ECOLOGICAL ASSESSMENT FOR MACLEAY COAST DESTINATION PROJECT

ARAKOON AND HAT HEAD NATIONAL PARKS

NOVEMBER 2024

CONTENTS

EXECUTIVE SUMMARY

The Macleay Coast Destination Project consists of a draft master plan for upgrades to facilities within the Arakoon and Hat Head national parks. The proposed works have been assessed in accordance with the requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) - Matters of National Environmental Significance (MNES), as well as with the requirements of the New South Wales (NSW) *Biodiversity Conservation Act 2016* (BC Act), *Biodiversity Conservation Regulation 2017, Fisheries Management Act 1994* (FM Act), and *State Environmental Planning Policy (Resilience and Hazards) 2021*.

Proposed Works

The proposal is for completion of a range of facility upgrade works within the Arakoon and Hat Head national parks. These include activities such as an upgrade to parking and camping facilities, improving pedestrian access, improving road safety through improved road design, enhancing open spaces for public gathering and the creation of an additional walking track. A total of five (5) separate areas have been identified to categorise the works locations. These consist of four precincts and the proposed walking track.

Survey Results

Site surveys were conducted between August and November 2023. These surveys mapped the vegetation communities within the study area, recorded key flora species within each vegetation community, recorded all fauna species utilising the study area at the time of survey; and noted the abundance and extent of faunal habitat available in order to assess the likelihood of threatened species occurring on site. A desktop assessment of relevant literature and databases was also conducted.

These assessments determined that two of the native vegetation communities within study area qualify as state listed Threatened Ecological Communities (TEC). They comprise the *Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner bioregions* TEC and *Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* TEC. The latter is also analogous with a federally listed TEC, *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia*.

Two threatened flora species were also identified within the study area, both of which were recorded nearby the proposed new trail. Numerous plants of the Native Guava (*Rhodomyrtus psidioides*) were recorded throughout the trail, with some of these located within the proposed works footprint. A total of four plants of the Scrub Turpentine (*Rhodamnia rubescens*) were also recorded during the survey, all of which are alongside a portion of the track that is already in use as an informal walking track.

A total of seven threatened fauna species were also recorded during survey. Species detected comprised the:

- White-bellied Sea-eagle (*Haliaeetus leucogaster*)
- Eastern Osprey (*Pandion cristatus*)
- South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*)
- Pied Oystercatcher (*Haematopus longirostris*)
- Powerful Owl (*Ninox strenua*)

- Koala (*Phascolarctos cinereus*); and the
- Little Bent-winged Bat (*Miniopterus australis*).

Desktop assessments also identified numerous additional threatened flora and fauna species which have the potential to occur within the study area.

Impact of the Proposal

The proposed works will require the removal of native vegetation and species habitat within the works footprint. Native vegetation removal is largely restricted to the minor removal of vegetation along the edge of proposed roads or tracks, with the majority of works proposed to occur within already disturbed or cleared areas. Some vegetation removal will be required within the TEC areas containing Native Guava. The proposed works may also require the removal or trimming of a single hollow-bearing tree, which has the potential to provide roosting habitat for small, hollow-obligate fauna such as microbats. A single Koala food tree may also require removal. Other fauna habitat features that may be present within the works footprint at the time of establishment can be relocated and retained within adjoining vegetation.

Indirect impacts such as an increased risk of weed spread, temporary noise and vibration impacts, the increased risk of pathogen spread and the increase in pedestrians on the new track are also associated with the proposed works. A number of mitigation measures have been developed to reduce the impacts of the proposal on the flora, fauna and ecological communities present. These include exclusion zones for sensitive areas, strategic track design, hygiene protocols and erosion and sedimentation controls.

Relative Legislative Compliance

Environment Protection and Biodiversity Conservation Act 1999

Assessment under the *Environment Protection and Biodiversity Conservation Act 1999* Matters of National Environmental Significance (MNES) determined that the impact of the proposal on MNES was unlikely to be significant. Hence referral to Department of Climate Change, Energy, the Environment and Water (DCCEEW) for approval is not required.

Fisheries Management Act 1994

The study area is located within a coastal environment and contains numerous mapped, unnamed watercourses. As the proposal may require works within a mapped area of Key Fish Habitat, prior notice of any works is to be provided to the Minister.

Biodiversity Conservation Act 2016

Numerous TECs, threatened flora species and threatened fauna species are known to occur or have the potential to occur within the study area. The potential impacts of the proposed works on these entities have been assessed via a Test of Significance. These assessments have determined that the proposal is unlikely to significantly impact these ecological communities, threatened species or their habitats. As such, a Species Impact Statement or entry into the Biodiversity Offset Scheme is not required.

State Environmental Planning Policy (Resilience and Hazards) 2021

The study area contains mapped areas of Littoral Rainforest, Coastal Environment Areas and Coastal Use Areas. As the proposed works are located within these mapped areas, the works are subject to various development controls under this State Environmental Planning Policy (SEPP).

ABBREVIATION GLOSSARY

Abbreviation	Description
AIS	Assets of Intergenerational Significance
BC Act	*Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
DAWE	Department of Agriculture, Water and the Environment
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DCP	Development Control Plan
DPIE	Department of Planning, Industry and Environment
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
GIS	Geographic Information System
ha	Hectares
HBT	Hollow-bearing Tree
KFT	Koala Food Tree
km	Kilometres
KTP	Key Threatening Process
LGA	Local Government Area
m	Metres
Master Plan	Macleay Coast Destination Draft Master Plan
MNES	Matter of National Environmental Significance
Microbat	Microchiropteran bat
NPWS	National Parks and Wildlife Service
NSW	New South Wales
OEH	Office of Environment and Heritage
PIR	Passive Infrared Camera
PCT	Plant Community Type
SEPP	State Environmental Protection Policy
SVTM	State Vegetation Type Map
TEC	Threatened Ecological Community

1. INTRODUCTION

1.1 Site Description

The National Parks and Wildlife Service (NPWS) have identified four precincts and an additional walking track to be subject to the proposed development works. These areas are located entirely within the Arakoon and Hat Head national parks. Each precinct currently provides a range of facilities for public and/or NPWS use.

The Trial Bay Precinct encompasses an 18.02-hectare area surrounding the Trial Bay Gaol. This gaol is a heritage-listed, decommissioned gaol that serves as a tourist attraction to the area. A large portion of the precinct functions as a NPWS campground offering access to Front Beach off Trial Bay. Existing facilities include car parking, access roads, campground bathrooms, camp kitchens, picnic shelters, some footpaths, a NPWS owned café and the start of the Monument Hill walking track. A gravel laneway extends southbound from this campground leading into the Cardwell Street Precinct.

The Cardwell Street Precinct covers a 3.13-hectare area, either side of Precinct 4 Beach Access Road. This area houses a NPWS Depot, a plant nursey, public vehicle access to Trial Bay and the southern portion of the gravel track leading north to the Trial Bay Precinct.

The Little Bay Precinct encompasses a 6.24-hectare area surrounding Little Bay. This area currently serves as a public access area to Little Bay and access to the Little Bay Walking Track. The precinct includes the car parking facilities for visitors to Little Bay, public toilet and shelter facilities, pedestrian access paths to Little Bay, the Overshot Dam in the south and the Overshot Dam Road.

The Smoky Cape Precinct extends from the car parking facilities along Lighthouse Road to the Smoky Cape Lighthouse. This covers a total area of 2.64 hectares of land which primarily functions as a tourist attraction providing public day use areas and accommodation stays. Facilities within this precinct include public toilets, picnic tables, barbeques and a pedestrian access footpath to the Smoky Cape Lighthouse. The Lighthouse Keepers Cottages are also located within this precinct, along with a storage shed and out-of-use stable buildings.

The new walking track is proposed to extend north from the Jack Perkins Track at North Smoky Beach to the southern end of the Little Bay Walking Track. This new track is proposed to cover a length of approximately 3.6 kilometres along the coastline. The majority of this proposed new track is currently used informally as a walking track with portions of the track also spanning along the shoreline of North Smoky Beach and Gap Beach.

The extent of each precinct and the proposed new track are mapped in Figure 1 to Figure 5

1.2 Site Location

The Macleay Coast Destination site extends from Trial Bay in the north to Smoky Cape in the south. The entirety of this site is located within New South Wales (NSW) national parks with the Trial Bay, Cardwell Street and Little Bay precincts all within the Arakoon National Park and the Smoky Cape Precinct and proposed new walking track within the Hat Head National Park. These national parks are located within the Kempsey Local Government Area (LGA) on the Mid North Coast with the nearest town (South West Rocks) less than three kilometres west of the site.

The location of the Macleay Coast Destination site is mapped in Figure 6.

Figure 1: Trial Bay Precinct

Figure 2: Cardwell Street Precinct

Figure 3: Little Bay Precinct

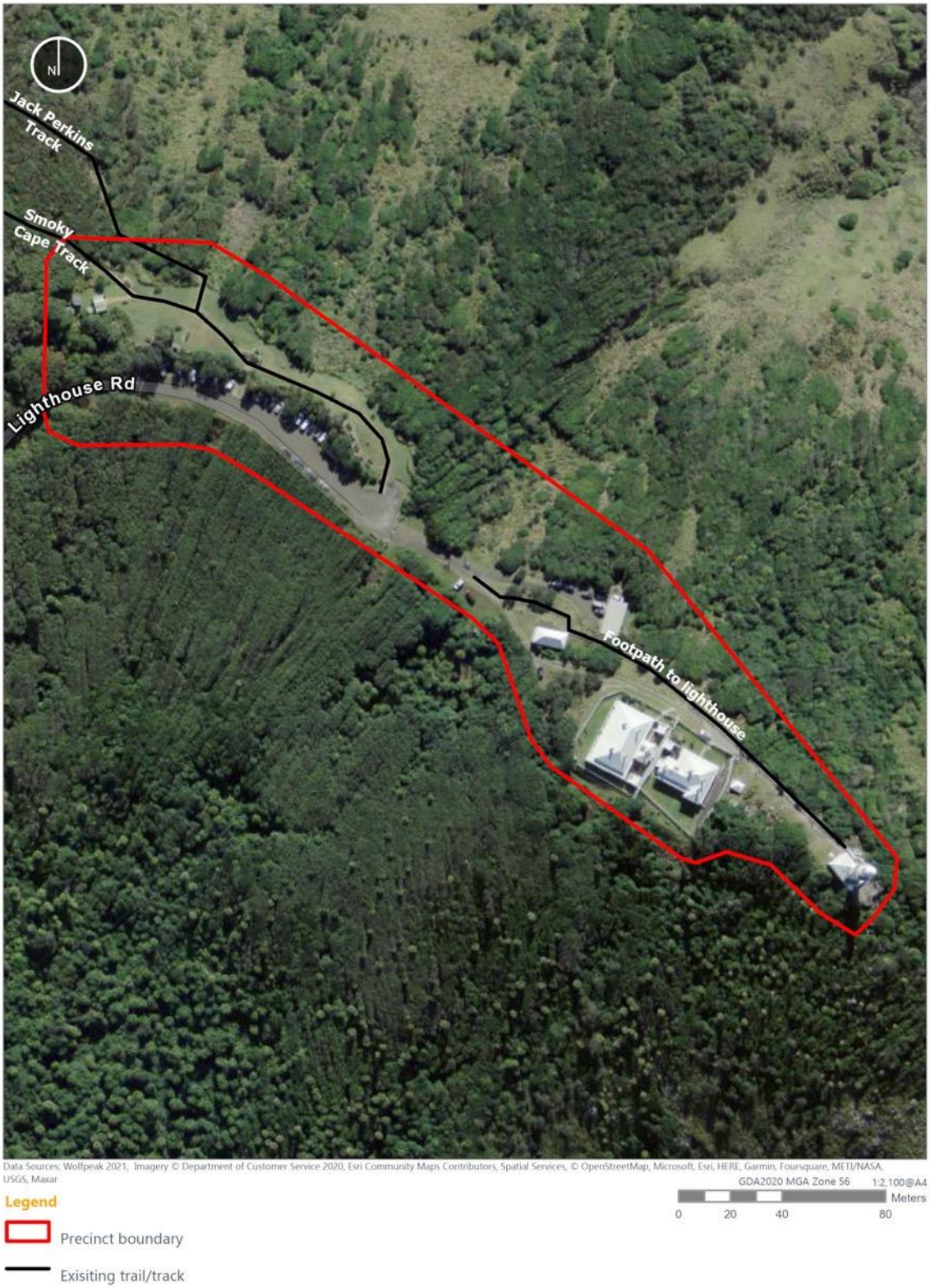

Figure 4: Smoky Cape Precinct

Figure 5: Proposed new trail

Figure 6: Location of the Macleay Coast Destination site

2. ACTIVITY SCOPE

The National Parks and Wildlife Service (NPWS) are proposing to develop the facilities within the Arakoon and Hat Head national parks, with the aim of improving park visitor facilities and increasing the range and quality of experiences on offer. Currently, the facilities within these parks have been developed in an ad hoc manner, resulting in an inconsistency in design and quality across the precincts. This approach is posing a limitation on the NPWS encouraging new visitor markets to the area and is gradually diminishing the appeal of the area to existing visitors. The Macleay Coast Destination Project aims to provide a holistic design to park upgrades, with the desired goal of improving community wellbeing, enhancing the regional visitor economy and increasing nature-based tourism in NSW.

The extent of proposed works is outlined in the Macleay Coast Destination Draft Master Plan (NPWS 2022). This master plan provides a detailed description of the proposed works for each precinct as well as an outline of the location of the proposed walking track development. The following sections provide a summary of the proposed development works at each precinct. It must be noted that some of the works proposed within this Master Plan have already been completed. Additionally, the NPWS have indicated a possibility that not all works proposed may be completed, due to their dependency on funding and permissibility under the *National Parks and Wildlife Act 1974* (NPW Act). As a precautionary measure, unless otherwise instructed by NPWS, this report has assessed the ecological impacts of completing all works proposed within the Macleay Coast Destination Draft Master Plan (Master Plan), as well as any additional works provided in separate precinct-specific design plans.

2.1 Trial Bay Precinct

The Trial Bay precinct currently functions as a tourist location for day visitors as well as a campground. Works proposed within this precinct are largely an upgrade to the existing infrastructure, in order to provide a safer and more accessible environment for visitors.

The existing precinct design provides limited separation between pedestrians and vehicles; and with tight corners and small road widths, poses a safety hazard. With the current road design largely allowing for one-way vehicle access only, vehicles are also directed through a section of the camping area, further increasing the risk of pedestrian-vehicle collision as well as detracting from the camping experience. Furthermore, some areas of the existing road design have been observed to lead to congestion and dangerous vehicle movements.

Parking congestion by day visitors has also frequently arisen as an issue within the precinct, which increases the risk of vehicle collisions, detracts from the camping experience and leads to an increase in environmental impacts with vehicles parking in undesignated areas.

The works proposed within this precinct have been designed to address these previous design issues and provide updated facilities. Designs have placed a focus on improving safety through strategic road design, increasing pedestrian accessways and creating separation between day-use and camping areas. The following provides a summary of the works proposed to be undertaken within the Trial Bay precinct:

- Realigning an existing road away from campers.
- Widening of the main one-way roads, to allow for two-way traffic.

- Addition of vehicle passing bay along a narrow two-way access road.
- Formalising existing pedestrian pathways.
- Addition of new pedestrian pathway along the waterfront to provide separation between pedestrians and campers.
- Addition of new pedestrian pathway around the northern boundary of the gaol, down to waterfront camping area.
- Relocating and replacing facilities such as picnic shelters and seating.
- Diverting electrical lines underground for aesthetic purposes.
- Restricting access to the bin bays to prevent public rubbish dumping but allowing for service vehicle access.
- Reconfiguring parking area for day-visitors.
- Addition of parking areas for all visitors.
- Upgrading existing amenities such as picnic shelters, toilet blocks, shower blocks, handrails, steps and access ramps.
- Installation on new amenities such as showers, seating, shelters and viewing areas.
- Installation of rainwater tanks.
- Relocation of existing pedestrian bridge to improve water drainage issues.
- Removing and rebuilding infrastructure along Front Beach in order to minimise erosion impacts.

Figure 7 maps the location of the proposed upgrade works. Appendix A provides the site-specific concept design for this precinct, on which this assessment has been based.

2.2 Cardwell Street Precinct

Works proposed to be undertaken within the Cardwell Street precinct are largely centred around improving vehicle access and formalising parking. The current layout of the precinct provides multiple points where conflicts between pedestrians and vehicles arise and provides no scope for pedestrian separation.

Further safety concerns have arisen around pedestrian/cycle movements across the access road, where vehicle sight lines are poor. The lack of formalised parking within this precinct has also led to those intending to use the Bridle Trail, parking along Trial Bay Gaol Road, where road widths and sight lines are not safe for pedestrian use.

Drainage issues are also prevalent along a section of the loop road and areas behind the intended road edge have become a laydown storage area, detracting from the aesthetics off the precinct and impacting adjoining vegetation.

The works proposed within this precinct have been designed to address these issues. Figure 8 maps the proposed precinct layout with a summary of the proposed works following:

- Widening of existing roads to allow for safer vehicle movements throughout the precinct and drainage issues to be removed.

- Addition of new pedestrian walkway through the precinct.
- Formalisation of car parking and promoting parking within the precinct by those using the Bridle Track.
- Relocation of nursery.
- Establishing a public space (with amenities) to be used for events.
- Removal of laydown storage and revegetation of encroached areas.
- Conversion of the depot building to a NPWS campground office.
- Formalising existing pedestrian/cycling track that joins the Trial Bay precinct, to allow use for a broader range of groups.
- Establishment of a new pedestrian track that links this path to the Bridle Track, removing any need to walk along Trial Bay Gaol Road.

Figure 8 maps the location of the proposed upgrade works. Appendix A provides the site-specific concept design for this precinct, on which this assessment has been based.

2.3 Little Bay Precinct

Roads and parking areas within the Little Bay precinct are currently dilapidated with vehicles frequently parking outside of the designated areas. There is also an absence of any formal pedestrian access through the precinct, providing a safety hazard between pedestrians and vehicles. Frequent pedestrian use on an informal access to the beach has also resulted in dune degradation with the formalised access track out of sight.

Works proposed within the Little Bay precinct aim to address these issues whilst also placing a large focus on aesthetic improvements and providing new amenities to broaden the functionality of the precinct. The following provides a summary of the works proposed to be completed:

- Widening of existing access road to allow for two-way traffic.
- Additional of new pedestrian pathway which would provide separation from vehicles and direct pedestrians to formal beach accessways.
- Installation of three viewing platforms and seating, with one strategically located to deter use of the informal beach access.
- Installation of updated equitable access BBQ and shelter area.
- Realignment of existing pedestrian pathway to provide clear directionality.
- Formalisation and reconfiguration of existing parking to provide large vehicle turning area and additional parking.
- Creation of an amphitheatre for public use.
- Upgrade of shower to improve drainage.
- Replacement of safety fence around Overshot Dam.
- Correction of dam drainage issues.
- Revegetation of disturbed groundcover.

Figure 9 provides the scope of the proposed works. Appendix A provides the site-specific concept design for this precinct, on which this assessment has been based.

2.4 Smoky Cape Precinct

Visitor access to the Smoky Cape precinct is largely centred around brief visits to the lighthouse and viewing areas. Facilities currently within the precinct do not encourage gatherings with the absence of a safe turn around area for large vehicles, no safe access for pedestrians from the carpark and very limited accessibility for disabled visitors.

At present, the walking track to the lighthouse is dilapidated and consists of a thin and steep, staired walkway, with no resting points or pedestrian overtaking opportunities. This design provides no access to the lighthouse for disabled access and limits usability to the less mobile members of the community.

The works proposed to be undertaken within the Smoky Cape precinct are largely centred around improving accessibility and encouraging longer visit times. The following provides a summary of the works proposed to be completed:

- Refurbishing the existing amenities to allow for disabled access.
- Installation of new covered shelter and BBQs with disabled access.
- Replacement of seating to orient towards views.
- Trimming of vegetation to maintain views from installed seating.
- Reconfiguration of carparking to allow for a safe location for pedestrians to walk and gather.
- Reconfiguration of existing carparking to allow large vehicle access and turn around.
- Installation of a traffic calming device.
- Upgrade of the pedestrian accessway to the lighthouse to provide a stable walking surface and rest areas.

Figure 10 provides the scope of the proposed works.

2.5 Walking Trail

The proposed new walking trail aims to provide an additional walking trail that connects from Smoky Cape to Little Bay. At present, formalised trails, the Smoky Cape Track and Little Bay Walking Track, connect these precincts through vegetation skirting around the mountains. The Macleay Coast Destination Project proposes to provide an additional trail between these points, which follows the coastline.

The Master Plan for the project indicates that the new trail will span a total distance of approximately 3.6 kilometres. Large portions of this proposed new trail, utilise existing formed trails and shorelines, resulting in a much smaller distance that will require construction works.

The proposed new trail has also been designed so as to follow existing informal tracks that have formed from repeated public use. It is anticipated that the formalisation of the new trail will be in line with a Grade 5 walking trail, where the track will remain unmarked, rough and steep in some

areas. Some of these areas will require minimal to no works to formalise with other areas requiring a larger scope of works such as the possible installation of stairs.

The location of anticipated works for the new trail is mapped in Figure 11.

2.6 Key Definitions

The following key definitions have been used in this report.

Works footprint - defined as the area that will be directly impacted by the proposed action. This includes all areas where ground disturbance is proposed, all locations where infrastructure is proposed to be placed or removed, and the extent of the proposed new walking trail.

Study area - The study area is defined as the extent of land that has been assessed within this report. This generally conforms to the precinct boundaries however an additional section extending north from the Cardwell Street precinct, where track works are proposed has been included. The study area along the proposed new trail includes the trail footprint and a 20-metre buffer to this area.

Locality - defined as the land within a ten-kilometre radius of the works footprint.

Figure 7: Proposed activity scope within the Trial Bay precinct

Figure 8: Proposed activity scope within the Cardwell Street precinct

Figure 9: Proposed activity scope within the Little Bay precinct

Figure 10: Proposed activity scope within the Smoky Cape precinct

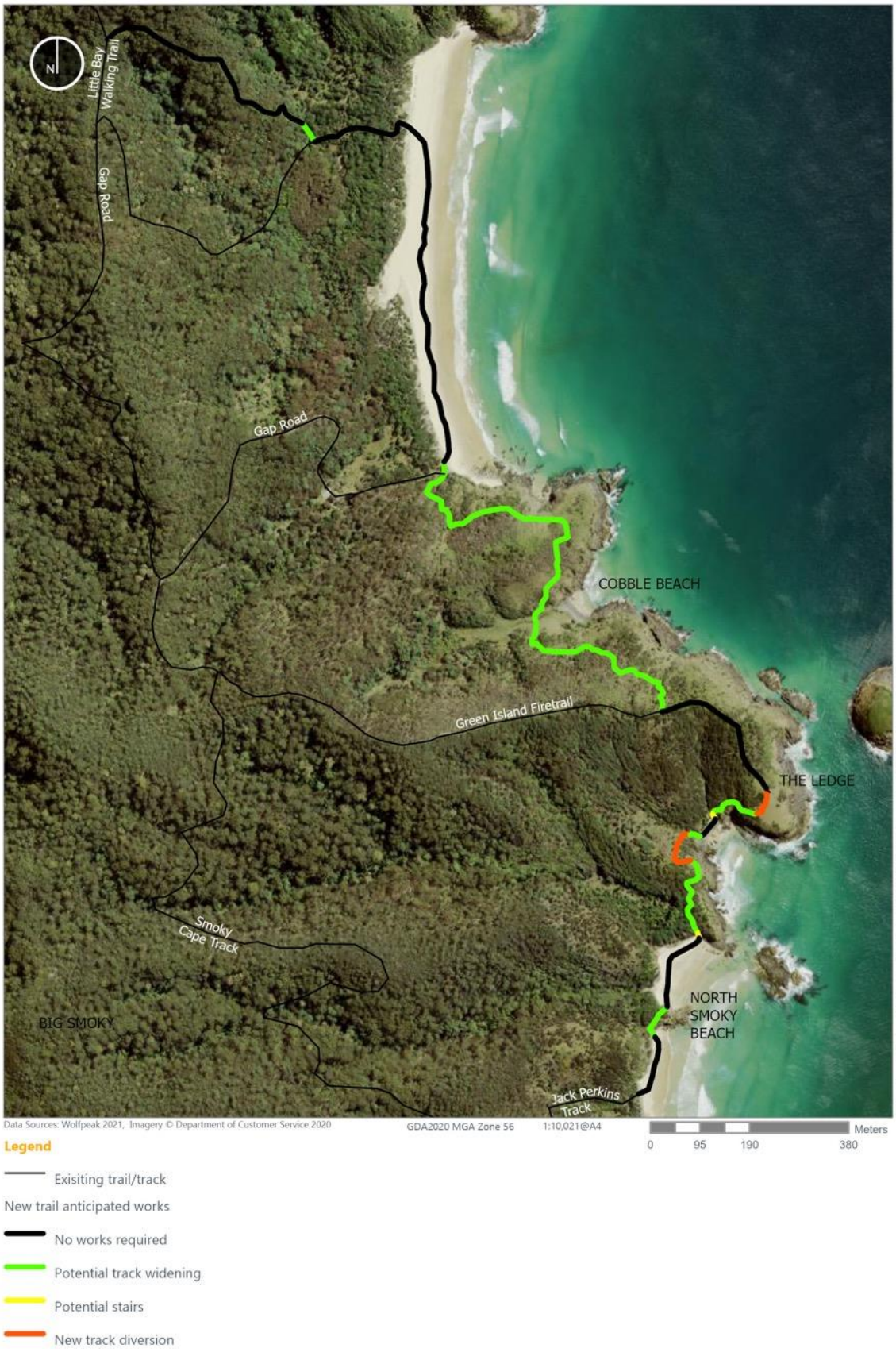

Figure 11: Proposed activity scope for the new trail

3. LEGISLATIVE CONTEXT

The following legislative considerations have been addressed in relation to the proposed development.

Table 1: Legislative considerations

Legislative Relevance	Report Section
Commonwealth	
***Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)** Matters of National Environmental Significance have been identified in the assessment area. An assessment as to the significance of impacts to these MNES is required.	Section 7.1
State	
***Environmental Planning and Assessment Act 1979* (EP&A Act)** The proposed activities are being assessed under Part 5 of the EP&A Act.	All sections
***National Parks and Wildlife Act 1974* (NPW Act)** A review of the NPWS Assets of Intergenerational Significance (AIS) Interactive Map (NPWS 2023) indicated an absence of AIS within the Macleay Coast Destination Project site.	No further assessment required
***Fisheries Management Act 1994* (FM Act)** Multiple watercourses occur within the Macleay Coast Destination Project site and the site is located along multiple bays and coastal systems. As such, an assessment under this Act has been conducted.	Section 7.2
***Biodiversity Conservation Act 2016* (BC Act)** Test of significance assessments are required to determine if entry into the Biodiversity Offset Scheme is required due to the potential for significant impacts on threatened entities.	Section 7.3
State Environmental Planning Policy (Resilience and Hazards) 2021 Littoral Rainforests, Coastal Environment Areas and Coastal Use Areas are all are mapped within the Macleay Coast Destination Project site. These are further discussed in this report.	Section 7.4
State Environmental Planning Policy (Biodiversity and Conservation) 2021 This SEPP does not apply to Part 5 developments. Assessment under this SEPP is not required.	No further assessment required

4. METHODS

4.1 Desktop Study and Literature Review

A desktop study was carried out prior to the field survey to gather relevant information and data. The following databases and Geographic Information System (GIS) layers were searched/obtained:

- Department of Climate Change, Energy, the Environment and Water - Protected Matters Search Tool (DCCEEW 2023a).
- Department of Climate Change, Energy, the Environment and Water - Species Profile and Threats Database (DCCEEW 2023b).
- Department of Planning and Environment - BioNet Atlas (DPE 2023a).
- Department of Planning and Environment - BioNet Vegetation Classification (DPE 2023b).
- Department of Planning, Industry and Environment – Resilience and Hazards SEPP digital data layer (2021).
- Office of Environment and Heritage – Threatened Biodiversity Profile Search (2023).
- Fauna Corridors for North East NSW digital data layer (Department of Planning, Industry and Environment 2011).
- NSW (Mitchell) Landscapes digital data layer (Department of Planning, Industry and Environment 2017).
- Coastal Quaternary Geology - North Coast of NSW digital data layer (Troedson & Hashimoto 2008).

Field identifications were based on the following resources:

- Scats, tracks and other traces (Triggs 1996).
- Field Guide to Eucalypts (Brooker and Kleinig 1999).
- Complete Book of Australian Mammals (Strahan 2000).
- Reptiles and Amphibians of Australia (Cogger 2014).
- Grasses of Coastal NSW (Department of Primary Industries 2016).
- The Australian Bird Guide (Menkort *et al*. 2017).
- Royal Botanical Garden – PlantNET database (Royal Botanic Garden 2023).

4.2 Habitat Suitability Assessments

Habitats within and adjacent to the study area were assessed for their suitability to support threatened species. The following survey methods were utilised.

4.2.1 Habitat Evaluations

Habitats within the precincts and along the proposed new walking trail were defined and assessed according to parameters such as:

- Structural and floristic characteristics of the vegetation.
- Degree and extent of disturbance.
- Availability of water.
- Surface rocks and outcrops.
- Vegetation connectivity.
- Abundance of fauna-specific food resources, i.e., mistletoe, nectar, gum, seed and sap source, Koala Food Trees.
- Size and abundance of tree hollows and fallen timber.

All hollow-bearing trees (HBTs) within the study area were located and recorded via a GPS enabled tablet. Any potential hollows found were inspected for signs of usage and assessed for potential habitat value.

Note that habitat assessments along the proposed new trail were restricted to an area of approximately two metres surrounding the proposed impact area.

4.3 Flora Survey

The flora survey consisted of the following:

- Searches for threatened species listed under the BC Act and EPBC Act.
- Identification, description and mapping of the vegetation communities within the study area.
- Identification, mapping and condition assessment of any TECs listed under the BC Act and/or EPBC Act.

Flora surveys were carried out by four WolfPeak Senior Ecologists and Ecologists between the 4th and 8th of September 2023.

4.3.1 Threatened Flora Searches

Threatened flora searches were conducted via random meander transects across the extent of the Macleay Coast Destination Project site. Threatened flora searches consisted of undertaking walking transects throughout the study area targeting habitat most likely to support threatened flora.

4.3.2 Vegetation Community Classification and Mapping

The vegetation communities were described from data collected during random meander surveys. The study area vegetation communities are classified as per the NSW Plant Community Type (PCT) Classification.

Identification of possible TECs was based on the data collected in the survey and review of the relevant listings by the NSW Scientific Committee Final Determinations and the DCCEEW Species Profile and Threats Database (DCCEEW 2023b).

4.4 Fauna Survey

The following describe the fauna survey methods undertaken within the study area. Methods employed were based on survey guidelines provided in the Department of Environment and Conservation guidelines for threatened biodiversity survey and assessment (2004).

Fauna surveys were carried out by four WolfPeak Senior Ecologists and Ecologists between the 17th of August and 19th of November 2023.

