

Murramarang South Coast Walk

(NPWS Estate) Final alignment



Review of Environmental Factors

29 July 2021

Heather Moorcroft



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Acronyms and abbreviations

ACHAR	Aboriginal Cultural Heritage Assessment Report
AHIP	Aboriginal Heritage Impact Permit
AHIMS	Aboriginal Heritage Information Management System
AS	Australian Standard
ASL	Above Sea Level
AS/NZS	Australian Standard/New Zealand Standard
AWTGS	Australian Walking Track Grading System
BC Act	<i>Biodiversity Conservation Act 2016 (NSW)</i>
BVTs	BioMetric Vegetation Types
DEC	NSW Department of Environment and Conservation
DECCW	NSW Department of Environment, Climate Change and Water
DPIE	NSW Department of Planning, Industry and Environment
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999 (Cwlth)</i>
FM	<i>Fisheries Management Act 1994 (NSW)</i>
FRP	Fibre Reinforced Polymer
HHIMS	Historic Heritage Information Management System
I-SEPP	NSW State Environmental Planning Policy (Infrastructure) 2007
LEP	Local Environmental Plan
LGA	Local Government Area
MNES	Matter of National Environmental Significance
NPW Act	<i>National Parks and Wildlife Act 1974 (NSW)</i>
NPWS	NSW National Parks and Wildlife Service
NRMA	National Roads and Motorists' Association
OEH	Office of Environment and Heritage
PMST	Protected Matters Search Tool
REF	Review of Environmental Factors
RNE	Register of the National Estate
SCIVI	Southeast NSW Native Vegetation Classification and Mapping
SEPP	State Environmental Planning Policy
TEC	Threatened Ecological Community
WM Act	<i>Water Management Act 2000 (NSW)</i>

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Executive summary

This Review of Environmental Factors (REF) report details an assessment of the environmental impacts of the proposed Murramarang South Coast Walk on the NSW National Parks and Wildlife Service (NPWS) estate. The Murramarang South Coast Walk is a proposed multi-day 48 km walk following the coastline of Murramarang National Park and adjacent areas, including the Murramarang Aboriginal Area. It is located on the south coast of NSW in the Eurobodalla and Shoalhaven local government areas. The construction and operation phases of the proposed walk in the NPWS estate are the proposed activity for the purposes of this REF.

The proposed activity is spread across the 48 km of the proposed walk. The construction phase includes development of approximately 12.77 km of new trail sections, upgrading of approximately 3.08 km of existing trail sections, closure and rehabilitation of approximately 5.87 km of redundant trail sections, and the upgrade of four precincts. The trail components of the proposed activity are to be within a 1.2 m corridor, with the majority being of natural earth. The operation phase of the proposed activity is for the construction phase components as well as for 10.33 km of trail alignment on the beaches and rock platforms and approximately 9.26 km of existing trail sections. The subject site is the area to be directly impacted by the proposed activity equates to approximately 23.87 ha.

The assessment, including extensive field surveys, was limited to a study area which incorporated the subject site and an additional area 10 m either side of the trail corridor and the remainder of the precincts. The study area was approximately 91.83 ha. The locality is defined as the area within a 10 km radius of the subject site.

The geology of the study area includes the Permian Sydney Basin formation and older Ordovician beds of the Lachlan Fold Belt. The geology of the area is considered scientifically important. The dominant plant community within the study area is Spotted Gum - White Stringybark – Burrawang shrubby open forest on hinterland foothills, northern South East Corner Bioregion. This community is relatively common across the locality. One threatened plant species potentially occurs in the study area although it was not observed during field surveys. Four potential Threatened Ecological Communities (TECs) were determined to be within or immediately adjacent to the study area: *Bangalay Sand Forest in the Sydney Basin and South East Corner Bioregions*; *Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions*; *Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions*; and *Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions*. Each of the potential TECs occur elsewhere in surrounding areas. Thirty-seven listed threatened fauna species and eight listed migratory fauna species were identified as occurring or potentially occurring within the study area, with the habitat and ecology of the species determining that all local populations must satisfy their lifecycle needs beyond the study area. The study area does not contain potential koala habitat as under NSW criteria; however, it contains habitat critical to the survival of the Koala as under Commonwealth criteria. The study area contains numerous riparian corridors, the majority of which appear to be intermittent and ephemeral.

The study area is reflective of the rich cultural landscape of the south coast with middens and artefacts scatters recorded in the vicinity. The proposed activity was designed and aligned to avoid known sites. There are a number of historic heritage items located within or adjacent to the study area. The general area also has important recreational and social values.

The proposed activity will require the modification or clearing of up to 1.95 ha of native ground cover and/or understory vegetation. No mature canopy trees are to be removed. As a result of the proposed activity, there may be a reduction of potential Bangalay Sand Forest TEC of up to 0.23 ha and a negligible amount e.g. < 0.01 ha, of Swamp Sclerophyll Forest TEC, and an increase in potential Littoral Rainforest TEC of up to 0.08 ha. There will be no direct impact on potential Swamp Oak Floodplain Forest TEC. There will be minimal direct impact to riparian corridors with the proposed activity trail alignment components generally following the contours. Limited foraging and low-quality sheltering habitat of threatened fauna species may be directly impacted by the proposed activity, and foraging habitat for threatened shorebirds may be impacted. A number of Aboriginal sites may be impacted by the proposed activity and an Aboriginal Heritage Impact Permit is recommended. The closure and rehabilitation of redundant track will result in the improved protection of a number of Aboriginal sites. Further archaeological investigation is to be carried out as part of the track head precinct upgrades at Maloneys Beach and Pretty Beach. One listed historic heritage item may be impacted by the proposed activity. Other listed cultural heritage will not be impacted.

A number of environmental safeguards and mitigation measures are recommended to reduce the potential impacts of the proposed activity on the environment. The safeguards and measures include: preparation and implementation of a Construction Environmental Management Plan and an Operational Environmental Management Plan; the installation and maintenance of sediment and erosion control measures; the provision of interpretive materials to promote appropriate visitor behaviour; a number of measures to reduce impact on neighbouring residents at Maloneys Beach; continuation of the threatened shorebird monitoring program and development of a Trigger, Action and Response Plan; and development and implementation of a visitor monitoring program. The recommendations of the Aboriginal Cultural Heritage Assessment Report (ACHAR) are incorporated into the safeguards and mitigation measures in this REF, including the requirement to develop and implement an Aboriginal Heritage Management Plan.

Incorporating the recommended environmental safeguards and mitigation measures, the proposed activity is assessed as being likely to have a negligible to low negative impact for most environmental values, with an overall positive impact on recreational and social values.

Taking into consideration the recommended safeguards and mitigation measures, the assessments of significance determined that none of the known or potentially occurring threatened entities listed under the *Biodiversity Conservation Act 2016* were likely to be placed at risk of extinction, or otherwise significantly impacted. Hence an Environmental Impact Statement is not required.

Taking into consideration the recommended safeguards and mitigation measures, assessment against the significant impact criteria determined that none of the known or potentially occurring entities listed under the *Environment Protection and Biodiversity Conservation Act 1999* were likely to be significantly impacted. Consequently, referral to the Commonwealth Minister for the Environment is not required.

1. Background

The Murramarang South Coast Walk proposed multi-day walk will traverse the coastal fringe of Murramarang National Park and adjacent areas, including the Murramarang Aboriginal Area (see Map 1). The walk will be approx. 48 km and generally follows the coastline north from Maloneys Beach, through Murramarang National Park, Durras, Depot Beach, Merry Beach, Kioloa and Murramarang Aboriginal Area, to Bawley Point in the north.

The proposed walk passes through a variety of coastal vegetation communities, and goes along beaches, across rock platforms and over headlands, providing walkers with views up and down the coast and out to sea. See Figure 1 and Figure 2 for general views of the Murramarang coastline. Accommodation for the walk is to be provided at existing facilities, or existing remote camping and the recommissioning of the Oaky Beach Camping Area. There will be new track facilities such as information shelters, directional signage and rest points along the track.

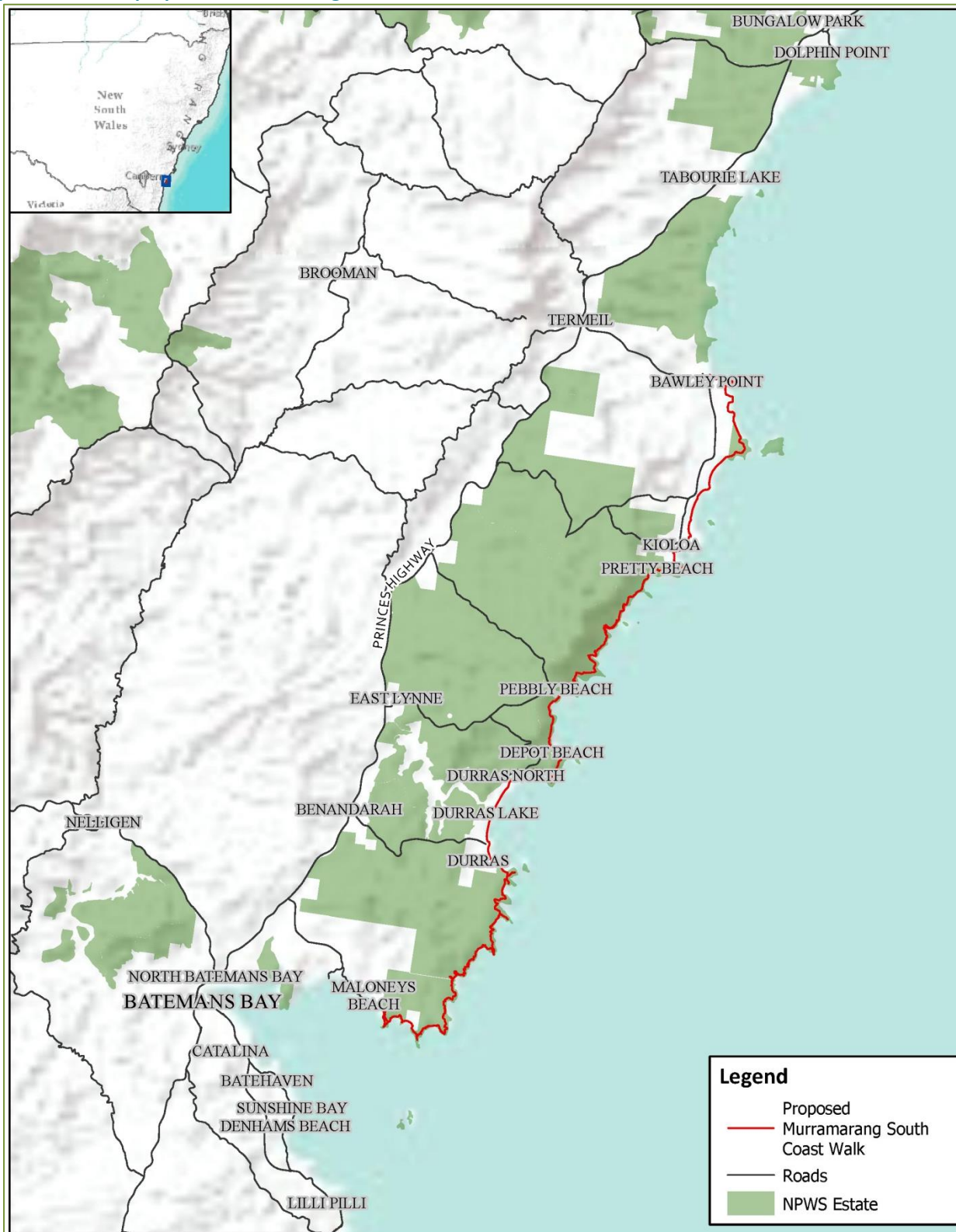
The Plan of Management for Murramarang National Park was amended in 2002 to include a “coastal walking route” along the length of the national park (NSW National Parks and Wildlife Service 2002a). The Plan specified a series of actions to develop the walk by utilising existing track, upgrading track where required, building new track, rationalising, re-routing and rehabilitating track that was no longer required, and using beaches and rock platforms. A Review of Environmental Factors (REF) was carried out for the proposed works, and the majority of the coastal walking route was completed immediately following. However, due to funding constraints, completion of the route along the length of the national park was not possible. In addition, further budgetary issues in subsequent years compromised the maintenance of the track.

In 2016, with funding commitment from the NSW Government, the NPWS commissioned a concept plan to complete the proposed walk. The aim of the concept plan reflected the intent of the Plan of Management with development of a signature walk experience by providing a “continuous and high quality hike through Murramarang National Park from Batemans Bay to Bawley Point” which would link up the villages of Durras, Pebbly Beach and Kioloa (NewScape 2017; p.5).

The NPWS estate components of the walk outlined in the concept plan (see Map 2) were ground truthed by NPWS staff. Adjustments to the alignment were made as the terrain in some sections was found to be unsuitable. Following these adjustments, preliminary investigations were carried out. These included a flora and fauna assessment (see Moorcroft 2019), an Aboriginal cultural heritage assessment (see Feary and Niemoeller 2020) and an assessment by track management specialists (see Track and Trail Management Services 2019). These investigations refined the alignment and informed an REF Consultation Draft and Draft Masterplan, which were released for public exhibition in July 2020.

In late 2019/early 2020, the Currowan Fire burnt approximately 500,000 ha in the Shoalhaven and the Eurobodalla LGAs (refer to Map 3 showing the extent of the Currowan Fire). Much of the northern sections of the proposed walk were burnt. Refer to Figure 3 and Figure 4 showing post-fire landscape. The fire exposed numerous previously unrecorded Aboriginal sites. Another Aboriginal cultural heritage assessment (see NGH 2021) was carried out, and two geological risk assessments (see Cardno 2020a; Cardno 2020b), which resulted in the realignment of some sections to avoid Aboriginal sites and unstable cliffs. Four precinct upgrades associated with the walk were also included in the proposed activity.

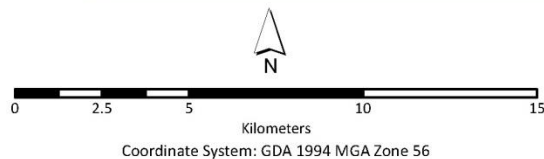
Map 1: Location of proposed Murramarang South Coast Walk



Legend

- Proposed Murramarang South Coast Walk
- Roads
- NPWS Estate

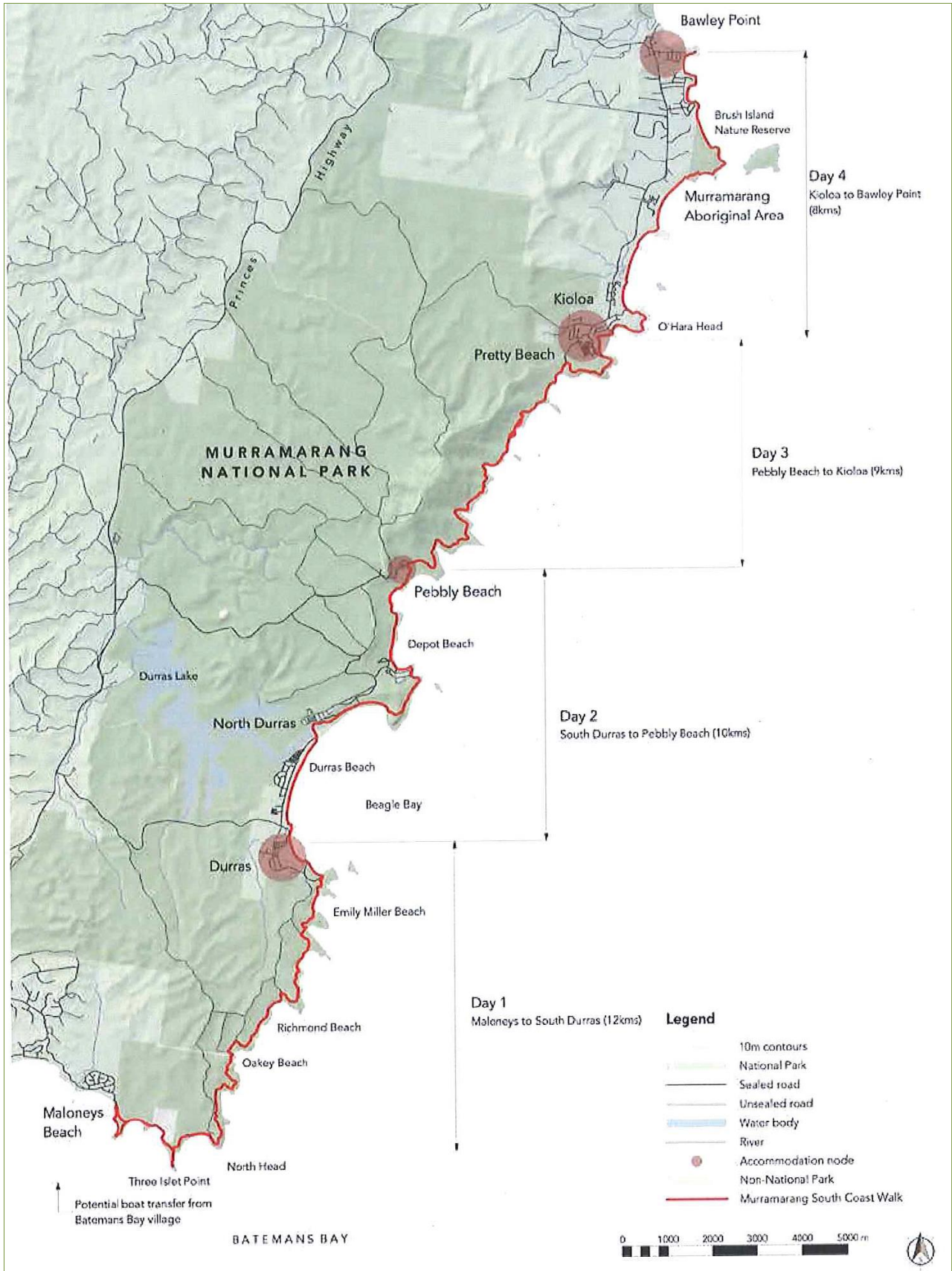
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Date: 6/08/2019



Map 2: Concept plan map of Murramarang South Coast Walk alignment



Source: NewScape (2017; p. 7)

