main suitable habitats around the coast of Australia. Mainly inhabit intertidal mudflats, sand flats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs.	Unlikely – no suitable habitat was recorded within the study area.
Calidris ferruginea	Curlew Sandpiper	M, CE	E	In Australia, Curlew Sandpipers occur around the coasts of all states and are also quite widespread inland, though in smaller numbers. They occur in Australia mainly during the non-breeding period but also during the breeding season when many non-breeding one-year old birds remain. Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh and in mangroves.	Unlikely – no suitable habitat was recorded within the study area.
Calidris melanotos	Pectoral Sandpiper	M	-	In New South Wales (NSW), the Pectoral Sandpiper is widespread, but scattered. Records exist east of the Great Divide, from Casino and Ballina, south to Ulladulla. West of the Great Divide, the species is widespread in the Riverina and Lower Western regions. Prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Calidris ruficollis	Red-necked Stint	M, CE	-	It is distributed along most of the Australian coastline with large densities on the Victorian and Tasmanian coasts. The Red-necked Stint breeds in Siberia and sporadically in north and west Alaska, probably from Taymyr region to Anadyr Territory and Koryakland. The Red-necked Stint mostly forages on bare wet mud on intertidal mudflats or sand flats, or in very shallow water; mostly in areas with a film of surface water and mostly close to edge of water. Roosts on sheltered beaches, spits, banks or islets, of sand, mud, coral or shingle, sometimes in saltmarsh or other vegetation.	Unlikely – no suitable habitat was recorded within the study area.
Calidris tenuirostris	Great Knot	M	V	In NSW, the species has been recorded at scattered sites along the coast down to about Narooma. It has also been observed inland at Tullakool, Armidale, Gilgandra and Griffith. Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sand flats, including inlets, bays, harbours, estuaries and lagoons. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms. Migrates to Australia from late August to early September, although juveniles may not arrive until October-November.	Unlikely – no suitable habitat was recorded within the study area.
Calonectris leucomelas	Streaked Shearwater	M	-	Found in the western Pacific, breeding on the coast and on offshore islands of Japan, Russia, and on islands off the coasts of China, North Korea and South Korea. This marine species can be found over both pelagic and inshore waters.	Unlikely – no suitable habitat was recorded within the study area.
Charadrius bicinctus	Double-banded Plover	M	-	The Double-banded Plover can be found in both coastal and inland areas. The Double-banded Plover is found on littoral, estuarine and fresh or saline terrestrial wetlands and also saltmarsh, grasslands and pasture. It occurs on muddy, sandy, shingled or sometimes rocky beaches, bays and inlets, harbours and margins of fresh or saline terrestrial wetlands such as lakes, lagoons and swamps, shallow estuaries and rivers.	Unlikely – no suitable habitat was recorded within the study area.
Charadrius leschenaultii	Greater Sand-plover	M, V	-	The Greater Sand-plover breeds in central Asia from Armenia to Mongolia, moving further south for winter. In Australia the species is commonly recorded in parties of 10-20 on the west coast, with the far northwest being the stronghold of the population. The species is apparently rare on the east coast, usually found singly. In NSW, the species has been recorded between the northern rivers and the Illawarra, with most records coming from the Clarence and Richmond estuaries. Almost entirely restricted to coastal areas in NSW, occurring mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks. Roosts during high tide on sandy beaches and rocky shores; begin foraging activity on wet ground at low tide, usually away from the edge of the water; individuals may forage and roost with other waders.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Charadrius mongolus	Lesser Sand Plover	M, E	V	The Lesser Sand-plover breeds in central and north eastern Asia, migrating further south for winter. In Australia the species is found around the entire coast but is most common in the Gulf of Carpentaria, and along the east coast of Queensland and northern NSW. Individuals are rarely recorded south of the Shoalhaven estuary, and there are few inland records. Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sand flats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms. Highly gregarious, frequently seen in flocks exceeding 100 individuals; also often seen foraging and roosting with other wader species. Roosts during high tide on sandy beaches, spits and rocky shores; forage individually or in scattered flocks on wet ground at low tide, usually away from the water's edge.	Unlikely – no suitable habitat was recorded within the study area.