4.4.1 Diurnal Bird Surveys

A total of 12 passive bird survey sessions were conducted across the Macleay Coast Destination Project site diurnally, with a minimum of three dedicated bird surveys at each precinct. Bird surveys involved active binocular searches and passive recording of bird calls whilst walking around the extent of the precinct/trail. Surveys were undertaken for a minimum of 30 minutes per survey. All bird species observed or heard calling during survey were recorded.

Bird species were also recorded opportunistically during other survey activities.

4.4.2 Spotlighting Surveys

Spotlighting surveys involved walking through the Macleay Coast Destination Project site with a handheld LED spotlight searching for fauna. Spotlighting targeted the branches and trunks of canopy and understorey trees whilst periodically scanning the ground. All species observed and heard calling from within the development site were recorded.

Spotlighting surveys were conducted over two nights, covering the Trial Bay, Cardwell Street and Little Bay precincts, as well as along the existing formed trail connecting the Cardwell Street and Little Bay precincts, the Bridle Track. Spotlighting surveys were also conducted along Gap Road and the southern end of Gap Beach, providing an indication of the nocturnal fauna that may be present along or adjacent to the proposed new trail.

Each survey was conducted for a minimum of two hours by four Ecologists. The location of the spotlighting transects are displayed in Figure 12 and Figure 13.

4.4.3 PIR Camera Surveys

Passive Infrared (PIR) cameras were deployed across the Macleay Coast Destination Project site between the 4th and 8th of September 2023. A total of nine cameras were deployed across the site during this five-day period.

PIR cameras were set to target a mix of ground-dwelling and arboreal fauna, with the type of deployment for each precinct/trial determined based on habitat suitability for fauna. Seven were positioned at a height of approximately 0.5 metres, facing a ground-set, baited tube. The remaining two were set at a height of approximately four metres, facing a baited tube on a platform to target arboreal species. Tubes were baited with a mixture of oats, peanut butter, honey and vanilla essence. The location of each PIR camera is displayed in Figure 12 and Figure 13.

4.4.4 Microchiropteran Bat Call Recording and Analysis

A single Microchiropteran bat (Microbat) call detection survey was undertaken across the Macleay Coast Destination Project site. This survey was conducted utilising a Titley Scientific Anabat Swift unit, set along the edge of a potential microbat corridor that runs between the Trial Bay and Cardwell Street precincts. This unit was set for a total of 15 consecutive nights between the 4th and 19th of October 2023. Despite this large survey effort, only four nights of data was retrieved due to SD card storage fault caused by the high winds experienced during this period. All microbat call detection data was forwarded to a call identification expert, Anna McConville at Echo Ecology, for analysis of species (Appendix D).

The set location of this Anabat unit is displayed in Figure 12.

4.4.5 Secondary Evidence Searches

This survey method involved the inspection of the habitats within the study area for secondary evidence of use by threatened fauna. Searches involved:

- The inspection under fallen timber, rocks and debris.
- The inspection of dense vegetation, aquatic habitats and leaf litter for frogs and reptiles.
- The inspection of trees for Koalas and claw markings.
- Searches for Glider sap incisions.
- Searches for nests and dreys.
- Searches for scats, owl regurgitation pellets, tracks and feeding signs.

4.4.6 Opportunistic Observations

This involved passive and active observation of any fauna on or directly adjacent to the Macleay Coast Destination Project site during the survey period. Searches for fauna focused on the crowns of trees for species such as the Koala, under decorticating bark or dense leaf litter for reptiles and amphibians and opportunistically for fauna such as Macropods.

All species observed or heard calling during the entire survey period were recorded.

4.5 Survey limitations

Given the limited timeframe of the survey period, fauna detected only represents a snapshot of the full species assemblages that may be present in the study area throughout the year. Some species only occur seasonally or during particular climatic conditions and the detection on such species is recognised as a limitation.

The survey was undertaken in spring which is a period of increasing fauna activity. The survey timing is not considered to be a limitation on the detection of threatened flora species.

To counter any limitations, qualitative and quantitative habitat evaluation was used as well as a standard ecological field survey to assess the study areas significance to threatened species.

Figure 12: Fauna survey locations (northern precincts)

Figure 13: Fauna survey locations (Smoky Cape precinct and new trail)

5. NATURAL VALUES ASSESSMENT

5.1 Desktop Analysis

5.1.1 Locally Recorded Threatened Species

A desktop review of threatened species previously recorded within the locality was conducted through the use of the BioNet Atlas (DPE 2023a). This assessment identified multiple historic records of threatened species within the study area and within the broader locality.

The following fauna species have historically been recorded within the study area:

- Australian Fur-seal (*Arctocephalus pusillus doriferus*) [Trial Bay] - most recent record in 2001
- Brush-tailed Phascogale (*Phascogale tapoatafa*) [Trial Bay] - most recent record in 2021
- Eastern Osprey (*Pandion cristatus*) [Trial Bay, Cardwell Street, Little Bay, Smoky Cape, Walking trail] - most recent record in 2020
- Grey-headed Flying-fox (*Pteropus poliocephalus*) [Cardwell Street, Walking trail] - most recent record in 2003
- Koala (*Phascolarctos cinereus*) [Trial Bay, Cardwell Street, Little Bay, Smoky Cape, Walking trail] - most recent record in 2023
- Little Eagle (*Hieraaetus morphnoides*) [Smoky Cape] - most recent record in 2000
- Pied Oystercatcher (*Haematopus longirostris*) [Trial Bay, Smoky Cape] - most recent record in 2022
- Sooty Oystercatcher (*Haematopus fuliginosus*) [Trial Bay, Smoky Cape, Walking trail] - most recent record in 2021
- Squirrel Glider (*Petaurus norfolcensis*) [Trial Bay, Cardwell Street] - most recent record in 2018
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*) [Trial Bay, Little Bay, Smoky Cape, Walking trail] - most recent record in 2019
- White-throated Needletail (*Hirundapus caudacutus*) [Trial Bay, Little Bay] - most recent record in 2019
- Wompoo Fruit-Dove (*Ptilinopus magnificus*) [Walking trail] - most recent record in 1999

Only a single historic threatened flora record occurs within the study area, with this occurring near the western boundary of the Smoky Cape precinct. This record is of a single plant of the White-flowered Wax Plant (*Cynanchum elegans*) recorded in 2007.

The following figures map the location of all previously recorded flora and fauna within the Macleay Coast Destination Project site.

All species with at least one historic record within the locality have been assessed for their potential to occur within the study area in Appendix C.

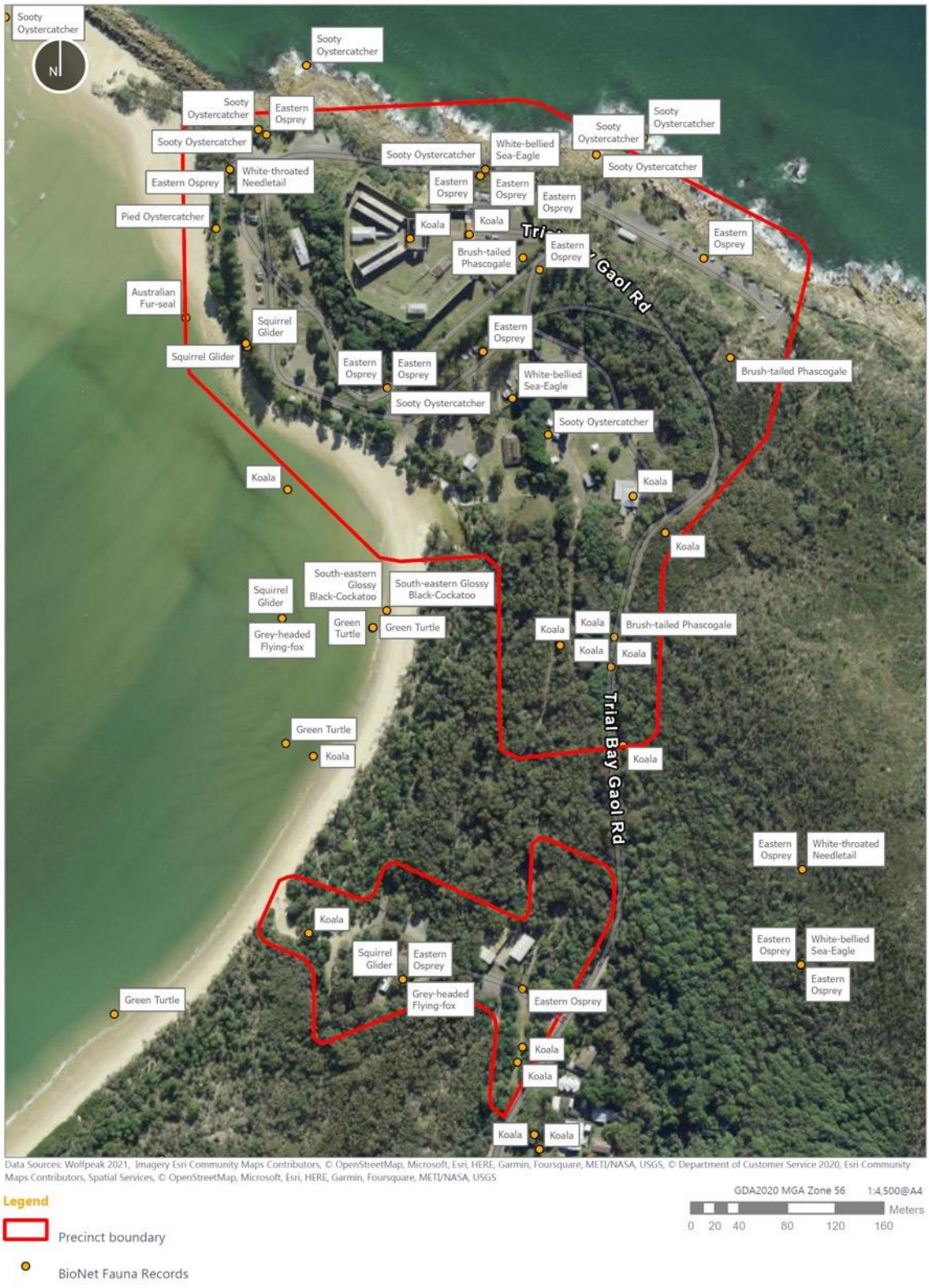

Figure 14: Threatened fauna previously recorded within the Trial Bay and Cardwell Street precincts

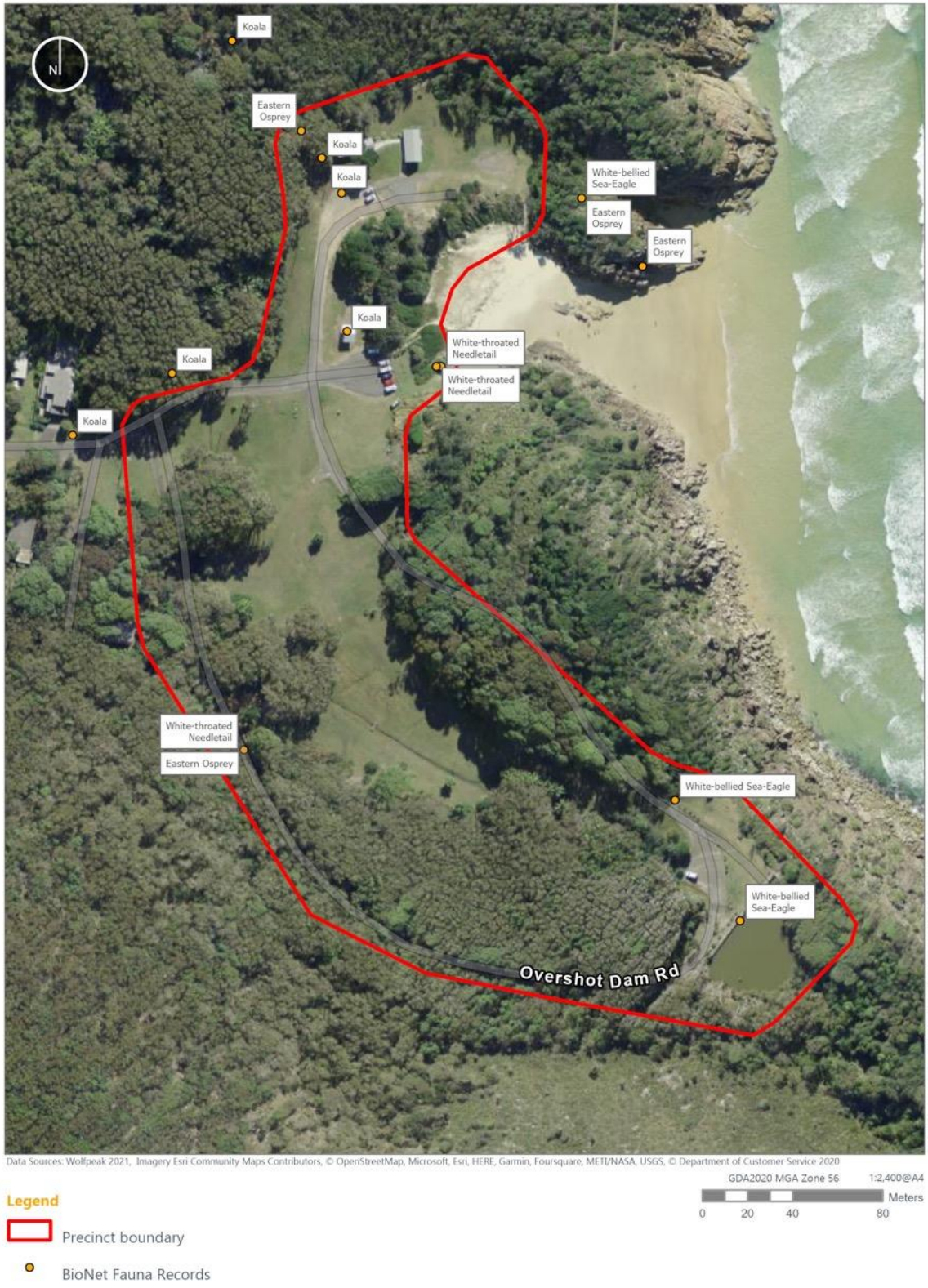

Figure 15: Threatened fauna previously recorded within the Little Bay precinct

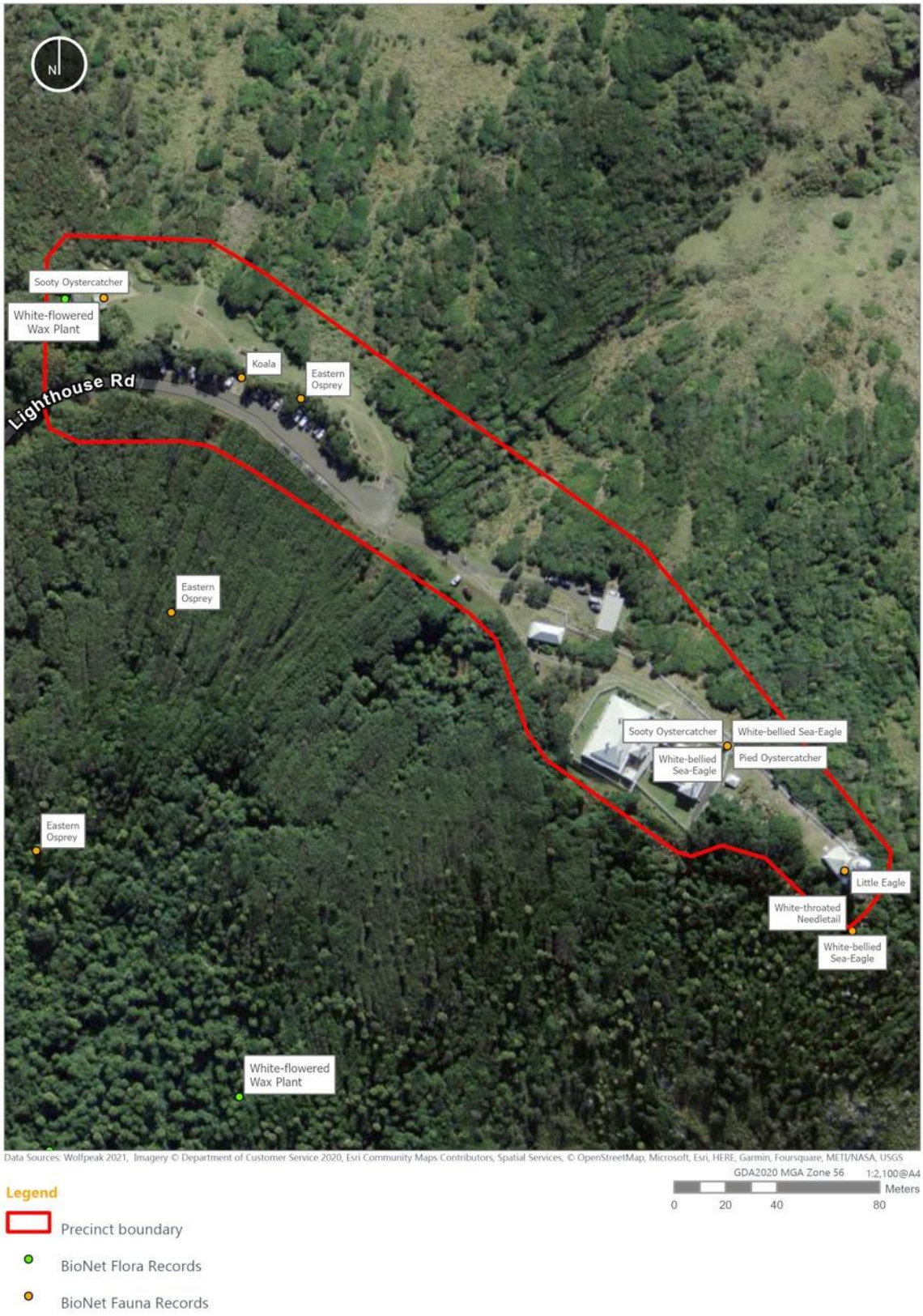

Figure 16: Threatened flora and fauna previously recorded within the Smoky Cape precinct

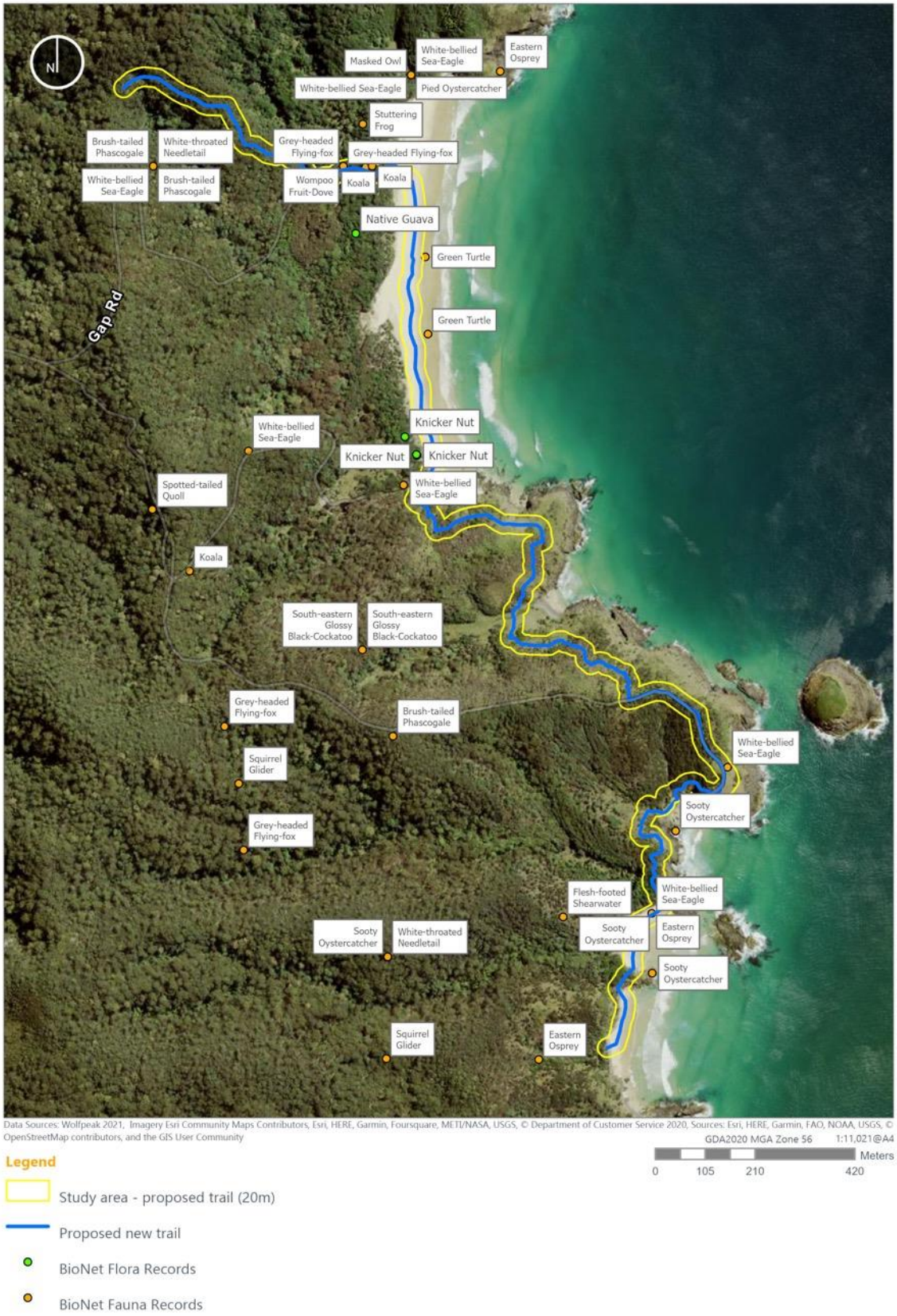

Figure 17: Threatened flora and fauna previously recorded within the proposed new trail study area

5.1.2 Matters of National Environmental Significance

An assessment of potential MNES within the locality was conducted via the Protected Matters Search Tool (DCCEEW 2023a). The results of this search are provided in Appendix B and discussed in Section 7.1 of this report.

5.1.3 NSW State Vegetation Type Mapping

In June 2022, the Department of Planning and Environment released the State Vegetation Type Map (SVTM) which maps NSW Plant Community Types (PCT) on a regional scale (DPE 2023d).

Review of this mapping revealed a total of 13 native PCTs mapped within the study area. These comprise:

- PCT 3122 - Far North Littoral Rainforest
- PCT 3127 - Mid North Headland Brush Box Littoral Rainforest
- PCT 3165 - Northern Brush Box Subtropical Wet Forest
- PCT 3174 - Northern Turpentine-Brush Box Wet Forest
- PCT 3252 - Northern Hinterland Grey Gum-Mahogany Grassy Forest
- PCT 3408 - Northern Headland Grassland
- PCT 3410 - Spinifex Strandline Grassland
- PCT 3788 - Coastal Foredune Wattle Scrub
- PCT 3796 - Northern Lowland Graminoid Clay Heath
- PCT 3801 - Far North Sandplain Wallum Heath
- PCT 4004 - Northern Melaleuca quinquenervia Swamp Forest
- PCT 4005 - Northern Paperbark Banksia Littoral Forest
- PCT 4020 - Coastal Creekflat Layered Grass-Sedge Swamp Forest

The remainder of the study area is mapped as non-native vegetation.

5.2 Landscape Values

5.2.1 Soils, Geology and Topography

The study area is located in a coastal area, surrounded by numerous bays and beaches of the Pacific Ocean.

The Trial Bay and Cardwell Steet precincts consist of low-lying land parcels fringing Trial Bay. The Cardwell Street precinct gently slopes to the west, with a maximum elevation of only six metres. These lower elevations are also typical of the Trial Bay precinct, however higher elevation areas (up to 24 metres above sea-level) occur at the site of the gaol and along the eastern precinct boundary, which forms the base of Monument Hill. The Trial Bay precinct fringes the Pacific Ocean in the north, where a rocky coastline tapers out to a man-made break wall.

The Little Bay precinct is similarly low-lying, with beach access to Little Bay. Elevations within this precinct rise towards the northern and southern boundaries with these areas forming the base of Monument Hill and an unnamed mountain. Elevations within this precinct rise to a maximum of 30 metres above sea-level.

The Smoky Cape precinct is situated on the coastal headland, Smoky Cape. The lighthouse is positioned at the highest elevation of 120 metres above sea-level, with elevations sloping in all directions, down to 90 metres in the far west of the precinct.

The proposed new walking trail follows the coastline across numerous headlands and beaches. This trail undulates from North Smoky Beach in the south, up to approximately 60 metres at the Green Island Headland. The trail then descends down to Cobble Beach before going over another headland to reach Gap Beach. From the point off Gap Beach where the trail heads west towards the proposed junction with the Little Bay Walking Trail, the elevation steadily rises to a height of 122 metres above sea-level as it rises up the edge of Little Smoky mountain.

With the study area located along the coast, the entire study area is underlain by the Quaternary deposition *Coastal Barrier* and characterised with a dominance of marine sand (Troedson and Hashimoto 2008).

The NSW Landscape (formerly Mitchell Landscape) mapping indicates that the study area is largely located on the *Ingalba Coastal Hills* landscape with the low-lying areas of the Trial Bay, Cardwell Street and Little Bay precincts also located on the *Manning – Macleay Barriers and Beaches* and *Manning- Macleay Coastal Alluvial Plains* landscapes.

5.2.2 Watercourses

As previously described the study area is located along the coastline where it runs adjacent to or along numerous beaches and bays. In addition to these, multiple coastal drainages and seeps run through the study area, flowing from areas of higher elevation.

Two dams were also noted within/and nearby to the study area. These comprised the constructed Overshot Dam at Little Bay and a small, natural dam just south of the pedestrian access to south Gap Beach, nearby the proposed walking trail.

The location of these watercourses in relation to the study area are mapped in Figure 18.

Figure 18: Watercourses in relation to the Macleay Coast Destination Project site

5.3 Ecological Values

5.3.1 Habitat Values

The following table summarises the survey findings resulting from habitat assessments conducted within the study area and details the opportunities and/or constraints it provides for potentially occurring threatened species.

Table 2: Site habitat values

Habitat component	Values within the study area	Fauna habitat potential
Aquatic habitat	The works footprint is located along the coastline and across multiple drainages and seeps. Two dams also occur within the study area, with the formalised Overshot Dam in the Little Bay precinct, and a small unnamed dam alongside an existing pedestrian footpath to south Gap Beach.	The study area may provide habitat for fauna that forages in or around the shoreline (i.e. marine birds, waders and shorebirds). Marine mammals and fishes are unlikely to occur within the study area with the precincts largely restricted to terrestrial habitats and the shallow edges of shorelines. Dams within the study area may provide suitable habitat for non-threatened amphibians and waterbirds (i.e. ducks and freshwater waders). Drainages and seeps are unlikely to support freshwater fish and crustaceans.
Groundcover	The groundcover within the study area varies significantly. The highly trafficked areas largely consist of low-managed lawn or bare ground, with vegetation communities surrounding these more often characterised by a moderately dense ground cover of shrubs and/or vines. Headland areas along the proposed new trail are characteristic of coastal headlands with a naturally low groundcover of grasses and herbs.	Potential habitats for fauna dependant on dense groundcover varies greatly however the Trial Bay, Cardwell Street and Little Bay precincts, as well as the study area for the proposed new trail, all offer areas of suitable habitat for small, ground-dwelling fauna species. Fewer areas of suitable habitat for these species occur within the Smoky Cape precinct, with this precinct largely containing an open and exposed shrub layer, surrounded by denser, more suitable vegetation outside of the precinct boundaries.
Logs and debris	Similarly to groundcover, the presence of fallen logs and debris is largely limited to the less-trafficked areas of the study area. Some of these denser vegetated areas contained woody debris and small fallen logs. Logs and debris were absent in picnic and camping areas as these areas are regularly maintained. Although present in forested areas immediately surrounding the proposed new trail, the proposed trail itself was largely void of fallen logs, with these	The study area contains limited potential shelter resources for ground-dwelling threatened mammals, reptiles and birds. Suitable habitats for these species are largely restricted to the forested areas at the edge of the precinct boundaries.

Habitat component	Values within the study area	Fauna habitat potential
	potentially moved off the trail by members of the public already utilising the informal track.	
Hollows	Very few tree hollows were recorded across the study area (Figure 19). Those recorded were all located within the Trial Bay, Cardwell Street and Little Bay precincts, with each of these containing small to medium sized tree hollows. No large hollows or high value hollow-bearing trees were recorded within the study area. Tree hollows are likely more abundant in the forested areas outside of the study area.	Very limited potential roosting habitat for hollow-obligate fauna within the study area. Hollow-obligate fauna are still, however, considered likely to forage within the study area with a higher abundance of hollows in connected forested vegetation adjoining each precinct.
Koala food trees	Koala food trees (KFT) were not in abundance across the study area with only a few small areas containing KFTs noted. A small patch of Forest Red Gum was recorded along the southern boundary of the Cardwell Street precinct. The only other areas containing preferred KFTs was a patch of Swamp Mahogany, that were recorded just east of the proposed new trail (north of Gap Beach area).	Some areas within the study area contain a potential foraging resource for the Koala. Other areas are unlikely to provide a sufficient foraging resource for this species.
Allocasuarinas	*Allocasuarina* are a dominant understorey species within the Smoky Cape and Little Bay precincts. These trees were also noted in abundance within vegetation along the trail north of the Cardwell Street precinct and within some vegetation communities alongside the proposed new trail.	The study area provides an abundance of potential foraging habitat for the South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*).
Flowering trees	Flowering trees are common across the study area where they are likely to provide a year-round nectar resource.	Flowering trees within the study area may provide a potential foraging resource for threatened nectivorous species.
Sap sources	Sap resources are sparse across the study area with only scattered Acacias and the occasional Brush Box and Bloodwood recorded.	There are limited to no sap resources available for gliders.
Fruiting Species	An abundance of fruiting species was recorded within the study area with species such Beach Alectryon, Hard Quandong, Geebung, Acronychia and a variety of figs present.	There is an abundance of potential fruiting resources to attract threatened frugivores such as Wompoo Fruit-dove (*Ptilinopus magnificus*), Rose-crowned Fruit-dove (*Ptilinopus regina*), Barred Cuckoo Shrike (*Coracina lineata*) and the Grey-headed Flying-fox (*Pteropus poliocephalus*).

Habitat component	Values within the study area	Fauna habitat potential
Caves, bridges, culverts, cliffs	No caves are known to occur within the study area. A small footbridge over a drainage channel is located within the Trial Bay precinct. Numerous small culverts and drains occur in the study area, however most of these would be too small to provide potential roosts for microbats	The study area contains a low microbat roosting potential.
Corridors	The northern portion of the proposed new trail falls within a mapped regional corridor named Hat Head National Park (DPE 2011). This mapped corridor details habitat linkages to southwards, where it connects to other regional corridors south and west. No other regional or sub-regional corridors are mapped as occurring within the study area (Figure 20).	Vegetation within the study areas provides strong habitat linkages for a variety of fauna species including birds, macropods and arboreal species.
Habitat Linkages	The vegetation within the study area has strong habitat linkages to dense, forested vegetation off-site. Habitats in the Smoky Cape precinct and along the new trail have strong habitat connectivity to the dense vegetation surrounding Big Smoky and Little Smoky and connect further down the coast to Hat Head. Further north, habitat connectivity thins out as is gets closer to the South West Rocks township.	