Map 3: Extent of the Currowan Fire 2019/2020 within the Shoalhaven LGA

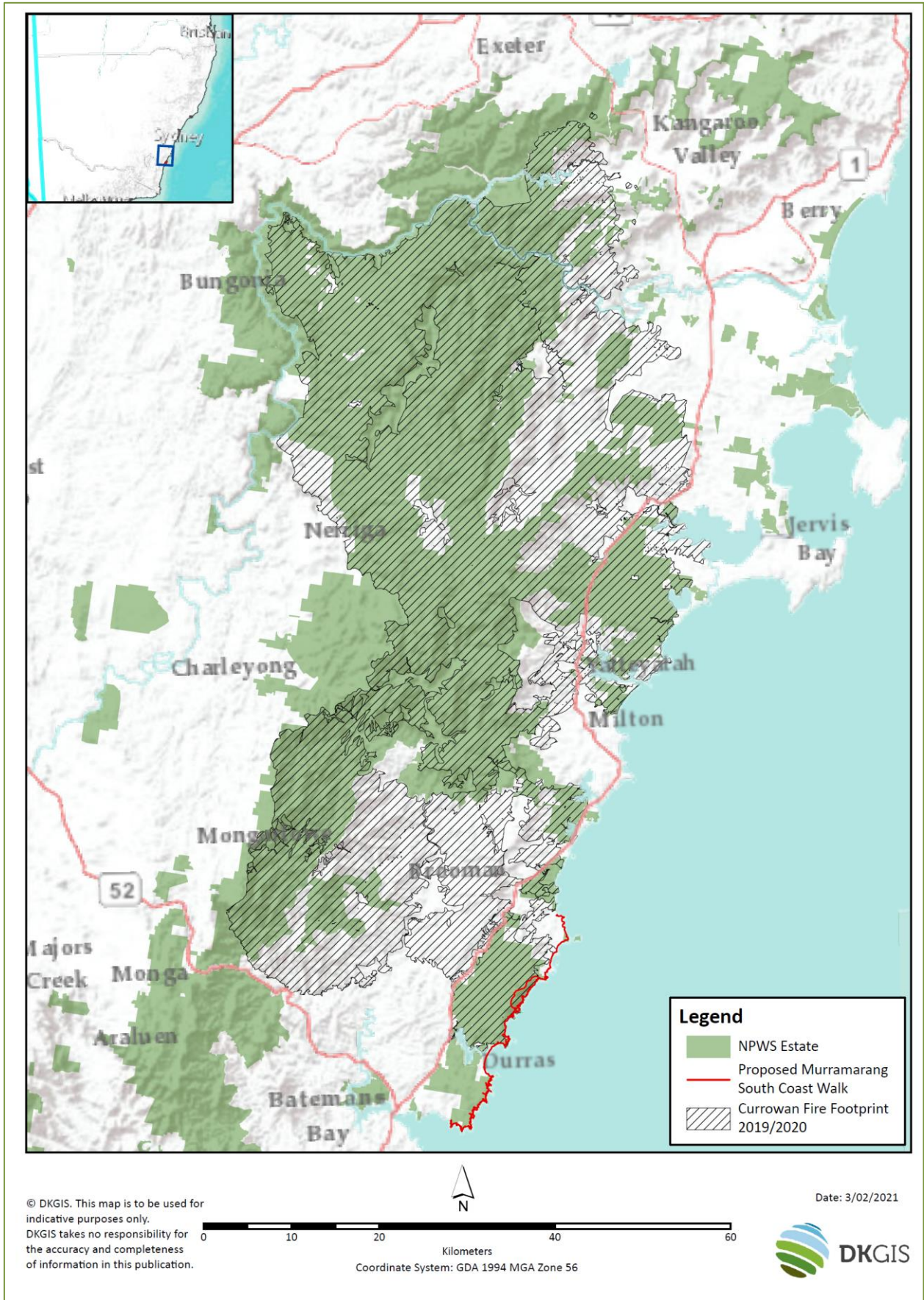


Figure 1: View north along Murramarang coastline



Figure 2: View south along Murramarang coastline



Figure 3: View south along Murramarang coastline post-fire



Figure 4: Forest vegetation community recovery post-fire



This REF is based on the current *Review of Environmental Factors template* (Office of Environment and Heritage Service 2017a) and the *Guidelines for Preparing a Review of Environmental Factors* (NSW OEH 2016a).

2. Brief description of the proposed activity

Table 1: Brief of proposed activity

Item	Detail
Description of proposed activity	Construction and operation of the NPWS estate components of the proposed Murramarang South Coast Walk.
Name of NPWS park or reserve	Murramarang National Park and Murramarang Aboriginal Area.
Location of activity	Murramarang National Park and Murramarang Aboriginal Area, adjacent to coastline between Maloneys Beach in the Eurobodalla Local Government Area (LGA) to Bawley Point in the Shoalhaven LGA.
Estimated commencement date	May 2021
Estimated completion date	March 2023

3. Proponent's details

Table 2: Proponents details

Item	Detail
Area of Section/Division	Shoalhaven Area, South Coast Branch
Contact name	Tom Pinzone
Position	Senior Project Officer
Street address	55 Graham Street, Nowra, NSW
Postal address	PO Box 707, Nowra, NSW 2541
Email	tom.pinzone@environment.nsw.gov.au

4. Permissibility and statutory requirements

4.1. Legal permissibility

4.1.1. *National Parks and Wildlife Act 1974 (NSW)*

The *National Parks and Wildlife Act 1974* (NPW Act) seeks to conserve nature, including habitats, ecosystems and ecosystem processes, biodiversity, landforms, landscapes, wild rivers, and historic and cultural objects, places and features in NSW. It provides for the reservation of national parks and other places of natural, cultural and social value and specifies such areas are to be managed in accordance with the principles for each particular reserve type and a management plan. The Act specifies that the purpose of reserving land as a national park is to identify, protect and conserve areas containing outstanding or representative ecosystems, natural or cultural features or landscapes or phenomena that provide opportunities for public appreciation and inspiration, and sustainable visitor or tourist use and enjoyment. It provides for the legal protection of plants and animals. The Act is administered by the NPWS.

Murramarang National Park and Murramarang Aboriginal Area are declared under the NPW Act. The seaward boundary of Murramarang National Park is gazetted to the mean low water mark, and the seaward boundary of Murramarang Aboriginal Area is gazetted to the high-water mark.

4.1.1.1. *Objects of the Act (s. 2A)*

The objects of the NPW Act are:

- “1(a) the conservation of nature, including, but not limited to, the conservation of:
 - (i) habitat, ecosystems and ecosystem processes, and
 - (ii) biological diversity at the community, species and genetic levels, and
 - (iii) landforms of significance, including geological features and processes, and
 - (iv) landscapes and natural features of significance including wilderness and wild rivers,
- (b) the conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including, but not limited to:
 - (i) places, objects and features of significance to Aboriginal people, and
 - (ii) places of social value to the people of New South Wales, and
 - (iii) places of historic, architectural or scientific significance,
- (c) fostering public appreciation, understanding and enjoyment of nature and cultural heritage and their conservation,
- (d) providing for the management of land reserved under this Act in accordance with the management principles applicable for each type of reservation.”

The proposed activity is generally consistent with s. 1(a) and 1(b) of the Act in relation to conservation of natural and cultural values with the incorporation of measures to reduce the potential impact on habitats, ecosystems and ecosystem process, biodiversity, and landscape and natural and cultural values.

The proposed activity will specifically meet s. 2A(1)(c) of the Act to increase the public appreciation, understanding and enjoyment of the area’s natural and cultural heritage with provision of improved access and services such as a well graded walking track, and an increase in interpretation media.

The proposed activity is consistent with the principles applicable to the reserves as required under object 1(d) of the Act. Refer to Section 4.1.1.2 below.

Conclusion: The proposed activity is consistent with the objects of the *National Parks and Wildlife Act 1974*.

4.1.1.2. Reserve management principles under the Act (s. 30E – 30K)

Under s. 30E of the Act, the purpose of reserving land as national parks is to “identify, protect and conserve areas containing outstanding or representative ecosystems, natural or cultural features or landscapes or phenomena that provide opportunities for public appreciation and inspiration and sustainable visitor or tourist use and enjoyment so as to enable those areas to be managed in accordance with” management principles outlined in subsection (2), including “(d) the promotion of public appreciation and understanding of the national park’s natural and cultural values”, and “(e) provision for sustainable visitor or tourist use and enjoyment that is compatible with the conservation of the national park’s natural and cultural values”.

The proposed activity aims to: promote the public understanding and appreciation of the natural and cultural values of the reserves; and allow for sustainable tourist and visitor use and enjoyment, whilst protecting the natural and cultural heritage.

Under s. 30K of the Act, the purpose of reserving land as an Aboriginal area is to “identify, protect and conserve areas associated with a person, event or historical theme, or containing a building, place, object, feature or landscape: (a) of natural or cultural significance to Aboriginal people, or (b) of importance in improving public understanding of Aboriginal culture and its development and transitions, so as to enable those areas to be managed in accordance with” management principles outlined in subsection (2), including “(d) the promotion of public understanding and appreciation of the Aboriginal area’s natural and cultural values and significance where appropriate”, and “(g) provision for sustainable visitor or tourist use and enjoyment that is compatible with the Aboriginal area’s natural and cultural values and the cultural values of the Aboriginal people”.

The proposed activity aims to: promote the public understanding and appreciation of the Aboriginal area’s natural and cultural values; and allow for sustainable tourist and visitor use and enjoyment that is compatible with the Aboriginal area’s natural and cultural values and the cultural values of the Aboriginal people.

Conclusion: The proposed activity is consistent with the reserve management principles of national parks and Aboriginal areas as specified under the *National Parks and Wildlife Act 1974*.

4.1.1.3. Protection of Aboriginal cultural heritage

Aboriginal cultural heritage is protected under Part 6 of the Act as Aboriginal objects and Aboriginal places. The NPWS, in carrying out its work, is to identify, conserve, protect and prevent from damage, Aboriginal objects and Aboriginal places. Aboriginal objects and declared Aboriginal places are provided protection by establishing offences of harm. An Aboriginal object or place must not be harmed or desecrated unless under an approved Aboriginal Heritage Impact Permit (AHIP).

The proposed activity does not impact on any Aboriginal places.

The proposed activity may impact on Aboriginal objects. The proposed activity has been developed in consideration of the Aboriginal objects identified during the Aboriginal cultural heritage assessments with the trail alignment components being adjusted and relocated in numerous areas to avoid such objects. However, as Aboriginal sites are present across all landscapes of the study area it is not feasible to avoid the location of all known and previously recorded Aboriginal sites by further realignment and design. The alignment and location of the proposed activity was assessed as the best possible outcome for minimal impacts to Aboriginal cultural heritage.

Advice from the independent heritage consultants is that the archaeological material potentially present in the area of the proposed activity is not sufficient value to reject the proposed activity. Environmental safeguards and mitigation measures in this REF are for the NPWS to:

- apply for an AHIP for the trail alignments and Yellow Rock and Oaky Beach precinct works
- apply for an AHIP to carry out further archeological investigations in the form of test pitting at Maloneys Beach and Pretty Beach precincts
- adopt a salvage approach under the AHIPs in accordance with conditions provided by NGH (2021)
- and develop and implement an Aboriginal Heritage Management Plan for the walk and include processes to manage unexpected finds etc.

Conclusion: The proposed activity is consistent with the protection of Aboriginal cultural heritage as specified under the *National Parks and Wildlife Act 1974*.

4.1.1.4. Title and relevant sections of plan of management or statement of management intent

The plans of management relevant to the proposed activity are the Murramarang National Park, Brush Island Nature Reserve, Belowla Island Nature Reserve and Tollgate Islands Nature Reserve Plan of Management (NPWS 2002); and the Murramarang Aboriginal Area Plan of Management (NPWS 1998).

The proposed activity is consistent with the following objectives of the Murramarang Aboriginal Area as stated in the Murramarang Aboriginal Area Plan of Management: protecting Aboriginal cultural significance; protecting archaeological deposits and Swan Lagoon; and development and promotion of the area in partnership with the local Aboriginal people. In addition, the proposed activity will assist with implementation of the following overall strategies of the Plan: promotion of public appreciation; limiting access to disturbed areas; visitor access via formed tracks; and improving walking tracks and interpretive signing.

Conclusion: The proposed activity is consistent with the Murramarang Aboriginal Area Plan of Management.

The proposed activity is consistent with the following objectives of the Murramarang National Park as stated in the Murramarang National Park, Brush Island Nature Reserve, Belowla Island Nature Reserve and Tollgate Islands Nature Reserve Plan of Management: promotion of the appreciation and understanding by visitors; provision of recreation opportunities; enhancement of opportunities for walking; and provision opportunities for low key tourism.

Table 3 considers the proposed activity against the relevant policies and actions in the Park’s Plan of Management.

Table 3: Proposed activity in relation to the Park’s Plan of Management policies and actions

Plan policy/action	Relation of proposed activity
Signposts will be erected at track entrances at Merry Beach, Pretty Beach, Pebbly Beach, Wasp Head and elsewhere as necessary advising visitors of the value of the natural values of the park and the prohibition of collection (p. 14).	This action has already been implemented. However, the proposed activity includes development of a track commencement ‘celebration’ at Maloneys Beach and a smaller track head at Pretty Beach, and installation of directional and interpretation signage. Signs will include information on activities that are prohibited in the national park. The proposed activity will result in implementation of this action.
Aboriginal sites within the park and reserves will be protected from disturbance (p. 21).	Protection of Aboriginal sites under the National Parks and Wildlife Act 1976 The alignment of the proposed activity was informed by the results of Aboriginal cultural heritage assessments including a number of field surveys and has been defined to minimise the impact on Aboriginal sites where possible (see Feary and Niemoeller 2020; NGH 2021). The Aboriginal Cultural Heritage Assessment Report (ACHAR) for the final alignment advised that the proposed activity

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	<p>may impact on Aboriginal objects. The proposed activity has been developed in consideration of the Aboriginal objects identified during the Aboriginal cultural heritage assessments with the trail alignment components being adjusted and relocated in numerous areas to avoid such objects. As Aboriginal sites are present across all landscapes of the study area it is not feasible to avoid the location of all known and previously recorded Aboriginal sites by further realignment and design of the trail components. Test pitting for Aboriginal cultural heritage at Maloneys Beach and Pretty Beach precincts is to be carried out prior to any works in these areas.</p> <p>The alignment and location of the proposed activity was assessed as the best possible outcome for minimal impacts to Aboriginal cultural heritage. Advice from the independent heritage consultants is that the archaeological material potentially present in the area of the proposed activity is not sufficient value to reject the proposed activity. An environmental safeguard and mitigation measure is for NPWS to apply for an AHIP for the trail alignments and Yellow Rock and Oaky Beach precinct works. Also, the NPWS is to apply for an AHIP to carry out further archeological investigations for the test pitting at Maloneys Beach and Pretty Beach precincts. The salvage approach under the AHIP during the proposed activity, is to be in accordance with that provided by NGH (2021). The NPWS acting in accordance with the conditions of the AHIPs is a defence against harm.</p> <p>The proposed activity is consistent with this policy.</p>
<p>The Batemans Bay Local Aboriginal Land Council will be consulted about all aspects of management of Aboriginal sites and active involvement of Aboriginal people will be encouraged (p. 21).</p>	<p>The Batemans Bay Local Aboriginal Land Council was consulted about the proposed activity, and a representative accompanied the heritage consultants for some of the field survey (see Feary and Niemoeller 2020; NGH 2021). The final ACHAR recommends that the Aboriginal community is invited to be involved in the salvage program during construction of the trail components and Yellow Rock and Oaky Beach precinct upgrades, and in the test pitting program at Maloneys Beach and Pretty Beach. These recommendations are included as environmental safeguards and mitigation measures in this REF. In addition, a further recommendation in the ACHAR is for the NPWS to consult with Registered Aboriginal Parties, which includes the Batemans Bay Local Aboriginal Land Council, to explore opportunities to showcase Aboriginal culture in interpretation along the walk.</p> <p>The proposed activity is consistent with this policy.</p>
<p>All work involving ground disturbance will be preceded by a survey for Aboriginal sites (p. 21).</p>	<p>The Aboriginal cultural heritage assessment for the proposed activity included a number of field surveys for Aboriginal sites (see Feary and Niemoeller 2020; and NGH 2021). The final ACHAR recommends that the Aboriginal community is invited to be involved in the salvage program during construction of the trail components and Yellow Rock and Oaky Beach precinct upgrades, and in the test pitting program at Maloneys Beach and Pretty Beach precincts. These recommendations are included as environmental safeguards and mitigation measures in this REF.</p> <p>The proposed activity is consistent with this policy.</p>
<p>All work involving ground disturbance will be preceded by a check for historic places (p. 22).</p>	<p>A check of historic places has been conducted. The proposed activity takes into consideration the location of historic places listed on the NSW Historic Heritage Information Management System (HHIMS) as well as in any historic places listed under local environmental plans for the Shoalhaven and Eurobodalla LGAs.</p>

	The proposed activity is consistent with this policy.
Signs will be erected at park entrances and other appropriate location to inform visitors that they are in a national park (p. 23).	The proposed activity includes the development of a track commencement 'celebration' at Maloneys Beach and a smaller track head at Pretty Beach. Signage and interpretive media are also to be included along the walk. Signage is to be consistent with the <i>Park Signage Manual</i> . The proposed activity assists in the implementation of this action.
An information signposting and interpretation program will be prepared and implemented providing for place and direction signposting where necessary at carparks and walking track entrances and interpretive signs at camping and major day use areas (p. 23).	The proposed activity includes the development of a track commencement 'celebration' at Maloneys Beach and a smaller track head at Pretty Beach. Signage and interpretive media are also to be included along the walk. Signage is to be consistent with the <i>Park Signage Manual</i> . The proposed activity assists in the implementation of this action.
That part of the park between Pretty Beach and Pebbly Beach, the coastline between Pebbly Beach and Depot Beach and the area between Wasp Head and Acheron Ledge will be maintained in a natural condition to provide a relatively remote recreational experience (p. 27).	The proposed activity between Pretty Beach and Pebbly Beach, Pebbly Beach and Depot Beach, and Wasp Head and Acheron Ledge is limited to the development of new trail sections, upgrading of existing trail sections and rehabilitation of redundant trail sections. Other than infrastructure associated with these works such as directional signage and rest points, no other facilities are to be developed in these areas. The proposed activity is consistent with this policy.
Facilities provided within natural areas will be limited to walking tracks, visitor information and, if necessary, basic toilet facilities (p. 27).	See above. The proposed activity is consistent with this policy.
Walking tracks may be upgraded or relocated where necessary. A coastal walking route will be formalised within the park which will involve upgrading selected informal walking tracks, creating short sections of new walking tracks and installing associated infrastructure such as signs and lookouts. Other informal tracks will be closed for rehabilitation (p. 27).	The proposed activity includes the development of new trail sections, upgrading of existing trail sections where necessary, the closure and rehabilitation of redundant trail sections, and installing associated infrastructure such as signs. The proposed activity is consistent with this policy.
Walk-in camping will be permitted in Murramarang National Park: - at designated camping areas (subject to availability); - more than 100 metres from the coastline, any walking track or road; - more than 500 metres from picnic areas, camping areas and villages (p. 27).	The proposed activity allows for walk-in camping as in accordance with the areas noted in the Plan of Management. The proposed activity is consistent with this policy.
If impacts of walk-in camping prove unacceptable affected areas may be closed to camping or number of campers may be control by a permit system (p. 27).	Safeguards and mitigation measures of this REF include the monitoring of visitor use of the proposed activity and introduction of a permit system if required. The proposed activity is consistent with this policy.
Public vehicle use will not be permitted other than on designated public access roads (p. 29).	The proposed activity includes rehabilitation works and upgrading the NPWS section of the Maloneys Beach precinct as the principal track head for the Murramarang South Coast Walk. This will include improved facilities such as: a formal carpark (pending archaeological test pitting); accessible walking trails; and revegetation and rehabilitation of areas, including unauthorised vehicle access tracks to the beach. The current practice of driving vehicles into the NPWS section of Maloneys Beach area has damaged the foredune resulting in little vegetation cover and a lack of sand accumulation. Consistent with the Plan of Management, beach access for vehicles will not be