Diomedea antipodensis	Antipodean Albatross	M, V	V	The majority of the Antipodean Albatross breed on Antipodes Island, with a small number of pairs breeding on Campbell Island. 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. Forage for the Antipodean Albatross is extremely patchy, both spatially and temporally, and individuals traverse great distances in search of food. This species feeds pelagically on squid, fish and crustaceans.	Unlikely – no suitable habitat was recorded within the study area.
Diomedea antipodensis gibsoni	Gibson's Albatross	M, V	V	This species is known only to breed on the Adams, Disappointment and Auckland Islands in the subantarctic Auckland Island group. Breeds bienially in colonies among grass tussocks on isolated subantarctis islands, using the wind to travel great distances both during and between breeding seasons. This species regularly occurs off the NSW coast from Green Cape to Newcastle. This species feeds pelagically on squid, fish and crustaceans.	Unlikely – no suitable habitat was recorded within the study area.
Diomedea epomophora	Southern Royal Albatross	M, V	-	During the non-breeding season, the Southern Royal Albatross has a wide and possibly circumpolar distribution, ranging north to about 35°S. The Southern Royal Albatross is moderately common throughout the year in offshore waters of southern Australia, mostly off south-eastern NSW, Victoria and Tasmania. Off South Australia, they are mostly seen May to September. It breeds on Campbell, Adams, Enderby and Auckland Islands, south of New Zealand. Nests on flat or gently sloping ground on slopes, ridges, gullies and plateaux of large islands, and on the summits of islets. Depressions, gullies, lee slopes and vegetation provide shelter for its nests, but exposed sites are also needed nearby so that the Southern Royal Albatross can take off and land. Its nests are placed among vegetation that is sparse enough for easy access.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Diomedea exulans	Wandering Albatross	M, V	E	The Wandering Albatross breeds on Macquarie Island. Macquarie Island lies in the southwest Pacific Ocean, about half-way between New Zealand and Antarctica. A single breeding pair has also been recorded on Heard Island. The Territory of Heard Island and McDonald Islands are an Australian external territory and volcanic group of barren Antarctic islands, about two-thirds of the way from Madagascar to Antarctica. It feeds in Australian portions of the Southern Ocean. On breeding islands, the Wandering Albatross nests on coastal or inland ridges, slopes, plateaux and plains, often on marshy ground. Nests of the Wandering Albatross are sited on moss terraces, in dense tussocks, and often in loose aggregations on the west (windward) side of islands. It prefers open or patchy vegetation (tussocks, ferns or shrubs), and it requires nesting areas that are near exposed ridges or hillocks so that it can take off.	Unlikely – no suitable habitat was recorded within the study area.
Diomedea sanfordi	Northern Royal Albatross	M, E	-	The Northern Royal Albatross ranges widely over the Southern Ocean, with individuals seen in Australian waters off south-eastern Australia. It breeds on Chatham Island and Tiara Head on the South Island of New Zealand. Its habitat includes subantarctic, subtropical, and occasionally Antarctic waters. The Northern Royal Albatross nests on flat or gently sloping ground, on slopes, ridges, gullies and plateaux of large islands, and on the summits of islets. Depressions, gullies, lee slopes and vegetation provide shelter for its nests, but exposed sites are also needed nearby so that the Southern Royal Albatross can take off and land. Its nests are placed among vegetation that are open enough for adults to easily walk through.	Unlikely – no suitable habitat was recorded within the study area.
Fregata ariel	Lesser Frigatebird	M	-	Major breeding populations of the Lesser Frigatebird are found in tropical waters of the Indian and Pacific Ocean (excluding the east Pacific), as well as one population in the South Atlantic (Trinidade and Martim Vaz, Brazil). Outside the breeding season it is sedentary, with immature and non-breeding individuals dispersing throughout tropical seas, especially of the Indian and Pacific Oceans.	Unlikely – no suitable habitat was recorded within the study area.