Figure 19: Location of recorded hollow-bearing trees within the study area

Figure 20: Location of recorded mapped regional and sub-regional corridors

5.3.2 Flora Survey Results

5.3.2.1 Threatened Flora

Two threatened flora species were recorded during the field surveys. These comprise:

- Native Guava (*Rhodomyrtus psidioides*)
- Scrub Turpentine (*Rhodamnia rubescens*)

Numerous plants of the Native Guava, which is listed as Critically Endangered under both the BC Act and EPBC Act, were recorded during the survey period. All plants were recorded along, or in very close proximity to the proposed new trail. The locations of each of these plants are described following:

- A patch of approximately 36 plants was recorded on the northern side of the existing Jack Perkins Track. These plants are all located along the embankment or behind the rail to the stairs, extending from the edge of the track to approximately five metres up the embankment (Photo 1). Some plants occur right on the edge of the embankment, next to the formed pedestrian pathway.
- Another patch of Native Guava was recorded along the edge of the existing goat track which is proposed to be formalised, up from the north of North Smoky Beach. Approximately 15 individuals of this species were recorded immediately adjoining the track (Photo 2). Some of these are currently at risk of being trampled by pedestrians utilising the informal track.
- A single plant was recorded at the intersection between the proposed new trail and the existing pedestrian trail to north Gap Beach. This plant is located immediately east of the existing goat track, where it is currently at risk of trampling by pedestrians utilising the formal track (Photo 3).
- A very large patch of this species (>100 individuals) was recorded south of the proposed new trail and existing pedestrian trail to north Gap Beach. These records are largely centred around the Rainforest Walking Track, which is an unmapped, non-maintained track that runs parallel to Gap Beach.
- A single plant was recorded along the edge of the existing pedestrian track to north Gap Beach (Photo 4).

Most plants of this species that were observed displayed evidence of infection of the Myrtle Rust pathogen (*Puccinia psidii*), to varying degrees. Plants recorded were largely juvenile (<30cm height) with none recorded fruiting or flowering.

Photo 1: Location of large patch of Native Guava

Photo 2: Native Guava along the existing goat track

Photo 3: Native Guava at the intersection of the existing and proposed new track

Photo 4: Example Native Guava recorded along the proposed new trail

A total of four plants of the Scrub Turpentine were recorded during the survey. These plants were recorded along the edge of the existing track, which is marked as the northern extent of the proposed new track. These plants were recorded in two locations with a single plant located approximately one metre east of the track in one section (Photo 5) and approximately three additional plants recorded only 30cm-1m off the edge of the track further north-west.

Plants were recorded displaying evidence of infection of the Myrtle Rust pathogen with the larger patch of this species also currently at risk of trampling. The Scrub Turpentine is listed as Critically Endangered under both the BC Act and EPBC Act.

Photo 5: Scrub Turpentine along the edge of the proposed new trail

It must be noted that in addition to the above species, one species which has similar characteristics to the threatened species, Scented Acronychia (*Acronychia littoralis*), was recorded within the Trial Bay and Cardwell Street precincts during the survey. These plants are an Acronychia species, believed to be *Acronychia imperforata* (Logan Apple), however, due to finite nuances between this species and the threatened species, Scented Acronychia (*Acronychia littoralis*), confirmation of this species identification was sought from the National Herbarium of New South Wales. On the 10th of January 2024, the herbarium confirmed that the plant specimens are likely to be the common species, *Acronychia imperforata*.

The following table provides the location details of the recorded threatened flora species with Figure 21 displaying each location.

Table 3: GPS coordinates of threatened fauna recorded during the survey period

Threatened fauna species	Number of plants	Zone	Easting	Northing
Native Guava	~36	56J	508119	6579508
	~14	56J	508264	6579859
	1	56J	508269	6579868
	~4	56J	507590	6581217
	~20	56J	507599	6581294
	>100	56J	507579	6581318
	~2	56J	507492	6581310
	1	56J	507540	6581362
Scrub Turpentine	1	56J	507474	6581414
	>3	56J	507386	6581465

Figure 21: Location of threatened flora recorded along the proposed new trail

5.3.2.2 Vegetation Communities

Field surveys identified that the study area is largely vegetated with native vegetation. The condition of vegetation varies with the disturbance history. Some areas contain intact remnant vegetation while other areas are in a modified state with patchy vegetation or formerly cleared land with exotic species.

Mapping of the field verified vegetation communities is provided in Figure 22 to Figure 26. A total of nine Plant Community Types (PCTs) were mapped within the study area. A description of the native vegetation communities is provided in the following tables. Due to the scale and complexity of vegetation associations in the study area, a description is provided for each broad community type comprising Littoral Rainforest, Swamp Forest, Headland/dune scrub, Maritime Grassland and Dry Sclerophyll Forest.

Table 4: Vegetation community description – Littoral Rainforest

Vegetation Community	Littoral Rainforest
NSW Plant Community Type (PCT)	PCT 3122: Far North Littoral Rainforest PCT 3127: Mid North Headland Brush Box Littoral Rainforest
TEC Status	BC Act - *Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* EPBC Act - *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia*
Location and Area	A total of 5 hectares of Littoral Rainforest was mapped within the study area. Major occurrences are at the Smoky Cape precinct and along the new trail, with smaller regrowth areas at the Trial Bay precinct.
Description	**Canopy:** *Structure and Species*: Comprises a dense canopy layer with a mix of canopy species including Tuckeroo (*Cupaniopsis anacardioides*), Hard Quandong (*Elaeocarpus obovatus*), Lilly Pilly (*Acmena smithii*), Logan Apple (*Arconychia imperforata*) and Red Olive Berry (*Elaeodendron australe*). At Trial Bay, the canopy is dominated by regrowth trees including Wavy Pittosporum (*Pittosporum undulatum*), Hard Quandong, Guioa (*Guioa semiglauca*) and Bolly Gum (*Litsea reticulata*). Wind shear is evident in some stands, especially at Smoky Cape where the canopy is much lower in height than sheltered areas. *Height range:* 8-15 metres. **Midstory and Shrub Layer:** *Structure and Species:* Vines are common in this layer and form dense thickets in some areas, while other locations are dominated by rainforest shrubs and canopy juveniles. Species recorded include Mock Olive (*Notelaea longifolia*), Cabbage Gum (*Livistona australis*), Veiny Wilkiea (*Wilkiea huegliana*) and Beach Alectryon (*Alectryon coriaceus*). The threatened plant Native Guava (*Rhodomyrtus psidioides*) was recorded in the shrub layer in this community.

	Height range: 1-5 metres. **Ground layer:** *Structure and Species*: The ground layer is generally sparse and has a high percentage of leaf litter. Dominant groundcover species include Creeping Beard Grass (*Oplismenus imbecillis*), Red-fruit Saw Sedge (*Gahnia sieberiana*), Maidenhair Fern (*Adiantum hispidilum*) and Native Wandering Jew (*Commelina cyanea).* *Height range:* 0-0.5 metres. **Vines and Scramblers:** *Structure and Species*: A dense vine layer occurs in the canopy and understory layers of this community. Species include Kangaroo Vine (*Cissus antarctica),* Native Grape (*Cayratia clematidea*), Lawyer Vine (*Smilax australis*), Giant Water Vine (*Cissus hypoglauca*), Milk Vine (*Marsdenia rostrata*) and Whip Vine (*Flaellaria indica*).
Condition	The stands at Trial Bay have been cleared in the past and represent regrowth. This is especially evident around the gaol. Other stands of the community are likely to be remnant and have good structure and diversity. Weed cover throughout was generally very low.

Photo 6: Regenerating Littoral Rainforest at Trial Bay

Photo 7: Littoral Rainforest at Smoky Cape

Table 5: Vegetation community description – Swamp Forest

Vegetation Community	Swamp Forest
NSW Plant Community Type (PCT)	PCT 4007: Northern Sands Paperbark Sedge Low Forest
TEC Status	Floristically qualifies as the *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (BC Act) and *Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland* (EPBC Act), however, fails to meet the geomorphological criteria as the extent of this PCT within the study area is not located on a floodplain. As such, this community is not considered to conform to a TEC.
Location and Area	A total of 4.7 hectares of this community is mapped in the study area. This community largely occurs in the Cardwell Street and Little Bay precincts.
Description	**Canopy:** *Structure and Species*: The canopy is moderately dense with Swamp Oak (*Casuarina glauca*) and Broadleaf Paperbark (*Melaleuca quinquinervia*). Bangalow Palm (*Archontophoenix cunninghamiana*) is a common canopy

	associate at Little Bay and Forest Red Gum (*Eucalyptus tereticornis*) was observed in localised areas at Cardwell Street. *Height range:* 8-15 metres. **Midstory:** *Structure and Species:* Consists of a layer of regenerating canopy trees and a mix of other species including Bangalow Palm, Cabbage Palm (*Livistona australis),* Celerywood (*Polyscias elegans*) and Logan Apple. *Height range:* 8-15 metres. **Shrub Layer:** *Structure and Species:* Some areas of the community feature an open shrub layer. Commonly recorded species were Blue Lilly Pilly (*Syzygium oleosum*), Sandpaper Fig (*Ficus coronata*) and Cheese Tree (*Glochidion ferdinandi*). *Height range:* 3-8 metres. **Ground layer:** *Structure and Species*: The ground layer is dense and dominated by various sedge species and ferns. These include Twig Rush (*Machaerina juncea)*, *Juncus usitatus,* Saw Sedge *(Gahnia clarkei*) and Harsh Ground Fern (*Hypolepis muelleri*). *Height range:* 0-0.8 metres. **Vines and Scramblers:** *Structure and Species*: Vines are generally uncommon in this community. Some areas feature Monkey Rope (*Parsonsia straminea*) in the understorey. At Cardwell Street, the vine *Cynanchum carnosum* was frequently observed in the ground layer.
Condition	All stands were in good condition with only very minor weed invasion and edge effects noted. Most areas appear to be remnant.

Photo 8: Swamp Oak dominated Swamp forest near Cardwell Street

Table 6: Vegetation community description - Dune/headland scrub

Vegetation Community	Dune/headland scrub
NSW Plant Community Type (PCT)	PCT 3791: Far North Headland-Dune Scrub PCT 3788: Coastal Foredune Wattle Scrub PCT 3795: Mid North Swamp Oak Headland Scrub
TEC Status	Not a TEC
Location and Area	A total of 12.6 hectares of this community is mapped in the study area. It occurs in all precincts and extensively along the coastal headlands and foreshores.
Description	**Canopy:** *Structure and Species*: The canopy species in this community vary with location. At Trial Bay the dominant species are Pandanus (*Pandanus tectorius*), Brushbox (*Lophostemon confertus*) and Coastal She-oak (*Casuarina equisetifolia*) with occasional Swamp Oak. At Cardwell Street, the shrubland community is dominated by Coastal Tea Tree (*Leptospermum laevigatum*), Tuckeroo and Coastal Banksia (*Banksia integrofolia*). At Little Bay, Coastal Banksia, Tuckeroo and Logan Apple are the dominant species. The communities along the new trail and at Smoky Cape have a variable canopy composition and include Coastal Banksia, Brushbox, Swamp Oak and Coastal She-oak.

	Height range: 8-15 metres. **Midstory:** *Structure and Species:* Commonly recorded species in this layer include Forest Oak (*Allocasuaria torulosa*), Dogwood (*Jacksonia scoparia*), Geebung (*Persoonia sericea*) along with regenerating canopy trees. *Height range:* 4-8 metres. **Shrub Layer:** *Structure and Species:* A shrub layer is often present. Species include Coastal Wattle *(Acacia longifolia* subsp*. sophorae*), Coffee Bush (*Breynia oblongifolia*), Beach Alectryon, Boobialla (*Myoporum acuminatum*) and Monotoca (*Monotoca scoparia*). The invasive species Lantana (*Lantana camara*) and Bitou Bush (*Chrysanthemoides monilifera* subsp *rotundata*) occur largely along the new track sections and some dense patches were recorded. *Height range:* 0.5-2 metres. **Ground layer:** *Structure and Species*: The ground layer is variable throughout these communities. Some areas such as dune shrubland have an open groundcover with patchy grasses and forbs such as Basket Grass, Pomax (*Pomax umbellata*) and Spiny Matrush. Other areas on exposed headlands with an open canopy have a dense ground layer dominated by Spiny Matrush, Blady Grass (*Imperata cylindrica*), Kangaroo Grass (*Themeda triandra*), Red-fruit Saw-Sedge (*Gahnia sieberiana*) and Barbed Wire Grass (*Cymbopogon refractus*). *Height range:* 0-0.8 metres. **Vines and Scramblers:** *Structure and Species*: Vines are generally uncommon. In coastal headland communities Snake Vine (*Stephania japonica*), Milk Vine, Lawyer Vine and Wonga Wonga Vine were recorded in varying densities.
Condition	Generally, in good condition with few disturbances noted aside from weed invasion in some areas with Lantana, Bitou Bush and exotic grasses.

Photo 9: Headland scrub

Photo 10: Coastal Dune Scrub

Table 7: Vegetation community description – Maritime Grassland

Vegetation Community	Maritime Grassland
NSW Plant Community Type (PCT)	PCT 3408: Northern Headland Grassland PCT 3410: Spinifex Strandline Grassland
TEC Status	PCT 3408 is listed as a TEC as follows: BC Act: *Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner bioregions*
Location and Area	A total of 1.3 hectares of Northern Headland grassland is mapped on coastal headlands along the new trail. A small area of Spinifex Grassland covering 0.2 hectares occurs in the study area at Little Bay and Gap Beach (along the new trail).
Description	**Canopy:** *Structure and Species*: Absent aside from occasional Coastal Banksia in the headland grassland community. **Midstory:** *Absent* **Shrub Layer:** *Structure and Species:* Prostrate shrubs occur in the coastal headland community and include Rice Flower (*Pimelea linifolia*), Hairy Bush Pea (*Pultenaea villosa)* and *Hibbertia aspera*. *Height range:* 0.05-0.2 metres. **Ground layer:** *Structure and Species*: The headland grassland has a dense layer of Kangaroo Grass (*Themeda triandra*). Other species recorded in lower abundance include Kidney Weed (*Dichondra repens*), Poranthera (*Poranthera microphylla*), Spiny Matrush and Couch (*Cynodon dactylon*). The Spinifex Grassland community is comprised on an open to dense layer of Coast Spinifex *(Spinifex sericeus)* with a few other species present including Pigface (*Carpobrotus glaucescens),* Beach Morning Glory (*Ipomoea brasiliensis)* and Beach Mustard (*Cakile maritima*). *Height range:* 0-0.2 metres. **Vines and Scramblers:** *Absent*
Condition	Good condition with no significant weed invasion. Some minor trampling and erosion noted on coastal headlands due to walkers.

Photo 11: Themeda headland grassland

Table 8: Vegetation community description – Dry Sclerophyll Forest

Vegetation Community	Dry Sclerophyll Forest
NSW Plant Community Type (PCT)	PCT 3174: Northern Turpentine-Brush Box Wet Forest PCT 3248: Northern Blackbutt-Turpentine Shrub Forest
TEC Status	Not a TEC
Location and Area	A total of 2.1 hectares of this community is mapped in the study area. It occurs along a section of new trail behind Gap Beach.
Description	**Canopy:** *Structure and Species*: Dominant canopy species in this community are Blackbutt (*Eucalyptus pilularis*), Brushbox (*Lophostemon confertus*) and Grey Ironbark (*Eucalyptus siderophloia*). *Height range:* 20-25 metres. **Midstory:** *Structure and Species:* Commonly recorded species in this layer include Forest canopy juveniles, Turpentine (*Syncarpia glomulifera*), Bangalow Palm, Cabbage Palm and Coastal Banksia.

	Height range: 8-12 metres. **Shrub Layer:** *Structure and Species:* A low shrub layer of primarily rainforest species is present. Species include Scentless Rosewood (*Synoum glandulosum*), Tree Heath (*Trochocarpa laurina*) and Mock Olive (*Notelaea longifolia*). The threatened plant Scrub Turpentine (*Rhodamnia rubescens*) was recorded on this layer at two locations. *Height range:* 1-4 metres. **Ground layer:** *Structure and Species*: The ground layer is dominated by Spiny Matrush, Blady Grass, Tussock Grass *(Poa labillardierei*). *Height range:* 0-0.5 metres. **Vines and Scramblers:** *Structure and Species*: Vines are common throughout and include Common Milk Vine, Lawyer Vine, Snake Vine and Appleberry (*Billardiera scandens*).
Condition	Good condition and represents intact remnant vegetation. High species diversity.

Photo 12: Dry sclerophyll forest behind Gap Beach

Figure 22: Vegetation communities within the Trial Bay precinct

Figure 23: Vegetation communities within the Cardwell Street precinct/study area

Figure 24: Vegetation communities within the Little Bay precinct

Figure 25: Vegetation communities within the Smoky Cape precinct

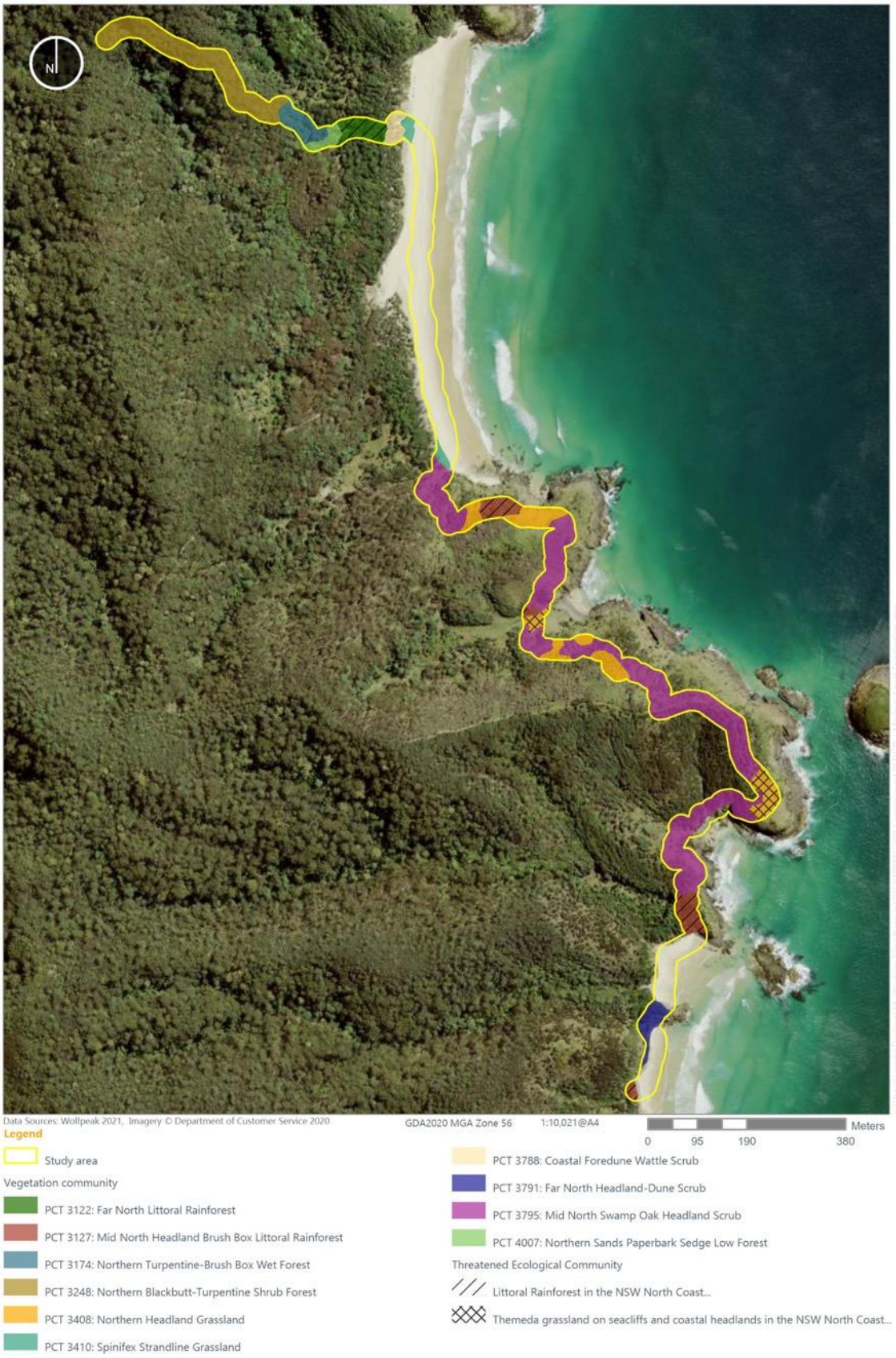

Figure 26: Vegetation communities along the proposed new trail

5.3.2.3 Threatened Ecological Communities and Populations

Three of the native vegetation communities identified within the study area are considered to conform to a Threatened Ecological Community (TEC).

PCTs 3122 and 3127, which are present within all precincts and the walking trail, are consistent with Littoral Rainforest TECs, listed under both the BC Act and EPBC Act. Review of the determination criteria for these TECs indicated that these vegetation communities within the study area are a good floristic, structural and geomorphological match to the TECs. The full 5.03-hectare extent of these PCTs within the study area is considered to conform to the *Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* TEC, which is listed as *Endangered* under the BC Act; and the *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia*, which is listed as *Critically Endangered* under the EPBC Act.

PCT 3408, is also associated with a BC Act listed TEC, *Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner bioregions*. Classification of this vegetation community as a TEC is not consistent across the extent of the PCT, with only 0.47 hectares of the 1.36 hectares of this community within the study area considered to conform to the TEC. This difference in classification is due to the dominance of the genus Themeda, which is a key indicator species for this TEC. Some areas of this headland grassland community were dominated by Lomandra species and other grasses, which does not floristically align with classification of this TEC.

Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner bioregions is listed as *Endangered* under the BC Act.

5.3.3 Fauna Survey Results

5.3.3.1 Observed Fauna

Field surveys identified the presence of 96 fauna species utilising the study area at the time of survey. The most prevalent were avian species, with a total of 62 bird species recorded across the study area. Bird species were detected via a range of survey methods with some observed within habitats inside the study area and others seen flying overhead or calling from adjacent habitats. Bird species detected consisted of common terrestrial species (i.e., White-throated Gerygone [*Gerygone olivacea*], Sacred Kingfisher [*Todiramphus sanctus*], Rainbow Bee-eater [*Merops ornatus*], Topknot Pigeon [*Lopholaimus antarcticus*]), rainforest birds (i.e., Noisy Pitta [*Pitta versicolor*], Eastern Whipbird [*Psophodes olivaceus*]), raptors (i.e., Wedge-tailed Eagle [*Aquila audax*], Brahminy Kite [*Haliastur indus*], Brown Falcon [*Falco berigora*]), and freshwater and marine waders (i.e. Eastern Reef Egret [*Egretta sacra*], White-faced Heron [*Egretta novaehollandiae*], Little Black Cormorant [*Phalacrocorax sulcirostris*]). Photo 13depicts one common bird species, the Tawny Frogmouth (*Podargus strigoides*), that was observed utilising site habitats during the survey period.

Photo 13: Tawny Frogmouth observed perched within the Cardwell Street precinct

Five threatened bird species were also recorded during the survey period. These are further discussed in Section 5.3.3.2.

A total of three amphibian species were recorded during the survey period. Each of these were recorded nearby the proposed new trail with two of these species, the Eastern Dwarf Tree Frog (*Litoria fallax*) and Rocket Frog (*Litoria nasuta*), detected present within the small dam adjacent to the entrance to the south of Gap Beach. One additional amphibian species, the Green Tree Frog (*Litoria caerulea*) was observed further west of this dam, along Gap Road (Photo 14). Although outside of the study area, these species are likely to move around to areas within the study area during wet periods when water flows along the drainage lines and seeps.

Photo 14: Green Tree Frog observed near Gap Beach

A variety of mammals were also detected during the survey period with ground-dwelling species such as the Short-beaked Echidna (*Tachyglossus aculeatus*) [Photo 15] and Swamp Wallaby (*Wallabia bicolor*); and arboreal species such as the Common Ringtail Possum (*Pseudocheirus peregrinus*), Sugar Glider (*Petaurus breviceps*) and Koala (*Phascolarctos cinereus*) observed directly. The presence of the Koala is further discussed in Section 5.3.3.2. Of note were multiple dead Eastern Grey Kangaroos (*Macropus giganteus*) that were observed along the shoreline of various beaches within the study area.

A range of other mammals were detected present within the study area via PIR cameras. Species such as the Common Brushtail Possum (*Trichosurus vulpecula*) [Photo 16], Feathertail Glider (*Acrobates pygmaeus*), Black Rat (*Rattus rattus*), Brown Antechinus (*Antechinus stuartii*) [Photo 17] and Dingo (*Canis lupus dingo*) [Photo 18] were all detected via PIR camera surveys. The Dingo was also recorded present via the detection of secondary evidence such as scats and tracks.

Photo 15: Short-beaked Echidna observed within the Cardwell Street precinct

Photo 16: Common Brushtail Possums recorded via PIR camera surveys

Photo 17: Brown Antechinus recorded via PIR camera surveys

Photo 18: Dingo recorded via PIR camera surveys

Notably, there was a sparsity of mammals recorded within the Smoky Cape precinct with only a single macropod scat recorded. PIR camera surveys did not detect any fauna utilising this precinct. This is anticipated to be indicative of the lack of dense vegetation within the precinct boundary.

Field surveys also detected the presence of microbat species within the study area via call detection surveys. A single call detection device was placed within a microbat flyway that runs between the Trial Bay and Cardwell Street precincts. Analysis of these calls confirmed the presence of four microbat species (identified to a confidence level of definite or probable). Species present included the Gould's Wattled Bat (*Chalinolobus gouldii*), Eastern Horseshoe Bat (*Rhinolophus megaphyllus*), Eastern Forest Bat (*Vespadelus pumilus*) and the BC Act threatened species, the Little Bent-winged Bat (*Miniopterus australis*).

Reptile species recorded during the survey period largely consisted of snakes with the Brown Tree Snake (*Boiga irregularis*) and Yellow-faced Whip Snake (*Demansia psammophis*) observed directly and snake tracks observed within sand along the new trail. An additional two snake species, the Common Tree Snake (*Dendrelaphis punctulatus*) and Eastern Brown Snake (*Pseudonaja textilis*) were reported to frequent the Smoky Cape precinct by the Caretaker of the Lighthouse Keepers Cottages. Other reptile species recorded during the survey period comprised the Pale-flecked Garden Sunskink (*Lampropholis guichenoti*) and the Lace Monitor (V*aranus varius*) [Photo 19].

Photo 19: Lace Monitor recorded along the proposed new trail

A complete list of fauna recorded during the field survey is provided in the following table.

Table 9: Fauna species detected

Family	Scientific Name	Common Name	Trial Bay	Cardwell Street	Little Bay	Smoky Cape	New Trail
Amphibia							
Hylidae	*Litoria caerulea*	Green Tree Frog					Obs
	Litoria fallax	Eastern Dwarf Tree Frog					HC
	Litoria nasuta	Rocket Frog					Obs
Aves							
Acanthizidae	*Gerygone olivacea*	White-throated Gerygone	Obs, HC		HC		
Accipitridae	*Aquila audax*	Wedge-tailed Eagle					Obs
	Elanus axillaris	Black-shouldered Kite				Obs	
	Haliaeetus leucogaster	**White-bellied Sea-Eagle**				Obs	Obs
	Haliastur indus	Brahminy Kite					Obs
	Pandion cristatus	**Eastern Osprey**	Obs	Obs	Obs		
Alcedinidae	*Dacelo novaeguineae*	Laughing Kookaburra	Obs	Obs	Obs, HC		Obs, HC
	Todiramphus sanctus	Sacred Kingfisher	Obs	Obs			
Anatidae	*Anas superciliosa*	Pacific Black Duck			Obs		
Ardeidae	*Egretta novaehollandiae*	White-faced Heron	Obs		Obs		Obs
	Egretta sacra	Eastern Reef Egret	Obs				
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird	Obs	Obs	Obs, HC		
	Cracticus torquatus	Grey Butcherbird	Obs	Obs			
	Gymnorhina tibicen	Australian Magpie			HC		
	Strepera graculina	Pied Currawong	Obs, HC		Obs, HC		HC
Cacatuidae	*Cacatua sanguinea*	Little Corella	Obs				

Family	Scientific Name	Common Name	Trial Bay	Cardwell Street	Little Bay	Smoky Cape	New Trail
	Calyptorhynchus lathami lathami	**South-Eastern Glossy Black-Cockatoo**					CC
	Eolophus roseicapilla	Galah	Obs	Obs			
	Zanda funereus	Yellow-tailed Black-Cockatoo	Obs, HC	Obs			
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	Obs	Obs			
Charadriidae	*Vanellus miles*	Masked Lapwing	Obs, HC	Obs	Obs, HC		
Columbidae	*Columba leucomela*	White-headed Pigeon			Obs		
	Geopelia humeralis	Bar-shouldered Dove			HC		
	Lopholaimus antarcticus	Topknot Pigeon					Obs
	Ocyphaps lophotes	Crested Pigeon	Obs	Obs			
	Spilopelia chinensis	Spotted Dove			HC		
Corvidae	*Corvus orru*	Torresian Crow					Obs
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo			Obs, HC		
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird					Obs
Dicruridae	*Dicrurus bracteatus*	Spangled Drongo			Obs		
Falconidae	*Falco berigora*	Brown Falcon				Obs	
Haematopodidae	***Haematopus longirostris***	**Pied Oystercatcher**					Obs
Hirundinidae	*Hirundo neoxena*	Welcome Swallow	Obs	Obs			Obs
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull	Obs	Obs			
	Thalasseus bergii	Crested Tern	Obs	Obs			
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark					HC
Maluridae	*Malurus lamberti*	Variegated Fairy-wren	Obs	Obs	Obs, HC		HC

Family	Scientific Name	Common Name	Trial Bay	Cardwell Street	Little Bay	Smoky Cape	New Trail
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird	Obs	Obs			HC
	Anthochaera chrysoptera	Little Wattlebird	Obs	Obs	Obs		HC
	Entomyzon cyanotis	Blue-faced Honeyeater	HC				
	Manorina melanocephala	Noisy Miner	Obs	Obs	Obs		
	Meliphaga lewinii	Lewin's Honeyeater	Obs	Obs	HC		
	Philemon citreogularis	Little Friarbird			Obs		
	Philemon corniculatus	Noisy Friarbird	Obs	Obs	Obs, HC		HC
	Phylidonyris niger	White-cheeked Honeyeater					OW
Meropidae	*Merops ornatus*	Rainbow Bee-eater			Obs, HC	Obs, HC	Obs, HC
Monarchidae	*Grallina cyanoleuca*	Magpie-lark	Obs	Obs			
Oriolidae	*Oriolus sagittatus*	Olive-backed Oriole	Obs	Obs	Obs		
	Sphecotheres vieilloti	Australasian Figbird	Obs	Obs	Obs, HC		
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush			HC		
	Pachycephala rufiventris	Rufous Whistler			Obs, HC		
Pardalotidae	*Pardalotus striatus*	Striated Pardalote	HC				
Petroicidae	*Eopsaltria australis*	Eastern Yellow Robin			Obs		
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant	Obs	Obs			
	Phalacrocorax varius	Pied Cormorant	Obs	Obs			Obs
Pittidae	*Pitta versicolor*	Noisy Pitta			Obs		
Podargidae	*Podargus strigoides*	Tawny Frogmouth	Obs	Obs			
Psittacidae	*Trichoglossus haematodus*	Rainbow Lorikeet	Obs, HC	Obs	Obs		
Psophodidae	*Psophodes olivaceus*	Eastern Whipbird		Obs	Obs		HC

Family	Scientific Name	Common Name	Trial Bay	Cardwell Street	Little Bay	Smoky Cape	New Trail
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	Obs	Obs			
Strigidae	***Ninox strenua***	**Powerful Owl**					Obs
Sulidae	*Morus serrator*	Australasian Gannet	Obs				
Zosteropidae	*Zosterops lateralis*	Silvereye			Obs		
Mammalia							
Acrobatidae	*Acrobates pygmaeus*	Feathertail Glider		PIR			
Canidae	*Canis lupus dingo*	Dingo					Tracks, Scat, PIR
Dasyuridae	*Antechinus sp.*	Unidentified antechinus			PIR		
	Antechinus stuartii	Brown Antechinus			PIR		
Macropodidae	*Macropod sp.*	Unidentified macropod				Scat	Scat
	Macropus giganteus	Eastern Grey Kangaroo	Obs		Obs, Scat		
	Notamacropus rufogriseus	Red-necked Wallaby			Obs, PIR		
	Wallabia bicolor	Swamp Wallaby					Obs
Muridae	*Mus musculus*	House Mouse	PIR				
	Rattus fuscipes	Bush Rat		PIR	PIR		PIR
	Rattus rattus	Black Rat		PIR	PIR		PIR
	Rattus sp.	Unidentified rat	Dead				
Peramelidae	*Isoodon/Perameles sp.*	Unidentified Bandicoot	Diggings				Diggings
Petauridae	*Petaurus breviceps*	Sugar Glider		Obs			
Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum			PIR		Dead
Phascolarctidae	***Phascolarctos cinereus***	**Koala**			Obs		Obs, Scat

Family	Scientific Name	Common Name	Trial Bay	Cardwell Street	Little Bay	Smoky Cape	New Trail
Pseudocheiridae	*Pseudocheirus peregrinus*	Common Ringtail Possum	PIR		Obs		
Rhinolophidae	*Rhinolophus megaphyllus*	Eastern Horseshoe Bat		Ana			
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna		Obs, PIR			Diggings
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat		Ana			
	Miniopterus australis	**Little Bent-winged Bat**		Ana			
	Vespadelus pumilus	Eastern Forest Bat		Ana			
Reptilia							
Colubridae	*Boiga irregularis*	Brown Tree Snake					Obs
	Dendrelaphis punctulatus	Common Tree Snake				Rep	
Elapidae	*Demansia psammophis*	Yellow-faced Whip Snake					Obs
	Pseudonaja textilis	Eastern Brown Snake				Rep	
Scincidae	*Lampropholis guichenoti*	Pale-flecked Garden Sunskink	Obs				
	Lampropholis sp.	Unidentified grass skink	Obs				
Unknown	-	Unidentified snake					Tracks
Varanidae	*Varanus varius*	Lace Monitor		PIR			Obs
Key: threatened under the BC Act and/or EPBC Act (bold), microbat call detection device (Ana) observed (Obs), heard call (HC), chewed cones (CC), PIR camera (PIR), reported by Caretaker (Rep).							