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	<p>provided from within the Murramarang National Park, except by emergency services, NPWS and existing commercial operators.</p> <p>The proposed activity is consistent with this policy.</p>
<p>Signs will be erected at appropriate locations encouraging minimum impact bushwalking and advising of restrictions on the location of pack camping (p. 29).</p>	<p>The proposed activity includes development of a track head precinct at Maloneys Beach. Although the detail on the interpretive information to be provided at the track head has yet to be finalised, this REF includes environmental safeguards and mitigation measures relating to interpretive information to include a number of messages consistent with minimum impact bushwalking.</p> <p>The proposed activity will assist with the implementation of this action.</p>
<p>Walking tracks at Snapper Point will be signposted and inappropriate tracks will be closed and revegetated. Where possible, the track system will be designed to minimise visitation to sensitive geological features (p. 29).</p>	<p>This action has been implemented and the tracks at Snapper Point have been rationalised. The proposed activity will continue the rationalisation of tracks. The new trail sections in this area do not provide access to the sensitive geological features.</p> <p>The proposed activity will assist with the implementation of this action.</p>
<p>A coastal walking track route will be created along the length of the park between North Head and Merry Beach. (p. 30).</p>	<p>The proposed activity will result in a walking trail between North Head and Merry Beach.</p> <p>The proposed activity will result in implementation of this action.</p>
<p>The route will largely utilise existing tracks and incorporate beaches and rock platforms where appropriate (p. 30).</p>	<p>The proposed activity will utilise existing tracks where possible and incorporates beaches and rock platforms. The proposed activity includes using 9.26 km of existing trail sections and upgrading approx. 3.08 km of existing trail sections. Approx. 10.33 km of the route is to be on beaches and/or rock platforms. Approx. 12.77 km of new trail sections are to be developed as some existing trail sections do not meet Australian Standard (AS) 2156 <i>Walking track classes</i>, are severely eroded and require rehabilitation or do not provide for a high-quality visitor experience.</p> <p>The proposed activity will result in implementation of this action.</p>
<p>Short sections of new track will be constructed between North Durras and Depot Beach behind Point Upright and immediately north of Honeysuckle Beach carpark (p. 30).</p>	<p>The proposed activity includes development of new track between North Durras and Depot Beach, behind Point Upright, and north of Honeysuckle Beach carpark towards Oaky Beach.</p> <p>The proposed activity will result in implementation of this action.</p>
<p>Existing tracks will be upgraded where necessary and associated environmental protection and safety works will be undertaken (p. 30).</p>	<p>The proposed activity includes the upgrading of approx. 3.08 km of existing trail sections. All upgrading works will be consistent with NPWS procedures and associated environmental protection and safety measures.</p> <p>The proposed activity will result in implementation of this action.</p>
<p>The existing vehicle track to Honeysuckle Beach will be closed to vehicles and incorporated into the walking route (p. 30).</p>	<p>The proposed activity does not include the closure of the existing vehicle track to Honeysuckle Beach and incorporation into the walking route. This action cannot be implemented as there is an inconsistency in the Plan of Management showing the vehicle track as a public access road.</p> <p>For this action to be implemented the Plan of Management requires an amendment with public consultation on the issue.</p>
<p>The walking track from Pebbly Beach to Clear Point will be re-routed in order to bypass the Pebbly Beach cabins (p. 30).</p>	<p>The alignment of the proposed activity will by-pass the Pebbly Beach cabins by using the beach as the preferred route.</p> <p>The proposed activity will result in implementation of this action.</p>

<p>The vehicle tracks to Acheron Ledge will be closed to public use and tracks not required for management purposes or walking access will be rehabilitated (p. 30).</p>	<p>The main vehicle track to Acheron Ledge has already been closed to vehicle public use. The proposed activity includes rationalising the walking trails in the Acheron Ledge area.</p> <p>The proposed activity will result in full implementation of this action.</p>
<p>A walking track will be constructed between Maloneys Flat and Quierga Beach (p. 30).</p>	<p>The proposed activity includes development of a walking trail section between Maloneys Flat and Quierga Beach.</p> <p>The proposed activity will result in implementation of this action.</p>
<p>Vehicle access to beaches threatens the integrity of coastal vegetation and dunes and disturbs and can endanger other beach users (p. 30).</p>	<p>The proposed activity includes rehabilitating and upgrading the NPWS section of the Maloneys Beach as the principal track head for the Murramarang South Coast Walk. This will include improved facilities such as: a formal carpark (pending archaeological test pitting); accessible walking trails; and re-vegetation and rehabilitation of areas, including unauthorised vehicle access tracks to the beach. The current practice of driving vehicles into the NPWS section of Maloneys Beach area has damaged the foredune resulting in little vegetation cover and a lack of sand accumulation. Consistent with the Plan of Management, beach access for vehicles will not be provided from within the Murramarang National Park, except for emergency services, NPWS and existing commercial operators.</p> <p>The proposed activity is consistent with this statement of the Plan.</p>

Conclusion: The proposed activity is generally consistent with the Murramarang National Park Plan of Management.

4.1.1.5. Leasing, licensing and easement provisions of Part 12 of the Act

The NPWS advise that there are no leases, licenses or easements that will be directly impacted by the proposed activity. The area of the NRMA Murramarang Beachfront Holiday Resort at South Durras is held under lease. The proposed activity does not directly impact the lease area with the alignment of the walking route being along the beach in the intertidal area below the lease area.

Part 12 of the NPW Act is not applicable to the proposed activity.

4.1.1.6. Management powers and responsibilities of OEH (s. 8 and s. 12) (for internal OEH projects only)

Section 8 and s. 12 of the NPW Act specify the powers and functions of the Chief Executive of the Office of Environment and Heritage (OEH) and the NPWS.

Under s. 8(3) “the Chief Executive shall in the case of every national park ... (b) arrange for the carrying out of such works as the Chief Executive considers necessary for or in connection with the management and maintenance thereof”. The proposed activity is considered necessary works for management and maintenance.

Under s. 12(f), the NPWS “is to carry out such works and activities as the Minister may direct, either generally or in a particular case, in relation to the ... provision of facilities and opportunities for sustainable visitor or tourist use and enjoyment on land reserved under this Act”. The proposed activity will provide for sustainable visitor use and enjoyment of the reserves.

Conclusion: The proposed activity is consistent with the powers and responsibilities of the OEH (NPWS) under s. 8 and s. 12 of the *National Parks and Wildlife Act 1974*.

4.1.1.7. Permissibility under the National Parks and Wildlife Act 1974 - Conclusion

The proposed activity is permissible under the *National Parks and Wildlife Act 1974*.

4.1.2. Wilderness Act 1987 (NSW)

The objects of the *Wilderness Act 1987* are:

- (a) to provide for the permanent protection of wilderness areas,
- (b) to provide for the proper management of wilderness areas, and
- (c) to promote the education of the public in the appreciation, protection and management of wilderness.

There are no declared *Wilderness Areas* within the Murramarang Aboriginal Area or Murramarang National Park.

The *Wilderness Act 1987* is not applicable to the proposed activity.

4.1.3. Environment Planning and Assessment Act 1979 (NSW)

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the principal planning legislation for NSW. It provides a framework for the environmental planning and assessment of development proposals.

Environmental planning instruments are made under Part 3 of the EP&A Act. They guide development and land use. These instruments include State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs). SEPPs specify planning controls for certain areas and/or types of development.

Under s. 65 of Infrastructure SEPP 2007 (referred to as I-SEPP), development consent under Part 4 of the EP&A Act is removed for development undertaken within lands reserved under the NPW Act. The NPWS is assessing the proposed activity under Division 5.1 of the EP&A Act. Accordingly, this REF reports takes into account the factors concerning the impact of the proposed activity on the environment.

4.1.3.1. SEPP (Koala Habitat Protection) 2020

At the time of preparing this REF, the *State Environmental Planning Policy (Koala Habitat Protection) 2020* applies in NSW. The SEPP aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline. The policy applies to Shoalhaven and Eurobodalla LGAs as they are listed on Schedule 1 of the policy. Although the policy does not apply to land dedicated under the *National Parks and Wildlife Act 1974*, consistent with the REF guidelines, the objectives and principles of the SEPP are observed in the assessment of the proposed activity.

This REF considers the objectives and principles of *State Environmental Planning Policy (Koala Habitat Protection) 2020* to the proposed activity. Refer to Section 9.17.

4.1.3.2. Coastal Management SEPP

The *State Environmental Planning Policy (Coastal Management) 2018* is the amalgamated policy replacing SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection). The Coastal Management SEPP gives effect to the *Coastal Management Act 2016* by outlining how proposed activities in the coastal zone should be assessed. The SEPP defines and maps four coastal management areas identified in the Act. The four coastal management areas are:

1. *Coastal wetlands and littoral rainforests area* — areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26.
2. *Coastal vulnerability area* — areas subject to coastal hazards such as coastal erosion and tidal

inundation.

3. *Coastal environment area* — areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included.
4. *Coastal use area* — land adjacent to coastal waters, estuaries and coastal lakes and lagoons.

The study area is subject to the Coastal Management SEPP. The SEPP mapping shows the study area is within the *Coastal wetlands and littoral rainforests area*, the *Coastal environment area* and the *Coastal use area*. Mapping is not yet available for the *Coastal vulnerability area*.

Under clause 10(1) of the Coastal Management SEPP, works can be carried out on land identified as “coastal wetlands” or “littoral rainforest” on the Coastal Wetlands and Littoral Rainforests Area Map only with development consent. However, under clause 10(6), this clause does not apply to proposed activities on land reserved under the NPW Act if the proposed development is consistent with a plan of management prepared under that Act for the land concerned. As detailed above in Section 4.1.1, the proposed activity is consistent with the relevant plans of management. Therefore, clause 10(1) of the Coastal Management SEPP does not apply.

Under the *Coastal Management Act 2016*, public authorities e.g. the NPWS, is to have regard to coastal management programs, to the coastal management manual in the preparation and review of plans of management and to the objects of this Act. The objects of this Act are to manage the coastal environment consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the State. Each of the coastal management areas also has objectives defined under the Act.

The proposed activity is consistent with the objects of the *Coastal Management Act 2016* and the objectives for the relevant coastal management areas. An assessment of the impact of the proposed activity on Littoral Rainforest is incorporated in sections 10.2 and 11.1. There are no Coastal Wetlands in the study area. Coastal risk areas are considered in Section 9.10.

4.1.4. Heritage Act 1977 (NSW)

The aims of the NSW *Heritage Act 1977* (the Heritage Act) are, amongst other things, to: promote an understanding of the State’s heritage; encourage the conservation of heritage; provide for identification, registration and interim protection of items of heritage significance; and provide assistance to owners of such heritage.

The NSW Heritage Register lists those items and places covered by the Heritage Act. Listings include: Aboriginal places; heritage items; items listed by local councils in Local Environmental Plans; and items listed under s. 170 by NSW government agencies. Approval under s. 57(1) is required for works to a place, building, work, relic, moveable object, precinct, or land listed on the NSW Heritage Register. The NSW Maritime Heritage Register lists items related to maritime heritage.

A search of databases indicates there are a number of heritage items listed under the Heritage Act within the vicinity of the proposed activity. The heritage items and places relevant to the proposed activity are described in Section 9.23 of this report, and the impact on this heritage is assessed in Section 10.6.

4.1.5. Biodiversity Conservation Act 2016 (NSW)

The purpose of the *Biodiversity Conservation Act 2016* (BC Act) is to maintain a healthy, productive and resilient environment for the well-being of the community, now and into the future, consistent with the

principles of ecologically sustainable development. Under s. 7.3 of the BC Act, a test for determining whether the proposed activity is likely to significantly affect threatened species or ecological communities, or their habitats is carried out. The test, known as the five-part test, is applied to species, populations and ecological communities listed on schedules of the BC Act. All factors must be considered and an overall conclusion made based on all factors in combination. An Environmental Impact Statement is required if, through application of the five-part test, an action is considered likely to have a significant impact on a threatened species, population or ecological community.

The NPWS is assessing the proposed activity under Division 5.1 of the EP&A Act. The NPWS has not opted into the Biodiversity Offset Scheme (BOS) for the proposed activity. The NPWS has chosen to apply s. 7.3 of the BC Act to define the significance of the projects affect. The decision to no opt-in to the BOS was informed by the results of the flora and fauna assessment, which found no significant impact from the proposed activity on key matters, and in consultation with the Biodiversity and Conservation Division of the NSW Environment, Energy and Science acting as the (advisory) Determining Authority for the project.

The Biodiversity Values (BV) Map under Part 7 of the BC Act identifies land with high biodiversity value that is particularly sensitive to impacts from development and clearing. The map forms part of the Biodiversity Offsets Scheme Threshold which is one of the triggers for determining whether the Biodiversity Offset Scheme (BOS) applies to a clearing or development proposed activity. The BV Map only applies to those developments considered under Part 4 of the EP&A Act. The proposed activity is being assessed under Part 5 of the EP&A Act, not Part 4. Therefore, the BV Map does not apply.

Refer to Section 11.1 for the test for determine whether the proposed activity is likely to significantly affect threatened species or ecological communities, or their habitats as required under s. 7.3 of the BC Act.

4.1.6. Fisheries Management Act 1994 (NSW)

The *Fisheries Management Act 1994* (FM Act) applies to all waters within the limits of NSW. It aims, amongst other things, to conserve threatened species, populations and ecological communities of fish and marine vegetation, and promote ecologically sustainable development, including the conservation of biological diversity. The FM Act is administered by the NSW Department of Primary Industry – Fisheries Division.

Under s. 199 of the FM Act, a public authority must, before it carries out or authorises the carrying out of dredging work or reclamation work, give the Minister written notice of the proposed work, and consider any matters raised by the Minister. Dredging includes works that involve excavating water land, moving or removing material on to or from water land, and reclamation works means using materials e.g. sand, soil, gravel, timber or rocks to fill reclaim water land or depositing such material on water land to construct something over water land. “Water land” means any land submerged by water either permanently or intermittently.

The proposed activity will not result in any net loss of key fish habitat.

There are no threatened species or key threatening process listed in the schedules of the FM Act relevant to the proposed activity.

Some of the construction works in the proposed activity may involve dredging or reclamation work as defined under s. 199 of the FM Act e.g. possible installation of stepping stones and possible benching in catchments of small drainage lines. In early March 2021, the NPWS provided formal notification of works under s. 199 of the FM Act.

For detail on general consultation with the Department of Primary Industries – Fisheries Division refer to Section 5.2.

4.1.7. Water Management Act 2000 (NSW)

The *Water Management Act 2000* (WM Act) aims to provide sustainable and integrated management of the State's water sources for the benefit of both present and future generations by a number of measures including: applying ecologically sustainable development principles; protecting, enhancing and restoring water sources, their associated ecosystems, ecological processes and biological diversity and their water quality; fostering significant social and economic benefits from the sustainable and efficient use of water; and encouraging best practice in the management and use of water. The WM Act sets out a series of management principles to guide water management activities. Under the WM Act, the creeks and drainage lines, and their associated banks within the study area of the proposed activity, are considered 'waterfront land'.

Under s. 41 of the *Water Management Regulations 2018*, public authorities are exempt from s. 91E (1) of the WM Act in relation to all controlled activities that it carries out in, on or under waterfront land. Therefore, the NPWS does not require Controlled Activity Approval for works associated with waterfront land. However, applying best practice principles, in accordance with the *Guidelines for controlled activities on waterfront land – riparian corridors* (Department of Industry 2018), this REF considers the impact of the proposed activity on riparian corridors within the study area.

The riparian corridors relevant to the proposed activity are described in Section 9.8 of this report, and the impact on the riparian corridors is assessed in Section 10.2.

4.1.8. Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the primary Commonwealth legislation for protecting the environment and conserving biodiversity values of national environmental significance. Approval from the Commonwealth Minister for the Environment is required under the EPBC Act if a proposed action will have, or is likely to have, a significant impact on matters considered to be of national environmental significance. The EPBC Act Administrative Guidelines on Significance (Australian Government 2013) set out 'Significant Impact Criteria' that are to be used to assist in determining whether a proposed action, a 'proposed activity', is likely to have a significant impact on matters of national environmental significance. Matters of national environmental significance (MNES) listed under the EPBC Act include:

- listed threatened species and ecological communities
- listed migratory species
- Wetlands of International Importance
- the Commonwealth marine environment
- World Heritage properties
- National Heritage places
- nuclear actions
- Great Barrier Reef

Other matters protected by the EPBC Act include Commonwealth land, Commonwealth Heritage Places, Commonwealth reserves and marine species listed under the Act. If the impact is significant then a referral to the Commonwealth Minister for the Environment is required.

The MNES relevant to the proposed activity are described in Section 9.20, and the impact on these matters is assessed in Section 11.2.

As the area of the proposed activity falls within the coastal geographic context of the modelled distribution of the Koala, an assessment of impact on the Koala is carried out to determine if a referral under the EPBC Act is required. The Koala EPBC Act referral assessment is in Section 11.3.

4.2. Consistency with NPWS policies

Numerous NPWS policies apply to Murramarang National Park and Murramarang Aboriginal Area. The policies in Table 4 apply specifically to the proposed activity.