Fregata minor	Great Frigatebird	M	-	Major breeding populations of the Great Frigatebird are found in tropical waters of the Pacific and Indian Ocean, as well as one population in the South Atlantic (Trinidade and Martim Vaz, Brazil). It is predominately sedentary, with immature and non-breeding individuals dispersing throughout the tropical seas with the exception of the east and central Atlantic.	Unlikely – no suitable habitat was recorded within the study area.
Gallinago hardwickii	Latham's Snipe	M	-	Recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia. Occurs in permanent and ephemeral wetlands up to 2000 m above sea-level.	Unlikely – no suitable habitat was recorded within the study area.
Gallinago megala	Swinhoe's Snipe	M	-	Few definite records exist for Swinhoe's Snipe in Australia. The species has been recorded in the north between the Kimberley Divide and Cape York Peninsula. Breeds in central and southern Siberia. During the non-breeding season Swinhoe's Snipe occurs at the edges of wetlands, such as wet paddy fields, swamps and freshwater streams. The species is also known to occur in grasslands and drier cultivated areas.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Gallinago stenura	Pin-tailed Snipe	M	-	The species distribution within Australia is not well understood. In NSW a single banded bird was reported near West Wyalong. Non-breeding migrant in Australia. During non-breeding period the Pin-tailed Snipe occurs most often in or at the edges of shallow freshwater swamps, ponds and lakes with emergent, sparse to dense cover of grass/sedge or other vegetation.	Unlikely – no suitable habitat was recorded within the study area.
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	V	Distributed along the coastline (including offshore islands) of mainland Australia and Tasmania. Found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, and the sea).	Unlikely – species has been recorded within the broader locality however, no suitable habitat was identified within the study area.
Cuculus optatus	Oriental Cuckoo	M	-	Migrates from Eurasia as far south as Indonesia, New Guinea and North Australia. Some remain through Australia in the winter. Inhabits rainforest margins, monsoon forest, vine scrub and mangroves.	Unlikely – may occur in air space above study area. Unlikely that the works would significantly affect migratory species.
Hirundapus caudacutus	White-throated Needletail	M, V	-	Widespread in eastern and south-eastern Australia. Almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. They also commonly occur over heathland but less often over treeless areas, such as grassland or swamps.	Unlikely – may occur in air space above study area. Unlikely that the works would significantly affect migratory species.
Hydroprogne caspia	Caspian Tern	M	-	Within Australia, the Caspian Tern has a widespread occurrence and can be found in both coastal and inland habitat. The Caspian Tern breeds on variable types of sites including low islands, cays, spits, banks, ridges, beaches of sand or shell, terrestrial wetlands and stony or rocky islets or banks. This species usually forages in open wetlands, including lakes and rivers.	Unlikely – species has been recorded within the broader locality however, no suitable habitat was identified within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Limosa lapponica	Bar-tailed Godwit	M	-	The Bar-tailed Godwit has been recorded in the coastal areas of all Australian states. It is widespread in the Torres Strait and along the east and south-east coasts of Queensland, NSW and Victoria, including the offshore islands. It is found south from Cooktown to Port Phillip Bay, but is less common west of the Bellarine Peninsula. There are a few inland records from NSW and Victoria. The species is occasionally recorded at King Island and the Furneaux Group, with scattered records on the north and east coasts of Tasmania. The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas.	Unlikely – no suitable habitat was recorded within the study area.
Limosa limosa	Black-tailed Godwit	M	V	A migratory wading bird that breeds in Mongolia and Eastern Siberia and flies to Australia for the southern summer, arriving in August and leaving in March. In NSW, it is most frequently found at Kooragang Island (Hunter River estuary). Occurs in sheltered bays, estuaries and lagoons with large intertidal mudflats and sand flats. Also found at inland mudflats, swamps.	Unlikely – no suitable habitat was recorded within the study area.
Macronectes giganteus	Southern Giant-Petrel	M, 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.	Unlikely – no suitable habitat was recorded within the study area.