5.3.3.2 Threatened Fauna

A total of seven threatened fauna species were recorded throughout the survey period. These comprised:

- White-bellied Sea-Eagle (*Haliaeetus leucogaster*)
- Eastern Osprey (*Pandion cristatus*)
- South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*)
- Pied Oystercatcher (*Haematopus longirostris*)
- Powerful Owl (*Ninox strenua*)
- Koala (*Phascolarctos cinereus*)
- Little Bent-winged Bat (*Miniopterus australis*)

The White-bellied Sea-Eagle was recorded flying over-head on multiple occasions throughout the survey period. A juvenile of this species was observed flying over the Smoky Cape precinct on the 4th and 6th of September (Photo 20). An additional three sightings of an adult of this species were recorded along the proposed new trail. Two sightings were recorded in a single day (17th August) just north of the Green Island Firetail and at south Gap Beach. The other recording was of a single adult White-bellied Sea-eagle, flying over Cobble Beach, alongside a Brahminy Kite (6th September).

The White-bellied Sea-eagle is listed as Vulnerable under the BC Act.

Photo 20: White-bellied Sea-eagle flying over the Smoky Cape precinct

The Eastern Osprey, which is also listed as Vulnerable under the BC Act, was recorded on two occasions nearby the Cardwell Street precinct during the survey period. This species was observed flying over the shoreline of Trial Bay on the 4th of September. It was also recorded during spotlighting surveys on the 5th of September, where it was observed roosting within a Brush Box (*Lophostemon confertus*) within the forested vegetation off the Bridle Track.

Whilst not directly observed, evidence of the South-eastern Glossy Black-Cockatoo was observed along the Jack Perkins Track which connects the Smoky Cape precinct to the start of the proposed new trail. Chewed Allocasuarina cones, which evidence foraging by this species, were observed at the base of a single tree along this track on the 17th of August. The South-eastern Glossy Black-Cockatoo is listed as Vulnerable under both the BC Act and EPBC Act.

The Pied Oystercatcher was observed on a single occasion during the survey period (17th August). Two individuals of this species were observed flying in and foraging along the sand of Cobble Beach, along the proposed new track. This species is listed as Endangered under the BC Act.

A single record of the Powerful Owl was also recorded during the survey period. This nocturnal species was observed during daylight hours, perched within a tree above the existing pedestrian track to the north of Gap Beach. This species was observed on the 7th of September, clasping a young Common Brushtail Possum which was likely the result of foraging from the night prior (Photo 21). The presence of owl whitewash immediately below this perch location further indicates that this individual was likely to have remained in this location since the previous night.

The Powerful Owl is listed as Vulnerable under the BC Act.

Photo 21: Powerful Owl observed with kill from previous night

Only a few metres south of this Powerful Owl sighting, the Koala was also observed, resting within the tree canopy. A further inspection through binoculars indicated that the Koala appeared to be in a healthy condition with no obvious signs of disease (Photo 22). This species was recorded within the canopy of a Swamp Mahogany (*Eucalyptus robusta*), which is a known Koala food tree species. Further foraging resources for this species were noted within the area with the Koala located within a patch of vegetation dominated by this canopy tree species. Further evidence of the frequent presence of the Koala to this area was noted with Koala scats also recorded at the base of trees further along the existing pedestrian track (Photo 23).

A second Koala was recorded within the Little Bay precinct on the 19th of November. A male Koala was observed resting within canopy vegetation between the Little Bay Walking Trail and the Overshot Dam (Photo 24). This individual was in a healthy condition and was actively aware of pedestrians using the walking trail.

The Koala is listed as Endangered under both the BC Act and EPBC Act.

Photo 22: Binocular-view of the Koala observed during the field survey

Photo 23: Koala scats observed along the edge of the existing pedestrian track

Photo 24: Koala observed resting within the Little Bay precinct

Analysis of the microbat call detection device also confirmed the presence of an additional threatened species, the Little Bent-winged Bat. This species is listed as Vulnerable under BC Act. Calls for this species were detected on all recording nights, with the number of confirmed passes ranging from one to 75 passes per night.

The following table provides the location details of the recorded threatened fauna species with Figure 27 displaying each location.

Table 10: GPS coordinates of threatened fauna recorded during the survey period

Threatened fauna species	Date recorded	Zone	Easting	Northing
White-bellied Sea-Eagle	17-Aug-2023	56J	508205	6580347
	17-Aug-2023	56J	507767	6580823
	4-Sept-2023	56J	508155	6579251
	6-Sept-2023	56J	508155	6579251
	6-Sept-2023	56J	508035	6580538
Eastern Osprey	4-Sept-2023	56J	506565	6583538
	5-Sept-2023	56J	506805	6583308
South-eastern Glossy Black-Cockatoo	17-Aug-2023	56J	507956	6579312
Pied Oystercatcher	17-Aug-2023	56J	508049	6580469
Powerful Owl	7-Sept-2023	56J	507499	6581323

Threatened fauna species	Date recorded	Zone	Easting	Northing
Koala	7-Sept-2023	56J	507502	6581315
	7-Sept-2023	56J	507485	6581286
	19-Nov-2023	56J	507320	6582608
Little Bent-winged Bat	4-Oct-2023	56J	506823	6583492
	5-Oct-2023	56J	506823	6583492
	6-Oct-2023	56J	506823	6583492
	7-Oct-2023	56J	506823	6583492

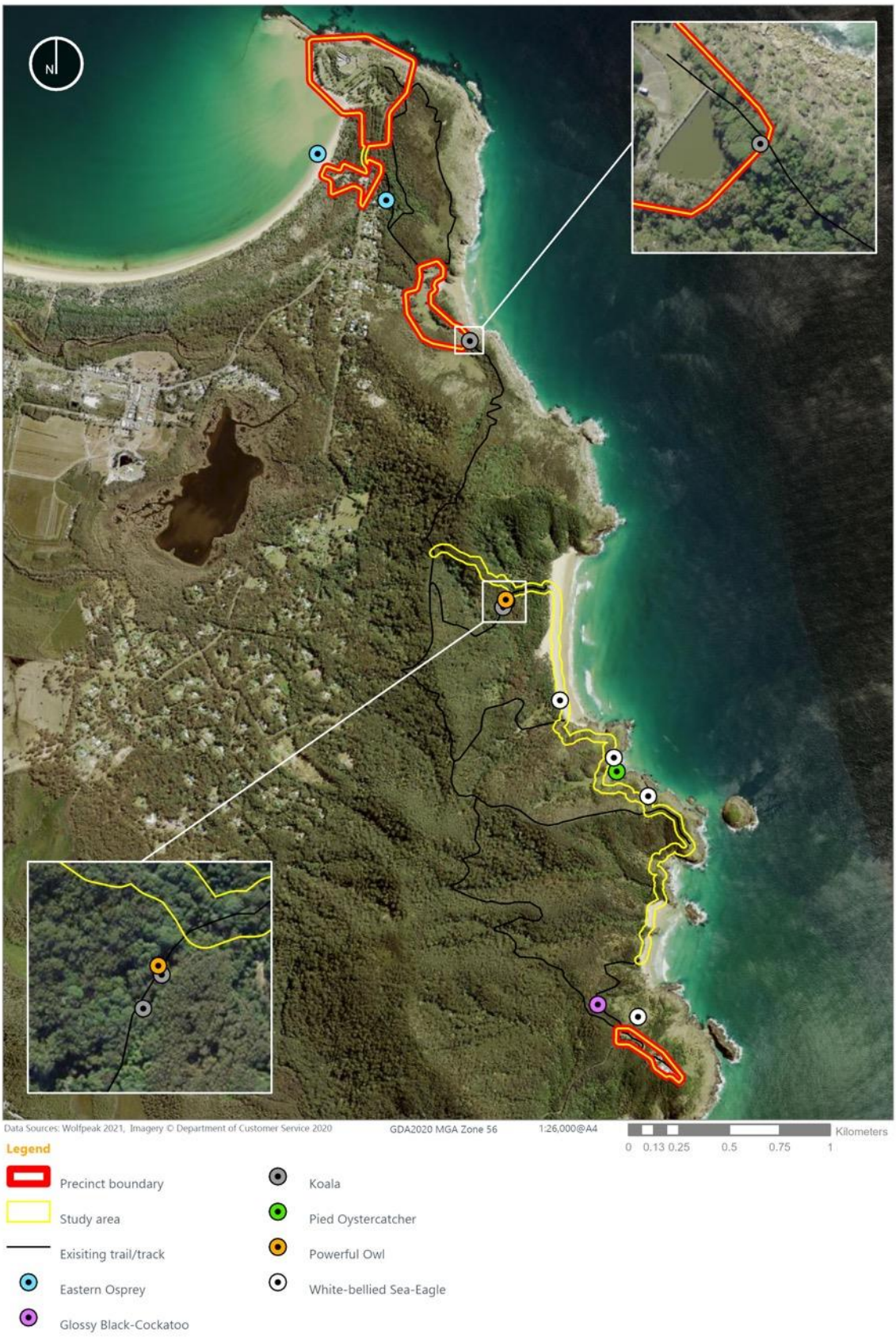

Figure 27: Location of threatened fauna recorded during the survey period

5.4 Constraints Analysis

The desktop assessment and field survey has identified several ecologically sensitive areas in the study area. These have been categorised into high, moderate and low constraints areas with the following describing the categorisation levels.

High ecological constraint:

- Areas containing threatened plant species
- Littoral Rainforest TEC
- Themeda Grassland TEC

Moderate ecological constraint:

- Aquatic habitat and riparian vegetation near proposed works
- Koala food trees (KFTs)
- Hollow-bearing trees (HBTs)

Low ecological constraint:

- Generic foraging habitat for threatened species
- Native vegetation that is not a TEC

The following figures map the location of ecologically sensitive areas with high and medium constraints. All other non-mapped areas that contain vegetation are to be considered within the low constraint category.

Mitigation measures have been formulated to avoid and minimise impacts in ecologically sensitive areas. Some vegetation removal and disturbance will be required in these areas however this will be limited to the minimum extent needed and measures will be employed to reduce potential indirect impacts.

Figure 28: Ecologically sensitive areas within the Trial Bay precinct

Figure 29: Ecologically sensitive areas within the Cardwell Street precinct

Figure 30: Ecologically sensitive areas within the Little Bay precinct

Figure 31: Ecologically sensitive areas within the Smoky Cape precinct

Figure 32: Ecologically sensitive areas within the new trail study area

6. IMPACT ASSESSMENT

6.1 Application of Avoid Principles

Avoidance principles have been considered in the design of the Macleay Coast Destination Project. This consideration has significantly reduced the amount of vegetation and habitat that is required to be removed or modified.

The overall design has ensured that the majority of the proposed works will be located within areas already disturbed and has attempted to utilise as much of the existing infrastructure as possible. This has resulted in much of the overall impact area comprising low value habitat or an absence of habitat.

The strategic positioning of the proposed new track along an existing informal alignment has also reduced the extent of vegetation and habitats that will require disturbance. Furthermore, the formalisation of the track has been kept to the minimum that is required to direct pedestrians and encourage them to stay within the track footprint.

Despite the strategic design, not all environmental impacts could be avoided with some pedestrian pathways and parking proposed to be situated within forested areas. Impacts to these areas have been subject to minimise principles.

6.2 Application of Minimise Principles

Minimisation principles have also been considered at the design phase, with the NPWS engaging WolfPeak for ecological input prior to finalisation of the plans. Some pathways, such as the footpath up to the west of the gaol (Trial Bay precinct) and the pathway connecting the Bridle Trail to the Cardwell Street precinct, have been determined based on ecologist advice as to the path of least impact.

Furthermore, the NPWS have followed ecologist advice as to the final location of the proposed new trail through an area of high ecological value. The original proposed location for this section of trail was to follow the existing informal track across the Green Island Headland, up until it connected to the Green Island Fire trail. Following ecologist assessment, it was determined that this pathway would run directly through a TEC and would continue to encourage pedestrians to venture off the planned trail line, posing a risk of trampling of this TEC. The finalised trail location has taken into account ecologist advice and altered the planned route to skirt around the edge of the TEC, minimising impacts to this community.

In all stages of the proposed works, impacts to vegetation and habitats will be minimised as far as practicably possible. Any impact areas adjoining vegetation will be clearly delineated so as to minimise the risk of disturbance beyond what has been assessed and vegetation removal will be kept to the minimum required to establish the proposed infrastructure. A range of other environmental safeguards will be implemented to minimise direct and indirect impacts to the park's natural values. These measures are described in the following section.

6.3 Application of Mitigation Measures

6.3.1 General Clearing Measures

Vegetation clearing is to be kept to the minimum required to complete the proposed works.

Areas to be cleared/modified should be clearly marked (e.g. with stakes and bunting) before clearing in order to prevent inadvertent clearance beyond what is required and has been assessed.

6.3.2 Cardwell Street Tree Removal

Tree removal to be undertaken within the Cardwell Street precinct is to incorporate at a maximum, the trees identified with the concept design assessed in this report (Appendix A). The specific number of trees outlined for removal is further detailed in Section 6.4.1. All trees that are marked on this plan for retention are to be retained throughout the clearing works.

6.3.3 Site Inductions

All staff present on site during vegetation clearing or for the construction of the proposed works are to undertake a brief site induction prior to entry. Site induction is to specify that:

- No clearing is to occur beyond the marked area.
- The location of high and medium constraint areas.
- Any relevant mitigation measures to be applied within the proposed works area.
- Vehicles are only to be parked in pre-existing cleared, designated areas.
- All rubbish is to be disposed of properly and not be placed within retained vegetation.
- Any materials are to be stored outside the retained vegetation.
- Clearing and earthworks is to avoid damage to root zones of the retained trees.

6.3.4 Pathway Delineation

A qualified ecologist is to be engaged immediately prior to any clearing works for the following proposed pedestrian pathways:

- Pedestrian pathway linking the current amenities and the western side of the gaol (Trial Bay precinct)
- Pedestrian pathway linking the Bridle Trail to the Cardwell Street precinct.

The ecologist is to be present to aid NPWS in delineating the exact pathway location, so as to ensure the path of least environmental impact is taken. The approximate location of the first two listed pathways has been marked using temporary stakes (Photo 25), however the exact pathway location is to be micro-sited by the ecologist at the time of construction/clearing.

Photo 25: Example of temporary stake marking approximate track location

6.3.5 Ecologically Sensitive Area Protection

The location of ecologically sensitive area protection measures is mapped in Figure 33 to Figure 38.

6.3.5.1 TEC Protection

Exclusion zones are to be established around the retained Littoral Rainforest and Themeda Grassland TECs. This is to be achieved by placing a physical barrier around the edge of the TECs wherever there is any risk of NPWS staff or contractors entering or placing materials. Exclusion zones are to be established using temporary fencing or stakes and bunting, in conjunction with signage. Along the proposed new trail, this must remain in place for the entire duration of the works. As works within the remaining four precincts may occur over a large timeframe, and locations are all currently in use as a tourist attraction, exclusion zones are not required to remain for the duration of the works, however, are required to remain in place for the extent of time where there is a risk of NPWS staff or contractors entering or storing materials.

6.3.5.2 Littoral Rainforest Protection

Exclusion zones are also to be established around areas of Littoral Rainforest that are mapped on the NSW Government, Resilience and Hazards SEPP map (NSW Government 2023). These exclusion zones are to be established prior to any works commencing within the Smoky Cape

precinct and are required to remain in place for the extent of time where there is a risk of NPWS staff or contractors entering or storing materials.

6.3.5.3 Threatened Flora Protection

Areas containing threatened flora species are highly sensitive and have been marked as high constraint. Throughout the duration of establishment of the new track, these areas are to be clearly marked to provide a visual indicator of this high constraint area. Visual indication of the start and finish of threatened flora occurrences is to be visibly different to TEC exclusion markup and is recommended to utilise the green post system. This entails installing a green guidepost at the beginning and end of the threatened plant population to act as a visual trigger for contractors and staff.

Any works within the marked threatened flora area are to be conducted in the presence of a suitably qualified ecologist to ensure that the pathway construction does not impact any of these threatened plants. Immediately prior to works in this area, the ecologist is to mark each threatened plant to aid contractors and staff in avoiding impacts. In doing so (and throughout all other activities), the threatened plants are not to be touched, reducing the likelihood of any further spread of Myrtle Rust.

Markers for threatened flora are to be removed on the completion of the new trail, so as to avoid public interference with the plants.

A threatened flora protection area has also been mapped around the Scrub Turpentine recorded in the north of the trail, however a formal trail already occurs in these areas, so no works are proposed to occur within these mapped protection areas.

6.3.5.4 Pathway Design

The pathway to be formalised for the new track is to be kept to the minimum required to establish the route, with the exception of two areas where higher risks are associated with a less formalised path. The following details these locations and provides information about the recommended trail design.

North Smoky Beach – northern entry

The informal trail that currently runs through this location is surrounded by numerous Critically Endangered plants which are immediately next to the track. These plants are all less than 30cm in height and are currently at high risk of being trampled by walkers.

Altering the location of this trail to avoid these plants is not considered viable due to the topography of the area, which naturally directs walkers between the crevice of the adjoining rocky headland into the threatened plant area. Should an alternate path be formed, it is likely that walkers would continue to use the existing informal path regardless, retaining the existing risk of trampling. As such, the new pathway is to remain in the same location as the informal trail with the design to encourage walkers to remain on the path.

The new trail in this threatened flora area is, hence, recommended to consist of a raised boardwalk. The height of the boardwalk is to be approximately 15-20 cm above ground level so as to discourage dismount yet remain low enough to not impede on light penetration to surrounding plants.

Green Island Headland (The Ledge)

Vegetation on the Green Island headland (also known as The Ledge) comprises a Themeda Grassland TEC. Avoidance measures are considered unviable in this area due to cultural heritage impacts and constraints. As such, the pathway through this area is to hug the tree line, where it is considered to have the least environmental impact.

This headland also provides a picturesque viewpoint and naturally entices walkers to venture towards the cliff edge to maximise their view and use as a picnic/resting location. In doing so, trampling over the Themeda Grassland TEC. In an attempt to discourage walkers from trampling this TEC, a more formalised pathway design is to be considered in this area.

As a raised boardwalk is not viable in this location due to cultural heritage impacts, a formalised gravel pathway with clear edging is to be installed. The installation of clear pathway edging is intended to illude to a more formalised pathway which may further discourage walkers from veering off the path. Pathway edging is recommended to comprise of a thin strip of timber, which only requires shallow embedding or a local stone edging. The following photo provides an example of timber pathway edging which may be installed along the path in this area.

Photo 26: Pathway design along the Green Island Headland

Figure 33: Ecologically sensitive area protection measures – Trial Bay and Cardwell Street precincts

Figure 34: Ecologically sensitive area protection measures – Little Bay precinct

Figure 35: Ecologically sensitive area protection measures – Smoky Cape precinct

Figure 36: Ecologically sensitive area protection measures – south of new trail

Figure 37: Ecologically sensitive area protection measures – middle of new trail

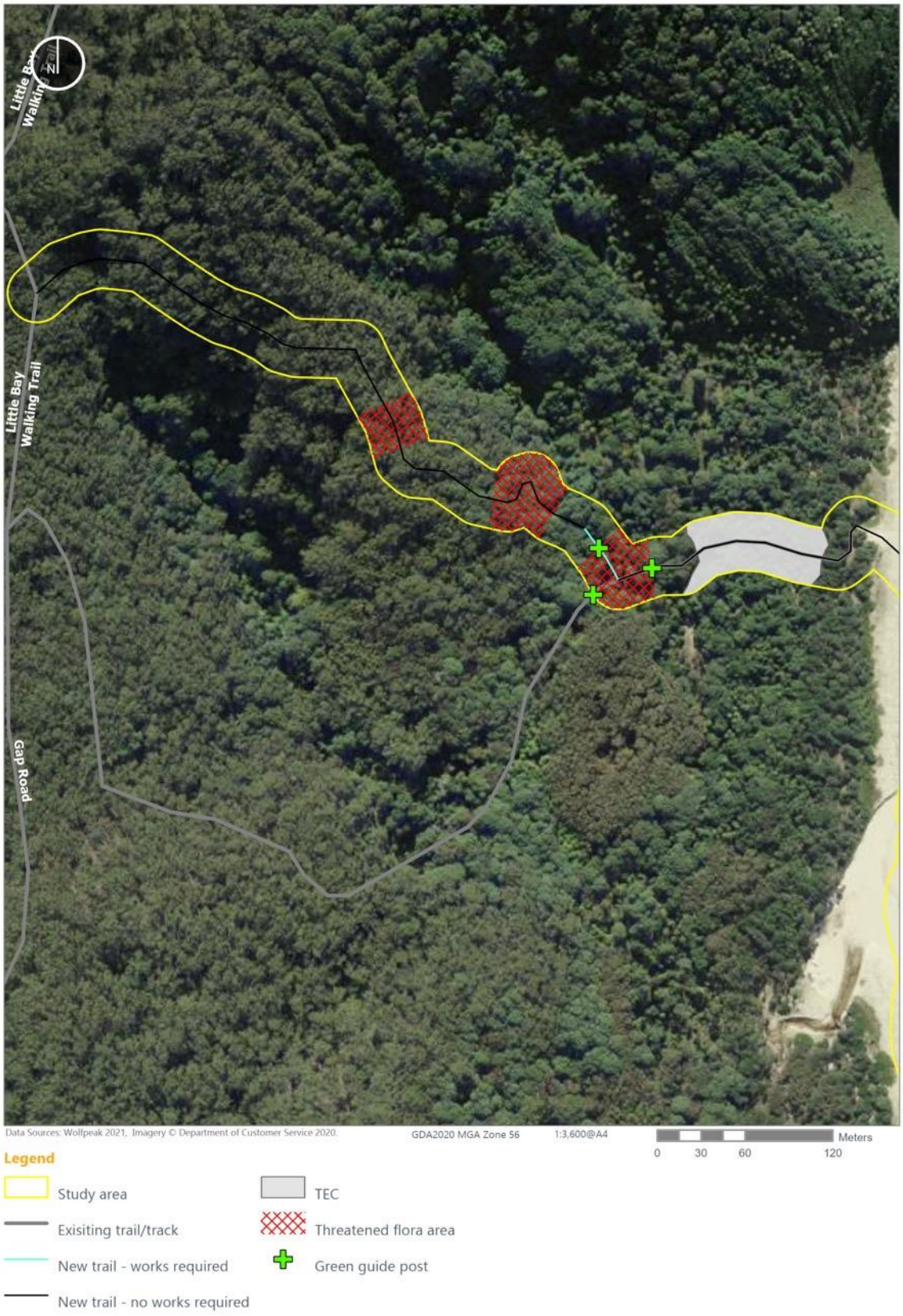

Figure 38: Ecologically sensitive area protection measures – north of new trail

6.3.6 Pre-clearing Survey and Clearing Monitoring

6.3.6.1 Areas marked with high constraint due to presence of KFTs

Prior to the removal of any vegetation within these mapped areas (refer to Figure 29 and Figure 32), a qualified ecologist or suitably qualified and experienced NPWS officer is to conduct a pre-clearing inspection of the vegetation to ensure the absence of fauna. This pre-clearing inspection is to be conducted in line with the following measures:

1. The clearing extent is to be inspected for fauna immediately prior to commencement of any canopy vegetation removal. This is to occur each morning if clearing spans over multiple days/weeks.
2. If a Koala is present in an area subject to vegetation removal/modification, works must be suspended until the Koala moves along on its own volition. If the Koala is located in a position where a 50-metre buffer may be established, works may proceed outside this buffer. In this event, the ecologist is to remain on site to monitor the Koala for signs of distress. If the ecologist determines that the Koala is in distress, works must be suspended within this area until a larger buffer is created, or the Koala moves along on its own volition.
3. Should any secondary evidence of fauna usage (i.e., nests, dreys, hives or hollows) be located within the trees to be felled, the host tree is to be flagged, and the ecologist is to remain on site to supervise the removal of this tree. Any detected fauna is to be relocated off-site. Any bird nest considered active is to be removed in a manner that allows retrieval of eggs/young, and these are to be taken into care by FAWNA.

6.3.6.2 Hollow-bearing trees

One hollow-bearing tree has the potential to be impacted by the proposed works. Should removal of any hollows within this tree be required, a qualified ecologist is to undertake a pre-clearing inspection immediately prior to hollow removal or disturbance. This pre-clearing inspection is to utilise a scoping camera and visual inspection of the hollows to confirm the absence of fauna. Should any fauna be identified utilising the tree hollows, one of the following measures is to be undertaken:

- If fauna present is diurnal, the ecologist is to careful remove and relocate the fauna to a suitable and safe location nearby.
- If fauna present is nocturnal, the ecologist is to return after dusk (when fauna is likely to have left the hollow to forage), confirm that the hollow is void of fauna and block the entrance to the hollow utilising an appropriate material such as a towel or expanding foam. This ensures that the hollow can be removed the following day, without risk of fauna injury.

6.3.6.3 All other vegetation removal

Prior to the removal of any canopy vegetation, an ecologist or suitably qualified/experienced NPWS officer is to conduct a pre-clearing inspection of the vegetation to ensure the absence of fauna. This pre-clearing inspection is to be conducted in line with the following measures:

1. The clearing extent is to be inspected for fauna immediately prior to commencement of any canopy vegetation removal. This is to occur each morning if clearing spans over multiple days/weeks.

2. Should any fauna be identified within the trees to be felled (i.e., Koala, Lace Monitor), tree removal is to be suspended until the fauna moves along on its own volition.

3. Should any secondary evidence of fauna usage (i.e., nests, dreys, hives or hollows) be located within the trees to be felled, removal of the host tree is required to be conducted in the presence of a qualified ecologist. Once present, the ecologist is to supervise tree removal and manage any fauna interactions. Any detected fauna is to be relocated off-site. Any bird nest considered active is to be removed in a manner that allows retrieval of eggs/young, and these are to be taken into care by FAWNA.

6.3.7 Ground Habitat Relocation

It is recommended that any ground-based hollows and wood debris within the works footprint are relocated into areas of suitable habitat adjoining. This should be undertaken under the direction of an ecologist or suitably qualified and experienced NPWS officer.

6.3.8 Hygiene Protocols

Management measures to avoid and minimise the spread of Myrtle Rust along the proposed new trail will be required. The DPIE document *Hygiene Guidelines: Protocols to protect priority biodiversity areas in NSW from Phytopthora cinnamomi, myrtle rust, amphibian chytrid fungus and invasive plants* (DPIE 2020) provides measures that should be followed to reduce the risk of spreading myrtle rust or introducing amphibian chytrid fungus.

It is recommended that a hygiene management plan for the works is prepared as per the template in Appendix F of the guidelines. This will identify the specific risks and procedures for the works and outline measures required prior to the.

At a minimum, the plan must include the following protocols to be enacted prior to entering the study area or moving between precincts/areas:

- Check personnel, clothing, footwear, backpacks and equipment for soil, plant material/propagules and other debris.
- Remove all soil, plant material and other debris using a hard brush and (if required) clean water.
- Ensure hands, clothing, footwear, and equipment are dry before proceeding.
- Ensure plant and machinery is thoroughly cleaned inside and out before entering the area or moving between different areas (refer to page 12 and 17 of the guide). Use 70% alcohol wipes or a spray bottle to apply disinfectant to the interior of vehicle. Spray the exterior with disinfectant or hand pressure sprayer. Allow the disinfectant to remain in contact with the surface for at least 30 seconds before rinsing with clean water.

6.3.9 Weed Control

Disturbance of soils during vegetation removal and construction has the potential to encourage weed invasion and/or spread. Hence, it is recommended that:

- Disturbance of vegetation and soils on the site should be limited to the areas of the proposed work and should not extend into adjacent vegetation.

- To assist in reducing the spread of exotic species, all vehicles and machinery are to be inspected for the presence of weeds prior to entering the study areas.
- Invasive Biosecurity Act listed weeds within the study area are appropriately treated and collected prior to clearing and are disposed of within a landfill facility.
- Any new weed infestations that arise within the works area during construction are to be treated and removed.

6.3.10 Strategic Timing of Works

Any works proposed to occur within a mapped watercourse or within a visible drainage feature (i.e., construction of new bridge or clearing of vegetation within concrete drain within the Trial Bay precinct), is to occur during an absence of standing water. Any beach works required are also to be conducted during lower tides.