Table 4: Relationship of the proposed activity with NPWS policies

Policy	Policy detail	Relation of proposed activity
Plans of management	See Section 4.1 above.	See Section 4.1 above.
Southern Branch Visitation Management Plan (draft 2008)	This plan is a high-level guiding document that outlines the priorities for the Southern Branch. It includes upgrading and completing the coastal walking track in Murramarang National Park, and general non-park specific initiatives and actions such as monitoring of visitor numbers and experiences.	The proposed activity is generally consistent with this plan and will implement a number of specific initiatives and actions. Recommendations of this REF also address items covered in this plan such as visitor monitoring.
Park Facilities Manual	This manual provides a coordinated set of standards and principles for facilities in NSW NPWS reserves. It provides staff with a system of consistent designs for facilities with a corporate image, and guidance on engineering considerations for construction of facilities including the obligation under the EP&A Act and other statutes to meet Building Codes of Australia and other Australian Standards e.g. walking track classification AS 2156, as well as for precinct planning, and vehicle access and planning. It allows scope for local characteristics to be incorporated into facilities and emphasises sustainable use of materials, visually integrating facilities and using local materials where possible. It also includes guidelines for lighting in national parks.	The proposed activity is generally consistent with the <i>Park Facilities Manual</i> . The proposed activity acknowledges the principles, follows the standards determined for walking tracks and precinct planning.
Walking Track Policy	This policy details NPWS requirements for the planning and management of walking tracks in national parks. The requirements include: being consistent with the relevant plan of management, and the <i>Park Facilities Manual</i> ; use of the <i>Australian Walking Track Grading System</i> (AWTGS) [which is based on the Australian Standard for walking track construction (AS 2156)]; addressing public safety issues; providing walking opportunities and opportunities for people with disabilities; interpretation; and ensuring adequate resources are available to maintain needed to keep the track maintained.	The proposed activity: is consistent with the plans of management for the reserves; is consistent generally with the <i>Park Facilities Manual</i> ; will use the AWTGS (AS 2156); takes into account public safety issues (see detail below); provides for a range of walking experiences, including for people with disabilities with development of the track head precinct at Maloneys Beach providing for people with a disability; and is budgeted for cyclic maintenance and whole of life costings. The proposed activity is generally consistent with this policy.
Visitor Safety Policy	This policy outlines the OEH's legal duty of care towards people in parks. It also provides guidance about how OEH can address safety	Two geological risk assessments were undertaken as part of finalising the alignment of the trail components of the proposed activity. The NPWS as

	<p>issues and reduce risk to park visitors while maintaining park values. In particular relevance to the proposed activity is clauses 44 to 46 of the <i>Visitor safety policy</i> which specifies the requirement for OEH/NPWS to manage and reduce the exposure of visitors to hazards. Hazards are identified as: a natural feature, such as a cliff, water hole or tree; a natural event, such as a storm or fire; a built structure, such as a viewing platform or walking track; and of some other kind. Exposure to hazards may include: providing a specific risk message and other general warnings and safety messages through signs, printed material, the website or social media; modifying visitor use at the hazard location (for example, re-routing a walking track); redesigning or relocating a visitor area; closing a visitor area – partly or wholly, temporarily or permanently.</p>	<p>advised, that in addition, best practice lessons learnt will be incorporated from recent work in Royal National Park and Blue Mountains National Park.</p> <p>The proposed activity is generally consistent with this policy.</p>
<p>Cultural Heritage Conservation Policy</p>	<p>This policy applies to the conservation of items of Aboriginal cultural heritage on NPWS lands and items of Aboriginal cultural heritage works by NPWS on non-NPWS lands. The policy includes seeking input from the relevant Aboriginal community, identification of Aboriginal cultural heritage items on NPWS lands and assessment of the impact on heritage items.</p>	<p>As part of the Aboriginal cultural heritage assessment for the proposed activity, the Aboriginal community has been consulted, Aboriginal cultural heritage items have been identified and the impact of the proposed activity on these items has been assessed. Further investigations with test pitting are to be carried out for Maloneys Beach and Pretty Beach precincts.</p> <p>The proposed activity is generally consistent with this policy.</p>
<p>Park Signage Manual and associated Signage Policy and Procedures</p>	<p>The Park Signage Manual sets out the design, procurement, manufacture, installation and maintenance of signage in NPWS reserves. The Signage Policy and Procedure is part of the <i>Park Signage Manual</i>.</p>	<p>The design, procurement, manufacture, installation and maintenance of signage associated with the proposed activity is generally consistent with the <i>Park Signage Manual</i>. This includes track heads, directional and way finding signage. The interpretation materials for the proposed walk will adopt the design language from the manual and elevate commensurate with the signature experience.</p> <p>The proposed activity will be consistent with the <i>Park Signage Manual</i> and associated policies and procedures.</p>
<p>Vehicle Access General Policy</p>	<p>General principles under this policy state that vehicle access and associated infrastructure should: (a) not cause unacceptable impacts on nature and cultural heritage; (b) be designed with sensitivity to the landscape; (c) promote the principles of energy conservation and sustainability; (d) be appropriate and necessary to meet park management needs or to provide for visitor use and enjoyment; (e) be designed to supply opportunities for understanding, appreciation and enjoyment of visitors, and take maximum advantage of interpretive opportunities and scenic values; and (f) provide</p>	<p>The carpark to be developed at Maloneys Beach as part of the track head precinct associated with the proposed activity takes account of these principles. The area has had a flora and fauna assessment carried out and will be subject to archaeological test pitting prior to any approval being granted for development of the carpark.</p> <p>The existing unacceptable impacts on the Maloneys Beach area, including impacts to foreshore vegetation, erosion of dune system, illegal camping, uncontrolled fires, littering and safety of beach users, with the unauthorised beach access track will be</p>

	access to a range of visitor experiences in parks for people with disabilities.	halted with the re-vegetation and rehabilitation of the area. Vehicle access to the beach is not permitted in the Plan of Management for the Park. The proposed activity is generally consistent with this policy.
Commercial fishing access policy	This policy outlines the requirements of commercial fishers and people practicing aquaculture to access locations that are not open to the public. Under the National Parks and Wildlife Regulation 2019 (NPW Regulation), a person needs consent from the park manager to drive a vehicle on roads, tracks or areas in a national park that are not otherwise open to the public. The NSW National Parks and Wildlife Service (NPWS) can issue commercial fishers vehicle-based permits to provide such access. This meets the needs of the commercial fishing and aquaculture industry while ensuring that NPWS fulfils its responsibility to manage parks for the whole NSW community.	The proposed activity includes halting the unauthorised beach access to the Maloney Beach. The NPWS will consult with current licenced commercial fishers and ensure they remain able to undertake their licences activities at Maloneys Beach. The NPWS will also work with the licenced commercial fishers to ensure they have the correct permits to undertake these activities on-park. The proposed activity is generally consistent with this policy.

Conclusion: The proposed activity is generally consistent with the relevant OEH/NPWS policies.

4.3. Type of approval sought

The determining authority for the proposed activity is the Minister for Energy and Environment.

5. Consultation - general

5.1. Summary of consultation process

5.1.1. Preliminary consultation

Preliminary community consultation was carried out by the NPWS with neighbours including those from Merry Beach Caravan Park, Maloneys Beach and the NRMA Murramarang Beachfront Holiday Resort.

In addition to these targeted preliminary consultation, a public website was developed by the NPWS where people could register their interest and received information on the project (see: <https://www.environment.nsw.gov.au/topics/parks-reserves-and-protected-areas/park-management/community-engagement/walking-tracks-and-trails-in-national-parks/murramarang-south-coast-walk>)

5.1.2. Public exhibition

The public exhibition period for the REF Consultation Draft and Draft Masterplan for the project was from 20 July 2020 until 9 August 2020. The period was extended until the 23 August 2020.

During the exhibition period, submissions were sought via the consultation portal on the Environment, Energy and Science Group of the Department of Planning, Industry and Environment website and the NSW Government “have your say” website.

The public exhibition was promoted with a video, the consultation website, a presentation for online meetings, local signage displays and a media release. In addition, notification emails were forwarded to

approximately 300 parties that had registered their interest in the project, as well as to Shoalhaven City Council, Eurobodalla Shire Council, community groups and relevant NSW Government agencies.

The NPWS convened meetings with non-government organisations and government agencies during the exhibition period. Online meetings and some COVID-19 safe small face-face meetings were held with local community members, organisations, tourism and business groups and bushwalking clubs as detailed in Table 5. The meetings with government agencies are detailed in Table 6.

Planned drop-in sessions with NPWS staff and provision of hard-copy reports during the public exhibition stage were not able to be undertaken because of COVID 19 restrictions.

Table 5: List of targeted non-government consultations undertaken during the exhibition period

Organisation	Method	Dates
Maloneys Beach Residents Association	In person meeting and email notification	Email: 20/07/2020 Meeting: 05/08/2020
Durras Community Association	In person meeting and email notification	Email: 20/07/2020 Meeting: 30/07/2020
Friends of Durras	In person meeting and email notification	Email: 20/07/2020 Meeting: 31/07/2020
Batemans Bay Bushwalkers	In person meeting and email notification	Email: 20/07/2020 Meeting: 17/08/2020
Shoalhaven Bushwalkers Club	In person meeting and email notification	Email: 20/07/2020 Meeting: 16/07/2020
National Parks Association – Milton	In person meeting and email notification	Email: 20/07/2020 Meeting: 05/07/2020
Destination NSW and Destination Southern	In person meeting and email notification	Email: 20/07/2020 Meeting: 11/08/2020
Tourism industry (six local operators)	Online meeting and email notifications	Email: 20/07/2020 Meeting: 13/08/2020

Table 6: List of targeted agency consultations undertaken during the exhibition period

Agency	Method	Dates
Eurobodalla Shire Council	In person meetings and email notification	Email: 20/07/2020 Meeting: 04/08/2020 Meeting: 23/07/2020 Meeting: 25/10/2020
Shoalhaven City Council	In person meeting and email notifications	Email: 20/07/2020 Email: 11/03/2021 Meeting: 27/08/2020
Department of Primary Industries - Fisheries	Email notifications	Email: 31/07/2020 Email: 11/03/2021
Department of Primary Industries - Marine Parks	Online meeting and email notification	Email: 20/07/2020 Meeting: 20/05/2020
Transport NSW	Email notifications	Email: 29/07/2020 Email: 28/09/2020 Email: 11/03/2021
NTSCORP	Email notification	Email: 30/07/2020

Further detail on submissions and the NPWS responses are in Section 5.5 below and in the NPWS submission report at Appendix A.

5.2. Statutory consultations – I-SEPP clauses

The NSW *State Environmental Planning Policy (Infrastructure) 2007* (I-SEPP) requires public authorities e.g. the NPWS, to consult with local councils and other public authorities for certain developments. These requirements, referred to as “I-SEPP requirements”, are addressed below in Tables 7 and 8.

5.2.1. Consultation with councils

Table 7: Consideration of I-SEPP clauses relating to local councils

I-SEPP Clause - Impact on Council infrastructure		
<p>Cl. 13 Consultation with councils – development with impacts on council related infrastructure or services. This clause applies to development carried out by, or on behalf of public authority, if the development meets the matters in the subclauses.</p> <p>Public authority must not carry out development to which this clause applies unless the authority has:</p> <p>“(a) given written notice of the intention to carry out the development to the council for the area in which the land is located, and</p> <p>(b) taken into consideration any response to the notice that is received from the council within 21 days after the notice is given.”</p>		
I-SEPP sub-clause	Consideration	Action
cl. 13(1)(a): “substantial impact on stormwater management services provided by a council”	The proposed activity will not substantially impact on stormwater management services provided by the Eurobodalla Shire Council or the Shoalhaven City Council.	<p>As the proposed activity does not meet the matters in the subclauses, the NPWS is not required to give written notice of the proposed activity under this I-SEPP clause. However, consultation was undertaken with the councils. A summary of the matters raised by the councils and the subsequent NPWS responses are in Section 5.4 below.</p>
cl. 13(1)(b): “likely to generate traffic to an extent that will strain the capacity of the road system in a local government area”	The proposed activity is unlikely to generate traffic to an extent that it will strain the capacity of the road system in the Shoalhaven or Eurobodalla LGAs.	
cl. 13(1)(c): “involves connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council”	The proposed activity does not involve connection to, or substantial impact on the capacity of, and part of a sewerage system owned by Eurobodalla Shire Council or Shoalhaven City Council.	
cl. 13(1)(d): “involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council”	The proposed activity does not involve connection to or use of substantial volume of water from any part of the water supply system owned by Shoalhaven City Council or Eurobodalla Shire Council.	
cl. 13(1)(e): “involves the installation of a temporary structure on, or the enclosing of, a public place that is under a council’s management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential”	The proposed activity may involve the installation of a temporary structure on a public place under the control of Eurobodalla Shire Council’s control. The development of the track head precinct at the NPWS estate area at Maloneys Beach is immediately adjacent to public place managed by the Shire Council. However, it is unlikely to cause major disruption to pedestrian or vehicular traffic.	
cl. 13(1)(f): “involves excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to a road for which a council is the road	The proposed activity does not involve the excavation of the surface of a footpath adjacent to a road which Eurobodalla Shire Council or Shoalhaven City Council is the road authority.	

<p>authority under the <i>Roads Act 1993</i>"</p>		
<p>I-SEPP Clause – impact on local heritage in LGA</p>		
<p>Cl. 14 Consultation with councils – development with impacts on local heritage. This clause applies to development carried out by or on behalf of a public authority if the development meets the matters in the subclauses.</p> <p>Public authority must not carry out development to which this clause applies unless the authority has:</p> <p>“(a) had an assessment of the impact prepared, and</p> <p>(b) given written notice of the intention to carry out the development, with a copy of the assessment, to the council for the area in which the heritage item or heritage conservation area (or the relevant art of such an area) is located, and</p> <p>(c) taken into consideration any response to the notice that is received from the council within 21 days after the notice is given.”</p>		
<p>I-SEPP sub-clause</p>	<p>Consideration</p>	<p>Action</p>
<p>cl. 14(1)(a): “likely to have an impact that is not minor or inconsequential on a local heritage item (other than a local heritage item that is also a State heritage item) or a heritage conservation area”</p>	<p>The proposed activity is in the vicinity of the Eurobodalla LEP listed heritage items “McMillan’s Sawmill, Wharf and Skids” and “Myrtle Beach-Wasp Head Geological Site (Myrtle Beach - Wasp Head coastal area)”.</p> <p>The field surveys failed to find the former item and local NPWS have been unable to locate them. It is possible that the item is buried under the sand. The proposed activity does not include excavation or removal of any material on the immediate beaches so it is unlikely that the item would be impacted if it does exist. The latter item is the rocky cliff and shoreline of the coast between Myrtle Beach north to Wasp Head where various geological features are exposed and evident. The proposed activity in the vicinity is limited to new trail section at Dark Beach and upgraded steps down to Mill Beach.</p> <p>The proposed activity is in the vicinity of the Shoalhaven LEP listed heritage item “Pebbly Beach Sawmill Complex, including Sawmill remnants, Town and school site”. The proposed activity is in the vicinity of the Pebbly Beach site however the alignment will follow the beach route. There will be rehabilitation of some redundant trail sections behind the cabins.</p> <p>It is unlikely that the proposed activity will have an impact that is not minor or inconsequential on the local heritage items for the Eurobodalla and Shoalhaven LGAs.</p>	<p>As the proposed activity does not meet the matters in the subclauses, the NPWS is not required to give written notice of the proposed activity under this I-SEPP clause. However, consultation was undertaken with the councils. A summary of the matters raised by the councils and the subsequent NPWS responses are in Section 5.4 below.</p>
<p>I-SEPP Clause – impact on flood liable land in LGA</p>		
<p>Cl. 15 Consultation with councils – development with impact on flood liable land. Flood liable land means land that is susceptible to flooding by the probable maximum flood event in accordance with <i>Floodplain Development Management: the management of flood liable land</i> (NSW Government).</p> <p>Public authority must not carry out, on flood liable land, development to which this Policy provides may be carried out without consent and that will change flood patterns other than to a minor extent unless the authority has:</p> <p>(a) given written notice of the intention to carry out the development to the council for the area in which the land is located, and</p> <p>(b) taken into consideration any response to the notice that is received from the council within 21 days after the notice is given.</p>		
<p>I-SEPP sub-clause</p>	<p>Consideration</p>	<p>Action</p>

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<p>N/A</p>	<p>Local councils carry out flood studies and flood risk management studies and develop subsequent flood risk management plans to manage flood risks in flood prone areas in the LGA and to meet obligations under the NSW Government Flood Prone Land Policy.</p> <p>A search of relevant online databases found no flood liable land in the study area, and no areas within the study area are subject to flood studies – either in progress or adopted (Eurobodalla Shire Council n.d.a; Shoalhaven City Council 2021a).</p> <p>This clause does not apply to the study area.</p>	<p>As the proposed activity does not meet the matters in the subclauses, the NPWS is not required to give written notice of the proposed activity under this I-SEPP clause. However, consultation was undertaken with the councils. A summary of the matters raised by the councils and the subsequent NPWS responses are in Section 5.4 below.</p>
<p>I-SEPP Clause – impacts on certain land within a coastal zone</p>		
<p>Cl. 15A: Consultation with councils –development with impacts on certain land within the coastal zone.</p> <p>A public authority, or a person acting on behalf of a public authority, must not carry out development to which this clause applies, which this Policy provides may be carried out without development consent, unless the authority or person has—</p> <p>(a) given written notice of the intention to carry out the development to the council for the local government area in which the land is located, and</p> <p>(b) taken into consideration any response to the notice that is received from the council within 21 days after the notice is given.</p>		
<p>I-SEPP sub-clause</p>	<p>Consideration</p>	<p>Action</p>
<p>cl. 15A (1) This clause applies to development on land that is within a coastal vulnerability area and is inconsistent with a certified coastal management program that applies to that land.</p>	<p>Coastal Vulnerability Area (CVA) mapping identifies land subject to coastal hazards to which Clause 12 of the Coastal Management SEPP and the Coastal Management Act will apply. The CVA is the mapped area where planning controls will be used to manage coastal risks caused by coastal hazards. Coastal hazard means the following—</p> <p>(a) beach erosion,</p> <p>(b) shoreline recession,</p> <p>(c) coastal lake or watercourse entrance instability,</p> <p>(d) coastal inundation,</p> <p>(e) coastal cliff or slope instability,</p> <p>(f) tidal inundation,</p> <p>(g) erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters</p> <p>No Coastal Vulnerability Area mapping is available for the locality and Coastal Management Programs for both LGAs are being prepared by the relevant Councils. However, the study area is not subject to any areas identified in the Shoalhaven Coastal Hazard Mapping (SCC 2021b) or the Eurobodalla Shire Council’s Sea Level Rise Investigation Area (ESC n.d.b).</p>	<p>As the proposed activity does not meet the matters in the subclauses, the NPWS is not required to give written notice of the proposed activity under this I-SEPP clause. However, consultation was undertaken with the councils. A summary of the matters raised by the councils and the subsequent NPWS responses are in Section 5.4 below.</p>
<p>Conclusion</p>	<p>I-SEPP statutory council consultation requirements are met</p>	