Macronectes halli	Northern Giant Petrel	M, V	V	The Northern Giant-Petrel has a circumpolar pelagic distribution, usually between 40-64°S in open oceans. Their range extends into subtropical waters (to 28°S) in winter and early spring, and they are a common visitor in NSW waters, predominantly along the south-east coast during winter and autumn. Breeding in Australian territory is limited to Macquarie Island and occurs during spring and summer. Adults usually remain near the breeding colonies throughout the year (though some do travel widely) while immature birds make long and poorly known circumpolar and trans-oceanic movements. Hence most birds recorded in NSW coastal waters are immature birds. Northern Giant-Petrels seldom breed in colonies but rather as dispersed pairs, often amidst tussocks in dense vegetation and areas of broken terrain.	Unlikely – no suitable habitat was recorded within the study area.
Monarcha melanopsis	Black-faced Monarch	M	-	Widespread in eastern Australia. Mainly occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrubland, warm temperate rainforest, dry (monsoon) rainforest and (occasionally) cool temperate rainforest.	Unlikely – may occur in air space above study area. Unlikely that the works would significantly affect migratory species.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Monarcha trivirgatus	Spectacled Monarch	M	-	Occurs along the entire east coast of Australia. Breeds in dense scrub in gullies of coastal ranges.	Unlikely – may occur in air space above study area. Unlikely that the works would significantly affect migratory species.
Motacilla flava	Yellow Wagtail	M	-	Rare but regular visitor around Australian coast, especially in the NW coast Broome to Darwin. Found in open country near swamps, salt marshes, sewage ponds, grassed surrounds to airfields, bare ground; occasionally on drier inland plains.	Unlikely – no suitable habitat was recorded within the study area.
Myiagra cyanoleuca	Satin Flycatcher	M	-	Widespread in eastern Australia and vagrant to New Zealand. Inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests.	Unlikely – may occur in air space above study area. Unlikely that the works would significantly affect migratory species.
Numenius madagascariensis	Eastern Curlew	M, CE	-	Found on intertidal mudflats and sandflats, often with beds of seagrass, on sheltered coasts, especially estuaries, mangrove swamps, bays, harbours and lagoons.	Unlikely – no suitable habitat was recorded within the study area.
Numenius minutus	Little Curlew	M	-	Little Curlews generally spend the non-breeding season in northern Australia from Port Hedland in Western Australia to the Queensland coast. The Little Curlew is most often found feeding in short, dry grassland and sedgeland, including dry floodplains and blacksoil plains, which have scattered, shallow freshwater pools or areas seasonally inundated.	Unlikely – no suitable habitat was recorded within the study area.
Numenius phaeopus	Whimbrel	M	-	The Whimbrel is a regular migrant to Australia and New Zealand, with a primarily coastal distribution. The Whimbrel is often found on the intertidal mudflats of sheltered coasts. It is also found in harbours, lagoons, estuaries and river deltas, often those with mangroves, but also open, unvegetated mudflats.	Unlikely – no suitable habitat was recorded within the study area.
Pandion haliaetus	Osprey	M	-	The Osprey has a global distribution with four subspecies previously recognised throughout its range. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	Unlikely – no suitable habitat was recorded within the study area.
Phoebetria fusca	Sooty Albatross	V	-	The Sooty Albatross has sometimes been observed foraging in inshore waters in southern Australia. The Sooty Albatross is a rare, but probably regular migrant to Australia, mostly in the autumn-winter months, occurring north to south-east Queensland, NSW, Victoria, Tasmania and South Australia. The Sooty Albatross breeds on islands in the southern Indian and Atlantic Oceans, and forages south of 30° S, between southern NSW and Argentina.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Pluvialis fulva	Pacific Golden Plover	M	-	Most Pacific Golden Plovers occur along the east coast and are especially widespread along the Queensland and NSW coastlines. In non-breeding grounds in Australia this species usually inhabits coastal habitats, though it occasionally occurs around inland wetlands. Pacific Golden Plovers usually occur on beaches, mudflats and sand flats (sometimes in vegetation such as mangroves, low saltmarsh such as Sarcocornia, or beds of seagrass) in sheltered areas including harbours, estuaries and lagoons, and also in evaporation ponds in salt works.	Unlikely – no suitable habitat was recorded within the study area.