Additionally, clearing of vegetation is recommended to be conducted outside of peak breeding and nesting season for most species. Peak periods are typically during spring and early summer.

6.3.11 Sedimentation and Erosion Controls

Standard erosion and sedimentation control measures will be required throughout the works to ensure that nearby retained habitats and adjoining aquatic environments are not substantially affected by erosion and sedimentation. This is to involve sediment fences should any nearby watercourse contain water at the time of works which may indirectly increase the changes of sedimentation or erosion.

6.3.12 Dust suppression

In the event that high dust levels occur as a result of clearing operations, dust suppression via water dispersal is to be undertaken.

6.3.13 Signage, Awareness and Education

To minimise potential impacts of vegetation trampling and litter by trail users, educational signage is to be provided at several locations along the proposed new trial. Signage is to target key environmental threats which realistically could be mitigated through educational signage.

Signage is to include the following information at select areas.

6.3.13.1 Green Island Headland

The Green Island Headland provides a picturesque viewpoint and naturally entices walkers to venture towards the cliff edge to maximise their view and use as a picnic/resting location. As vegetation on this headland is a grassland, members of the public generally are unaware of the importance of this Themeda Grassland TEC. As such, educational signage is to be installed at either end of this TEC area along the track. Signage is suggested to say the following:

Environmentally Sensitive Area

Grassland on this headland is an Endangered Ecological Community and is sensitive to disturbance, please do not stray from path

6.3.13.2 Trail heads

General information at both trail heads is to be installed. Signage is to be strategically worded to educate walkers without sounding like generic text (which is more likely to be disregarded). At a minimum, signage is to include the following information:

- All rubbish must be carried out and disposed of at designated areas. It is recommended to highlight that this includes food scraps, as there is often public misconception about the environmental impacts of disposing of food such as fruit scraps.
- All flora and fauna are protected and not to be disturbed.

6.3.14 Track Maintenance

Track maintenance needs to be conducted on a regular basis to remove fallen trees and other obstructions. Any areas along the trail that become muddy should be monitored and treated when necessary. This will discourage informal track making and trampling of adjoining vegetation. Track maintenance is to also include control of any new weed infestations adjacent to the trail.

In addition, any tree branches that overhang the threatened flora areas lower than two metres in height are to be considered for trimming on a regular basis. Low hanging tree branches form one of the reasons that walkers veer from a formed track, so trimming of these will reduce this risk, in turn reducing the likelihood of threatened flora trampling. Branch trimming is to be kept to the minimum required in order to deter walkers from going off track and is not to be conducted to the extent that it may alter light penetration.

6.4 Impact Assessment

6.4.1 Direct Impacts

Despite the application of the avoid and minimise principals, some direct impacts to native vegetation and habitats will be required in order to complete the works. Direct impacts are considered to be minimal in extent, in consideration of the size of the proposed Master Plan.

The following sections provide the details of each proposed direct impact, with maps outlining the specific areas where native vegetation is proposed to be impacted. All other construction is proposed to be located within the boundaries of existing infrastructure (i.e., gravelled footpaths or paved areas) or in areas that have previously been cleared of native vegetation.

6.4.1.1 Trial Bay Precinct

Table 11: Direct impacts of proposed works within the Trial Bay precinct

Impact No.	Direct impact	Extent	Relevant mitigation measures
A	Vegetation removal/trimming within a TEC, for construction of the pedestrian pathway	Pathway has been strategically situated along an old, disused track. This has ensured that direct impacts are limited to the trimming of overhanging vegetation.	• TEC protection • Pathway delineation
B	Removal of vegetation from the outer edges of a TEC in order to widen existing road and improve drainage issues.	Only a thin strip of roadside vegetation from within this community will require removal. Vegetation to be removed largely comprises groundcovers and shrubs however the occasional small tree may also require removal.	• TEC protection
C	Vegetation removal within a formed drainage channel.	Trimming of tree roots and possible removal of trees growing within the concreted drainage channel.	• Strategic timing of works
	Removal of hollow-bearing tree	Fig within the drainage channel contains small tree hollows between the exposed roots (see photo below). Hollows may provide potential roosting habitat for microbats. Trimming of tree roots within this drainage channel may remove or expose these tree hollows.	• Pre-clearing survey and clearing monitoring
D	Removal of large tree	Removal of a single Norfolk Island Pine on the corner of the existing road.	• Pre-clearing survey and clearing monitoring
E	Vegetation removal	Removal of a cluster of She-oaks and a single Swamp Oak for establishment of car park.	• Pre-clearing survey and clearing monitoring
F	Tree removal	Removal of a single Brush Box for establishment of dual carriageway.	• Pre-clearing survey and clearing monitoring
G	Tree removal	Removal of a single Tuckeroo for formalisation of car park.	• Pre-clearing survey and clearing monitoring

Field surveys conducted by an ecologist (in conjunction with the project engineer and a NPWS representative) within this precinct were able to confirm the specific number of trees that will require removal for the works. The following table outlines the number of each tree species that will require removal for construction of the Trial Bay precinct upgrade.

Table 12: Tally of trees to be removed within the Trial Bay precinct

Common name	Scientific name	Number to be removed
Norfolk Island Pine	*Araucaria heterophylla*	1
Coast Banksia	*Banksia integrifolia*	1
Horsetail She-oak	*Casuarina equisetifolia*	6
Swamp Oak	*Casuarina glauca*	1
Tuckeroo	*Cupaniopsis anacardioides*	1
Rusty Fig	*Ficus rubiginosa*	5
Brush Box	*Lophostemon confertus*	1

Photo 27: Hollow-bearing tree which may be impacted by the proposed works

6.4.1.2 Cardwell Street Precinct

Table 13: Direct impacts of proposed works within the Cardwell Street precinct

Impact No.	Direct impact	Extent	Relevant mitigation measures
A	Removal of lower stratum vegetation and possible removal trees to create pedestrian pathway.	Thin strip of lower stratum vegetation removal. Possible removal of three trees (2x Swamp Oak, 1x Broad-leaved Paperbark), pending arborist assessment.	• TEC protection • Pre-clearing survey and clearing monitoring
B	Removal of lower stratum vegetation and possible removal trees to create pedestrian pathway.	Thin strip of lower stratum vegetation removal. Possible removal of three trees (1x Tuckeroo, 2x Broad-leaved Paperbark), pending arborist assessment.	• Pre-clearing survey and clearing monitoring
C	Tree removal	Removal of five canopy trees to create car parking and amenities. Trees to be removed include Swamp Oak (x2), Logan Apple (x2) and Green Bolly Gum (x1).	• Pre-clearing survey and clearing monitoring
D	Potential tree removal	Potential removal of two trees (Ribbonwood and Banksia) to formalise car parking, pending arborist assessment.	• Pre-clearing survey and clearing monitoring
E	Tree removal	Removal of a single tree (Swamp Oak) to formalise car parking.	• Pre-clearing survey and clearing monitoring
F	Potential tree removal	Potential removal of three trees (Broad-leaved Paperbark, Cheese Tree and Forest Red Gum) to update road infrastructure, pending arborist assessment.	• Pre-clearing survey and clearing monitoring
G	Removal of vegetation to create a pathway connecting to the Bridle Trail.	Thin strip of vegetation removal through forested area. The pathway can be strategically aligned so as to avoid the requirement for canopy tree removal. Shrubs and groundcover will require removal, and some vine thickets will need to be trimmed.	• Strategic timing of works • Pathway delineation

The following table summarises the canopy trees identified for removal or possible removal within this precinct.

Table 14: Tree removal inventory

Common Name	Scientific Name	Number to be removed	Number which may be removed*
Swamp Oak	*Casuarina glauca*	3	2
Broad-leaved Paperbark	*Melaleuca quinquenervia*		3
Tuckeroo	*Cupaniopsis anacardioides*		1
Logan Apple	*Acronychia imperforata*	2	
Green Bolly Gum	*Neolitsea australiensis*	1	
Ribbonwood	*Euroschinus falcatus*		1
Coastal Banksia	*Banksia integrofolia*		1
Cheese Tree	*Glochidion ferdinandi*		1
Forest Red Gum	*Eucalyptus tereticornis*		1
	Total	**6**	**10**
Key: * pending arborist assessment			

Of the trees listed above, a single tree, Forest Red Gum, is considered to be a locally preferred Koala food tree species. This tree, earmarked for potential removal, comprised a regrowth tree of approximately 14m height and 17cm diameter at breast height. The requirement to remove this tree for the proposed works has been assessed within the Arboricultural Impact Assessment (Whispering Tree Arboricultural Consulting 2024) for this precinct, which determined that the tree does not necessarily require removal and is to be retained and assessed.

6.4.1.3 Little Bay Precinct

Table 15: Direct impacts of proposed works within the Little Bay precinct

Impact No.	Direct impact	Extent	Relevant mitigation measures
A	Lower stratum vegetation removal and revegetation	Groundcover vegetation disturbance in order to establish pathway. All unpaved portions of this impact area are proposed to be revegetated.	Nil
B	Lower stratum vegetation removal	Removal of groundcover vegetation in order to establish amphitheatre,	Nil

6.4.1.4 Smoky Cape Precinct

No vegetation removal is required within this precinct.

6.4.1.5 Proposed new track

Table 16: Direct impacts of proposed works along the proposed new track

Impact No.	Direct impact	Extent	Relevant mitigation measures
A	Native vegetation removal along the track line, some of which is located within a TEC.	Vegetation removal is anticipated to be limited in consideration that an informal track already follows the proposed trail path. Any vegetation removal required will be restricted to groundcover and shrub vegetation only, bordering the edge of the existing path (if required). No upper stratum vegetation is proposed for removal.	• TEC protection
B	Potential damage to threatened flora species, Native Guava.	No threatened flora species will be removed. Mitigation measures have been proposed to ensure that disease spread or accidental damage to threatened plants is avoided during construction activities. At present, there is a trampling risk to these plants by walkers currently using the informal trail. As some of these threatened plants are located just on the edge of the existing trail, the plants are small and there are canopy branches overhanging the informal track, there is a high risk of trampling of these species. The new trail in this location has been recommended to consist of a raised boardwalk, so as to ensure that the existing track will not need to be widened, and no threatened species will be removed. This design will also aid in deterring walkers from exiting the formed path and trampling threatened species.	• TEC protection • Threatened Flora Protection • Pathway design • Hygiene protocols • Track maintenance
C	Damage to a sensitive grassland TEC	Removal of approximately a one-metre-wide strip of vegetation from the outer edge of this TEC. With no formal path in this location at present, there is a high risk of walkers trampling this TEC. The establishment of the formalised path is intended to encourage walkers to remain within the path and not impact the retained headland TEC.	• TEC protection • Pathway design • Signage, awareness and education
D	Potential damage to threatened flora species for widening at trail intersection.	There is potential for the trail at the intersection to require widening. Should this be required, this poses a risk of damage to a threatened flora species located along the edge of the pathway.	• TEC protection • Threatened Flora Protection

Impact No.	Direct impact	Extent	Relevant mitigation measures
			• Hygiene protocols • Track maintenance
Entire area	Increased foot traffic.	The establishment of the new track will see an increase in pedestrian use, bringing with it an increase in general potential impacts like littering or plant collection. Despite this expected increase, impacts as a result of this are anticipated to be relatively minimal in consideration that the track is currently used by walkers and that the proposal will see the formalisation of the pathway, reducing the risk of vegetation trampling and the creation of additional informal tracks. Furthermore, signage is recommended to be installed to educate walkers on how to mitigate their impacts to the environment.	• Signage, awareness and education • Track maintenance

Direct impacts to vegetation and fauna habitat are relatively minute in consideration of the extent of works proposed within the Master Plan. No large areas of vegetation or habitat are proposed to be removed with the majority of works proposed to occur within already disturbed or cleared areas; and the situation of new tracks or pathways to be strategically positioned so as to weave through upper stratum vegetation and utilise existing informal tracks. Direct impacts largely involve the occasional removal of vegetation along the edge of proposed roads or tracks. The removal of this vegetation will reduce the extent of foraging habitat for a number of known and potentially occurring threatened species, including nectar and fruit sources and prey habitat. No Koala food trees are proposed to be removed and only a single hollow-bearing tree may be impacted by the proposed works. This hollow-bearing tree is of low faunal value and due to the low positioning of the hollows. Mitigation measures can ensure that the removal of these hollows will not pose a risk of faunal injury. Any hollow logs that are located within the works footprint can be relocated into adjoining retained vegetation, whereby availability for faunal usage will remain.

The application of mitigation measures can also ensure that the proposed works will not directly impact the threatened flora that were recorded within the study area. Mitigation measures have been proposed to reduce indirect impacts to these entities as much as possible.

Figure 39: Location of proposed vegetation removal – Trial Bay precinct

Figure 40: Location of proposed vegetation removal – Cardwell Street precinct

Figure 41: Location of proposed vegetation removal – Little Bay precinct

Figure 42: Location of proposed vegetation removal – New trail

6.4.2 Indirect Impacts

The following addresses the potential indirect impacts which may be associated with the proposal.

a) **Vegetation and sensitive area trampling:** The proposed new trail will see in increase in foot traffic through the area, inadvertently increasing the risk of vegetation trampling should walkers veer from the designated pathway or form new tracks. Mitigation measures such as pathway design, signage and track maintenance have been proposed to reduce this risk.

b) **Injury/mortality during clearing:** With limited tree hollows, nest, dreys or dense vegetation proposed for removal, the risk of injury to fauna during clearing operations is considered to be minimal.

c) **Inadvertent impacts on retained or adjoining vegetation:** If not properly demarcated and protected, it is possible that retained trees and vegetation on and adjacent to the study area could be impacted by vegetation management activities. Recommendations are provided to reduce this risk.

d) **Erosion and sedimentation:** Potential for impacts on aquatic habitats if erosion and sedimentation measures are not adequately constructed. Any works within watercourses are to be strategically timed to occur when no water is present. The project will also require thorough control measures to reduce sediment laden runoff entering receiving environments.

e) **Noise and Vibration:** The works will create noise and vibration during construction; however, this will only be temporary. Some fauna species may be discouraged from foraging on or adjacent to the study area during construction. Operationally, noise levels are largely anticipated to return to their current levels.

f) **Vegetation Fragmentation:** The proposed works will only result in very minor vegetation fragmentation throughout the study area. The works will not lead to any isolation of habitat and vegetation will remain in the broader areas that will continue to provide connectivity for fauna.

g) **Dust:** Minor levels of dust may be generated during construction and may lead to minor impacts on directly adjoining vegetation. Dust suppression will be undertaken if required to reduce this impact.

h) **Edge effects:** The removal of trees and vegetation has the potential to expose areas of adjoining vegetation to higher edge effects such as wind, light penetration and weed invasion. No large areas of vegetation are proposed to be removed with the majority of vegetation removal restricted to thin strips of vegetation along an outer edge of larger habitat. Although the removal of any vegetation poses a risk of increased edge effects, the limited extent of vegetation proposed for removal is not expected to significantly increase existing edge effects.

i) **Pathogen spread:** With the absence of mitigation measures, there is a potential for the pathogen, Myrtle Rust, to be further spread across the study area during construction activities. Mitigation measures have been proposed to reduce this risk.

j) **Weed invasion:** The proposed works are considered unlikely to introduce any new weed species to the precincts, with these areas already established tourist attractions. The introduction of the new trail, however, is considered to bring the slight risk of weed introduction through any inappropriate disposal of food scraps by walkers. This risk is already present with the informal track often used, and signage has been

recommended to inform walkers of the impacts of food scrap disposal in order to mitigate this increased risk. There is also considered to be a slight potential increase in risk of weed spread across the proposed new trail with an increase in wakers to the area. This risk is not considered significant in consideration that walkers already utilise the informal trail.

7. LEGISLATIVE OBLIGATIONS

7.1 Environment Protection and Biodiversity Conservation Act 1999

7.1.1 MNES Assessment Summary

The provisions of the EPBC Act require determination of whether the proposal has, will or is likely to have a significant impact on a MNES. An assessment of potential MNES which could occur in the locality was undertaken using the Protected Matters Search Tool (DCCEEW 2023a). This search identified a range of MNES with the potential to occur. These matters are summarised in the following table.

Table 17: MNES Assessment Summary

Category	Result	Relevance	Significant Impact Likely?
World Heritage Properties	None	The proposed development will not affect any World Heritage areas.	No
National Heritage Places	None	The proposed development will not affect any National Heritage Places.	No
Wetlands of International Importance	None	The proposed development will not affect any Wetlands of International Importance.	No
Great Barrier Reef Marine Park	None	The proposed development will not affect the Great Barrier Reef Marine Park.	No
Commonwealth Marine Environment	1	The proposed development will not affect a Commonwealth Marine Environment.	No
Listed Threatened Ecological Communities	6	Six listed TECs are listed as known or likely to occur within the locality. Field assessments confirmed that one of these TECs occur within the study area. Assessments have determined that the proposed development will not significantly impact this TEC.	No
Listed Threatened Species	87	Four threatened species were recorded utilising the study area during survey and an additional 12 species are considered to potentially occur. Assessments of these have determined that the proposed works will not significantly impact these species.	No

Category	Result	Relevance	Significant Impact Likely?
Listed Migratory Species	62	Several migratory birds are considered potential occurrences in the study area. Assessments have determined that the proposed development will not significantly impact these species.	No

7.1.2 Commonwealth Marine Environment

A single Commonwealth Marine Environment was identified within the locality. This environment is located within the Pacific Ocean, beginning three nautical miles from the coast. No works are proposed within this Commonwealth Marine Environment and no indirect impacts from the proposed works are anticipated.

7.1.3 Threatened Ecological Community

The Protected Matters Search Tool identified the following EPBC Act-listed TECs that are likely to occur within the assessment area:

- Coastal Swamp Oak (*Casuarina glauca*) Forest of NSW and South East Queensland.
- Coastal Swamp Sclerophyll Forest of NSW and South East Queensland.
- Littoral Rainforest and Coastal Vine Thickets of Eastern Australia.
- Lowland Rainforest of Subtropical Australia.
- Subtropical and Temperate Coastal Saltmarsh.
- Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions.

Field assessments identified that one of these TECs is present within the study area. This comprises the *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia* TEC, which was recorded in every precinct as well as along the proposed new track.

An assessment if significance for this TEC is provided below.

7.1.3.1 Assessment of Significance

An action is likely to have a significant impact on a *Critically Endangered* or *Endangered* ecological community, if it will:

- Reduce the extent of an ecological community.
- Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines.
- Adversely affect habitat critical to the survival of an ecological community.

- Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.
- Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting.
- Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
  - assisting invasive species, that are harmful to the listed ecological community, to become established, or
  - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or
- Interfere with the recovery of an ecological community.

Critical habitat refers to areas critical to the survival of an ecological community and may include areas that are necessary for:

- Activities such as foraging, breeding, roosting or dispersal.
- The long-term maintenance of the ecological community (including the maintenance of species essential to the survival of the ecological community).
- Maintain genetic diversity and long-term evolutionary development.
- Reintroduction of populations or recovery of the community.

7.1.3.1.1 Littoral Rainforest and Coastal Vine Thickets of Eastern Australia TEC

Significant Impact Criteria

Table 18: Significant impact assessment – Littoral Rainforest and Coastal Vine Thickets TEC

Significant Impact Criteria	Details
Reduce the extent of an ecological community.	This TEC occurs patchily throughout the study area and surrounds. The extent of direct impacts proposed within this TEC is limited to the trimming of roadside vegetation and the establishment of walking tracks/paths. These proposed works will require the removal of a minute amount of vegetation (<0.13 hectares) across the entire extent of this TEC. Vegetation removal is limited to the removal of lower stratum vegetation only, in order to widen a road and establish the tracks/paths. This will reduce a very small fraction of its local extent of this TEC.
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines.	The majority of the proposed works within this TEC have been strategically situated in a location containing prior ground disturbance, with the proposed new walking trails largely situated where an informal trail or old disused track occurs. The extent of vegetation removal works is limited to the widening of these paths to conform to a Grade 5 walking trail, where trails are anticipated to be no wider than one meter wide. In consideration of this, and that no canopy vegetation within this

Significant Impact Criteria	Details
	TEC is proposed to be removed, the proposed works are considered unlikely to fragment or increase fragmentation of this TEC.
Adversely affect habitat critical to the survival of an ecological community.	The proposal does not affect any habitat critical to the survival of the community.
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	The proposed works within this TEC will largely see the slight widening on existing tracks. This will require some surface soil disturbance however the limited extent is not anticipated to significantly impact the surrounding abiotic factors that key for the TECs survival. The widening of the existing road within the Trial Bay precinct will require more groundworks, however the existing infrastructure in this area is currently causing hydrological issues, with the work proposed to correct these issues. As such, the proposed works are not anticipated to significant impact abiotic factors that key for this TEC's survival.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting.	The proposal is not anticipated to substantially change the species composition of this TEC.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • assisting invasive species, that are harmful to the listed ecological community, to become established, or • causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.	The proposed development has some potential to reduce the quality of the TEC, with the increased pedestrian use of these areas. These risks are, however, already prevalent and by implementing the mitigation measures proposed, the proposed works are considered likely to reduce the current risks to the TEC. The establishment of the proposed works are anticipated to encourage walkers to remain within the formalised trails, reducing the risk of vegetation trampling. No other impacts are likely to result in the reduction or integrity of the TEC.
Interfere with the recovery of an ecological community.	The minor impact on the TEC is unlikely to interfere with its recovery.
Resulting Impact	**No significant impact**

7.1.4 Threatened Species

Four federally listed threatened species were recorded during the survey period and potential occurrence assessments identified an additional 13 EPBC Act-listed threatened species with the potential to occur. These species are listed below with a Significant Impact Assessment of each following.

Recorded during the survey period:

- Scrub Turpentine (*Rhodamnia rubescens*)
- Native Guava (*Rhodomyrtus psidioides*)
- South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*)
- Koala (*Phascolarctos cinereus*)

Considered to potential occur:

- Scented Acronychia (*Acronychia littoralis*)
- White-flowered Wax Plant (*Cynanchum elegans*)
- Austral Toadflax (*Thesium austral*)
- Red Knot (*Calidris canutus*)
- White-throated Needletail (*Hirundapus caudacutus*)
- Swift Parrot (*Lathamus discolor*)
- Spotted-Tailed Quoll (*Dasyurus maculatus*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- Loggerhead Turtle (*Caretta caretta*)
- Green Turtle (*Chelonia mydas*)
- Hawksbill Turtle (*Eretmochelys imbricata*)
- Flatback Turtle (*Natator depressus*)

7.1.4.1 Assessments of Significance

An action is likely to have a significant impact on a *Critically Endangered* or *Endangered* species, if it will:

- Lead to a long-term decrease in the size of a population.
- Reduce the area of occupancy of this species.
- Fragment an existing population into two or more populations.
- Adversely affect habitat critical to the survival of a species.
- Disrupt the breeding cycle of a population.
- Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

- Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat.
- Introduce disease that may cause the species to decline.
- Interfere with the recovery of the species.

An action is likely to have a significant impact on a *Vulnerable* species, if it will:

- Lead to a long-term decrease in the size of an important population of a species.
- Reduce the area of occupancy of an important population.
- Fragment an existing important population into two or more populations.
- Adversely affect habitat critical to the survival of a species.
- Disrupt the breeding cycle of an important population.
- Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
- Result in invasive species that are harmful to a *Vulnerable* species becoming established in the vulnerable species' habitat.
- Introduce disease that may cause the species to decline.
- Interfere substantially with the recovery of the species.

An *important population* is defined under the MNES Significant Impact Guidelines (Department of the Environment 2013) as one that is necessary for a species' long-term survival and recovery. This includes such populations as:

- Key populations either for breeding or dispersal.
- Populations that are necessary for maintaining genetic diversity.
- Populations that are near the limit of the species range.

Critical habitat refers to areas critical to the survival of a species or ecological community and may include areas that are necessary to/for:

- Activities such as foraging, breeding, roosting or dispersal.
- Succession.
- Maintain genetic diversity and long-term evolutionary development.
- Reintroduction of populations or recovery of the species/community.

7.1.4.1.1 Scrub Turpentine

Significant Impact Criteria

Table 19: Significant impact assessment - Scrub Turpentine

Significant Impact Criteria	Details
Lead to a long-term decrease in the size of a population	The development proposes to retain all Scrub Turpentine recorded in the study area and no works are proposed in the immediate vicinity of these plants. The proposed works, therefore, are unlikely to lead to a direct reduction in the size of the population in the long term.
Reduce the area of occupancy of this species	The proposal will not remove any Scrub Turpentine and the known area of occupancy will not be reduced.
Fragment an existing population into two or more populations	The proposal will not remove any Scrub Turpentine and all vegetation immediately surrounding these plants is to be retained. Each of the plants recorded within the study area are located next to an existing formalise trail, which may already fragment populations. No changes to this nearby trail are proposed. As such, the proposed development is not considered likely to fragment an existing population of the Scrub Turpentine.
Adversely affect habitat critical to the survival of a species	The proposed development will not remove any Scrub Turpentine, nor will it remove any vegetation nearby these plants.
Disrupt the breeding cycle of a population	Due to the extent of Myrtle Rust infection across the remaining Scrub Turpentine populations in Australia, this species is characterised by a lack of successful seedling recruitment and now largely reproduces via suckers. The development does not propose to directly impact any area nearby the recorded plants, hence will not impact any area where the plants may re-shoot.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The development does not propose to remove any Scrub Turpentine and will not directly impact any area of habitat immediately surrounding these plants. As such, the proposed works are not likely to modify habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	The existing Scrub Turpentine within the subject land are already subject to potential weed invasion with walkers already utilising the trail through the area. No changes to this trail are proposed and no other invasive species that are harmful to Scrub Turpentine, are anticipated to be introduced to the study area as a result of the proposed works.
Introduce a disease that may cause the species to decline	Most of the plants of this species were recorded with an existing prevalence of Myrtle Rust. The development is unlikely to result in an increased risk of spread of this disease, further than what currently exists. No other disease that poses a potential risk to this species is likely to be introduced to the site.
Interferes with the recovery of the species	As no Scrub Turpentine are proposed to be removed and no works are proposed nearby the recorded population; the proposal is not likely to interfere with the recovery of this species.
Resulting Impact	**No significant impact**

7.1.4.1.2 Native Guava

Significant Impact Criteria

Table 20: Significant impact assessment – Native Guava

Significant Impact Criteria	Details
Lead to a long-term decrease in the size of a population	The development proposes to retain all Native Guava recorded on the study area. Additionally, the proposal will see an increased protection of these plants with clear, formalised walking trails around the plants, reducing the existing risk of trampling by walkers. The proposed works, therefore, are unlikely to lead to a direct reduction in the size of the population in the long term.
Reduce the area of occupancy of this species	The proposal will not remove any Native Guava and the known area of occupancy will not be reduced.
Fragment an existing population into two or more populations	The proposal will not remove any Native Guava; however, the trail will bisect a population of this species along the proposed new track. This track is already present through the population with the proposed works would utilise the same alignment. Recommendations have been made to ensure this section of the track consists of a raised boardwalk, ensuring that all vegetation surrounding these plants can to be retained. The proposed new track nearby the single Native Guava near the north of the trail consists of a single plant which is already fragmented from other populations by the occurrence of multiple tracks through the area. As such, the proposed development is not considered likely to fragment an existing population of the Native Guava.
Adversely affect habitat critical to the survival of a species	The proposed development will not remove any Native Guava, nor will it remove any vegetation within surrounding these plants. In addition, the development will see numerous protection and management measures implemented which aim to enhance habitat for this species.
Disrupt the breeding cycle of a population	Due to the extent of Myrtle Rust infection across the remaining Native Guava populations in Australia, this species is characterised by a lack of successful seedling recruitment and now largely reproduces via suckers. Mitigation measures to ensure staff and contractor awareness of this species, ecologist supervision during any works within the immediate area, and the implementation of hygiene protocols have been recommended to ensure that the proposed works will not further disrupt the breeding cycle of this species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The development does not propose to remove any Native Guava and will see an increased protection of these plants through the formalisation of the track. As such, the proposed works are not likely to modify habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	The existing Native Guava within the subject land are already subject to potential weed invasion with walkers already utilising the informal track through the area. The proposed works will formalise this track, encouraging walkers to remain on the path, reducing the likelihood of weed invasion spreading into the adjoining community.

Significant Impact Criteria	Details
Introduce a disease that may cause the species to decline	Most of the plants of this species were recorded with an existing prevalence of Myrtle Rust. The development is unlikely to result in an increased risk of spread of this disease, further than what currently exists. No other disease that poses a potential risk to this species is likely to be introduced to the site.
Interferes with the recovery of the species	As no Native Guava is proposed for removal, existing threats of trampling occur within the study area and the proposed works and mitigation measures have been designed to reduce this risk; the proposal is likely to have a positive impact on the Native Guava population within the subject land (assuming that protection and management measures are successfully implemented).
Resulting Impact	**No significant impact**

7.1.4.1.3 Austral Toadflax

Important Population Assessment

Any potentially occurring population of this species within the study area is likely to be small in consideration that it was not detected during site surveys. Should a population of this species occur within the study area, it is hence, unlikely to represent an important population of this species.

Significant Impact Criteria

Table 21: Significant impact assessment – Austral Toadflax

Significant Impact Criteria	Details
Lead to a long-term decrease in the size of an important population of a species	This species was not recorded during site surveys however, there is the potential for this cryptic species to occur within the Themeda Grassland communities. The establishment of the proposed works where these species have the potential to occur would consist of minor groundworks in order to establish walking tracks. This establishment of the track aims to discourage walkers from trampling over an area of potential habitat for this species, which is a threat already present. Despite the track design in this area aiming to discourage walkers leaving the track, the increased foot traffic that will result from the establishment of the new track may result in an increased risk of trampling, in the instances where walkers stray from the path. This risk is present however is considered unlikely to place a potential population at a significant decline. Any Austral Toadflax occurring in proximity will maintain the opportunity to recruit within the study area post construction and there would be no change in pollination or dispersal for these populations. As such, it is considered unlikely that proposed works will be able to reduce the size of a potentially occurring population.
Reduce the area of occupancy of an important population	No individuals were found within the works footprint during site surveys however, there is the potential for this cryptic species to occur within

Significant Impact Criteria	Details
	the Themeda Grassland communities. The extent of works proposed within these suitable habitat areas is limited to the development of a single gravel pathway around the edge of one of the Themeda Grassland communities. The establishment of this pathway will very minutely reduce the area of occupancy for a potentially occurring population of this species.
Fragment an existing important population into two or more populations	The proposed track within the potential habitat for this species would be situated around the outer edges of the community, ensuring that fragmentation of a potential population would not result. No barrier to pollination or any form of genetic dispersal is likely for any plant given no barrier is created to animal pollinators or wind vectors, or to dispersal via wind, water or animal vectors. Thus, no population would become fragmented as a result.
Adversely affect habitat critical to the survival of a species	This species was not recorded within the proposed works footprint. The Themeda Grassland communities within the study area may form habitat critical to the survival of this species, however the project design has ensured that impacts to this mitigated from the formalisation of the new track. At present, walkers trample through this vegetation community, impacting its integrity. The proposed works will see a formal pathway around the edge of this community and educational signage, discouraging pedestrians from trampling this critical habitat. Despite this design, there is the potential for some walkers to leave the formed pathway, which maintains the risk of trampling. The extent of this anticipated, in consideration that this risk is currently highly present, is no considered likely to be significant.
Disrupt the breeding cycle of an important population	The breeding cycles of the Austral Toadflax is unlikely to be disrupted due to the minor scale of the works. The works are unlikely to affect pollination or recruitment.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The degree of possible vegetation loss imposed by the proposed activity is not significant enough to affect a local population of the Austral Toadflax to the point that it could cause a decline of the species.
Result in invasive species, that are harmful (by competition, modification of habitat, or predation) to Vulnerable species becoming established in the Vulnerable species' habitat	There is potential for further spread of weeds in disturbance areas or the possible introduction of new weed species during construction or by walkers, which may increase competition; however, weed control measures are recommended to reduce this risk.
Introduce a disease that may cause the species to decline	Diseases such as Phytophthora are existing threats to this species. The risk will be mitigated by hygiene protocols for the construction phase to minimise risk of the diseases being introduced via contaminated plant, tools, and footwear e.g., imported from use in areas where such diseases are present.