5.2.2. Consultation with other public authorities

Table 8: Consideration of I-SEPP clauses relating to other public authorities

I-SEPP Clause – impact of development on flood liable land and notifying the State Emergency Service		
<p>Cl. 15AA: Consultation with State Emergency Service —development with impacts on flood liable land.</p> <p>In this clause, flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the manual entitled <i>Floodplain Development Manual: the management of flood liable land</i> published by the New South Wales Government and as in force from time to time.</p> <p>A public authority, or a person acting on behalf of a public authority, must not carry out development on flood liable land that may be carried out without development consent under a relevant provision unless the authority or person has —</p> <p>(a) given written notice of the intention to carry out the development (together with a scope works) to the State Emergency Service, and</p> <p>(b) taken into consideration any response to the notice that is received from the State Emergency Service within 21 days after the notice is given.</p>		
I-SEPP Clause	Consideration	NPWS action
<p>Cl 15AA (2): Any of the following provisions in Part 3 is a relevant provision—</p> <p>(a) Division 1 (Air transport facilities),</p> <p>(b) Division 2 (Correctional centres and correctional complexes),</p> <p>(c) Division 6 (Emergency services facilities and bush fire hazard reduction),</p> <p>(d) Division 10 (Health services facilities),</p> <p>(e) Division 14 (Public administration buildings and buildings of the Crown),</p> <p>(f) Division 15 (Railways),</p> <p>(g) Division 16 (Research and monitoring stations),</p> <p>(h) Division 17 (Roads and traffic),</p> <p>(i) Division 20 (Stormwater management systems).</p>	N/A	N/A
I-SEPP Clause	Clause requirements	
<p>Cl. 16 Consultation with public authorities other than councils.</p>	<p>Public authority must not carry out specified development unless the authority has:</p> <p>“(a) given written notice of the intention to carry out the development to the specified authority in relation to the development, and</p> <p>(b) taken into consideration any response to the notice that is received from that authority within 21 days after the notice is given.”</p>	
I-SEPP clause in relation to land reserved under the <i>National Parks and Wildlife Act 1974</i>		
<p>cl. 16(2)(a): development adjacent to land reserved under the <i>National Parks and Wildlife Act 1974</i> – the Department of Environment and Climate Change [Office of Environment and Heritage].</p>	<p>The proposed activity is within Murramarang National Park and Murramarang Aboriginal Area.</p>	<p>The proposed activity will be considered under the <i>National Parks and Wildlife Act 1974</i> and the Minister for Energy and Environment / NPWS is the proponent and determining authority for the proposed activity.</p>
I-SEPP clause in relation to development adjacent to a marine park declared under the <i>Marine Parks Act 1997</i>		
<p>cl. 16(2)(b): development adjacent to a marine park declared under the <i>Marine Parks Act 1997</i> – Marine Parks Authority [Department of Primary Industries – Marine].</p>	<p>Batemans Marine Park was declared in 2007 and extends the length of the coastline of Murramarang National Park and Murramarang Aboriginal Area from the three-nautical-mile offshore NSW water limit to the</p>	<p>The NPWS has undertaken consultation with the relevant Ministers in relation to this I-SEPP requirement. The NSW Department of Primary Industry [Marine] provided a detailed submission covering both the Draft Masterplan and REF Consultation Draft. Comments on the Draft Masterplan included: better referencing</p>

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	<p>mean high-water mark. The Murramarang National Park is gazetted to the mean low-water mark and the Murramarang Aboriginal Area is gazetted to the high-water mark. The proposed activity includes sections in the intertidal area which is within Batemans Marine Park.</p>	<p>of the Marine Park and promotion of the contiguous land/sea experience, joint opportunities for interpretive material and removal of beach access at Maloneys Beach. Comments on the REF Consultation Draft included more detailed consideration of:</p> <ul style="list-style-type: none"> • potential impacts on aquatic habitats • marine park zoning • crossing of ephemeral creeks • waste management <p>The proposed activity has been amended to take account of these matters and this REF also includes environmental safeguards and mitigation measures in relation to the issues raised.</p>
I-SEPP clause in relation to development adjacent to an aquatic reserve declared under the Fisheries Management Act 1994		
<p>cl. 16(2)(c): development adjacent to an aquatic reserve declared under the Fisheries Management Act 1994.</p>	<p>The proposed activity is not adjacent to an aquatic reserve as declared under the Fisheries Management Act 1994.</p>	N/A
I-SEPP clause in relation to development in foreshore area under the Sydney Harbour Foreshore Authority Act 1998		
<p>cl. 16(2)(d): development in the foreshore area within the meaning of the Sydney Harbour Foreshore Authority Act 1998 – the Sydney Harbour Foreshore Authority.</p>	<p>The proposed activity is not within the foreshore area within the meaning of the Sydney Harbour Foreshore Authority Act 1998.</p>	N/A
I-SEPP clause in relation to development in or over navigable waters		
<p>cl. 16(2)(e): development comprising a fixed or floating structure in or over navigable waters – the Maritime Authority of NSW [Roads and Maritime Services].</p>	<p>The proposed activity does not involve the development of a fixed or floating structure in or over navigable waters.</p>	<p>As the proposed activity does not meet the matters in the subclauses, the NPWS is not required to give written notice of the proposed activity under this I-SEPP clause. However, the NPWS notified the Roads and Maritime Services (Department of Transport) of the proposed activity. No submission was received.</p>
I-SEPP clause in relation to developments in bushfire prone land		
<p>cl. 16(2)(f): development for the purposes of an educational establishment, health services facility, correctional centre or group home, or for residential purposes, in an area that so bush fire prone land” – the NSW Rural Fire Service.</p>	<p>The proposed activity does not involve a development for any of the listed purposes.</p>	N/A
I-SEPP clause in relation to developments in the Dark Sky Region		
<p>cl. 16(2)(g): development that may increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map—the Director of the Observatory.</p> <p>Note—The dark sky region is land within 200 kilometres of the Siding Spring Observatory.</p>	<p>The proposed activity does not involve a development within the dark sky region.</p>	N/A
I-SEPP clause in relation to developments near defence communications facility near Morundah		

<p>cl. 16(2)(h): development on Defence communications facility buffer land within the meaning of clause 5.15 of the Standard Instrument—the Secretary of the Commonwealth Department of Defence.</p> <p>Note—Defence communications facility buffer land is located around the defence communications facility near Morundah.</p>	<p>The proposed activity does not involve a development within the Defence communications facility buffer land located around the defence communications facility near Morundah.</p>	<p>N/A</p>
<p>I-SEPP clause in relation to developments in a mine subsidence district</p>		
<p>cl. 16(2)(i): development on land in a mine subsidence district within the meaning of the <i>Mine Subsidence Compensation Act 1961</i>—the Mine Subsidence Board.</p>	<p>The proposed activity does not involve a development within mine subsidence district within the meaning of the <i>Mine Subsidence Compensation Act 1961</i>.</p>	<p>N/A</p>
<p>I-SEPP clause in relation to traffic generating developments</p>		
<p>Cl. 104 Traffic generating development. This clause applies to development specified in Column 1 of the Table to Schedule 3 that involves new premises of a relevant size and capacity or enlargement or extension of existing premises.</p> <p>Under 104(3), before determining the development, the consent authority must:</p> <p>“(a) give written notice of the development application to the RTA within 7 days after the application is made. intention to carry out the development to the specified authority in relation to the development, and</p> <p>(b) taken into consideration: (i) any submission that the RTA provides in response to that notice within 21 days after the notice was given”; “(ii) the accessibility of the site concerned”; and “(iii) any potential traffic safety, road congestion or parking implications of the development”.</p> <p>Under 104(4) “The consent authority must give the RTA a copy if the determination for the application within 7 days after the determination is made.”</p>		
<p>I-SEPP schedule</p>	<p>Consideration</p>	<p>NPWS action</p>
<p>I-SEPP Schedule 3 includes <i>Area used exclusively for parking</i> and <i>Tourist facilities</i> (for 200 or more motor vehicles).</p>	<p>The proposed activity includes the development of a carpark at Maloneys Beach precinct. However, the capacity of the carpark is for 14 cars, not 200 or more. Therefore, the NPWS is not required to undertake consultation with the Roads and Maritime Services (RMS) in relation to this I-SEPP requirement.</p>	<p>N/A</p>
<p>Conclusion</p>		<p>I-SEPP statutory consultation requirements in relation to other authorities are met</p>

5.3. Ongoing consultation

The NPWS will carry out additional consultation and communication as a result of the statutory consultation. These consultations include further discussions with:

- Eurobodalla Shire Council and Shoalhaven City Council in regard to the impacts of the project on existing infrastructure and future extension of the proposed Murramarang South Coast Walk to off-reserve areas managed by the Councils.
- Department of Primary Industries - Fisheries in relation to continued access for licenced beach hauling operations at Maloneys Beach.
- Department of Primary Industries - Marine Parks in relation to the finalisation of the Batemans Marine Park Management Plan, and possible opportunities to promote joint wilderness experiences and consideration of uniform design and interpretative and regulatory signs.

Refer to Section 7.3 for environmental safeguards and mitigation measures resulting from these matters.

5.4. Matters raised by councils

Both Eurobodalla Shire Council and Shoalhaven City Council indicated support for the project noting the proposed walk was included in their destination action plans.

Eurobodalla Shire Council supported the proposed activity to upgrade the Maloneys Beach precinct, noting the proposed activity may increase usage of Council facilities and provided detailed commentary regarding the beach access.

Shoalhaven City Council's initial submission was brief and indicated firm support for the project and an invitation for NPWS to work with them on the extension of the walk north. However, the Council's submission only related to Draft Masterplan, not the REF Consultation Draft. Therefore, in March 2021 the NPWS invited the Council to provide further comments. The Council responded with numerous comments in relation to the REF Consultation Draft.

The matters raised by the Councils and the responses by the NPWS are detailed below in Table 9.

Table 9: Non-I-SEPP matters raised by councils and NPWS responses

Council	Matter	NPWS response
Eurobodalla	Requested the REF further detail community impacts and the potential for impacts to council facilities by increased usage.	Further detail on community impacts and impacts on Council facilities with increased visitor numbers has been included in REF. Refer to Section 10.3.
	No safeguards or mitigation measures included in Draft REF to address potential increased usage of facilities in the Eurobodalla LGA.	Inclusion of ongoing visitor monitoring and continued liaison with the Council added as environmental safeguards and mitigation measures. Refer to Section 7.3.
	Noted the community concerns around the loss of beach access at Maloneys Beach.	Consistent with the Plan of Management, beach access for vehicles will not be provided from within the Murramarang National Park, except for emergency services, NPWS and existing commercial operators.
Shoalhaven	The repeal of SEPP 44 and the need to consider the provisions of the new Koala Habitat Protection SEPP.	Consideration on whether assessment of proposed activity against updated Koala Habitat Protection SEPP included in this REF. Refer to Section 9.17.
	Whether or not the proposed activity would impact areas mapped under the Biodiversity Values Map and if it does whether or not NPWS would opt into the Biodiversity Offset Scheme.	The Biodiversity Values Map and Offset scheme do not apply to the proposed activity. However, discussion on Biodiversity Values Map and Biodiversity Offset Scheme and why they do to apply are included. Refer to Section 4.1.5.
	Inclusion and addressing any comments made by NTSCORP or South Coast People Native Title claimants and specify the subdivision in the Act that applies and the process to make the proposed activity a valid act.	Details on consultation with native title claimants/NTSCORP, included the relevant subdivision of the Act, are included in Section 6.2 and in the NPWS submissions report in Appendix A. No submissions were received from native title claimants or NTSCORP during the public exhibition. However, the native title claimants, via NTSCORP did provide comments on the draft ACHAR. Refer to Section 6.3.
	Inclusion of additional I-SEPP considerations, in particular: <ul style="list-style-type: none"> • 15AA • 15A • 16(2)(g) to (i) • response from the Marine Park Authority 	<p>Clauses 15AA, 15A and 16(2)(g) to (i), and Marine Park Authority considerations have been included in the REF. Refer to Section 5.2.</p> <p>Environmental safeguards and mitigation measures in relation to the Batemans Marine Park have been included. Refer to Section 7.3.</p>
	Inclusion of response from Fisheries.	The consultation schedule with Fisheries is included in Table 7 and in Appendix A.

		Matters raised by Fisheries are included in Section 5.5 and summarised in Appendix A.
	Whether the proposed activity study area includes Lake Durras, which is mapped as a Coastal Wetland mapped under the Coastal Management SEPP 2018.	The proposed activity study area does not include Lake Durras. Refer to Section 9.1.
	Inclusion of the presence of the threatened population "Greater Glider in the Eurobodalla Local Government Area".	The Endangered Population Greater Glider in the Eurobodalla LGA has been included and assessed in this REF. Refer to sections 9.15.2 and 11.1.
	More detail on the impact of the proposed activity on Aboriginal heritage.	<p>Further information on the Aboriginal cultural heritage of the area has been added to the REF. Consistent with NPWS policy details on exact locations etc, have not been included. Refer to Section 9.22.</p> <p>More detail on the impact of the proposed activity on Aboriginal heritage has also been included. Refer to Section 10.5.</p> <p>A series of environmental safeguards and mitigation measures relating to Aboriginal cultural heritage have been included. Refer to Section 7.3.</p>
	The inclusion of matters under Clause 228 of the EP&A Regulations as required under s. 5.6(2)(a) of the EP&A Act.	<p>NPWS REF template is based on the <i>Planning Guidelines - Is an EIS required</i> (NSW Department of Planning 1995) subject to clause 228(1)(a) of the EP&A Regulations. The template adequately addresses the provisions as specified in clause 228(2) with the structure and impact assessment as set under the guidelines. The NPWS REF template was originally reviewed by the previous NSW Office of Environment and Heritage prior to its use for proposals on park.</p> <p>The NPWS REF template is currently subject to an internal review and agency consultation and will be updated to include all recent changes to the EP&A Act and subordinate Environmental Planning Instruments.</p>
	Assessment of impacts of the proposed activity on existing infrastructure.	This REF assesses the impacts of the proposed activity on existing infrastructure e.g. Council toilet and other facilities. Refer to Section 10.3.

5.5. Matters raised by other government agencies

Table 10: Summary of matters raised by other government agencies

Agency	Matter raised
Department of Primary Industries - Fisheries Division	<p>All waterways within the proposed footprint of the walking track are 1st and 2nd order streams and therefore not considered to be key fish habitat.</p> <p>No objections to the track being designed and constructed as described with the full implementation of all mitigation measures described.</p> <p>The usage of Maloneys Beach by commercial fishers for licensed beach hauling operations and that closure of the beach access may impact on their operations and consultation with the operators should be undertaken.</p>

Department of Planning, Industry and Environment – Crown Lands	Concern if proposed activity will take people to trig reserve Lot 7010 DP1020712, which is managed by Crown Lands, and the requirement for a license.
Department of Transport	Nil response.

5.6. Summary of submissions and matters raised, and NPWS responses

During the public exhibition period, 105 submissions were received. They included:

- 85 submissions from individuals
- 15 submissions from non-government organisations and community groups
- 5 submissions from other government agencies

A petition containing the signatures of 1,020 people was received on 21 August 2020.

No hard copy or form style submissions were received.

Of the 105 submissions received, 55 provided overall support for the project. Twenty-four of these submissions raised matters that required further consideration. Objections to the project in its entirety or detailing of matters requiring consideration without providing support were made in 50 submissions.

The NPWS reviewed all submissions. The NPWS responses include both amendments to the proposed activity and the inclusion of numerous environmental safeguards and mitigation measures. The matters raised in the submissions and the NPWS responses are noted in Table 11 below.

Table 11: Matters raised by general community and NPWS responses

Matter	Description	NPWS response
Track route	Some submissions raised issues relating to the track route. These suggested the track was too close to cliff edges, did not capture a wide enough range of landscape or that there are already adequate tracks within Murramarang National Park to enable a coastal walk.	The alignment of the trail components of the proposed activity has been changed in a number of places to make use of existing trail sections, avoid sensitive Aboriginal cultural sites, threatened shorebird habitat and areas which pose a geological risk.
Park usage	Submissions raising issues associated with park usage, such as: existing and increased anti-social behaviour, littering, lack of amenities and inappropriate toileting, illegal camping and campfires leading to an increased risk of bushfire.	Campfires will be restricted at walk-in campsites. A toilet will be provided at Yellow Rock precinct and the recommissioning of the Oaky Beach Camping Area includes installation of a toilet.
Maloneys Beach	Many submissions provided detailed points relating to the proposed Maloneys Beach precinct upgrade. These included: requesting an alternative location for the southern trail head, the design of the car park and other facilities, potential increase in traffic, continuing vehicle access to the beach, increased usage of council facilities and a need for a formal link to the Acheron Trail.	The size of the carpark at Maloneys Beach has been reduced to minimise impacts on park neighbours. The final design will also include vegetation screening and drainage upgrades. An environmental safeguard and mitigation measure of the installation and use of track and road counters used to monitor visitation and identify park usage habits is included in this REF. Consistent with the Plan of Management, beach access for vehicles will not be provided from within the Murramarang National Park, except for emergency services, NPWS and existing commercial operators. The NPWS will consult with current licenced commercial fishers and ensure they remain able to undertake their licences activities at Maloneys Beach. The NPWS will also work with the licenced

		<p>commercial fishers to ensure they have the correct permits to undertake these activities on-park.</p> <p>The NPWS will continue to work with the Shoalhaven City Council and the Eurobodalla Shire Council to monitor and manage community impacts and usage of public facilities off-park.</p> <p>A staircase from Maloneys Beach to the Acheron Trail will be installed.</p>
Park setting	<p>Submissions expressing concern that the walk would harm the Park's environmental values or change the park's character. These included potential loss of the sense of remoteness and solitude, perceptions of commercialisation, environmental impacts and that walkers would disturb threatened shorebirds. Others referenced the sensitivity of the Park as it recovers from the Currowan Fire. A number of submissions questioned whether the NPWS has adequate resources to manage additional facilities and increased visitor numbers.</p>	<p>The proposed activity has been designed to minimise the impact to the Park's environmental values, including the impact on post-fire refugia. A number of environmental safeguards and mitigation measures have been included in addition to minimum impact design measures.</p> <p>The proposed activity is consistent with the Park's Plan of Management and specifically meets several policies and actions prescribed in the Plan. The NPWS is funded to implement the Park's Plan of Management.</p>
Local community	<p>Submissions identified the effect an increase in visitors could have on the local community, including the lifestyle of residents, the character of the villages and potential impact on existing Council facilities with increased usage.</p>	<p>An environmental safeguard and mitigation measure relating to the promoting the walk as an off-peak experience has been included in this REF.</p> <p>The NPWS will continue to work with the Shoalhaven City Council and the Eurobodalla Shire Council to monitor and manage community impacts and usage of public facilities off-park.</p>
Expansion of concept	<p>Suggestions that the proposal be extended south to Batemans Bay through Long Beach and crossing Cullendulla Creek. Submissions were also received relating to mountain biking and kayak options. Some submissions requested that NPWS consider additional shelter, toilet and camping facilities.</p>	<p>Budgetary constraints do not allow for the extension of the project to Batemans Bay, particularly with the requirement to cross Cullendulla Creek in Cullendulla Creek Nature Reserve.</p> <p>Upgrading the proposed activity to provide for mountain bikes and kayaks is not consistent with the Park's Plan of Management. Under the Plan, facilities provided within natural areas are limited to walking tracks, visitor information and, if necessary, basic toilet facilities</p>
Durras Lake	<p>Some submissions outlined safety concerns with walkers attempting to cross Durras Lake when it is not safe.</p>	<p>The NPWS will explore options to ensure walkers are informed of hazards along the route including Durras Lake. If conditions are deemed unsafe, the track within the Park will be closed using existing online channels, media release and alert systems. There are no plans to install a crossing of Durras Lake or alternative walking track.</p>

Further detail on submissions can be found in the NPWS submission report at Appendix A.