Pluvialis squatarola	Grey Plover	M	-	Non-breeding visitor to Australia, Grey Plovers usually forage on large areas of exposed mudflats and beaches of sheltered coastal shores such as inlets, estuaries and lagoons. They usually roost in sandy areas, such as on unvegetated sandbanks or sand-spits on sheltered beaches or other sheltered environments such as estuaries or lagoons	Unlikely – no suitable habitat was recorded within the study area.
Rhipidura rufifrons	Rufous Fantail	M	-	Occurs in coastal and near coastal districts of northern and eastern Australia. In east and south-east Australia, the Rufous Fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (Eucalyptus microcorys), Mountain Grey Gum (E. cypellocarpa), Narrow-leaved Peppermint (E. radiata), Mountain Ash (E. regnans), Alpine Ash (E. delegatensis), Blackbutt (E. pilularis) or Red Mahogany (E. resinifera); usually with a dense shrubby understorey often including ferns.	Unlikely – may occur in air space above study area. Unlikely that the works would significantly affect migratory species.
Stercorarius parasiticus	Arctic Jaeger	M	-	The Parasitic Jaeger breeds on the northernmost coasts of Eurasia and North America. This marine species is predominately coastal but will migrate over land.	Unlikely – no suitable habitat was recorded within the study area.
Sterna hirundo	Common Tern	M	-	The species is a non-breeding migrant to Australia, where it is widespread and common on the eastern coast south to eastern Victoria, and common on parts of the northern coast, mainly east of Darwin. Common Terns are marine, pelagic and coastal. In Australia, they are recorded in all marine zones, but are commonly observed in near-coastal waters, both on ocean beaches, platforms and headlands and in sheltered waters, such as bays, harbours and estuaries with muddy, sandy or rocky shores. However, off Wollongong, NSW, Common Terns were recorded in all marine zones but generally recorded in offshore and pelagic waters, 11–55 km from shore.	Unlikely – no suitable habitat was recorded within the study area.
Sternula albifrons	Little Tern	M	-	Migrating from eastern Asia, the Little Tern is found on the north, east and south-east Australian coasts, from Shark Bay in Western Australia to the Gulf of St Vincent in South Australia. In NSW, it arrives from September to November, occurring mainly north of Sydney. Almost exclusively coastal, preferring sheltered environments; however, may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records). Nests in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands.	Unlikely – no suitable habitat was recorded within the study area.
Thalasseus bergii	Crested Tern	M	-	Greater Crested Terns are widespread around the coasts of the Indian Ocean, Southern Ocean and west-central Pacific Ocean. They inhabit coastal bays and inlets, lakes and large rivers. Terns are ground nesting birds that lay their eggs in shallow scrapes.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Thalassarche bulleri	Buller's Albatross	M, V	-	Buller's Albatross breed in New Zealand (Snares, Solander and Chatham Islands), but are regular visitors to Australian waters. They are frequently seen off the coast from Coffs Harbour, south to Tasmania and west to Eyre Peninsula. In Australia, Buller's Albatross are seen over inshore, offshore and pelagic waters. They appear to congregate over currents where water temperature exceeds 16 °C.	Unlikely – no suitable habitat was recorded within the study area.
Thalassarche bulleri platei	Northern Buller's Albatross	M, V	-	The Pacific Albatross is a non-breeding visitor to Australian waters. Foraging birds are mostly limited to the Pacific Ocean and the Tasman Sea, although birds do reach the east coast of the Australian mainland. The Pacific Albatross is a marine, pelagic species. It occurs in subtropical and subantarctic waters of the South Pacific Ocean.	Unlikely – no suitable habitat was recorded within the study area.