Significant Impact Criteria	Details
Interferes substantially with the recovery of the species	The proposed works would result in the removal of a relatively minute area of habitat for the Austral Toadflax that is not significant enough to interfere with its recovery.
Resulting Impact	**No significant impact**

7.1.4.1.4 Other Threatened Plants (Scented Acronychia, White-flowered Wax Plant)

Significant Impact Criteria

Table 22: Significant impact assessment – Other Threatened Plants

Significant Impact Criteria	Details
Lead to a long-term decrease in the size of a population	None of the subject species were identified present within the study area during site survey. Any potentially occurrence of these species within the area, are hence, likely to be limited to the isolated, immature individual. Any occurrences of these species are likely to be within the broader study area and not within the works footprint that was extensively surveyed. The establishment of the proposed works where these species have the potential to occur would consist of minor groundworks in order to establish walking tracks, where plants of these species would be readily identifiable. Any that occur in proximity will maintain the opportunity to recruit within the study area post construction and there would be no change in pollination or dispersal for these populations. As such, it is considered unlikely that proposed works will be able to reduce the size of a potentially occurring population.
Reduce the area of occupancy of this species	The proposal is unlikely to remove any of the subject species and the known area of occupancy will not be reduced.
Fragment an existing population into two or more populations	No barrier to pollination or any form of genetic dispersal is likely for any plant given no barrier is created to animal pollinators or wind vectors, or to dispersal via wind, water or animal vectors. Thus, no population would become fragmented as a result.
Adversely affect habitat critical to the survival of a species	These species were not recorded within the proposed works footprint and vegetation within this area is not considered critical habitat for these species. Post-works, the remainder of the study area and other habitats in the locality will retain the potential to support these species, hence retaining the viability of any occurring local population.
Disrupt the breeding cycle of a population	The breeding cycles of the subject plant species are unlikely to be disrupted due to the minor scale of the works and given that no mature plants would be impacted. The works are unlikely to affect pollination or recruitment.
Modify, destroy, remove or isolate or decrease the availability or quality of	The degree of possible vegetation loss imposed by the proposed activity is not significant enough to affect a local population of the

Significant Impact Criteria	Details
habitat to the extent that the species is likely to decline	subject species to the point that it could cause a decline of the species.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	There is potential for further spread of weeds in disturbance areas or the possible introduction of new weed species during construction or by walkers, which may increase competition; however, weed control measures are recommended to reduce this risk.
Introduce a disease that may cause the species to decline	Diseases such as Phytophthora are existing threats to these species. The risk will be mitigated by hygiene protocols for the construction phase to minimise risk of the diseases being introduced via contaminated plant, tools, and footwear (e.g. imported from use in areas where such diseases are present).
Interferes with the recovery of the species	The proposed works would result in the removal of a relatively minute area of habitat for the subject species that is not significant enough to interfere with their recovery.
Resulting Impact	**No significant impact**

7.1.4.1.5 South-eastern Glossy Black-Cockatoo

Important Population Assessment

The South-eastern Glossy Black-Cockatoo population utilising the study area are not considered to represent an important population of these species as the extent of available habitat in the broader area is likely to indicate that a potentially occurring population is unlikely to be necessary for maintaining genetic diversity. The study area is also not located near the limit of these species' ranges.

Significant Impact Criteria

Table 23: Significant impact assessment – South-eastern Glossy Black-Cockatoo

Significant Impact Criteria	Details
Lead to a long-term decrease in the size of an important population of a species	The proposal may require the removal or trimming of a very minor extent of foraging resource for this species. This provides a very small potential foraging resource for this species which would be dependent on broader vegetated areas to support its life cycle. Given the limited foraging resources to be removed, that no nesting habitat occurs within the study area and the highly mobile nature of these birds, the proposal is unlikely lead to a decrease in the potential local population.
Reduce the area of occupancy of an important population	The proposal will result in the loss of only a single foraging resource for a local South-eastern Glossy Black-Cockatoo population which is insignificant in relation to the extent of their range.
Fragment an existing important population into two or more populations	The South-eastern Glossy Black-Cockatoo is highly mobile and known to be capable of crossing human-modified habitat. The proposed works will offer no barrier to movement. Thus, it will not fragment an existing population.

Significant Impact Criteria	Details
Adversely affect habitat critical to the survival of a species	The vegetation to be removed is not considered critical habitat for the South-eastern Glossy Black-Cockatoo due to the ecology of the species. Post-construction, other habitats in the locality will retain the potential to support these species, hence helping support the viability of the local population.
Disrupt the breeding cycle of an important population	The habitat to be removed does not represent potential breeding habitat for the South-eastern Glossy Black-Cockatoo given the absence of tree hollows. The removal of this habitat would hence not be capable of disrupting the breeding cycle of this species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The degree of possible vegetation loss imposed by the proposed development is not considered significant enough to affect a local population of the South-eastern Glossy Black-Cockatoo to the point that it could cause a decline of the species.
Result in invasive species, that are harmful (by competition, modification of habitat, or predation) to Vulnerable species becoming established in the Vulnerable species' habitat	No new species that affects the South-eastern Glossy Black-Cockatoo is likely to be introduced as a direct result of the proposed works.
Introduce a disease that may cause the species to decline	No disease that poses a potential risk to this species is likely to be introduced to the study area.
Interferes substantially with the recovery of the species	The proposal will result in the removal of a relatively minute area of foraging habitat for the South-eastern Glossy Black-Cockatoo, that is not significant enough to interfere with their recovery.
Resulting Impact	**No significant impact.**

7.1.4.1.6 Koala

Significant Impact Criteria

Table 24: Significant impact assessment - Koala

Significant Impact Criteria	Details
Lead to a long-term decrease in the size of a population	The study area provides a known foraging resource for the Koala. The proposed works propose to potentially remove a single regrowth preferred foraging resource for this species. Recommendations of ecologist pre-clearing surveys in areas that contain foraging resources for this species have also been proposed to ensure that any vegetation removal works will not cause additional stress to any individuals present at the time of works. As such, the proposal is considered unlikely to lead to a direct reduction in the size of the population in the long term.
Reduce the area of occupancy of this species	The proposal may remove up to one preferred foraging tree for this species. The removal of this single tree will not reduce the area of occupancy for the local population.

Significant Impact Criteria	Details
Fragment an existing population into two or more populations	The extent of vegetation removal is proposed to consist of thin areas along the edge of larger patches of vegetation. No barriers to movement for this species are proposed. The Koala is a relatively mobile species and will continue to be able to readily traverse through the study area, post development. Given these factors, there is no potential for fragmentation or isolation of the local population.
Adversely affect habitat critical to the survival of a species	The proposal may remove up to one preferred foraging tree for this species and will only impact a minor extent of lower stratum vegetation within areas of suitable habitat for this species. As such, the proposed works are not likely to adversely affect habitat critical to the survival of this species.
Disrupt the breeding cycle of a population	The proposal may remove up to one preferred foraging tree for this species and will only impact a minor extent of lower stratum vegetation within areas of suitable habitat for this species. Post-construction, the study area will retain its anthropogenic land uses. It is hence, not capable of disrupting the breeding cycle of a population of this species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	As detailed previously the proposal may remove up to one preferred foraging tree for this species. The extent of vegetation removal is not critical to this species and is small in relation to the extent required to support the life-cycle requirements of the Koala. As such, the removal of this vegetation is unlikely to affect the local population of the Koala to the point that it could cause the species to decline.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	No new species that affects the Koala is likely to be introduced as a direct result of the proposal.
Introduce a disease that may cause the species to decline	No disease that poses a potential risk to this species is likely to be introduced to the site.
Interferes substantially with the recovery of the species	The proposal will result in the removal of a relatively minute area of vegetation from within areas of suitable habitat for this species. Only a single regrowth Koala food tree species may be removed and no barriers to movement or increase in threats to this species will be introduced. The proposed works is hence, not likely to interfere with the recovery of the Koala.
Resulting Impact	**No significant impact.**

7.1.4.1.7 Red Knot

Significant Impact Criteria

Table 25: Significant impact assessment – Red Knot

Significant Impact Criteria	Details
Lead to a long-term decrease in the size of a population	Suitable habitat for this species within the study area consists of the sandy beaches. The only proposed works to occur within this suitable habitat is low impact ground works in small areas of the Trial Bay and Cardwell Street precincts. Given this limited extent of works and the highly mobile nature of this species, the proposal is unlikely lead to a decrease in the potential local population.
Reduce the area of occupancy of this species	The proposed works will not reduce the area of occupancy for this species.
Fragment an existing population into two or more populations	The Red Knot is highly mobile and known to be capable of crossing human-modified habitat. The proposal will offer no barrier to movement. Thus, it will not fragment an existing population.
Adversely affect habitat critical to the survival of a species	The vegetation to be removed is not considered suitable habitat for this species. Some minor works are proposed to be constructed within sandy areas nearby existing accessways. These areas are also not likely to be suitable for this species.
Disrupt the breeding cycle of a population	The habitats to be removed do not represent potential breeding habitat for this species. Habitats within the development footprint are likely to only represent the occasional roosting habitat during low tides. The proposed works would hence not be capable of disrupting the breeding cycle of the subject species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The degree of possible vegetation loss imposed by the proposed works is not significant enough to affect a local population of this species to the point that it could cause a decline of the species.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	No new species that affects the Red Knot is likely to be introduced as a direct result of the proposal.
Introduce a disease that may cause the species to decline	No disease that poses a potential risk to this species is likely to be introduced to the development footprint.
Interferes substantially with the recovery of the species	The proposal will result in the removal of a relatively minute area of suitable habitat for this species that is not significant enough to interfere with their recovery.
Resulting Impact	**No significant impact**

7.1.4.1.8 White-throated Needletail

Important Population Assessment

The White-throated Needletail population potentially utilising the study area is not considered to represent an *important population* of this species. Breeding does not occur in Australia and the study area is also not located within the limit of this species' range.

Significant Impact Criteria

Table 26: Significant impact assessment – White-throated Needletail

Significant Impact Criteria	Details
Lead to a long-term decrease in the size of an important population of a species	The White-throated Needletail is an aerial forager, and the works would be unlikely to negative impact this species. The proposed works would therefore be unlikely to lead to a decrease of an important population.
Reduce the area of occupancy of an important population	The modification of habitat within the study area would not reduce the area of occupancy of this species given it is highly mobile and foragers over large expanses of habitat.
Fragment an existing important population into two or more populations	The White-throated Needletail is predominately an aerial species and highly mobile. The proposal will offer no barrier to movement. Thus, it will not fragment an existing important population.
Adversely affect habitat critical to the survival of a species	The vegetation within the study area is not considered critical habitat for the White-throated Needletail. Post-development, the remainder of the site and other habitats in the locality will retain the potential to support this species, hence helping support the viability of the local population.
Disrupt the breeding cycle of an important population	The White-throated Needletail is a migratory species and does not breed in Australia. The removal of this habitat would hence not be capable of disrupting the breeding cycle of the White-throated Needletail.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The degree of possible vegetation loss imposed by the works is not significant enough to affect a local population of the White-throated Needletail to the point that it could cause a decline of the species.
Result in invasive species, that are harmful (by competition, modification of habitat, or predation) to a Vulnerable species, becoming established in the Vulnerable species' habitat	No new species that affects the White-throated Needletail is likely to be introduced as a direct result of the proposed works.
Introduce a disease that may cause a species to decline	No disease that poses a potential risk to this species is likely to be introduced to the study area.
Interferes substantially with the recovery of the species	The works would be unlikely to interfere with the recovery of this species. No threats to this species will be introduced as a result of the proposal.
Resulting Impact	**No significant impact**

7.1.4.1.9 Swift Parrot

Significant Impact Criteria

Table 27: Significant impact assessment – Swift Parrot

Significant Impact Criteria	Details
Lead to a long-term decrease in the size of a population	The proposal will require the removal of up to 16 native canopy trees, planted landscaping trees and the occasional lower-stratum vegetation throughout the study area. This provides a very small potential foraging resource within the nomadic range of the Swift Parrot. Given the extent of retained habitat, as well as adjacent and nearby habitats, the highly mobile nature of this species, and the relatively small area of habitat to be removed, the proposal is unlikely lead to a decrease in the potential local population.
Reduce the area of occupancy of this species	The proposal will result in the loss of nil to a very small number of foraging resources for a potential local Swift Parrot population. This vegetation loss is considered insignificant in relation to the extent of their range.
Fragment an existing population into two or more populations	The Swift Parrot is highly mobile and known to be capable of crossing human-modified habitat. The proposed works will offer no barrier to movement to this species. Thus, it will not fragment an existing population.
Adversely affect habitat critical to the survival of a species	The vegetation to be removed is not considered critical habitat for the Swift Parrot due to the ecology of the species. Post-development, the remainder of the study area and other habitats in the locality will retain the potential to support these species, hence helping support the viability of the local population.
Disrupt the breeding cycle of a population	The habitat to be removed does not represent potential breeding habitat for the Swift Parrot which breeds in Tasmania. The removal of this habitat would hence not be capable of disrupting the breeding cycle of the Swift Parrot.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The degree of possible vegetation loss imposed by the proposed development is not considered significant enough to affect a local population of the Swift Parrot to the point that it could cause a decline of the species.
Result in invasive species that are harmful to a critically endangered species becoming established in the critically endangered species' habitat	No new species that affects the Swift Parrot is likely to be introduced as a direct result of the proposal.
Introduce a disease that may cause the species to decline	No disease that poses a potential risk to the Swift Parrot is likely to be introduced to the study area.

Significant Impact Criteria	Details
Interferes substantially with the recovery of the species	The proposal will result in the removal of a very small extent of vegetation within an area of potential foraging habitat for the Swift Parrot, that is not significant enough to interfere with their recovery.
Resulting Impact	**No significant impact**

7.1.4.1.10 Spotted-tailed Quoll

Significant Impact Criteria

Table 28: Significant impact assessment – Spotted-tailed Quoll

Significant Impact Criteria	Details
Lead to a long-term decrease in the size of a population	The proposal will require the removal of up to 16 native canopy trees, planted landscaping trees and the occasional lower-stratum vegetation throughout the study area. Vegetation proposed to be removed consists of the occasional thin strip of vegetation from across the extent of the entire study area. These form relatively small areas of habitat to be impacted in proportion to the foraging and denning habitats available for this species within the broader study area and national parks. No potential denning resources are present within the works footprint; hence, none will be impacted by the proposed works. The study area will, hence, continue to offer foraging and denning habitat for the Spotted-tailed Quoll as part of a larger home range. The Spotted-tailed Quoll is highly mobile and known to be capable of crossing human-modified habitat. With no barriers to movement proposed, the proposal will not lead to a long-term decrease of a potentially occurring population.
Reduce the area of occupancy of this species	While the proposed works will remove/modify a small proportion of the study areas potential habitat for the Spotted-tailed Quoll, this loss is only a minor fraction of a potential territory of a single individual. Extensive forests occur adjacent to the study area and the broader national parks. Consequently, the majority of habitat potentially utilised by a local population is not affected by this proposal and therefore will not significantly reduce the area of occupancy of a population.
Fragment an existing population into two or more populations	The Spotted-tailed Quoll is highly mobile species and known to be capable of crossing human-modified habitat (DCCEEW 2023b). The proposed works will not create any barriers to movement. Thus, it will not fragment an existing population.
Adversely affect habitat critical to the survival of a species	The proposed works footprint potentially forms a small part of the Spotted-tailed Quoll's wider home range, and potential foraging and denning habitat in the broader national parks is relatively extensive. Connectivity across the study area and to adjacent habitat will be maintained post-construction. Given the available habitats to be retained for this species, the habitats within the study area are not considered habitat critical to the survival of the Spotted-tailed Quoll.

Significant Impact Criteria	Details
Disrupt the breeding cycle of a population	The proposal is not expected to disrupt the breeding cycle of a population given that: • No habitat features such as hollow-bearing trees will be impacted. • The potential for this species to occur and breed in the study area will be retained post-construction. • The proposed works footprint only forms a minute part of their local range, and hence lifecycle requirements. Alternative potential habitat in the study area and surrounds is extensive.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The degree of possible vegetation loss imposed by the proposed works in relation to the extensive areas of habitats to be retained within the broader area is not significant enough to affect a potential local population of the Spotted-tailed Quoll to the point that it could cause a decline of the species.
Result in invasive species that are harmful to a critically endangered species becoming established in the critically endangered species' habitat	No new species that affects the Spotted-tailed Quoll is likely to be introduced as a direct result of the proposal.
Introduce a disease that may cause the species to decline	No disease that poses a potential risk to this species is likely to be introduced to the study area.
Interferes substantially with the recovery of the species	The proposal will result in the removal of a relatively minute area of foraging habitat for the Spotted-tailed Quoll that is not significant enough to interfere with their recovery.
Resulting Impact	**No significant impact.**

7.1.4.1.11 Grey-headed Flying-fox

Important Population Assessment

The Grey-headed Flying-fox population potentially utilising the development site is considered to represent an *important population* of this species. The nearest Flying-fox camp is located south of Saltwater Lagoon, just over one kilometre from the study area. Population statistics of this camp have not been verified since 2018, however there are known large camps of this species only 28 kilometres south-east, within the Kempsey township (DCCEEW 2023c). As such, foraging individuals potentially utilising the development site are likely to be key for breeding.

Significant Impact Criteria

Table 29: Significant impact assessment - Grey-headed Flying-fox

Significant Impact Criteria	Details
Lead to a long-term decrease in the size of an important population of a species	The proposal will require the removal of up to 16 native canopy trees, planted landscaping trees and the occasional lower-stratum vegetation throughout the study area. This likely provides an

Significant Impact Criteria	Details
	extremely small nectar resource for the population relative to its ecological requirements and local extent of potential habitat. While in very strict terms a negative effect, this loss will have a very minor impact on the local Grey-headed Flying-fox populations as the site in total would only form a very minute fraction of this species wider opportunistic/seasonally variable foraging range. The study area is also not a known roost for the Grey-headed Flying-fox (DCCEEW 2023b) and alternative foraging habitat in the locality is evidently extensive. The proposal will thus not lead to a long-term decrease in the size of these important populations.
Reduce the area of occupancy of an important population	The minor loss of foraging habitat in the study area is insignificant relative to the area of occupancy which is measured in terms of hundreds of thousands of hectares. Consequently, the proposal would not reduce the area of occupancy of the important population.
Fragment an existing important population into two or more populations	The Grey-headed Flying-fox is highly mobile and known to be capable of crossing human-modified habitat. The proposal will offer no barrier to movement. Thus, it will not fragment an existing important population.
Adversely affect habitat critical to the survival of a species	The vegetation in the works footprint is not considered critical habitat for the Grey-headed Flying-fox. Post-development, the remainder of the study area and other habitats in the locality will retain the potential to support this species, hence helping support the viability of the local population.
Disrupt the breeding cycle of an important population	The habitat to be removed does not represent potential breeding habitat. The removal of this habitat would hence not be capable of disrupting the breeding cycle of the Grey-headed Flying-fox.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The degree of possible vegetation loss imposed by the proposed works is not significant enough to affect a local population of the Grey-headed Flying-fox to the point that it could cause a decline of the species.
Result in invasive species, that are harmful (by competition, modification of habitat, or predation) to Vulnerable species becoming established in the Vulnerable species' habitat	No new species that affects the Grey-headed Flying-fox is likely to be introduced as a direct result of the proposal.
Introduce a disease that may cause the species to decline	No disease that poses a potential risk to this species is likely to be introduced to the site.
Interferes substantially with the recovery of the species	The proposal will result in the removal of a relatively minute area of foraging habitat for the Grey-headed Flying-fox that is not significant enough to interfere with their recovery.
Resulting Impact	**No significant impact**

7.1.4.1.12 Endangered Turtles (Loggerhead Turtle)

Significant Impact Criteria

Table 30: Significant impact assessment – Endangered Turtles

Significant Impact Criteria	Details
Lead to a long-term decrease in the size of a population	Suitable habitat for this species within the study area consists of the sandy beaches. The only proposed works to occur within this suitable habitat is low impact ground works in small areas of the Trial Bay and Cardwell Street precincts. Given this limited extent of works and the situation of the works within an already disturbed and busy area which would not be suitable for this species, the proposal is unlikely lead to a decrease in the potential local population.
Reduce the area of occupancy of this species	The proposed works will not reduce the area of occupancy for this species.
Fragment an existing population into two or more populations	The proposal will offer no barrier to movement for this species. Thus, it will not fragment an existing population.
Adversely affect habitat critical to the survival of a species	Some minor works are proposed to be constructed within sandy areas nearby existing pedestrian accessways. Although technically suitable for nesting, these areas are highly frequented by visitors and already contain access infrastructure. Due to these factors, it is considered unlikely these areas would be used as a nesting site. As such, the proposal will not affect any habitat critical to the survival of this species.
Disrupt the breeding cycle of a population	As previously stated, the habitats to be impacted do not represent potential breeding habitat for this species. The proposed works would hence not be capable of disrupting the breeding cycle of this species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The degree of possible habitat modification by the proposed works is not significant enough to affect a local population of this species to the point that it could cause a decline of the species.
Result in invasive species that are harmful to a critically endangered species becoming established in the critically endangered species' habitat	No new species that affects the Loggerhead Turtle is likely to be introduced as a direct result of the proposal.
Introduce a disease that may cause the species to decline	No disease that poses a potential risk to this species is likely to be introduced to the development footprint.
Interferes substantially with the recovery of the species	No foraging habitat for this species occurs within the study area. The proposal will result in the minor alteration of a portion of habitat which is not considered to represent suitable breeding habitat for this species. The degree of habitat modification is not significant enough to interfere with the recovery of this species.
Resulting Impact	**No significant impact**

7.1.4.1.13 Vulnerable Turtles (Green Turtle, Hawksbill Turtle, Flatback Turtle)

Important Population Assessment

The turtle populations potentially utilising the study area are considered to represent an important population of these species.

Significant Impact Criteria

Table 31: Significant impact assessment – Vulnerable Turtles

Significant Impact Criteria	Details
Lead to a long-term decrease in the size of an important population of a species	Suitable habitat for these species within the study area consists of the sandy beaches. The only proposed works to occur within this suitable habitat is low impact ground works in small areas of the Trial Bay and Cardwell Street precincts. Given this limited extent of works and the situation of the works within an already disturbed and busy area which would not be suitable for these species, the proposal is unlikely lead to a decrease in the potential local population.
Reduce the area of occupancy of an important population	The proposed works will not reduce the area of occupancy for the subject species.
Fragment an existing important population into two or more populations	The proposal will offer no barrier to movement for the subject species. Thus, it will not fragment an existing population.
Adversely affect habitat critical to the survival of a species	Some minor works are proposed to be constructed within sandy areas nearby existing pedestrian accessways. Although technically suitable for nesting, these areas are highly frequented by visitors and already contain access infrastructure. Due to these factors, it is considered unlikely these areas would be used as a nesting site. As such, the proposal will not affect any habitat critical to the survival of the subject species.
Disrupt the breeding cycle of an important population	As previously stated, the habitats to be impacted do not represent potential breeding habitat for the subject species. The proposed works would hence not be capable of disrupting the breeding cycle of these species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The degree of possible habitat modification by the proposed works is not significant enough to affect a local population of these species to the point that it could cause a decline of the species.
Result in invasive species, that are harmful (by competition, modification of habitat, or predation) to Vulnerable species becoming established in the Vulnerable species' habitat	No new species that affects the subject species is likely to be introduced as a direct result of the proposal.

Significant Impact Criteria	Details
Introduce a disease that may cause the species to decline	No disease that poses a potential risk to the subject species is likely to be introduced to the development footprint.
Interferes substantially with the recovery of the species	No foraging habitat for these species occurs within the study area. The proposal will result in the minor alteration of a portion of habitat which is not considered to represent suitable breeding habitat for these species. The degree of habitat modification is not significant enough to interfere with the recovery of the subject species.
Resulting Impact	**No significant impact**

7.1.5 Migratory Species

The Protected Matters Search Tool identified numerous EPBC Act-listed migratory species with the potential to occur within the locality. Potential occurrence assessments identified 13 of these which have the potential to occur within the study area. These species are listed below with a Significant Impact Assessment following:

- Red Knot *(Calidris canutus)*
- Greater Sand Plover *(Charadrius leschenaultia)*
- White-throated Needletail *(Hirundapus caudacutus)*
- Black-faced Monarch *(Monarcha melanopsis)*
- Satin Flycatcher *(Myiagra cyanoleuca)*
- Osprey *(Pandion haliaetus)*
- Rufous Fantail *(Rhipidura rufifrons)*
- Little Tern *(Sternula albifrons)*
- Spectacled Monarch *(Symposiachrus trivirgatus)*

7.1.5.1 Assessment of Significance

The guidelines to assessment of significance define an action as likely to have a significant impact on a migratory species, if it will:

- Substantially modify (including fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat of the migratory species; or
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat of the migratory species; or
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the species.

An important area of habitat is defined under the MNES Impact Guidelines 1.1 (Department of the Environment 2013) as:

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

7.1.5.1.1 Migratory birds and turtles

Important habitat assessment

The works footprint is not considered likely to constitute an important area of habitat for the subject species on the basis of the following:

- The subject species are unlikely to occur within the works footprint other than as a fly-over or sand forager.
- Habitat for this species is locally abundant.

Significant Impact Criteria

Table 32: Significant impact assessment – Migratory birds and turtles

Significant Impact Criteria	Details
Substantially modify (including fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat of the migratory species	The works footprint is not considered likely to constitute an important area of habitat. Although the proposed works would remove a small portion of potential habitat for these species, the occurrence of these species is considered most likely to be nearby the study area and not within the works footprint. Given this, the proposed development would not substantially modify, destroy or isolate an area of important habitat for these migratory species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat of the migratory species	An invasive species is one that may become established in the habitat, and harm the migratory species by direct competition, modification of habitat, or predation. The proposed works would not introduce any such invasive species.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the species	No disruption of the lifecycle of these migratory species is likely, as the breeding is unlikely to occur within the study area. Additionally, vegetation requiring removal does not comprise a significant extent of potential foraging habitat.
Resulting Impact	**No significant impact**

7.2 Fisheries Management Act 1994

The study area is located along the coastline and contains numerous mapped watercourses. As such, assessment of the proposed development under the *Fisheries Management Act 1994* is required. This section addresses this legislation in relation to the proposed works.

7.2.1 Waterway Definition and Description

The Pacific Ocean fringes the entire study area, with a portion of the Trial Bay precinct mapped over this oceanic system. In addition, numerous mapped watercourses occur throughout the study area, all of which consist of unnamed coastal drainages and seeps, flowing from areas of higher elevation.

As per the Policy and Guidelines and Fish Habitat Conservation and Management (DPI 2013), the Pacific Ocean qualifies as a Class 1 waterway for fish passage, representing major key fish habitat. All the mapped, unnamed watercourses that bisect the study area qualify as Class 4 waterways, considered to be unlikely to contain key fish habitat. At the time of survey, these waterways contained little to no standing water and did not contain defined drainage channels. Classification of these watercourses under the Strahler system range from first to third order streams, with most of these directly flowing into the adjoining ocean.

7.2.2 Aquatic Vegetation

No aquatic vegetation was recorded present within the unnamed watercourses.

7.2.3 Key Fish Habitat

A review of the Department of Primary Industries Key Fish Habitat mapping (Department of Primary Industries 2023a) indicates that the entire Pacific Ocean surrounding the study area is Key Fish Habitat. This is to be expected, with marine environments critical habitat for a significant number of aquatic species. Due to variations in spatial datums, portions of this mapped area extend beyond the shoreline, where fish would not inhabit (i.e. over the carpark at the Trial Bay Goal). These mapped areas are not considered to be Key Fish Habitat, with the extent of this habitat restricted to the aquatic environments adjoining.

An additional mapped area of Key Fish habitat occurs near Gap Beach. This mapped area covers the extent of a third order stream which further flows into Gap Beach. This watercourse consists of a low-lying area between the two adjoining, elevated mountain slopes. The very northern tip of this mapped area occurs within the study area for the proposed new track, where it turns to head up the southern face of Little Smoky. Site surveys within this area indicated that this watercourse consists of a low-lying area with no clearly defined drainage channel, it is more representative of a low-lying wet forest community. The portion of the mapped Key Fish Habitat within the study area was dry, with formed pedestrian tracks already running through the proposed footprint.

The Department of Primary Industries mapping of Key Fish Habitat in relation to the study area is provided in Figure 43.

Figure 43: Key Fish Habitat mapping

7.2.4 Fauna Habitats

The portion of the Pacific Ocean within the study area consists of the sandy shorelines of various beaches and the rocky shoreline in the north of the Trial Bay precinct.

No aquatic faunal habitats are present within the other mapped watercourses across the study area, with all of these devoid of water, aquatic vegetation and defined banks at the time of survey.

7.2.4.1 Local Records of Threatened Fauna and Populations

A review of BioNet Atlas (DPE 2023a) identified numerous local records of threatened aquatic fauna within the locality. Each of these were oceanic species and records were confined to the adjoining ocean.

7.2.4.2 Potential Occurrence Assessment

The Protected Matters Search Tool (DCCEEW 2023a) identified numerous threatened aquatic fauna with the potential to occur within the locality. These have been assessed for their potential to occur within the study area in Appendix C. No threatened species listed under the *Fisheries Management Act 1994* are considered to potentially occur within the study area.

7.2.4.3 Impacts of the Proposal

The proposed works are to upgrade facilities where numerous unnamed coastal drainages and seeps occur, and on land adjoining an oceanic system. No works are proposed to occur within the oceanic environments.

There is the potential for track widening works to be required in the third order stream mapped as Key Fish Habitat. Any works within this area will be minimal, with the desired tracks already formed in this location. No works are required in the adjoining waterway (of which the Key Fish Habitat mapping is centred) with the maximum extent of works that may be required being the slight widening of this intersection area so as to clearly identify the pathway for walkers. This would require the removal of a small strip of native vegetation, none of which is aquatic. This and all other works within the mapped drainages are proposed to be conducted during dry periods, where no standing or flowing water is present.

7.2.4.4 Permit Requirement

The proposal may require track widening works within a mapped area of Key Fish Habitat. As per Section 199 of the *Fisheries Management Act 1994*, should these works be required, the Minister is to be given written notice of the proposed work, prior to commencement.

7.3 Biodiversity Conservation Act 2016

7.3.1 Assessment Pathways

Under the NSW BC Act, Part 5 developments under the EP&A Act are not required to enter into the Biodiversity Offset Scheme (BOS) unless significant impacts to threatened entities are likely to result.