6. Consultation - Aboriginal community

6.1. General consultation

In accordance with the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010a), the Aboriginal community was consulted as part of the Aboriginal cultural heritage assessments for the proposed activity. The consultation was carried out by independent contract archaeologists.

Consultation included:

- Advertising for interested parties by public notice in the Bay Post on 24 October 2018.
- Writing to required agencies and advising of proposed activity and seeking known interested parties.
- Writing to additional identified parties from OEH/or other organisations seeking their interest (14 Aboriginal parties registered an interest).
- Providing a project methodology to all Register Aboriginal Parties (RAPs) for the proposed activity on 13 November 2018.
- Carrying out field survey with representative from Batemans Bay Local Aboriginal Land Council for two days between November 2018 – July 2019.
- Providing draft ACHAR to RAPs for review and comment on 21 September 2019 for 28 days.
- Providing project update to RAPs to include Maloneys Beach on 11 March 2020.
- Providing project update to South Coast People (NC2017/003) Native Title claimants.
- Providing revised assessment methodology to all RAPs for review and comments, and seeking information on known Aboriginal cultural significance values associated with the area and/or Aboriginal objects.
- Carrying out of field surveys with representative from Batemans Bay Local Aboriginal Land Council and subsequent realignment of a number of trail sections to avoid Aboriginal cultural sites.
- Providing draft ACHAR to all RAPs for review and comments in February 2021 for 28 days.
- Extending the consultation period by an additional two weeks at the request of some RAPs.

6.2. Native Title Act 1993 (Cwlth)

Native title recognises the traditional rights and interests to land and waters of Aboriginal and Torres Strait Islander people. Under the *Native Title Act 1993* (NTA), native title claimants can make an application to the Federal Court to have their native title recognised by Australian law. Future acts, including the building of public infrastructure, are considered an act that may affect native title, and consultation and negotiation may be required.

The proposed activity is within the area subject to a Native Title claim of the South Coast People (NC2017/003 - South Coast People). The Applicant for the South Coast People's native title determination NSD 1331/2017 is NTSCORP Limited, a Native Title Service Provider for Aboriginal Traditional Owners in New South Wales and the Australian Capital Territory. NTSCORP was notified of the project details during the public exhibition period. This was in accordance with s. 24JB of the Native Title Act. NTSCORP responded that the package would be forwarded to the Applicant. No submission was received from NTSCORP or the Applicant during the exhibition period. However, NTSCORP, and the local Aboriginal community, including the Batemans Bay Local Aboriginal Land Council, did provide comments on the draft ACHAR. A summary of these comments and the NPWS responses are found below.

There are no Indigenous Land Use Agreements in the study area.

6.3. Summary of matters raised by the Aboriginal community and the ACHAR/NPWS response

As noted previously there were no submissions from the Aboriginal community during the public exhibition period. However, during the Aboriginal cultural heritage assessment process five Aboriginal parties provided comments on the proposed activity. These parties included the Batemans Bay Local Aboriginal Land Council, and the native title claimants via NTSCORP.

The matters raised by the Aboriginal community and the consultant archaeologists and the NPWS responses are found in Table 12 below. The consultant archaeologists and the NPWS reviewed all the comments. The responses include both amendments to the proposed activity and the inclusion of numerous environmental safeguards and mitigation measures. The matters raised in the submissions and the responses are noted in Table 12 below.

Table 12: Matters raised by the Aboriginal community and the ACHAR/NPWS responses

Matter	Description	ACHAR/NPWS response
Aboriginal engagement in construction	Most submissions stressed the need to ensure that Aboriginal people are able to be involved in the further archeological investigations and any salvage processes, and in the construction phase more generally.	In line with the NSW Government Aboriginal Procurement Policy, the NPWS will ensure that it meets the minimum target for procurement of Aboriginal businesses in the construction and operation of the proposed activity.
Opportunities for cultural activities in operation	Some submissions requested the designation of an area as a cultural camp and the provision of drinking water for community members while conducting cultural activities.	The NPWS is to continue discussions with the RAPs and local Aboriginal community for the designation of a cultural camp.
Aboriginal site awareness training	One submission suggested the provision of Aboriginal site awareness training for contractors.	Environmental safeguard and mitigation measures include site inductions and contractual arrangements that are to ensure that all relevant personnel are made aware of, amongst other things, their responsibilities of carrying out works in a conservation reserve and Aboriginal cultural heritage values; and the procedures and practices to reduce impact on the values.
Cultural interpretation	A number of submissions identified the need for appropriate cultural interpretation of the area on signage and other material, as well as support for cultural tours.	Environmental safeguards include: the interpretation of Aboriginal cultural values as identified and defined with the Aboriginal community; and exploring opportunities to support local Aboriginal businesses in tourism, hospitality and education in relation to the walk
Return of salvaged material	Suggestion that any salvaged material collected during the construction phase be returned to country consistent with cultural protocols.	Environmental safeguards and mitigation measures include: Any salvage of Aboriginal cultural heritage materials required for the trail alignment and the Oaky Beach and Yellow Rock components of the proposed activity are to be carried out in accordance with the ACHAR (NGH 2021); Aboriginal community representatives, as chosen by the NPWS, will be invited to participate in any salvage and in the subsurface testing processes; All cultural material recovered from the salvage surface collection and/or the subsurface testing is to be held in temporary care at the relevant NPWS or NGH office for analysis until it can be returned to site to be buried in accordance with Requirement 26 of the Code of Practice for Archaeological Investigations of Aboriginal Objects in New South Wales, and in an appropriate location within the study area that will not be subject to ground disturbance. The burial location of the cultural material recovered during the salvage and subsurface testing is to be submitted to the AHIMS database; and an

		Aboriginal Site Impact Recording Form must be completed and submitted to AHIS following the salvage process.
Communication and partnerships with Aboriginal community	Some submissions identified the need to provide information on the assessment and future management of the proposed activity in a format that is more accessible to the Aboriginal community, with the view that such communication could lead to more formal on-country partnership projects.	The NPWS will seek to continue ongoing communication with the Aboriginal community in relation to a number of matters. There are numerous environmental safeguard and mitigation measures including the development of an Aboriginal Heritage Management Plan. The Plan is to be developed in consultation with the Aboriginal community and will include protocols for consulting with the RAPs on the future management of the track.
Intangible values	Some submissions related to the need to include the intangible values of the area in the final ACHAR.	The final ACHAR includes detail on intangible values in Section 5. However, it is noted that the final assessment relied on information provided in previous reports in relation to intangible values as, despite the latter consultation process seeking information on such cultural values, no specific values were forthcoming. The environmental safeguard and mitigation measures include identification and interpretation of Aboriginal cultural values with the RAPs and local Aboriginal people.
Inclusion of feedback in report	One submission requested the inclusion of the feedback from the Aboriginal community be included in the ACHAR.	The final ACHAR includes the feedback provided by the Aboriginal community.

Further detail in relation to the matters raised can be found in NGH (2021).

7. Proposed activity

7.1. Location of activity

The Murramarang South Coast Walking Track is a proposed multi-day walk traversing the coastline of Murramarang National Park, adjacent coastal villages and the Murramarang Aboriginal Area. Murramarang National Park and Murramarang Aboriginal Area are on the south coast of New South Wales, in the Shoalhaven and Eurobodalla LGAs, in the South Coast NSW electorate. The location of the proposed walk is at Map 1. The national park and Aboriginal area are managed by the NPWS, with the local Aboriginal community actively involved in the management of Murramarang Aboriginal Area.

7.2. Description of proposed activity

7.2.1. General description

The proposed multi-day Murramarang South Coast Walk will traverse the coastal fringe of Murramarang National Park and adjacent areas. The walk will be approximately 48 km and generally follow the coastline north from Maloneys Beach on the northern shores of the Clyde River in the south, through Murramarang National Park, along the beaches adjacent to the coastal villages of South Durras, North Durra, Depot Beach, Merry Beach, Kiola then through Murramarang Aboriginal Area ending at Bawley Point. The walk passes through a variety of coastal vegetation communities, traverses beaches, across rock platforms and over headlands, providing walkers with a range of experiences and views up and down the coast and out to sea. See figures 1, 2 and 3 above for general views of the Murramarang coastline. The beach and rock platform sections of the walk include intertidal areas which are also part of Batemans Marine Park. Accommodation

for the walk is to be provided at existing NPWS facilities at Yellow Rock, North Head, Depot Beach, Pebbly Beach and Pretty Beach, the recommissioning and redesign of the Oaky Beach Camping Area, and private accommodation facilities within the coastal villages. There will be a number of lookouts, track head signage, as well as directional and wayfinding signage along the track.

The NPWS has advised that access to the area during works associated with the construction and operation phases of the proposed walk is to be on existing trails and will not require any additional vegetation clearing or earthworks.

The NPWS has advised that all works associated with the proposed activity will be in accordance with the design standard as outlined in the *Park Facilities Manual* (Office of Environment and Heritage 2016b). Refer to Appendix B for a copy of the relevant sections of the manual. Signage will be in accordance with the *Park Signage Manual* (NSW Office of Environment and Heritage 2017b). Refer to Appendix C for a copy of the relevant sections of the manual.

Information regarding the detail of the proposed activity is based on advice and information obtained from NPWS in the original project brief, during meetings between the consultants and relevant NPWS staff including the relevant Senior Project Officer, Project Officer, Ranger and Team Leader Ranger, and Shorebird Recovery Coordinator, and follow up conversation held in the field, via email and on the phone.

7.2.2. Trail components

The trail components of the proposed activity include construction and operation phases as follows:

- maintenance of a number of existing trail sections
- construction and maintenance of new linking trail sections and upgraded trail sections
- beach and rock platform sections of the walk alignment
- rehabilitation of redundant trail sections.

These, along with subsidiary trails, are shown on maps 4 - 7. Appendix D provides a description of each work section and an indicative scope of works. To avoid, minimise and manage any potential impacts on the environment, all trail components will be subject to an Environmental Work Method Statement. The statement will be prepared prior to work and approved by the Principal and will include detail on: access; refuelling; daily checks; security; and extraction.

Approximately 41.29 km of trail alignment is subject to the assessment. The proposed walk will be single trail except in places where it follows existing vehicles tracks for a few very short distances e.g. Acheron Fire Trail near Maloneys Beach; the old Oaky Beach access road, and the commencement of the Snapper Point Walking Track at Pretty Beach. A low-tide option for the commencement of the walk from the Maloneys Beach precinct to Reef Point will be promoted in interpretive material.

The construction phase will involve clearing or modifying native ground cover and/or understory vegetation and/or minor earthworks of the of the new linking and upgraded trail sections. No mature canopy trees will be removed as part of the proposed activity. There will be approximately 12.77 km of new linking trail developed, and approximately 3.08 km of existing trail upgraded. A trail corridor of between 600 – 1200 mm is to be used for the construction and ongoing maintenance (the operation) of the trail components (excluding the sections on the beaches and rock platforms). This is to accommodate edge disturbances such as batters and moving fallen timber. Further detail on the new linking trails sections and upgraded trail sections, including associated infrastructure, and rehabilitation of the redundant trail sections is described below. This information was provided by the NPWS. Existing trail sections that are part of the proposed

activity and that are not being upgraded or made redundant and rehabilitated, will be maintained in their current condition.

Ground surface

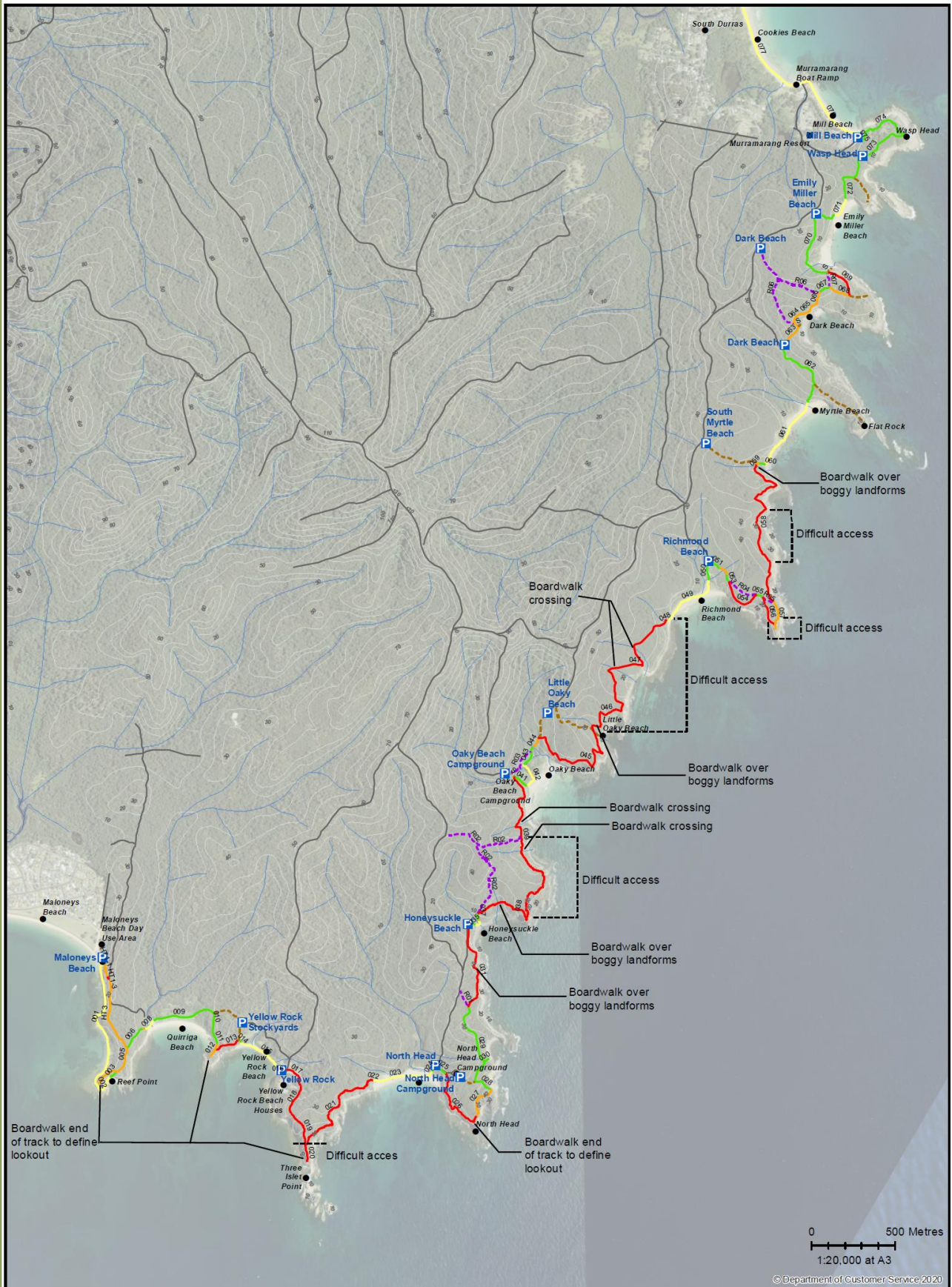
The new and upgraded trail sections are to follow the natural ground surface where possible. There are two sections where rock may need to be brought in by helicopter to create a rocky sandstone trail: Point Upright and south of Granite Point (see photos of these areas in Figure 5 and Figure 6). Works will be consistent with the *Park Facilities Manual* s. 5.3.3 (refer to Appendix B). The formed paths at Maloneys Beach precinct will be constructed from concrete, pavers and/or boardwalk to achieve Class 1 disabled access. The works will be consistent with the *Park Facilities Manual* ss. 5.3.10, 5.3.13 and 5.9.5 (refer to Appendix B). Gravel paths may also be required at Oaky Beach Camping Area. These works will be consistent with the *Park Facilities Manual* s. 5.3.4 (refer to Appendix B).