Thalassarche cauta	Shy Albatross	M, E	V	This species is circumpolar in distribution, occurring widely in the southern oceans. Islands off Australia and New Zealand provide breeding habitat. In Australian waters, the Shy Albatross occurs along the east coast from Stradbroke Island in Queensland along the entire south coast of the continent to Carnarvon in Western Australia. Although uncommon north of Sydney, the species is commonly recorded off southeast NSW, particularly between July and November, and has been recorded in Ben Boyd National Park. This pelagic or ocean-going species inhabits subantarctic and subtropical marine waters, spending the majority of its time at sea. Occasionally the species occurs in continental shelf waters, in bays and harbours. Known breeding locations include Albatross Island off Tasmania, Auckland Island, Bounty Island and The Snares, off New Zealand, where nesting colonies of 6-500 nests occur and may contain other species such as the Australian Gannet. Located on sheltered sides of islands, on cliffs and ledges, in crevices and slopes, nests are used annually and consist of a mound of mud, bones, plant matter and rocks.	Unlikely – no suitable habitat was recorded within the study area.
Thalassarche eremita	Chatham Albatross	M, E	-	Breeding for the Chatham Albatross is restricted to Pyramid Rock, Chatham Islands, off the coast of New Zealand. The principal foraging range for this species is in coastal waters off eastern and southern New Zealand, and Tasmania.	Unlikely – no suitable habitat was recorded within the study area.
Thalassarche impavida	Campbell Albatross	M, V	-	This species nests only at Campbell Island and the adjacent Isle de Jeanette Marie south of New Zealand, with a total population estimated at 24,600 pairs. It ranges widely in Australasian seas. In NSW waters it is probably frequently overlooked due to the difficulties of separating it from the Black-browed Albatross. However, it appears to be a regular visitor occurring in most months of the year with peaks in winter during the non-breeding season. Occurs in both inshore and offshore waters, including the continental shelf break and pelagic waters. Forages on fish, squid, crustacea, carrion and gelatinous organisms.	Unlikely – no suitable habitat was recorded within the study area.
Thalassarche melanophris	Black-browed Albatross	M, V	V	The Black-browed Albatross has a circumpolar range over the southern oceans and are seen off the southern Australian coast mainly during winter. This species migrates to waters off the continental shelf from approximately May to November and is regularly recorded off the NSW coast during this period. The species has also been recorded in Botany Bay National Park Inhabits Antarctic, subantarctic, subtropical marine and coastal waters over upwellings and boundaries of currents. Can tolerate water temperatures between 0ºC and 24ºC. Spends most of its time at sea, breeding on small isolated islands.	Unlikely – no suitable habitat was recorded within the study area.

Species	Common Name	EPBC Act	BC Act	Distribution and habitat	Likelihood of occurrence in the study area
Thalassarche salvini	Salvin's Albatross	M, V	-	Salvin's Albatross breeds on Bounty, Snares and Chatham Islands, south of New Zealand, as well as on Crozet Island in the Indian Ocean. The species forages over most of the southern Pacific Ocean, where it is particularly common in the Humboldt Current, off South America. There are small numbers in the Indian Ocean and sometimes in the South Atlantic Ocean. During the non-breeding season, the species occurs over continental shelves around continents. It occurs both inshore and offshore and enters harbours and bays (Jehl 1973). Salvin's Albatross is scarce in pelagic waters.	Unlikely – no suitable habitat was recorded within the study area.
Thalassarche steadi	White-capped Albatross	M, V	-	Mostly observed in inshore and offshore waters over the continental shelf and less frequently in pelagic waters off the shelf break. May occasionally enter larger bays. This species breeds on a number of islands in New Zealand waters. After breeding most birds remain in Australasian waters with some adults migrating across the Indian Ocean to seas off South Africa and Namibia. In NSW waters it appears to be a regular visitor principally occurring between March and December.	Unlikely – no suitable habitat was recorded within the study area.
Tringa brevipes	Grey-tailed Tattler	M	-	In NSW the Grey-tailed Tattler is distributed along most of the coast from the Queensland border, south to Tilba Lake. The Grey-tailed Tattler is often found on sheltered coasts with reefs and rock platforms or with intertidal mudflats. It can also be found at intertidal rocky, coral or stony reefs as well as platforms and islets that are exposed at low tide.	Unlikely – no suitable habitat was recorded within the study area.