Given that assessment under the BOS is not required for Part 5 proposals, a Test of Significance has been carried out to assess the potential impacts of the proposal on threatened species and ecological communities.

7.3.2 Test of Significance

The Test of Significance is prescribed in Part 7, Division 1, Section 7.3 of the BC Act. The purpose of the Test of Significance is to determine whether the proposed works are likely to significantly affect threatened species or ecological communities, or their habitats.

If it is determined that the proposed works will have a significant effect on an entity, a Biodiversity Development Assessment Report (BDAR) will be required if the proponent so elects, or if not, a Species Impact Statement must be prepared.

The Test of Significance has been prepared in consideration of the *Threatened Species Test of Significance Guidelines* (OEH 2018).

7.3.2.1 Entities Assessed

The following BC Act threatened species were recorded during the field survey.

- Scrub Turpentine (*Rhodamnia rubescens*)
- Native Guava (*Rhodomyrtus psidioides*)
- South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*)
- Pied Oystercatcher (*Haematopus longirostris*)
- White-bellied Sea Eagle (*Haliaeetus leucogaster*)
- Powerful Owl (*Ninox strenua*)
- Eastern Osprey (*Pandion cristatus*)
- Little Bent-wing Bat (*Miniopterus australis*)
- Koala (*Phascolarctos cinereus*)

Potential occurrence assessments in Appendix C have determined that the following additional BC Act listed threatened species also have the potential to occur within the study area:

- Scented Acronychia (*Acronychia littoralis*)
- Knicker Nut (*Caesalpinia bonduc*)
- White-flowered Wax Plant (*Cynanchum elegans*)

- Austral Toadflax (*Thesium austral*)
- Sanderling (*Calidris alba*)
- Barred Cuckoo-shrike (*Coracina lineata*)
- Beach Stone-curlew (*Esacus magnirostris*)
- Little Lorikeet (*Glossopsitta pusilla*)
- Sooty Oystercatcher (*Haematopus fuliginosus*)
- Little Eagle (*Hieraaetus morphnoides*)
- Swift Parrot (*Lathamus discolor*)
- Square-tailed Kite (*Lophoictinia isura*)
- Wompoo Fruit-Dove (*Ptilinopus magnificus*)
- Rose-crowned Fruit-Dove (*Ptilinopus regina*)
- Little Tern (*Sternula albifrons*)
- Masked Owl (*Tyto novaehollandiae*)
- Sooty Owl (*Tyto tenebricosa*)
- Spotted-tailed Quoll (*Dasyurus maculatus*)
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Eastern Coastal Free-tail Bat (*Micronomus norfolkensis*)
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*)
- Squirrel Glider (*Petaurus norfolcensis*)
- Brush-tailed Phascogale (*Phascogale tapoatafa*)
- Common Planigale (*Planigale maculata*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)
- Common Blossom Bat (*Syconycteris australis*)
- Loggerhead Turtle (*Caretta caretta*)
- Green Turtle (*Chelonia mydas*)
- New Zealand Fur-seal (*Arctocephalus forsteri*)
- Australian Fur-seal (*Arctocephalus pusillus doriferus*)

A test of Tests of Significance for these entities is provided below.

7.3.2.2 Responses

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

The proposal is to improve the facilities within the Arakoon and Hat Head national parks by updating infrastructure within the precincts and formalising the new walking trail. The majority of the works are proposed to be located in areas already disturbed, resulting in the requirement for a relatively small amount of native vegetation and habitat disturbance. Native vegetation removal largely consists of up to 16 canopy trees and the occasional removal of vegetation along the edge of existing roads or tracks.

Long-term, the proposed works are only marginally likely to increase the frequency of visitors to the area, with more walkers expected to utilise the new walking track. This increase in usage is considered to be negligible in the precincts, which are all currently well-established tourist facilities. Maintenance of trails and tracks will also be required.

The impact of the proposal is addressed separately for different species or groups as follows:

Recorded Threatened Plants - Scrub Turpentine, Native Guava

The Native Guava and Scrub Turpentine were recorded within the new track study area during the survey. Records range from isolated individual species to larger clusters numbering more than 15 plants. All plants within the study area were recorded along the edges of the existing formal and informal trails.

A single record of the Native Guava occurs within the BioNet Atlas. Field verification of this record revealed a larger area that contained hundreds of individuals. This cluster of plants is located nearby an existing, unmaintained track named the Rainforest Track, which is outside of the proposed study area. Historic records of Scrub Turpentine also occur within the region however each of these are well-outside of the proposed study area.

The Native Guava and Scrub Turpentine within the study area were affected by Myrtle Rust to varying degrees, and very few showed no signs of rust. Personal observations of other rust affected populations of these species have noted that they appear to continually regenerate and die back without ever flowering or setting seed.

All Scrub Turpentine recorded within the study area are located along the edge of a section of the new track that is already established as a formal walking track. As no additional works are required in this area, the proposed works are not anticipated to directly impact this species, with indirect impacts limited to those associated with an increased use of the track by walkers. Potential indirect impacts include the risk of trampling and the spread of weeds or pathogens, however as the sections of this track adjoining the Scrub Turpentine are already well established, these indirect impacts are considered to be negligible.

Many of the Native Guava recorded were located immediately adjoining the existing informal track, where they are currently at risk of trampling by walkers utilising the track. The proposed works will not remove or directly impact any threatened plants, however, as they occur in close proximity to the construction area, they will be afforded protection. Mitigation measures such as the requirement to have an ecologist present during any works within proximity to these threatened plants and the establishment of a green post system will ensure the protection of these threatened

plants throughout the construction phase. Further measures such as the application of strategic pathway design and the implementation of a track maintenance program will reduce the likelihood of impacts post-establishment of the track.

Potential indirect impacts may occur as a result of the works, such as an increased risk of trampling, the spread of pathogens and weed invasion, and a range of mitigation measures will be required to reduce these threats. The potential spread of Myrtle Rust is a particularly high risk to the Native Guava and Scrub Turpentine. Hygiene protocols will be required to reduce the risk of spreading rust and healthy plants being affected by rust.

The identification of these threatened plant populations and the implementation of the mitigation measures that are recommended are anticipated to lead to increased protection compared to the current regime. Therefore, the works would be unlikely to place a population of the plants at risk of extinction.

Potentially Occurring Threatened Plants – Scented Acronychia, Knicker Nut, White-flowered Wax Plant, Austral Toadflax

These threatened flora species were not recorded during the survey of the proposed impact area, however, are considered to have at least a low potential of occur within the broader study area. Scented Acronychia, Knicker Nut and White-flowered Wax Plant are all anticipated to have been identified during survey of the works footprint, should they be present. Austral Toadflax, however, is a cryptic groundcover species which may have eluded detection.

The extent of vegetation removal is proposed to be the minimum required in order to establish the works. Vegetation removal largely comprises the occasional removal of edge vegetation along the existing roads and/or tracks. Any vegetation removal through denser forested areas are proposed to be conducted either in the presence of an ecologist or in a location determined in conjunction with an ecologist to ensure that the final location does not impact any threatened species and impacts are kept to a minimum.

Following establishment of the proposed works, any potentially occurring individuals will maintain the opportunity to recruit within the study area, as no barrier to pollination or dispersal will be created. As such, the proposed works are not anticipated to place a potentially occurring population of these plants at risk of extinction.

Koala

The Koala was recorded on two occasions during the survey period. The first being at nearby the northern end of the proposed new track, and the second within vegetation adjoining the Overshot Dam within the Little Bay precinct. On both occasions, this species was observed diurnally resting within canopy vegetation. BioNet Atlas also indicates numerous records of this species throughout the national parks.

Habitat suitable for this species is present throughout the extent of the study area however preferred foraging resources are scarce. The local Koala population would be reliant on adjoining forested areas to support its life-cycle requirements, with only a few areas containing preferred Koala Food Trees (KFTs) present within the study area. Areas of higher value foraging habitat, such as the patch of Swamp Mahogany nearby the walking track, where a Koala was observed, are likely to within a home range for this species. The location of the study area in relation to these preferred habitats means that the Koala is likely to traverse the study areas or utilise vegetation transiently.

The proposal may require the removal of one preferred Koala food tree at the Cardwell Street precinct. Vegetation within the works footprint largely consist of scattered trees on forest edges, landscape plantings, shrubs and groundcover. Other preferred Koala food trees occur in close proximity to the footprint, and these will be protected during the works. As such, the works are only likely to have a very minor direct impact on the Koala.

The proposed works are unlikely to introduce or increase any potential threats such as road strike, dog attack or disease. Minor indirect impacts may result during clearing and construction works such as noise and vibration.

In consideration of the above, the works are considered unlikely to result in impacts of sufficient order of magnitude to place a local viable population at risk of extinction.

Highly mobile/large range species – South-eastern Glossy Black-Cockatoo, White-bellied Sea Eagle, Powerful Owl, Eastern Osprey, Barred Cuckoo-shrike, Little Lorikeet, Little Eagle, Swift Parrot, Square-tailed Kite, Wompoo Fruit-Dove, Rose-crowned Fruit-Dove, Masked Owl, Sooty Owl, Grey-headed Flying-fox

For the mobile and wide-ranging subject species, the vegetation to be impacted represents a minute area of generic known or potential foraging habitat of no specific significance given the amount of similar or higher quality habitat in the remainder of the national parks. Any potentially occurring local population of these species would clearly extend well beyond the site to meet their daily and seasonal lifecycle requirements, and none would be dependent on habitat in the works footprint for foraging or breeding.

No known nest sites for the bird species would be removed. Vegetation to be removed is also not within a known roost for the Grey-headed Flying-fox. Due to the ecology of the subject species, that no critical habitat will be removed, and the presence of extensive areas of forest adjacent and within range of the site: the proposal will essentially constitute a very minute reduction of their wider foraging range.

Given this information, and that no barrier to connectivity for these species will be created and that the local populations of the subject species would extend well beyond the confines of the site to meet their life cycle requirements, the works would be unlikely to result in a decline of the local population of any of the subject species.

Shorebirds - Pied Oystercatcher, Sooty Oystercatcher, Sanderling, Beach Stone-curlew, Little Tern

The subject shorebird species are known or likely to occur along the beach habitats within the study area. No foraging habitat for these species will be directly impacted by the proposed works and indirect impacts are expected to be minor, in consideration that the proposed works will not alter the current anthropological usage patterns of these shorelines.

As such, the proposed works are considered unlikely to result in a decline of these highly-mobile species.

Microbats - Little Bent-winged Bat, Eastern False Pipistrelle, Eastern Coastal Free-tail Bat, Large Bent-winged Bat, Yellow-bellied Sheathtail-bat, Greater Broad-nosed Bat, Common Blossom Bat

The Little Bent-winged Bat was recorded foraging within the flyway connecting the Trial Bay and Cardwell Street precincts. This species, and the other listed species, are also considered likely to occur within the broader study area.

Roosting habitat for these species generally comprises tree hollows, dilapidated buildings and caves. Tree hollows were recorded within the study area, of which only one is proposed to be impacted. The hollows within this tree are considered to be of low value to the subject species due to the multiple entrances and low height of the hollows. Due to the positioning of this tree hollow however, the mitigation measures proposed can effectively mitigate any direct impacts to a potential individual/colony of this species roosting within the tree hollow. No other roosting habitat for these species is located within the proposed works footprint.

The extent of vegetation removal proposed for the works is also limited, in the context of the foraging range for these species. There is also a marginal chance the establishment of additional walking tracks through forested vegetation will increase the extent of foraging habitat for these species, by inadvertently introducing additional small-scale flyways. Given this, and that no significant roosting habitat is proposed to be impacted by the works, that foraging resources in the study area do not meet a significant portion of any species' lifecycle's needs, and that no other critical habitat components (e.g. such as breeding sites, colonial roosting sites, etc) are to be affected by the proposal: the impact on these species is considered at most low and only comprises loss of some generic potential foraging habitat. Hence the proposal is not considered to have the potential to impact on the viability of these species, to the extent that it may place a viable local population at risk of extinction.

Hollow-obligate Mammals – Squirrel Glider, Brush-tailed Phascogale

While not detected during the survey, these species are likely to occur in forested areas around and possibly within the study area, and range over several hectares of forest. As such, the vegetation to be impacted would at most comprise a very minor extent of potential foraging habitat that is unlikely to affect their foraging success or movement patterns. No hollow-bearing trees suitable for these species will require removal, hence potential denning or breeding habitat will not be affected.

Indirect impacts associated with the proposal which may affect the subject species include edge effects and disturbances during clearing and construction works. While some of these impacts already pose a threat to the subject species, ameliorative measures will be required to ensure impacts are minimised. In summary, the works would be unlikely to place a local population of these species at risk of extinction.

Ground-dwelling Mammals – Spotted-tailed Quoll, Common Planigale

These species were not recorded during field survey however the occasional BioNet record occurs nearby, and habitats within the study area are considered to be suitable for these species. Records of these species are all within the densely forested areas of the national park where groundcover is likely to be dense, providing shelter for the subject species.

Only minor impacts to these species are anticipated for the majority of the proposed works within the precincts, in consideration that these areas are already disturbed and largely devoid of dense groundcover. As such, it is considered unlikely that either of these species would inhabit these open areas of the precincts.

There is potential for these species to occur, however, within the denser vegetated areas along the edges of the precincts and in vegetation surrounding the proposed new walking track. The proposed impacts in these areas are limited to the establishment of walking tracks or paths. These species have the potential to be adversely impacted by the establishment of these tracks as they

break continuity of cover and may provide access for predators. However, given that the track widths will be narrow, they largely follow existing alignments, and are not proposed to be located through areas of dense groundcover habitat; the trail is not considered likely to lead to fragmentation of habitat or create a barrier. Extensive areas of suitable habitat will remain within the broader national parks which will continue to offer habitat and refuge for any potentially occurring population of these species. As a result, the proposal is unlikely to have an adverse impact on a local population's lifecycle.

Aquatic Species – Loggerhead Turtle, Green Turtle, New Zealand Fur-seal, Australian Fur-seal

Each of the subject species are ocean-dwelling, only occasionally emerging from water to nest (turtles) or haul out (fur-seals). The extent of suitable habitat for these species consists of the small portions of sandy beach within the precincts and beaches along the proposed walking trail.

Use of these areas by seals would be limited to the occasional occurrence of a swimming seal when waters inundate these sandy shores at high tide. These species are not likely to emerge from the water in any locations within the study area, with hauling out locations typically rocky parts of islands.

A similar use of these areas during high tide is anticipated with any potentially occurring turtle species, with foraging habitat for these species more likely to be in deep waters. The subject turtles do, however, emerge from the water during nesting, where eggs are laid within sands just above the high-tide mark. Nesting for each of the subject turtles occurs between spring and autumn, with turtles generally known to have high site fidelity. BioNet Atlas records of both of these turtle species occur within the broader South West Rocks area, indicating a potential for these shorelines to be utilised during nesting season.

The proposed works within these beaches are limited to the upgrade of existing beach accesses, the installation of a new viewing area and access ramp and the formalisation of the walking track. No works will be required on the beaches along the new walking track, as walkers will be directed to walk along the shoreline. The remaining other works within these areas will require some low impact ground works in small areas of the Trial Bay and Cardwell Street precincts. Each of these proposed works' locations are situated in areas that are highly frequented by visitors and already contain access infrastructure. Due to these factors, it is considered unlikely these areas would be used as a nesting site for turtles. Mitigation measures have also recommended that no works are to occur within these areas during the high tide. As such, the proposed works are considered unlikely to adversely affect the life cycle of any of the subject species.

b) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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

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

Two TECs were recorded within the subject site. The *Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner bioregions* TEC occurs in patches along the headlands of the proposed new walking trail and the *Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* TEC was

recorded throughout the study area and beyond. Patches of this Littoral Rainforest within the study area would only represent a small portion of its local extent.

The establishment of the proposed works will require removal of small areas of these TECs. Direct impacts to the Themeda grassland TEC are limited to the removal of a thin strip along the edge of this grassland in order to formalise the walking trail. At present, this area and the extent of this TEC is frequented by walkers utilising the informal track. This current use means that walkers are traversing the entire TEC and placing this community is at risk of trampling and weed invasion/spread. Mitigation measures have been recommended to formalise the track in this location and install educational signage of the importance of the grassland. Although this will require a small amount of vegetation removal and is likely to increase the number of walkers through the area, these measures aim to discourage trampling of the retained TEC and hopefully reduce the existing risks present.

The patches of the Littoral Rainforest TEC within the works footprint represents only a minute portion of the TEC within the study area and surrounding lands. The establishment of the proposed works will require the further widening of the existing informal walking trail through this TEC and the occasional trimming of lower stratum vegetation along the edges of some of these patches. Vegetation removal is largely limited to ground stratum disturbance, resulting in no anticipated canopy gaps to be created and no areas of this TEC to be isolated.

There is a low risk of indirect impacts such as erosion and sedimentation, edge effects and weed invasion. These risks are considered to be mitigable through the measures such as erosion and sedimentation controls, track maintenance and weed control.

As a result, it is considered unlikely that the extent of vegetation removal and modification required for the proposed works will result in a significant impact to these TECs, to the point where either could be paced at risk of extinction.

c) The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

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

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

The extent of vegetation and habitat disturbance required is considered to be relatively minute in consideration of the extent of works proposed within the Master Plan. No large areas of vegetation or habitat are proposed to be removed with the majority of works proposed to occur within already disturbed or cleared areas; and the situation of new tracks or pathways to be strategically positioned so as to weave through upper stratum vegetation and utilise existing informal tracks. Direct impacts involve some tree removal at the Cardwell Street and Trial Bay precincts and minor removal of lower stratum and groundcover vegetation along the edge of proposed roads or tracks.

Some of this vegetation proposed to be removed is from within TECs and nearby areas containing threatened flora species. Mitigation measures have been proposed to ensure the preservation of these threatened plants and to minimise impacts within these TECs.

The removal of vegetation will reduce the extent of foraging habitat for a number of known and potentially occurring threatened species. One regrowth Koala food tree may potentially be impacted and only a single hollow-bearing tree may be impacted by the proposed works. Given the

extent of modification, current land uses and the limited extent of the proposed works footprint, these species would be reliant on adjacent and nearby habitats to fulfil their lifecycle requirements and the works footprint is not anticipated to be of key importance.

The proposed works would have minimal impact on connectivity as only minor lower stratum clearing will occur along the edge of vegetation or along the edge of an existing walking trail. No new permanent physical or behavioural barrier will be established, and no area of habitat will be fragmented or isolated.

The parks include habitat that is of local, regional and national significance for its conservation value. The proposal however, is unlikely to have a significant impact on these values due to the limited construction requirements, maintenance of existing anthropogenic usage of the areas, retained connectivity for fauna and as it will not impact the current hydrology of the area.

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

The proposed works will not directly or indirectly affect an area of outstanding biodiversity value.

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

A Key Threatening Process (KTP) is defined as a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities.

The following table lists the relevant KTPs listed under the BC Act and whether the proposed activity is recognised a threatening process.

Table 33: Key Threatening Processes

KTP	Extent/manner which proposal affects KTP	Mitigable?
Anthropogenic Climate Change	Vegetation removal and greenhouse gasses generated by machinery used during establishment of the proposed works.	Partially. The extent of greenhouse gasses generated during machinery works could be reduced by: • using electric equipment instead of diesel/petrol equipment where practicable. • minimising the use of machinery and plant where practicable. • turning off machinery when not in use and reduce throttle speed of machines. • Ensuring machinery is in good, serviced condition to reduce emissions.

KTP	Extent/manner which proposal affects KTP	Mitigable?
Clearing of native vegetation	Loss of native vegetation for establishment of the proposed works.	No, however vegetation removal will be minimised as much as practicable.
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments	The proposal has a small potential to add anthropogenic debris to the adjoining oceanic environments, should construction worker's litter.	Yes. Site inductions are to outline the requirement to dispose of rubbish in the correct manner.
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	Potential risk of introducing amphibian chytrid fungus.	Yes. Hygiene protocols have been recommended.
Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae	Myrtle Rust is already prevalent in the study area. There is the potential risk of further spread.	Yes. Hygiene protocols have been recommended.
Invasion of native plant communities by *Chrysanthemoides monilifera*	Bitou Bush is already present within the study area. There is a potential risk of further spread if not mitigated.	Yes. Weed control measures have been recommended.
Invasion of native plant communities by exotic perennial grasses	Exotic perennial grasses already occur within the study area. These have the potential to further spread through the study area if not mitigated.	Yes. Weed control measures have been recommended.
Invasion, establishment and spread of Lantana (*Lantana camara*)	Lantana is already present within the study area. There is a potential risk of further spread if not mitigated.	Yes. Weed control measures have been recommended.
Loss of Hollow-bearing Trees	A single hollow-bearing tree , which contains only small, low-value hollows, may require trimming or removal within the drainage channel in the Trial Bay precinct.	Yes. A pre-clearing survey of this tree is to be conducted in line with fauna relocation measures.
Predation and hybridisation by Feral Dogs, *Canis lupus familiaris*	Feral dogs are already present within the area. The proposal is unlikely to encourage additional dogs to the area.	Not required.

7.3.2.3 Conclusions

The Test of Significance has determined that the proposed works would not result in a significant impact on threatened species or ecological communities. A Species Impact Statement is not required for the works.

7.4 SEPP (Resilience and Hazards) 2021

Chapter 2 of the SEPP (Resilience and Hazards) 2021 pertains to Coastal Management and applies to the proposed works. This chapter addresses provisions of the *Coastal Management Act 2016* in relation to the following coastal management areas (NSW Government 2023):

- Coastal wetlands and littoral rainforest areas;
- Coastal vulnerability areas;
- Coastal environment areas; and
- Coastal use areas.

The study area does not contain any mapped Coastal Wetland areas or lands mapped as Proximity Areas to these. One Littoral Rainforest area is mapped within the Smoky Cape precinct, with the remining unmapped portion of this precinct mapped entirely as a proximity area to this Littoral Rainforest. No other Littoral Rainforests are mapped within the remainder of the study area. Figure 44 provides Coastal Wetland and Littoral Rainforest mapping in relation to the study area. These mapped areas are subject to Division 1 development controls under Part 2.2 of the SEPP, pursuant to Section 2.7(6):

"This section does not apply to the carrying out of development on land reserved under the National Parks and Wildlife Act 1974 if the proposed development is consistent with a plan of management prepared under that Act for the land concerned".

The proposed activity is not situated on land that is within the area identified as Coastal Vulnerability on the *Coastal Vulnerability Area Map*. Coastal vulnerability mapping is currently limited with a lack of mapped areas in the region, thus, the provisions pertaining to Coastal Vulnerability Areas do not apply.

The large majority of the study area is also mapped as a Coastal Environment Area and Coastal Use Area. The extent of these mapped areas is provided in Figure 45 and Figure 46, respectively. These areas are hence subject to Division 3 and 4 development controls under Part 2.2 of the SEPP.

A range of measures have been proposed to be implemented in order to minimise harm to the Littoral Rainforest, Coastal Environment Area and Coastal Use Areas. Mitigation measures include:

- Clearing limit markup and exclusion zones.
- Strategic timing of works during low-flow periods.
- Sedimentation and erosion controls.

Figure 44: Coastal Wetland and Littoral Rainforest mapping in the context of the study area

Figure 45: Coastal Environment Area mapping in the context of the study area

Figure 46: Coastal Use Area mapping in the context of the study area

8. CONCLUSION

This report has assessed the ecological impacts of upgrade works outlined in the Macleay Coast Destination Draft Master Plan. The proposed works are located entirely within the Arakoon and Hat Head national parks which contain a high species diversity and form important habitat for numerous threatened entities. The implementation of these works will require native vegetation and habitat removal, with direct impacts proposed within two TECs, amongst areas containing threatened flora species and within habitats utilised by threatened fauna species.

Recommendations have been made to reduce the impacts to these entities and mitigate any residual impacts. These include (but are not limited to) sensitive area protection measures, strategic track design, hygiene protocols and erosion and sedimentation controls.

Following the implementation of mitigation measures, assessments have been made as to the potential impacts to known or potentially occurring TECs, threatened flora species, threatened fauna species and migratory species. These assessments determined that the impacts of the proposal on these entities is unlikely to be significant, and referral to the DCCEEW or a Species Impact Statement is not required.

As works are proposed within mapped areas of Littoral Rainforest, Coastal Environment Areas and Coastal Use Areas; the proposed works are required to be consistent with various development controls under the *State Environmental Planning Policy (Resilience and Hazards) 2021*.

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APPENDICES

Appendix A. Site-specific Concept Designs

Trial Bay precinct

Cardwell Street precinct

Little Bay precinct

Appendix B. EPBC Protected Matters Report

Appendix C. Potential Occurrence Assessments

The following tables provide an assessment of threatened entities, known or potentially occurring within the locality. Assessments address the likelihood of threatened entities occurring within the study area based on:

- Habitat extent (e.g., sufficient to support an individual or the local population; comprises all of home range; forms part of larger territory, etc.); quality (i.e., condition, including an assessment of threats, historical land uses on and off-site, and future pressures); interconnectivity to other habitat; and ability to provide all the species life-cycle requirements (either the site alone, or other habitat within its range).
- Occurrence frequency (i.e., on-site resident; portion of larger territory or seasonal migrant).
- Usage i.e., breeding or non-breeding; opportunistic foraging (e.g., seasonal, migratory or opportunistic); marginal fringe of core range; refuge; roosts; etc.

An indicative scale has been used to indicate the likelihood of the species occurring. This scale is as follows:

- Unlikely (<1% probability) - no potentially suitable habitat; too disturbed; or habitat is very poor. No or few records in region or records/site very isolated e.g. by pastoral land, urbanisation, etc.
- Low (1-25%) - few minor areas of potential habitat; highly modified site/habitat; or few habitat parameters present, but others absent or relatively insignificant (sub-optimum habitat). Usually very few records in locality.
- Fair (25-50%) - some significant areas of potential habitat, but some habitat parameters limited. Potential for occasional foraging e.g. from nearby more optimal areas or known habitat. Records at least within 10-15 km radius of site.
- Moderate (50-75%) - quite good potentially suitable habitat on and adjacent to the site, and/or good quality and abundance of some vital habitat parameters. Records within <10km, or adjacent to site, or adjacent to high quality habitat where species likely to occur.
- High (>75%) - very good to optimum habitat occurring on or adjacent to the site (support breeding pair or population). Recorded within 5-10 km of site in same or similar habitat.
- Known (100%) – recorded within the study area during field survey.

Further assessment is required for entities considered to have a chance of occurring within the works footprint.

Threatened Species

Table 34: Potential occurrence assessment – threatened species

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
Flora					
Scented Acronychia *Acronychia littoralis*	E	E	15	Suitable habitat for this species occurs within the study area and immediate surrounds and numerous local records of this species are present. Field survey did not confirm the presence of this species.	Fair
Dwarf Heath Casuarina *Allocasuarina defungens*	E	E	1	In NSW this species is mostly found growing in tall heath on sand. Ideal habitat for this species does not occur within the study area. The single record in the locality is located approximately six kilometres west of the study area.	Unlikely
Hairy-joint Grass *Arthraxon hispidus*	V	V	0	A rainforest species favouring habitat with richer loams soils (OEH 2023). Marginally suitable habitat for this occurs within the study area however this species was not recorded during survey and no local records occur.	Unlikely
Knicker Nut *Caesalpinia bonduc*	E	-	4	Suitable habitat for this species occurs in the study area and local records of this species occur from nearby the proposed new trail. No trail works are required to be completed nearby these records, with this portion of the trail located along the sands of Gap Beach. Despite habitat suitability, this plant was not identified during field survey.	Fair
Sand Spurge *Chamaesyce psammogeton*	E	-	1	Although a single record of this species occurs within the locality, the location of this record is in error, with it mapped as occurring on the west of Big Smoky. The Sand Spurge is only known to grow along sand dunes. Although suitable habitat occurs within the study area, this species was not recorded during field survey.	Unlikely
Leafless Tongue-orchid *Cryptostylis hunteriana*	V	V	0	This species is found in a range of environments however larger populations are typically recorded in woodland that is dominated by	Unlikely

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
				select eucalypts and Allocasuarina. This preferred habitat does not occur within the study area. No local records of this species occur.	
White-flowered Wax Plant *Cynanchum elegans*	E	E	7	Suitable habitat for this species occurs within the study area with local records recorded in and around the Smoky Cape precinct. Field surveys were unable to locate the record within the Smoky Cape precinct, however habitats were confirmed to be suitable.	Moderate
- *Euphrasia arguta*	CE	CE	0	This species is historically known from the Bathurst area with plants from the Nundle area discovered in recent history. This re-discovery, north of its previously known range, was reported from eucalypt forests with a mixed grass and shrub understory (OEH 2023). Although within the assessment area, the location of the study area is not within the OEH mapped known or predicted geographic area (OEH 2023).	Unlikely
Clear Milkvine *Leichhardtia longiloba*	-	V	0	Typically recorded in wet sclerophyll forest and rainforest. Marginally suitable habitats present within the study area however there are no proximate records, and this species was not recorded during survey.	Unlikely
Macadamia Nut *Macadamia integrifolia*	-	V	0	This species is generally found in Queensland with the study area occurring in the southern extent of this species' known distribution. Records in the Mid North Coast are planted trees.	Unlikely
- *Maundia triglochinoides*	V	-	4	This species requires shallow freshwater, creeks, dams or swamps to grow and is often associated with the wetland species *Triglochin procerum*. Habitats within the works footprint are unlikely to be suitable for this species with watercourses largely limited to drainage lines and *Triglochin procerum* not recorded. All records of this species within the locality occur greater than seven kilometres south of the Smoky Cape precinct, in areas now heavily cleared.	Unlikely
Milky Silkpod *Parsonsia dorrigoensis*	V	E	0	This species is found in dry eucalypt forests on sandstone and in moist shrubby eucalypt forests on metasediments. Waterlogged sites along creeks are where this species is most commonly found (OEH 2023). The study area is not considered to provide suitable habitat for this	Unlikely

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
				species, no local records occur and this species was not recorded during survey.	
Brown Fairy-chain Orchid *Peristeranthus hillii*	V	-	1	Suitable habitat for this species is not considered to occur within the study area. The single local record of this species occurs from 1958, where is located in an area now heavily cleared, approximately six kilometres west of the study area.	Unlikely
Knotweed *Persicaria elatior*	V	V	0	This species is known to grow in moist areas with a particular preference for areas adjacent to streams and lakes. Suitable habitat for this species does not occur within the study area, no proximate records occur and this species was not recorded during surveys.	Unlikely
Southern Swamp-orchid *Phaius australis*	E	E	1	This species is limited to areas of swampy grassland and swampy forest. Although marginally suitable habitat is present within the study area, this species is readily detectable and was not recorded during survey.	Unlikely
Scrub Turpentine *Rhodamnia rubescens*	CE	CE	3	This species was recorded within the study area during field survey.	Known
Native Guava *Rhodomyrtus psidioides*	CE	CE	7	This species was recorded within the study area during field survey.	Known
Magenta Lilly Pilly *Syzygium paniculatum*	E	V	1	This species is restricted to specific soils of riverside rainforests and remnant littoral rainforests (OEH 2023). Although suitable habitat for this species occurs within the study area, it was not recorded during survey. The single local record occurs from South Smoky Beach.	Unlikely
Austral Toadflax *Thesium australe*	V	V	0	This species which is often associated with grassland on coastal sea cliffs. The Themeda Grassland communities within the study area, provide a potential habitat for this species. Although not detected during survey, this species is cryptic so is considered to have the potential to occur.	Fair
-	-	E	0	This species is known to occur in moist eucalypt forests, rainforests and in moist areas of dry eucalypt forests (OEH 2023). Suitable habitat does	Unlikely