Figure 5: Point Upright rocky section



Photo: Tom Pinzone NPWS

Map 4: Trail components – southern sections



Murramarang South Coast Walk

Separable Portion A - Maloneys Beach to Mill Beach

- Beach
- Existing
- New Track
- Redundant
- Subsidiary
- Upgrade

Map 5: Trail components – Point Upright section



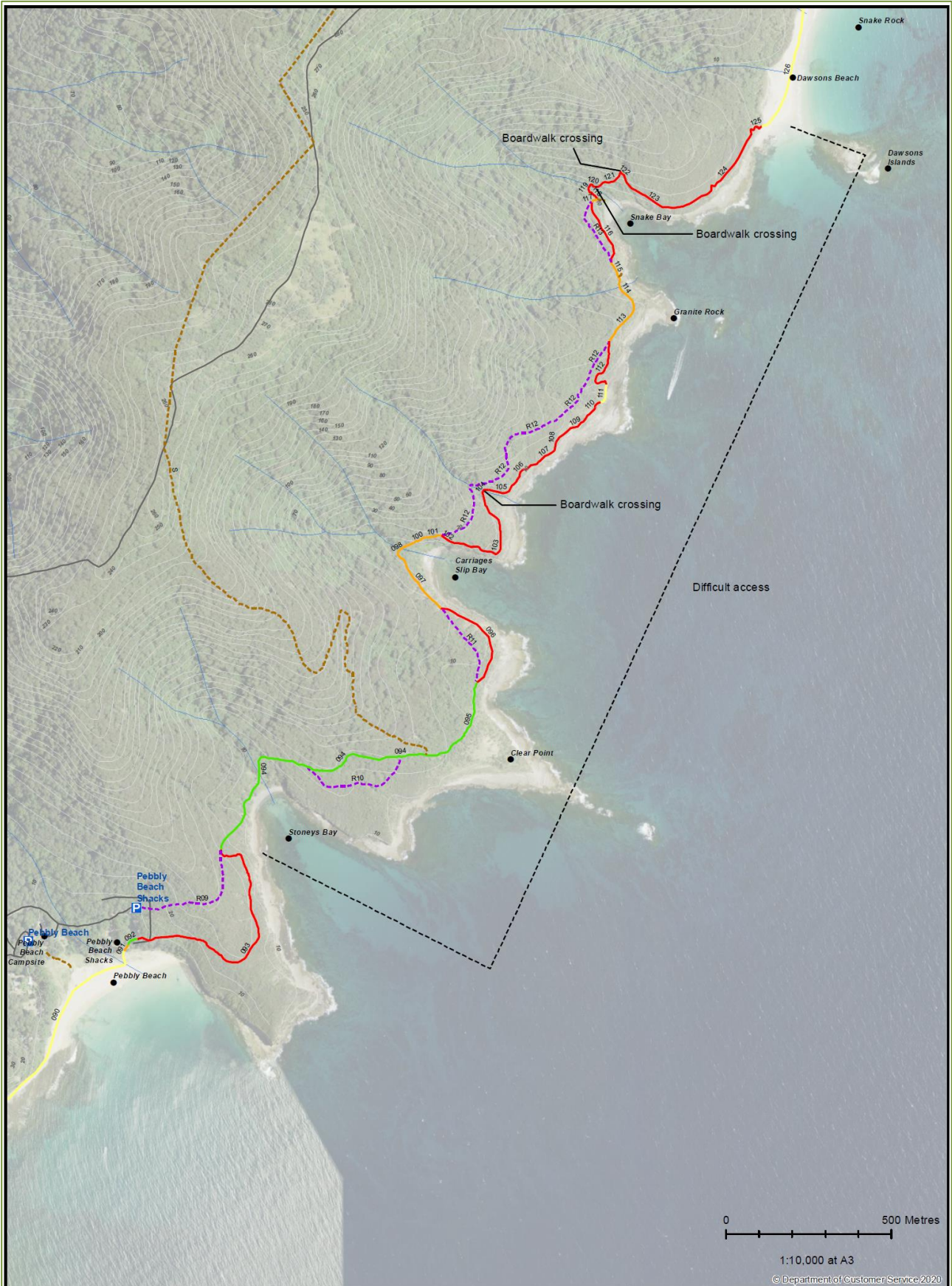
Murramarang South Coast Walk

Separable Portion B - Point Upright

-
 Beach
 New Track
 Subsidiary

-
 Existing
 Redundant
 Upgrade

Map 6: Trail components – Pebbly Beach to Dawsons Beach sections



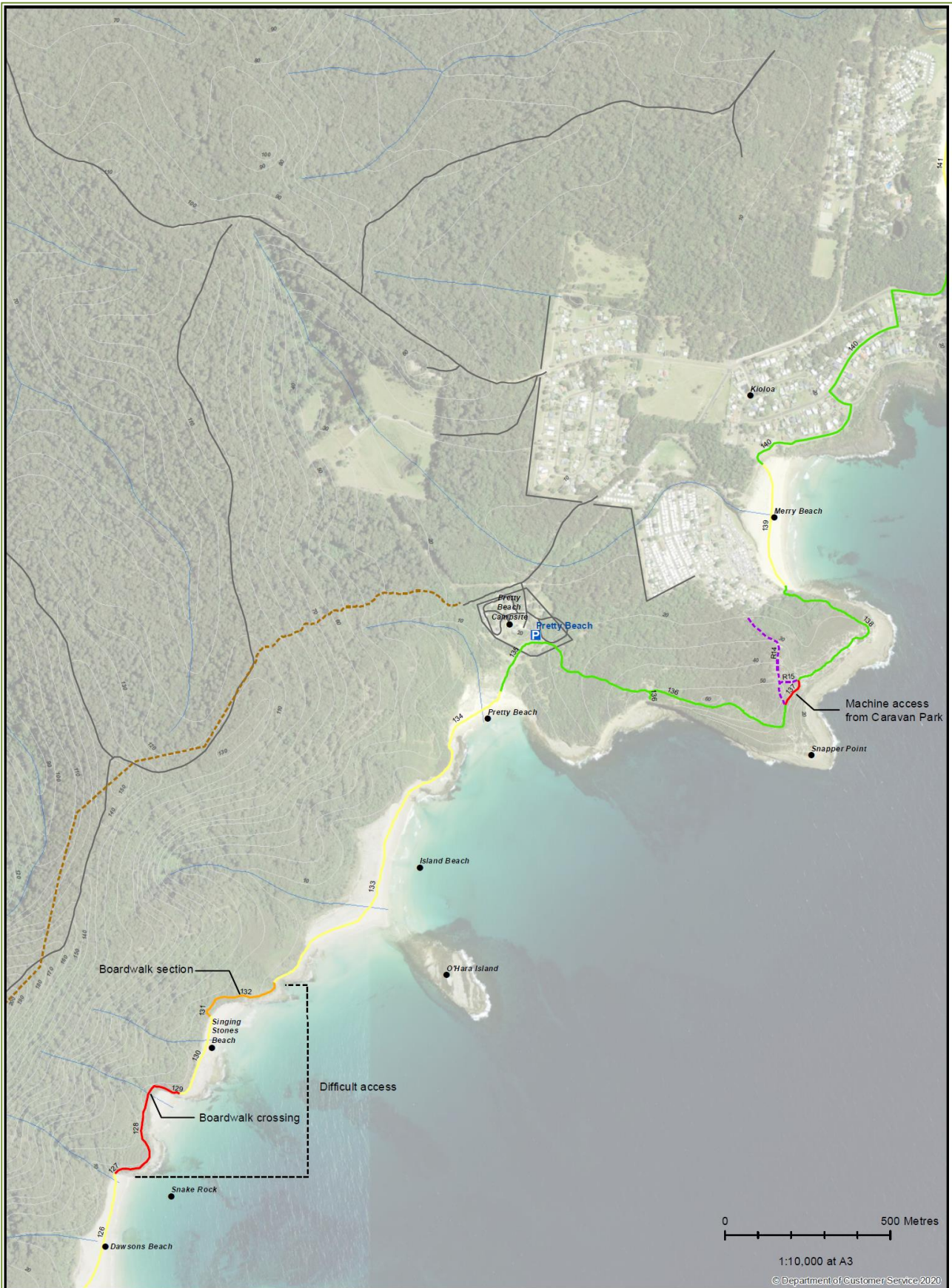
Murramarang South Coast Walk

Separable Portion C - Pebbly Beach to Dawsons Beach

-
 Beach
 New Track
 Subsidiary

-
 Existing
 Redundant
 Upgrade

Map 7: Trail components –Dawsons Beach to Merry Beach sections



Murramarang South Coast Walk
 Separable Portion D - Dawsons Beach to Merry Beach

- Beach New Track Subsidiary
- Existing Redundant Upgrade

Figure 6: Rocky section south of Granite Point



Photo: Tom Pinzone NPWS

Benching

Numerous trail sections require benching into the slope. Where vehicle access is available small excavators and other small machines will be used for this work. In areas with no vehicle access, these sections will be hand benched.

Installation of new stairs to some beaches and repair of existing stairs

New stairs are required at several locations where sections of the trail link to the beaches and rock platforms. These will mostly be constructed with timber and built onto the slope (refer to the example shown in Figure 7). In some sections, stone or concrete may be used for increased resilience to bushfires and increased longevity (refer to the example shown in Figure 8). These works will be consistent with the *Park Facilities Manual* s. 5.5.5 Sleeper stairs (refer to Appendix B). Some existing stairs require basic maintenance; replace timber sleepers, fix erosion issues etc (refer to Figure 9).

Figure 7: Example of timber stairs



Photo: Tom Pinzone NPWS

Figure 8: Example of stone steps



Photo: Tom Pinzone NPWS

Figure 9: Timber stairs at Honeysuckle Bay requiring maintenance



Photo: Tom Pinzone NPWS

Stairs are required at Maloneys Beach where the track commences and rises from the precinct to the Acheron Trail. These will be a mix of surface stairs and structure. The stairs will be located so as to not be visible from the neighbouring suburb. These works will be consistent with the *Park Facilities Manual* s. 5.5.6 Elevated stairs (refer to Appendix B).

Reinstating fire impacted infrastructure such as stairs, drains, footbridges and boardwalks

Sections of the existing walking trail that are to be incorporated into the proposed Murramarang South Coast Walk were impacted by the Currowan Fire. These sections require removal of fallen trees, and/or replacement of burnt infrastructure, such as the main section is Singing Stones Beach south of Pretty Beach. Refer to the Figure 10 and Figure 11 as examples of burnt infrastructure that needs reinstating.

Figure 10: Fire damaged stairs south of Pretty Beach



Photo: Tom Pinzone NPWS

Figure 11: Fire damaged boardwalk south of Pretty Beach



Photo: Tom Pinzone NPWS

Small foot bridges spanning drainage lines and creeks

A number of small footbridges are required. These will be constructed with Fibre Reinforced Polymer (FRP) decking in the same design as currently used, with stainless-steel fittings (screws, clips etc.). Refer to Figure 12 for an example of an existing footbridge.

Figure 12: Example of existing footbridge at Richmond Beach



Photo: Tom Pinzone NPWS

Elevated boardwalks

Small sections of boardwalk are required. These will be built from FRP and laid directly on ground or piered (as above) depending on ground conditions (refer to Figure 13 as an example of this type of boardwalk). The main section where this is required is south of Pretty Beach where the boardwalk is fire damaged. Other sections may be required for boggy areas. This type of work will be consistent with the *Park Facilities Manual* ss. 5.9.2, 5.9.3 and 5.9.5 (refer to Appendix B).

Figure 13: Example of boardwalk



Photo: Tom Pinzone NPWS

Formalised lookouts

Some lookouts may require formalisation to delineate safe zones or to discourage access to sensitive cultural locations. These lookouts will be built to be similar to the boardwalk example with FRP used to create a pad.

Fallen dead vegetation will be used to prevent access from lookout locations. Three Islet Point at Yellow Rock is main example where the FRP pad would be installed over grass near the point to prevent access to unstable cliff and midden location. Refer to Figure 14 as an example of a lookout location.

Figure 14: Three Islet Point lookout location



Photo: Tom Pinzone NPWS

Erosion control techniques

Erosion caused by inadequate drainage or informal visitor access will be controlled. Water will be diverted from the top of the slope and fallen timber will be placed strategically downslope to slow run-off. Mulch may also be used where vehicle access is available to the site. Refer to Figure 15 as an example of an eroded area requiring control measures.

Figure 15: Eroding slope near Depot Beach



Photo: Tom Pinzone NPWS

Trailhead, signage, interpretation and wayfinding totems

Track head infrastructure will be installed at Maloneys Beach and Pretty Beach precincts as per the design specifications (refer to Section 7.2.3). Signage will be consistent with the *Park Signage Manual* (refer to Appendix C for relevant sections). This includes: trail head signs consistent (refer to Figure 16 for an example); major track junctions will have directional signage (refer to Figure 17 for an example); and a limited number of wayfinding totems (refer to Figure 18) and directional markers (refer to Figure 19). A small amount of interpretive information would be provided on the signage where required. Signs would generally not be installed on beach areas where there is a high likelihood of cultural sites.

Figure 16: Example trail head sign at carparks, camping areas and day use areas



Figure 17: Example of directional sign for major track junctions



Figure 18: Example wayfinding totems for minor track junctions and other features



Figure 19: Example directional markers



Beach and rock platforms

There is approximately 10.33 km of trail alignment on beaches and rock platforms. There are no construction works proposed for these sections. However, as it is likely that the completion of the Murramarang South Coast Walk will result in an increased number and frequency of walkers, these alignments, both existing and new, are included in the assessment as a number are within and adjacent to known threatened shorebird habitat.

Redundant trail sections

Redundant trail sections will be rehabilitated and revegetated. This involves removing existing track infrastructure, repairing drainage and erosion issues, covering the redundant trail with mulch and fallen

timber and leaving the area too revegetate. These works will be carried out in high use areas where there is a new alignment or where there are erosion issues. Other sections i.e. low use areas, up to the first 50 m of the redundant trail section will be rehabilitated and revegetated to deter visitor access. The remaining redundant trail sections will be left to revegetate naturally. There is approximately 5.87 km of redundant trail sections. Redundant trail sections will be included in the project AHIP.

Ancillary activities

All stockpiling and compound sites are to be on existing disturbed areas. Material to be stored would include: track materials, waste, tools, fuel etc. Storing may include temporary installation of a small site shed and toilet.

7.2.3. Precinct developments and upgrades

Maloneys Beach precinct

Maloneys Beach precinct upgrade involves developing the main track head for the proposed walk by:

- carrying out test pitting to ascertain if there is any subsurface Aboriginal cultural heritage in the area
- upgrade of a culvert on entering the NPWS estate (in consultation with Council)
- development of a gravel vehicle drop-off turn-around and a gravel 14-space carpark with a spray seal finish
- installing a locked gate to provide management vehicle and licenced commercial fisher access
- provide a vegetation barrier between the carpark and neighbouring property and surrounds
- development of a track head and small and large shelters
- development of a track commencement ‘celebration’ – installation of signage
- development of formed walking paths from the carpark to the track commencement ‘celebration’
- decommissioning and repair of an unauthorised vehicle track to beach by regrading compacted areas, backfilling with soil and planting
- installing a footpath on the decommissioned vehicle track
- development of picnic zones
- installing barriers on the precinct’s western edge along the NPWS boundary to prevent vehicle access
- retaining beach access for pedestrians and walk-in launching of small vessels (kayaks etc.), management vehicles and licenced commercial fishers with access stabilised by fixing erosion issues and planting the dune with appropriate species
- construction of stairs up to Acheron Trail (location to be finalised after test excavations)

Refer to Figure 20 for a photo of the general site character of the proposed carpark location at Maloneys Beach precinct. Refer to figures 21 to 24 for Maloneys Beach precinct upgrade design specifications.

Figure 20: General site character of proposed carpark location at Maloneys Beach precinct