Tringa nebularia	Common Greenshank	M	-	The Common Greenshank does not breed in Australia; however, the species occurs in all types of wetlands and has the widest distribution of any shorebird in Australia.	Unlikely – species has been recorded within the broader locality however, no suitable habitat was identified within the study area.
Tringa stagnatilis	Marsh Sandpiper	M	-	Fresh or brackish (slightly salty) wetlands such as rivers, water meadows, sewage farms, drains, lagoons and swamps.	Unlikely – no suitable habitat was recorded within the study area.
Xenus cinereus	Terek Sandpiper	M	V	A rare migrant to the eastern and southern Australian coasts, being most common in northern Australia, and extending its distribution south to the NSW coast in the east. The two main sites for the species in NSW are the Richmond River estuary and the Hunter River estuary. The latter has been identified as nationally and internationally important for the species. In Australia, has been recorded on coastal mudflats, lagoons, creeks and estuaries. Favours mud banks and sandbanks located near mangroves, but may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools.	Unlikely – no suitable habitat was recorded within the study area.

* Distribution and habitat requirement information adapted from:
- Australian Government Department of the Environment http://www.environment.gov.au/biodiversity/threatened/index.html
- NSW Office of Environment and Heritage http://www.environment.nsw.gov.au/threatenedspecies
- Department of Primary Industries – Threatened Fish and Marine Vegetation http://www.dpi.nsw.gov.au/fisheries/species-protection

+ Data source includes
- Number of records from the NSW Office of Environment and Heritage Wildlife Atlas record data; and
- Identified from the Protected Matters Search Tool (PMST) http://www.environment.gov.au/epbc/pmst/index.html

Key:
- EP = endangered population
- CE = critically endangered
- E = endangered
- V = vulnerable
- M = migratory

All oceanic birds (i.e. albatross, petrel, terns, etc.) and wading birds (e.g. curlews, sandpipers, etc.) have been excluded from these results due to the absence of suitable habitat in the study area. Fish, whale, and turtle species have been excluded from these results due to the absence of suitable habitat in the study area. Some Migratory species (EPBC Act) including birds, turtles, and shark species have been excluded from these results due to the absence of suitable habitat in the study area.

Appendix C. Tree Assessment

Tree No.	Species	Common name	Native or exotic	Dbh (cm)	Structural Root Zone radius (m)	Recommended Tree Protection Zone radius (m)	Tree health	Tree structure	Tree S.U.L.E	Habitat value for fauna
38	*Callistemon linearis*	Narrow-leaved Paperbark	Native	25	2.1	4.2	Good	Fair	Medium (15-40yrs)	Limited - May provide roosting and foraging opportunities for common urban native and exotic birds
39	*Callistemon salignus*	Willow Bottlebrush	Native	20	1.7	2.4	Fair	Fair	Short (5-15yrs)	Limited - May provide roosting and foraging opportunities for common urban native and exotic birds
40	*Callistemon salignus*	Willow Bottlebrush	Native	25	1.9	3	Fair	Fair	Short (5-15yrs)	Limited - May provide roosting and foraging opportunities for common urban native and exotic birds
41	*Callistemon salignus*	Willow Bottlebrush	Native	25	1.9	3	Fair	Fair	Short (5-15yrs)	Limited - May provide roosting and foraging opportunities for common urban native and exotic birds
42	*Callistemon salignus*	Willow Bottlebrush	Native	25	1.9	3	Fair	Fair	Short (5-15yrs)	Limited - May provide roosting and foraging opportunities for common urban native and exotic birds
43	*Callistemon salignus*	Willow Bottlebrush	Native	20	1.7	2.4	Fair	Fair	Short (5-15yrs)	Limited - May provide roosting and foraging opportunities for common urban native and exotic birds
44	*Corymbia maculata*	Spotted Gum	Native	55	2.6	6.6	Good	Good	Medium (15-40yrs)	Good - May provide roosting and foraging opportunities for common urban native and exotic birds. No hollows

Notes: Tree species identification and diameter at breast height (dbh) has been estimated where plants were located in the rail corridor (no access to the rail corridor was undertaken for the assessment). Radius of the Tree Protection Zone (TPZ) calculated by the formula TPZ = dbh x 12. Recommended TPZ radius has been rounded (minimum TPZ size is 2 m radius). Radius of the Structural Root Zone calculated from the formula RSRZ = (stem diameter x 50)0.42 x 0.64. Inspections of tree condition were visual and undertaken from the ground only. Tree health definitions are as follows:

- Good: the tree is demonstrating good or exceptional growth for the species. The tree should exhibit a full canopy of foliage and have only minor pest or disease problems. Foliage colour size and density should be typical of a healthy specimen of that species.