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
Vincetoxicum woollsii				not occur within the study area and this species was not recorded during the field surveys.	
Amphibians					
Wallum Froglet *Crinia tinnula*	V	-	16	This species is generally found in coastal acidic paperbark swamps with potential to also occur in heathland and Melaleuca sedgelands. Suitable habitat of this type does not occur within the study area.	Unlikely
Green & Golden Bell Frog *Litoria aurea*	E	V	0	This species inhabits permanent waterbodies with a preference for those which are still. Waterbodies within the study area are unlikely to support this species.	Unlikely
Stuttering Frog *Mixophyes balbus*	E	V	1	This species is fund in wet, forested areas usually above 100 metres elevation and near mountain streams. Although suitable habitat may occur amongst nearby mountains, suitable habitat for this species does not occur within the study area.	Unlikely
Aves					
Magpie Goose *Anseranas semipalmata*	V	-	2	This species is generally found in shallow wetlands surrounded by dense sedges or rushes however may graze in grassland communities. The study area does not contain potential habitat for this species.	Unlikely
Regent Honeyeater *Anthochaera phrygia*	CE	CE	1	Although winter flowering nectar sources for this species occur within the general area, very few favoured species are present within the study area.	Unlikely
Flesh-footed Shearwater *Ardenna carneipes*	V	-	1	A marine species which nests on Lord Howe Island and in New Zealand. Potential to occur within the surrounding marine waters however unlikely to occur within the study area itself.	Unlikely
Australasian Bittern *Botaurus poiciloptilus*	E	E	4	A wetland species found in areas of dense sedges, reeds and rushes (OEH 2023). Suitable habitat for this species does not occur within the study area.	Unlikely
Sanderling	V	-	1	A summer migrant often found on low coastal beaches that have firm sand (OEH 2023). Potential habitat for this species occurs within the	Low

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
Calidris alba				study area however minimal local records occur. The local record is from the wetland areas around the Macleay River.	
Red Knot *Calidris canutus*	-	E	2	A marine species largely found in intertidal sandflats, mudflats, sandy beaches and estuaries. It has occasionally been recorded in saline wetlands near the coast however all local records of this species occur within 200 meters of the coastline. The sandy beaches within the study area provide suitable habitat for this species. Local records are from the wetland areas around the Macleay River.	Low
Curlew Sandpiper *Calidris ferruginea*	E	CE	19	A migratory shorebird which is generally found in intertidal mudflats of sheltered coasts. This species forages at shallow water and roosts on beaches, spits and wetlands (OEH 2023). The sandy beaches within the study area provide very marginally suitable habitat for this species, however occurrences of this species are considered more likely to centre around sheltered coasts.	Unlikely
Great Knot *Calidris tenuirostris*	V	CE	1	This species is known to occur in sheltered, coastal habitats containing large intertidal sandflats or mudflats. Suitable habitat for this species does not occur within the study area.	Unlikely
South-eastern Glossy Black-Cockatoo *Calyptorhynchus lathami lathami*	V	V	65	This species was recorded within the study area during field survey.	Known
Lesser Sand-plover *Charadrius mongolus*	V	E	1	An almost entirely coastal species which favours beaches of sheltered harbours, estuaries and bays with large intertidal mudflats or sandbanks. Although the study area contains beaches, habitats provided by these are not considered suitable for this species which favours more sheltered habitats.	Unlikely
Spotted Harrier *Circus assimilis*	V	-	1	This species is mostly found in native grassland or foraging over open habitats. It occurs throughout Australia, except in habitats of the coast, escarpment and ranges (OEH 2023). Suitable habitat for this species, hence, does not occur within the study area, which is entirely located along the coastline.	Unlikely

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
Brown Treecreeper (eastern subspecies) *Climacteris picumnus victoriae*	V	V	0	This species is mostly found in dry eucalypt forests with a preference for an open grassy understorey. It is not commonly found in areas with a dense shrub layer. Tree hollows are necessary for nesting. The study area does not contain suitable habitat for this species and no local records occur.	Unlikely
Barred Cuckoo-shrike *Coracina lineata*	V	-	3	This species is known from a range of habitats such as eucalypt forests, rainforests and swamp woodlands (OEH 2023). Suitable habitat for this species occurs within the study area.	Fair
Coxen's Fig-Parrot *Cyclopsitta diophthalma coxeni*	CE	CE	0	This species is only known to occur in five populations from Bundaberg in Queensland to the Hastings River in NSW. It is usually recorded in rainforest habitats where fig trees are available for foraging (OEH 2023). No local records of this species occur.	Unlikely
Varied Sittella *Daphoenositta chrysoptera*	V	-	4	This species forages in trees with rough bark or on dead trees. It is known to occur in a range of vegetation types excluding deserts and grassland. The study area is not considered to provide suitable habitat for this species.	Unlikely
Black-necked Stork *Ephippiorhynchus asiaticus*	E	-	84	This species is found in wetlands of major coastal rivers in NSW. Suitable habitat for this species does not occur within the study area with all local records from wetlands centres around the Macleay River and Saltwater Lagoon.	Unlikely
White-fronted Chat *Epthianura albifrons*	V	-	3	This species is an insectivorous bird that us usual found foraging on grassy or bare ground, in wetland areas (OEH 2023). Suitable habitat for this species does not occur within the study area.	Unlikely
Red Goshawk *Erythrotriorchis radiatus*	CE	E	0	This species is not known or predicted to occur as far south as South West Rocks with most NSW records occurring in the Clarence River Catchment (OEH 2023).	Unlikely
Beach Stone-curlew *Esacus magnirostris*	E	-	4	A coastal species that is often recorded along beaches, islands, estuaries and reefs (OEH 2023). Suitable habitat for this species occurs	Fair

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
				within the study area, although local records are all located greater than three kilometres from the study area.	
Grey Falcon *Falco hypoleucos*	E	V	0	An inland species that is not known to occur east of Tamworth (OEH 2023).	Unlikely
Little Lorikeet *Glossopsitta pusilla*	V	-	10	This species is mostly found in areas of profuse-flowering eucalypts where it feeds on nectar and pollen from the tree canopy. Has been recorded occurring in isolated roadside and paddock trees. Local records are largely west of the Macleay River however a single record occurs from within the Hat Head National Park. Suitable habitat for this species occurs within the broader area, however limited foraging resources occur within the study area.	Low
Painted Honeyeater *Grantiella picta*	V	V	0	This species inhabits mistletoe-infested forest and woodland communities. This habitat does not occur on the study area and no local records occur.	Unlikely
Brolga *Grus rubicunda*	V	-	38	A wetland dependent species (OEH 2023). No wetlands occur within the study area, hence considered unlikely to occur.	Unlikely
Sooty Oystercatcher *Haematopus fuliginosus*	V	-	50	A coastal species which favours rocky headlands, rock pools, rocky shelves, beaches and muddy estuaries (OEH 2023). Sandy beaches within the study area provide suitable habitat for this species and numerous records of this species occur within the study area.	High
Pied Oystercatcher *Haematopus longirostris*	E	-	58	This species was recorded within the study area during field survey.	Known
White-bellied Sea Eagle *Haliaeetus leucogaster*	V	-	214	This species was recorded within the study area during field survey.	Known
Little Eagle *Hieraaetus morphnoides*	V	-	4	This species forages in forest and woodland communities that contain an abundance of prey resources. The study area alone, is unlikely to support a sufficient prey source for this species however nearby	Fair

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
				habitats may support this species. Any potential occurrence is likely to be as part pf a larger foraging range.	
White-throated Needletail *Hirundapus caudacutus*	-	V	35	A migratory species which breeds in Asia over the winter months. When in Australia, this species is almost exclusively aerial where is also feeds aerially (DCCEEW 2023b). Numerous records of this species occur within the locality with some of these located within the study areas.	High
Comb-crested Jacana *Irediparra gallinacea*	V	-	3	This species is found in areas with a permanent water source and a good cover of surface vegetation. It is most commonly recorded in freshwater swamps, billabongs and ponds. Habitat for this species does not occur on study area.	Unlikely
Black Bittern *Ixobrychus flavicollis*	V	-	3	This species is found in freshwater and estuarine wetlands with dense vegetation. No wetlands occur within the study area.	Unlikely
Swift Parrot *Lathamus discolor*	E	CE	24	This species is known to prefer winter-flowering eucalypts which are rare within the study area, however common further offsite. There is some potential for this species to occur within the study area however potential occurrence is likely to be as part of a larger foraging range.	Fair
Mangrove Honeyeater *Lichenostomus fasciogularis*	V	-	1	Known to occur in mangrove woodlands/shrublands and forests adjacent to these (OEH 2023). Suitable habitat for this species does not occur within the study area.	Unlikely
Broad-billed Sandpiper *Limicola falcinellus*	V	-	1	This species is found in sheltered areas along the coast such as harbours, lagoons, saltmarshes and estuarine sandflats and mudflats (OEH 2023). The study area does not contain these favoured sheltered habitats. The single record of this species is from a wetland surrounding the Macleay River.	Unlikely
Bar-tailed Godwit *Limosa lapponica bauerI*	-	V	0	A migratory wader found in large intertidal sandflats, banks, estuaries, lagoons and bays. This species forages along the water's edge and is known to roost on saltmarshes, beaches and sandbars (OEH 2023). Suitable habitat for this species occurs within the study area however no records of this species exist within the locality.	Unlikely

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
Black-tailed Godwit *Limosa limosa*	V	-	5	A migratory wader found in large intertidal sandflats and mudflats. Marginally suitable habitat for this species occurs within the study area however occurrences of this species are more commonly centred around the wetlands surrounding the Macleay River.	Unlikely
Square-tailed Kite *Lophoictinia isura*	V	-	18	This species is commonly found in open forests and woodlands. Large stick nests are constructed in forks of living trees. No nests found on or adjacent to the study area and it was not detected by the survey. Recorded in locality, hence at least fair chance of occurrence as part of a larger foraging range.	Fair
South-eastern Hooded Robin *Melanodryas cucullata cucullata*	V	E	0	This species is found in a wide range of habitats as it requires structurally diverse vegetation (DCCEEW 2023b). Lightly wooded vegetation of open eucalypt woodlands and acacia scrub mallee are preferred. The study area is unlikely to support this species and no local records occur.	Unlikely
Blue-winged Parrot *Neophema chrysostoma*	-	V	0	This species is not known to occur as far north-east as South West Rocks and no local records of this species occur.	Unlikely
Barking Owl *Ninox connivens*	V	-	1	This species hunts over large territories where is prefers open forests and woodland. Suitable habitat for this species does not occur within the study area. Local record of this species occurs greater than seven kilometres west of the study area.	Unlikely
Powerful Owl *Ninox strenua*	V	-	8	This species was recorded within the study area during field survey.	Known
Eastern Curlew *Numenius madagascariensis*	-	CE	55	A shorebird with a preference for habitats with extensive tidal flats (DCCEEW 2023b). Habitat of this type does not occur within the study area.	Unlikely
Fairy Prion *Pachyptila turtur subantarctica*	-	V	0	A marine species known to breed on Macquarie Island and in subantarctic islands outside Australia (DCCEEW 2023b). Suitable habitat for this species does not occur within the study area.	Unlikely

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
Eastern Osprey *Pandion cristatus*	V	-	226	This species was recorded within the study area during field survey.	Known
Wompoo Fruit-Dove *Ptilinopus magnificus*	V	-	7	A rainforest species which also inhabits wet sclerophyll forests with a rainforest understory. Suitable habitat for this species occurs in the broader landscape surrounding Gap Beach. Records of this species also occur from within this area with one recorded immediately north of the existing trail to the north of Gap Beach.	High
Rose-crowned Fruit-Dove *Ptilinopus regina*	V	-	2	This species inhabits dense rainforest communities with a density of fruiting-bearing trees. Suitable habitat for this species occurs in the broader landscape surrounding Gap Beach.	Medium
Australian Painted Snipe *Rostratula australis*	E	E	1	This species is known to forage on mudflats and in shallow water, where there is a cover of tall vegetation (OEH 2023). Suitable habitat for this species does not occur within the study area.	Unlikely
Diamond Firetail *Stagonopleura guttata*	V	V	0	This species is known to occur in grassy eucalypt woodlands (OEH 2023). Suitable habitat for this species does not occur within the study area.	Unlikely
Little Tern *Sternula albifrons*	E	-	34	A coastal species which nests on sandy beaches or in low dunes, although sheltered environments are preferred (OEH 2023). Suitable habitat for this species occurs within the study area however preferred habitats are absent.	Low
Australian Fairy Tern *Sternula nereis nereis*	-	V	0	A subspecies which was historically known to occur in NSW. Little is known about whether this species still occurs in the state. This species was known to nest of sheltered beaches, above the high tide line but below vegetation. Habitats within the study area are considered to be too exposed for this species and no local records occur.	Unlikely
Eastern Grass Owl *Tyto longimembris*	V	-	5	This species inhabits areas of tall grass, which is required for shelter and breeding. Habitat of this type does not occur within the study area.	Unlikely

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
Masked Owl *Tyto novaehollandiae*	V	-	6	This species occurs in forests and woodlands with a sparse understory. It requires tree hollows for nesting and an abundance and diversity of prey species. Suitable habitat for this species occurs in the broader landscape. Records of this species also occur from within the area with one recorded north of Gap Beach.	High
Sooty Owl *Tyto tenebricosa*	V	-	1	A rainforest species which requires very large tree-hollows to roost/nest. Suitable habitat for this species occurs in the broader landscape surrounding Gap Beach however only a single local record occurs from approximately three kilometres south of this area.	Low
Terek Sandpiper *Xenus cinereus*	V	-	1	This species is known to prefer sandbanks and mudbanks that are near mangroves (OEH 2023). Suitable habitat for this species does not occur within the study area.	Unlikely
Various Albatross *Diomedea sp., Phoebetria sp., Thalassarche sp.*	R	V	-	Albatrosses are pelagic species which spend the majority of their time at sea. Breeding occurs on various islands or sea cliffs (OEH 2023). Although the adjoining Pacific Ocean provides suitable habitat for this species, habitats within the study area are considered unlikely to support these species.	Unlikely
Various Petrels *Fregetta sp., Macronectes sp., Pterodroma sp.*	R	R	-	Petrels are marine species' which breed on various offshore islands (OEH 2023). Although the adjoining Pacific Ocean provides suitable habitat for this species, habitats within the study area are considered unlikely to support these species.	Unlikely
Insects					
Australian Fritillary *Argynnis hyperbius inconstans*	E	CE	0	In NSW, this species is restricted to open, swampy coastal areas that contain the food plant, Arrowhead Violet (*Viola betonicifolia*) (DCCEEW 2023b). The Arrowhead Violet was not recorded during the vegetation surveys and no local records of this species occur.	Unlikely
Terrestrial Mammalia					
Eastern Pygmy-possum	V	-	1	This species is known to occur in a broad range of habitats such as those present within the study area. A large portion of the study area is	Unlikely

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
Cercartetus nanus				considered likely to be too disturbed for this species however habitats within the broader landscape may provide a sufficient habitat resource.	
Large-eared Pied Bat *Chalinolobus dwyeri*	V	V	0	The study area lacks preferred roosts such as caves, mines and Fairy Martin nests. Considered unlikely to occur on the study area due to the lack of breeding habitat and absence of records in the locality.	Unlikely
Hoary Wattled Bat *Chalinolobus nigrogriseus*	V	-	3	In NSW, this species favours forests dominated by Spotted Gum, Ironbarks and boxes; and heathy coastal forests where Scribbly Gum and Red Bloodwood are common. Vegetation within the study area is not suitable for this species.	Unlikely
Spotted-tailed Quoll *Dasyurus maculatus*	V	E	4	This species prefers forest habitats with dense vegetation. For denning, caves, large hollow logs or tree hollows are required. Suitable habitat for this species occurs within the broader National Parks, hence there is a potential of this species utilising the study area as part of its larger range. No denning resources for this species are considered to occur within the study area.	Moderate
Eastern False Pipistrelle *Falsistrellus tasmaniensis*	V	-	1	A winter-hibernating species with a preference for moist habitats containing trees taller than 20 metres in height (OEH 2023). Roosts in eucalypt hollows however has been found roosting in buildings or under loose bark. No potential roosting habitat occurs within the study area however habitats within this range may serve as a portion of a broader foraging range. Limited local records of this species occur.	Low
Eastern Coastal Free-tail Bat *Micronomus norfolkensis*	V	-	11	This species is most commonly recorded in woodland habitats with available roosting habitat such as tree hollows, house eaves and roofs. Limited potential roosting habitat occurs within the study area however habitats within this range may serve as a portion of a broader foraging range. Numerous local records of this species occur.	Moderate
Little Bent-winged Bat *Miniopterus australis*	V	-	18	This species was recorded within the study area during field survey.	Known

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
Large Bent-winged Bat *Miniopterus orianae oceanensis*	V	-	7	This species is known to occur in well-forested areas and often found roosting in caves, old mines and old buildings. Suitable foraging habitat for this species occurs within the study area.	High
Southern Myotis *Myotis macropus*	V	-	2	This species requires tree hollows, caves, tunnels or dense foliage for roosting. Forages along creek lines and other water bodies and has a preference for riparian habitat. Suitable habitat for this species does not occur within the study area.	Unlikely
Parma Wallaby *Notamacropus parma*	-	V	0	c	Unlikely
Greater Glider *Petauroides volans*	E	E	0	This species requires a high density of tree hollows for shelter. The study area is unlikely to contain enough habitat to support this species.	Unlikely
Yellow-bellied Glider *Petaurus australis*	V	V	0	Although suitable habitat for this species occurs within the study area, very few coastal populations of this species now occur and habitats within South West Rocks are too isolated for this species to recolonise.	Unlikely
Squirrel Glider *Petaurus norfolcensis*	V	-	84	The study area contains suitable habitat for this species and records occur within the Trial Bay and Cardwell Street precincts.	High
Brush-tailed Phascogale *Phascogale tapoatafa*	V	-	47	Suitable habitat for this species occurs within the study area and records of this species occur within the Trial Bay precinct. NPWS staff have also indicated that this species frequents habitats within the Cardwell Street precinct.	High
Koala *Phascolarctos cinereus*	E	E	153	This species was recorded within the study area during field survey.	Known
Common Planigale *Planigale maculata*	V	-	1	This species is found in areas where there is dense groundcover and in close proximity to water. Hollow logs, rocks and crevices are required for shelter diurnally (OEH 2023). There is some potential for this species to inhabit the broader National Park area however minimal dense groundcover was recorded within the study area itself.	Low

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
Long-nosed Potoroo *Potorous tridactylus tridactylus*	V	V	1	This species requires a dense understory and groundcover for refuge whilst feeding. Broadly suitable habitat for this species may occur within the general area, however the study area is unlikely to provide potential habitat for this species.	Unlikely
New Holland Mouse *Pseudomys novaehollandiae*	-	V	0	This species requires heathlands with a dense understory. Suitable habitat for this species does not occur on the study area and no local records occur.	Unlikely
Grey-headed Flying-fox *Pteropus poliocephalus*	V	V	79	A nomadic species which is dependent on winter flowering eucalypts. Suitable foraging resources for this species occurs within the study area and records of this species occur throughout the locality and study area.	High
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*	V	-	2	A wide-spread species which has been recorded in a variety of habitats across the state. Potentially suitable habitat for this species may occur within the study area.	Fair
Greater Broad-nosed Bat *Scoteanax rueppellii*	V	-	7	This species utilises a range of habitats although generally roosts in tree hollows. Suitable habitat for this species occurs within the broader area and habitats within the study area may provide a portion of this habitat.	Fair
Common Blossom Bat *Syconycteris australis*	V	-	4	This species is known to roost in Littoral Rainforests, and forage within nearby heathland and swamps (OEH 2023). Suitable habitat for this species occurs within the study area and local records occur nearby the Smoky Cape precinct.	Moderate
Eastern Cave Bat *Vespadelus troughtoni*	V	-	5	A cave-dwelling bat that inhabits wet sclerophyll forest and tropical mixed woodland. Suitable habitat for this species does not occur in the study area.	Unlikely
Reptilia					
Loggerhead Turtle *Caretta caretta*	E	E	13	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific	Low

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
				Ocean. There is some potential for females of this species to utilise sandy beaches for nesting, however tropical areas are more preferred.	
Green Turtle *Chelonia mydas*	V	V	21	An ocean-dwelling species which generally only emerges from the sea to nest on coastal beaches. Records of this species occur along beaches adjoining the study area, with some along Gap Beach and Trial Bay.	High
Leatherback Turtle *Dermochelys coriacea*	E	E	1	An ocean-dependent species which rarely breeds in Australia (OEH 2023). The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. Single occurrence of this species is from within the Macleay River.	Unlikely
Hawksbill Turtle *Eretmochelys imbricata*	-	V	2	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. There is some potential for females of this species to utilise sandy beaches for nesting, however tropical areas are more preferred.	Low
Flatback Turtle *Natator depressus*	-	V	0	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. There is some potential for females of this species to utilise sandy beaches for nesting, however tropical areas are more preferred.	Low
Aquatic Species					
New Zealand Fur-seal *Arctocephalus forsteri*	V	-	6	A marine species which utilises steep rocky islands during hauling out (OEH 2023). Despite this preference, occasional records of this species occur along the beaches surrounding the study area. Marine environments within the study area are likely to provide marginally suitable habitat for this species.	Fair
Australian Fur-seal *Arctocephalus pusillus doriferus*	V	-	1	A marine species which utilises flat, open areas on rocky islands during hauling out (OEH 2023). A single record of this species occurs within the locality, with this occurring within the shallows of Trial Bay, bordering the Trial Bay precinct.	High

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
Sei Whale *Balaenoptera borealis*	-	V	0	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
Blue Whale *Balaenoptera musculus*	-	E	0	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
Fin Whale *Balaenoptera physalus*	-	V	0	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
Grey Nurse Shark *Carcharias taurus*	-	CE	0	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
White Shark *Carcharodon carcharias*	-	V	0	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
Black Rockcod *Epinephelus daemelii*	-	V	0	The study area is within the known distribution of the Black Rockcod, however it inhabits inshore and rocky reefs, of which do not occur within the study area.	Unlikely
Southern Right Whale *Eubalaena australis*	-	E	0	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
School Shark *Galeorhinus galeus*	-	CD	0	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
White's Seahorse *Hippocampus whitei*	-	E	0	A marine species which utilises natural habitats such as corals, sponges and seagrasses for shelter (Department of Primary Industries 2023b). The extent of oceanic waters within the study area comprises the occasion shallow, sandy shoreline of the Pacific Ocean, where there is an absence of these shelter resources.	Unlikely

Species	Listing Status		# of records	Potential Occurrence Assessment	Likelihood of Occurrence
	BC Act	EPBC Act			
Precocious Lamprey *Mordacia praecox*	-	E	0	A freshwater species known to occur in rivers and streams. Suitable habitat for this species does not occur within the study area.	Unlikely
Sperm Whale *Physeter macrocephalus*	V	-	1	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
Eastern Gemfish *Rexea solandri*	-	CD	0	An oceanic species which inhabits deep continental shelf habitats, where it is general found between 250-500 metres deep. Suitable habitat for this species does not occur within the study area.	Unlikely
Whale Shark *Rhincodon typus*	-	V	0	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
Blue Warehou *Seriolella brama*	-	CD	0	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
Scalloped Hammerhead *Sphyrna lewini*	-	CD	0	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
Southern Bluefin Tuna *Thunnus maccoyii*	-	CD	0	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
Key: Critically Endangered (CE), Conservation Dependent (CD), Endangered (E), Vulnerable (V), Not listed (-), Range of listings (R), Test of significance required (green cell).					

Migratory Species

Table 35: Potential occurrence assessment - Migratory species

Species	BC Act	EPBC Act	Likelihood of Occurrence	Significance Assessment Required?
Aves				
Common Sandpiper *Actitis hypoleucos*	-	-	A wetland species with the potential to occur within the broader area. The development site, however, is unlikely to support this species with no wetlands present.	Unlikely
Common Noddy *Anous stolidus*	-	-	A seabird, unlikely to enter habitats within the study area except as a marginal fly-over.	Unlikely
Fork-tailed Swift *Apus pacificus*	-	-	This species is almost exclusively aerial (DCCEEW 2023b). Unlikely to utilise vegetation within the study area.	Unlikely
Flesh-footed Shearwater *Ardenna carneipes*	V	-	See assessment in Table 34.	Unlikely
Sooty Shearwater *Ardenna grisea*	-	-	A seabird, unlikely to enter habitats within the study area except as a marginal fly-over.	Unlikely
Wedge-tailed Shearwater *Ardenna pacifica*	-	-	A seabird, unlikely to enter habitats within the study area except as a marginal fly-over.	Unlikely
Sharp-tailed Sandpiper *Calidris acuminata*	-	-	A wetland species with the potential to occur within the broader area. The development site, however, is unlikely to support this species with no wetlands present.	Unlikely
Red Knot *Calidris canutus*	-	E	See assessment in Table 34.	Low
Curlew Sandpiper *Calidris ferruginea*	E	CE	See assessment in Table 34.	Unlikely
Pectoral Sandpiper *Calidris melanotos*	-	-	This species is largely found around swamps, wetlands and lakes. Suitable habitat for this species does not occur within the study area.	Unlikely

Species	BC Act	EPBC Act	Likelihood of Occurrence	Significance Assessment Required?
Streaked Shearwater *Calonectris leucomelas*	-	-	A seabird, unlikely to enter habitats within the study area except as a marginal fly-over.	Unlikely
Greater Sand Plover *Charadrius leschenaultii*	V	V	Suitable habitat for this species is present within the study area.	Fair
Oriental Cuckoo *Cuculus optatus*	-	-	This species is known to occur in rainforest margins, vine scrub, riverine thickets and monsoon forest. Suitable vegetation for this species does not occur within the development footprint.	Unlikely
Lesser Frigatebird *Fregata ariel*	-	-	A seabird, unlikely to enter habitats within the study area except as a marginal fly-over.	Unlikely
Great Frigatebird *Fregata minor*	-	-	A seabird, unlikely to enter habitats within the study area except as a marginal fly-over.	Unlikely
Latham's Snipe *Gallinago hardwickii*	-	-	This species is largely found around swamps, wetlands and lakes. Suitable habitat for this species does not occur within the study area.	Unlikely
Swinhoe's Snipe *Gallinago megala*	-	-	This species is largely found around swamps, wetlands and lakes. Suitable habitat for this species does not occur within the study area.	Unlikely
Pin-tailed Snipe *Gallinago stenura*	-	-	This species is largely found around swamps, wetlands and lakes. Suitable habitat for this species does not occur within the study area.	Unlikely
White-throated Needletail *Hirundapus caudacutus*	-	V	See assessment in Table 34.	High
Bar-tailed Godwit *Limosa lapponica*	-	-	A seabird which is unlikely to enter habitats within the study area, except to forage along sandy beaches.	Unlikely
Southern Giant-Petrel *Macronectes giganteus*	E	E	See assessment in Table 34.	Unlikely
Northern Giant Petrel *Macronectes halli*	V	V	See assessment in Table 34.	Unlikely

Species	BC Act	EPBC Act	Likelihood of Occurrence	Significance Assessment Required?
Black-faced Monarch *Monarcha melanopsis*	-	-	This species is mainly recorded in rainforest ecosystems including semi-deciduous vine-thickets and complex notophyll vine-forests (DCCEEW 2023b). Suitable habitat for this species may occur within the broader study area.	Fair
Satin Flycatcher *Myiagra cyanoleuca*	-	-	This species is largely recorded in heavily vegetated gullies of eucalypt-dominated forests and woodlands. On migration, it is known to occur in coastal forests, woodlands, mangroves and drier woodlands and open forests (DCCEEW 2023b). Suitable habitat for this species occurs within the study area.	Fair
Eastern Curlew *Numenius madagascariensis*	-	CE	See assessment in Table 34.	Unlikely
Little Curlew *Numenius minutus*	-	-	This species is known to frequent wetlands. No suitable habitat for this species is present within the study area.	Unlikely
Osprey *Pandion haliaetus*	-	-	See assessment in Table 34.	Known
White-tailed Tropicbird *Phaethon lepturus*	-	-	A seabird, unlikely to enter habitats within the study area except as a marginal fly-over.	Unlikely
Rufous Fantail *Rhipidura rufifrons*	-	-	In NSW, this species mainly inhabits wet sclerophyll forests, often in gullies (DCCEEW 2023b). Habitat of this type is present within the study area.	Moderate
Little Tern **Sternula albifrons**	E	-	See assessment in Table 34.	Low
Spectacled Monarch *Symposiachrus trivirgatus*	-	-	This species largely inhabits dense rainforests and wet sclerophyll forests. Some suitable habitat for this species is present within the broader study area.	Low
Common Greenshank *Tringa nebularia*	-	-	A wetlands species with no suitable habitat present within the study area.	Unlikely

Species	BC Act	EPBC Act	Likelihood of Occurrence	Significance Assessment Required?
Various Albatross *Diomedea sp., Phoebetria sp., Thalassarche sp.*	R	V	See assessment in Table 34.	Unlikely
Reptilia				
Loggerhead Turtle *Caretta caretta*	E	E	See assessment in Table 34.	Low
Green Turtle *Chelonia mydas*	V	V	See assessment in Table 34.	High
Leatherback Turtle *Dermochelys coriacea*	E	E	See assessment in Table 34.	Unlikely
Hawksbill Turtle *Eretmochelys imbricata*	-	V	See assessment in Table 34.	Low
Flatback Turtle *Natator depressus*	-	V	See assessment in Table 34.	Low
Aquatic Species				
Sei Whale *Balaenoptera borealis*	-	V	See assessment in Table 34.	Unlikely
Bryde's Whale *Balaenoptera edeni*	-	-	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
Blue Whale *Balaenoptera musculus*	-	E	See assessment in Table 34.	Unlikely
Fin Whale *Balaenoptera physalus*	-	V	See assessment in Table 34.	Unlikely

Species	BC Act	EPBC Act	Likelihood of Occurrence	Significance Assessment Required?
Oceanic Whitetip Shark *Carcharhinus longimanus*	-	-	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
White Shark *Carcharodon carcharias*	-	V	See assessment in Table 34.	Unlikely
Southern Right Whale *Eubalaena australis*	-	E	See assessment in Table 34.	Unlikely
Porbeagle *Lamna nasus*	-	-	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
Humpback Whale *Megaptera novaeangliae*	V	V	See assessment in Table 34.	Unlikely
Reef Manta Ray *Mobula alfredi*	-	-	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
Giant Manta Ray *Mobula birostris*	-	-	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
Orca *Orcinus orca*	-	-	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
Sperm Whale *Physeter macrocephalus*	-	-	An ocean-dependent species. The extent of oceanic waters within the study area comprises the occasional shallow shoreline of the Pacific Ocean. These areas are not of sufficient depth to support this species.	Unlikely
Whale Shark *Rhincodon typus*	-	V	See assessment in Table 34.	Unlikely

Key: Critically Endangered (CE), Conservation Dependent (CD), Endangered (E), Vulnerable (V), Not listed (-), Range of listings (R), Test of significance required (green cell).

Appendix D. Microbat Analysis Report