- Fair: the tree is in reasonable condition and growing well for the species. The tree should exhibit an adequate canopy of foliage. There may be some dead wood in the crown, some grazing by insect or animals may be evident, and/or foliage colour, size or density may be atypical for a healthy specimen of that species.
- Poor: tree is not growing to its full capacity. Extension growth of the lateral branches may be minimal. The canopy may be thinning or sparse. Large amounts of dead wood may be evident throughout the crown, as well as significant pest and disease problems. Other symptoms of stress indicating tree decline may be present.
- Very poor: The tree appears to be in a state of decline, and the canopy may be very thin and sparse. A significant volume of deed wood may be present in the canopy, or pest and disease problems may be causing a severe decline in tree health.
- Dead: the tree is dead.

Tree structure (the likelihood of the tree to fail under normal condition) was assessed according to the following criteria:

- Good: The tree has a well-defined and balanced crown. Branch unions appear to be strong, with no defects evident in the trunks or the branches. Major limbs are well defined. The tree would be considered a good example for the species. Probability of significant failure is highly unlikely.
- Fair: The tree has some minor problems in the structure of the crown. The crown may be slightly out of balance at some branch unions or branches may be exhibiting minor structural faults. If the tree has a single trunk, this may be on a slight lean, or be exhibiting minor defects. Tree map be re-sprouting from past cutting. Probability of significant failure is low.
- Poor: The tree may have a poorly structured crown, the crown may be unbalanced, or exhibit large gaps. Major limbs may not be well defined; branches may be rubbing or crossing over. Branch unions may be poor or faulty at the point of attachment. The tree may have suffered major root damage. Probability of significant failure is moderate.
- Very poor: The tree has a poorly structured crown. The crown is unbalanced, or exhibits large gaps. Major limbs are not well defined. Branch unions may be poor or faulty at the point of attachment. A section of the tree has failed, or is in imminent danger of failure. Active failure may be present, or failure is probably in the immediate future.
- Failed: A significant section of the tree or the whole tree has failed.
- Tree Safe Useful Life Expectancy (SULE) y is approximately how long a tree can be retained safely and usefully in the landscape providing site conditions remain unchanged and the recommended works are completed. The following ratings were used (as taken from arborist report):
- Unsafe or 0 years: The tree is considered dangerous in the location and/or no longer provides any amenity value.
- Less Than 5 years: The tree under normal circumstances and without extra stress should be safe and have value of maximum of 5 years. The tree will need to be replaced in the short term. Replacement plants should be established as soon as possible if there is efficient space, or consideration should be given to the removal of the tree to facilitate replanting.
- Short (5-15yrs): The tree under normal circumstances and without extra stress should be safe and have value of maximum of 10 years. Trees in this category may require regular inspections and maintenance particularly if they are large specimens. Replacement plants should be established in the short term if there is sufficient space, or consideration should be given to the removal of the tree to facilitate replanting. However, this is management decision and is beyond the scope of this inventory.
- Medium (15-40yrs): The tree under normal circumstances and without extra stress should be safe and of value of up to 40 years. During this period, regular inspections and maintenance will be required.