Figure 21: Maloneys Beach precinct design specifications - northern area

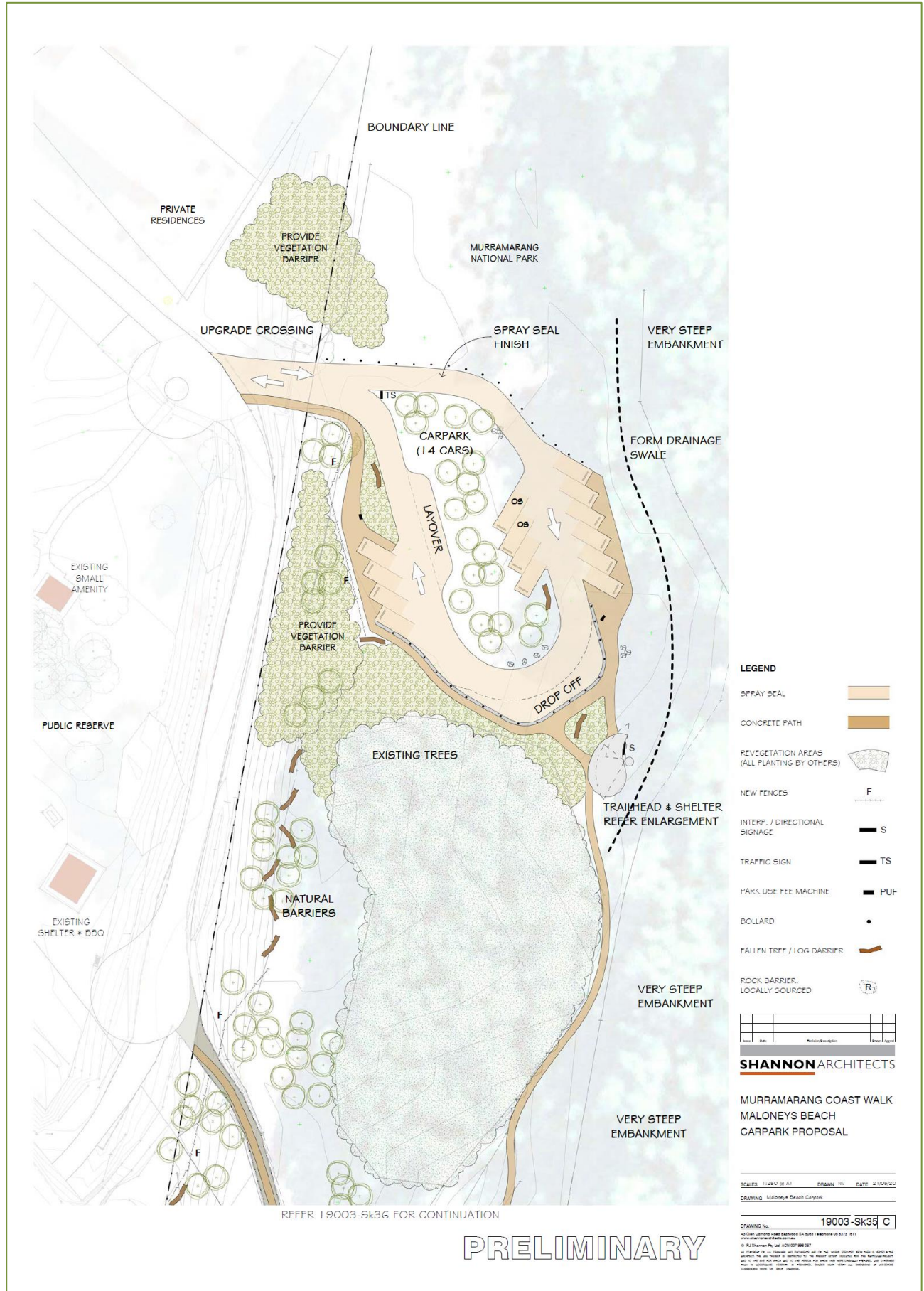


Figure 22: Maloneys Beach precinct design specifications - southern area

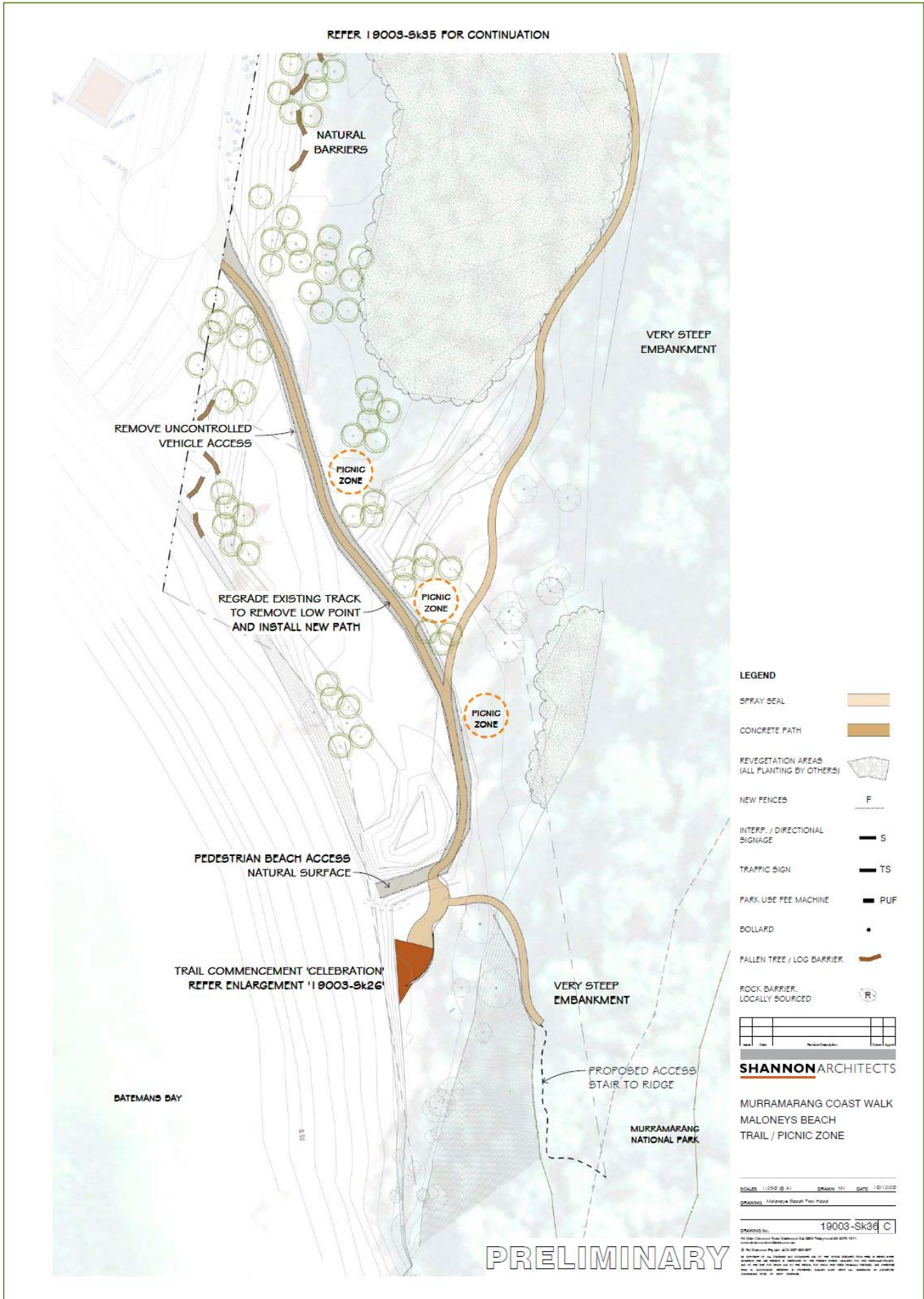
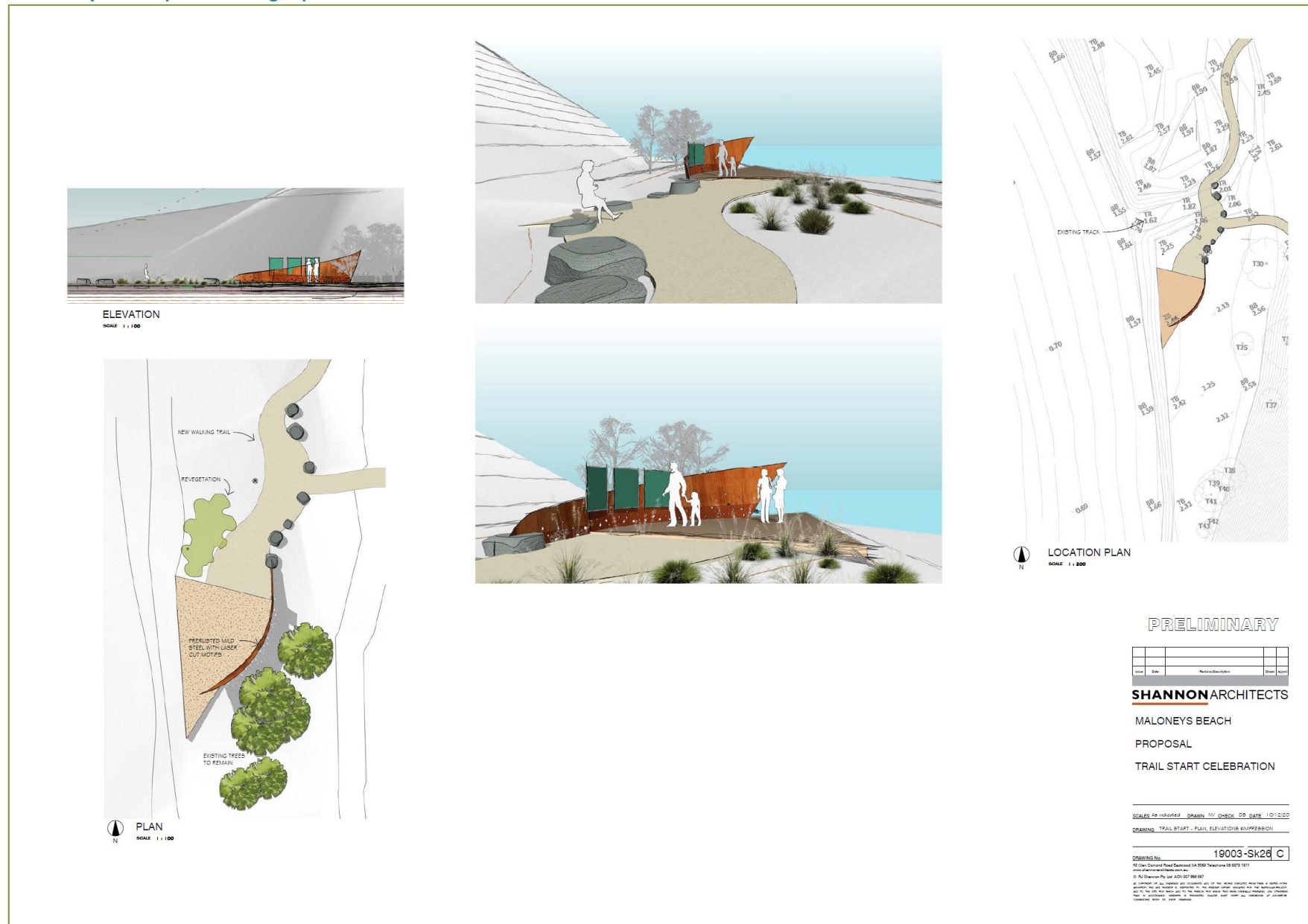


Figure 23: Maloneys Beach precinct design specifications - shelters and sign



Figure 24: Maloneys Beach precinct design specifications -trail commencement 'celebration'



All proposed works at Maloneys Beach precinct are within cleared or previously disturbed areas. There will be removal of ground cover and earth works associated with levelling for the carpark, the connecting formed walking paths and the shelters and trail commencement 'celebration'. No mature canopy trees will be removed. There will be no lighting installed for the carpark.

Yellow Rock precinct

Yellow Rock accommodation precinct involves upgrading the existing water and wastewater system by:

- connection of existing downpipes in the precinct to rainwater tanks
- connection of above ground rainwater tanks
- decommissioning of the existing wastewater disposal trenches and associated pipe networks
- connection of a pipe from the existing farm dam to the existing water tank
- decommissioning of a small existing rainwater tank at Beach House
- decommissioning of an existing water tower and pipe network near the Caretakers House
- installation of an additional solar power system at the existing amenity building
- installation of new wastewater treatment unit near the existing amenity building
- connection of sewer pipes to a new wastewater treatment unit using the existing trenches

installation of an Ecomax amended soil mound or equivalent Other works for Yellow Rock precinct include:

- installation of an access gate
- removal of parts of a damaged concrete boat ramp that are within the NPWS estate

All proposed works at Yellow Rock accommodation precinct are within cleared or previously disturbed areas and will require the removal of ground cover and/or minor earth works at or below ground surface i.e. down to 1 m. Proposed works at Yellow Rock precinct will not require the removal of mature canopy trees, and removal of native ground cover and understory vegetation, where it exists, is minimal.

Refer to Figure 25, 26 and 27 for photos of the general site character of the Yellow Rock precinct.

Refer to Figure 28 for the Yellow Rock precinct water and wastewater services plan concept.

Figure 25: General site character of Yellow Rock precinct



Figure 26: Proposed site of Ecomax mound



Figure 27: Yellow Rock precinct amenity building - proposed site for new wastewater treatment unit and solar system



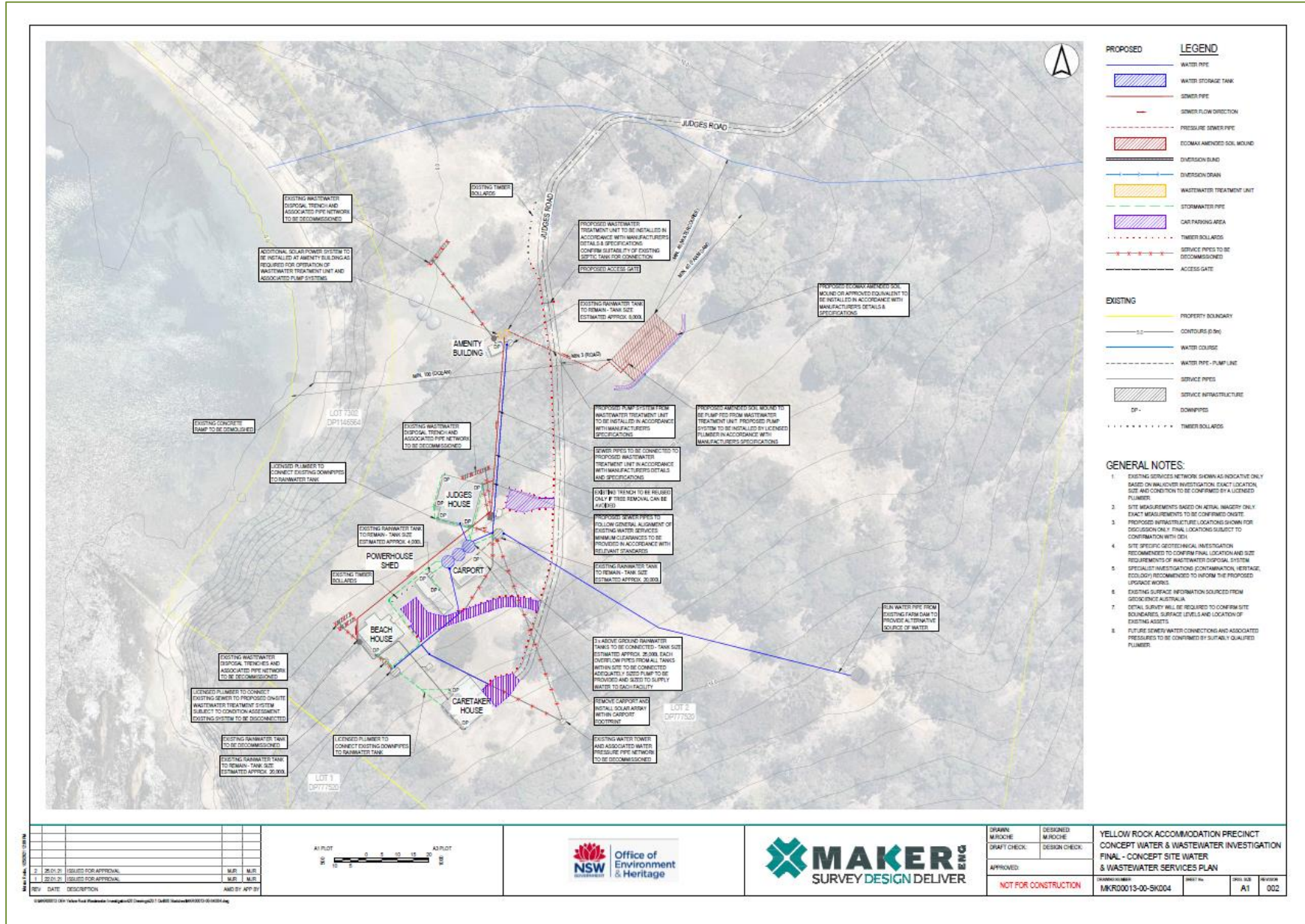
Oaky Beach precinct

Recommissioning the Oaky Beach Camping Area involves the following:

- installation of a four-space day visitor carpark
- development of ten camping sites with adjacent carpark spaces
- development of short linking walking trails from the carpark spaces to the camping sites, from the main trail to the Camping Area and from the main Camping Area to the walk-in camping sites
- development of five walk-in camping sites and one small shelter
- installation of a standard double stall skillion NPWS amenity block on a concrete slab with a concrete pump-out tank 1.5-2m deep installed to manufacturer's specifications

Proposed works at Oaky Beach precinct will not require the removal of mature canopy trees, and removal of native ground cover and understory vegetation, where it exists, i.e. the walk-in camp sites, is minimal. Minor earthworks will be required in some areas.

Figure 28: Yellow Rock precinct water and wastewater services plan concept



Figures 29 and 30 show general site characteristics of the Oaky Beach Camping Area. Refer to Figure 31 for the design specifications. The amenity block will be a Skillion double stall consistent with the *Park Facilities Manual* s. 6.4.7 (refer to Appendix B). It will have an in-ground tank, approximately 1.5-2m deep, and an attached rainwater tank, and due to the slope, may be on a platform or a concrete slab. There are no access issues for pumping out. The small shelter is to be a standard skillion shelter consistent with the *Park Facilities Manual* s. 6.3.5 (refer to Appendix B). This will also be on a concrete slab and have a rainwater tank attached.

Figure 29: Main access road and general site character of Oaky Beach Camping Area



Figure 30: General character of proposed walk-in camping sites at Oaky Beach Camping Area



Pretty Beach precinct

Pretty Beach precinct upgrade involves developing a small alternative track head. This will be completed by utilisation of the existing concrete path and seating area and the installation of track head signage.

Proposed works at Pretty Beach precinct will not require the removal of mature canopy trees, and removal of native ground cover and understory vegetation, where it exists, is negligible. Refer to Figure 32 for Pretty Beach alternative track head precinct design.

Figure 31: Oaky Beach Camping Area recommissioning design concept

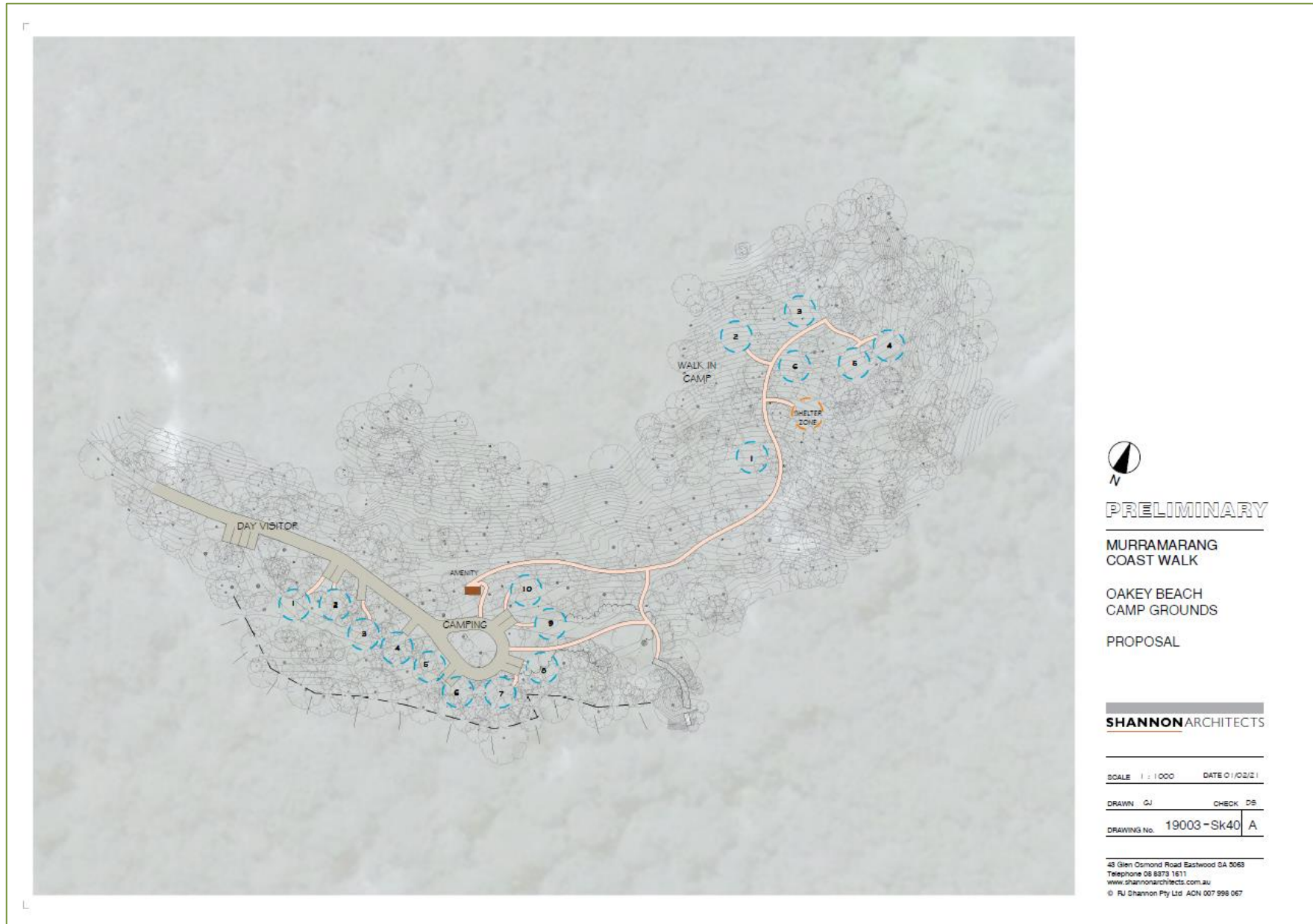





Figure 32: Pretty Beach precinct alternative trail head design



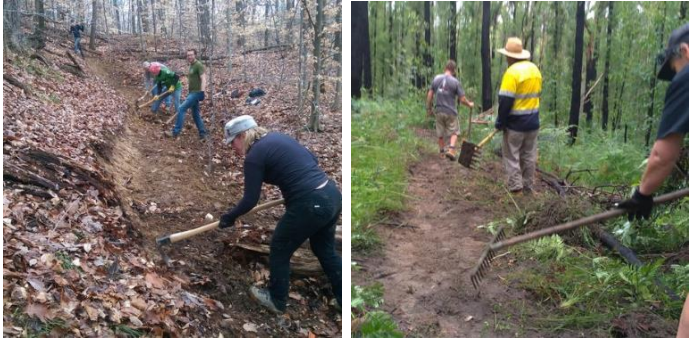



7.2.4. Access and use of machinery for construction

Access during the construction and operation phases of the proposed activity is limited to existing vehicle tracks and walking trails. Trail component sections that are accessible by vehicles will be constructed and maintained the use of small machinery, assisted by motorised wheelbarrows or modified 4WD ride-on mowers. Trail component sections that are not accessible by existing vehicle tracks will be constructed and maintained by hand tools. Table 13 below describes the types of machinery and tools to be used for the trail components of the proposed activity. The NPWS will advise on the permitted use of any non-handheld machinery. Refer to maps 4 to 7 above for machinery access requirements. For some remote sections, contractors may camp in the field to reduce travel time to the site. Precinct development works will require small machinery, and possibly larger machinery for the carpark at Maloney Beach.

Table 13: Types of machinery to be used in trail components of the proposed activity

Machinery type	Example photos of machinery in use
<p>Mini Excavator/loader</p> <p>Machinery will be limited to width < 1 m to minimise the tendency to build to the width of the blade or wheelbase.</p> <p>Vegetation and soil disturbance will be minimised by operating only within the trail corridor.</p>	
<p>Ride on mower</p> <p>Small 4WD ride on mowers and trailers may be used for some trail sections with good access.</p>	
<p>Motorised carriers</p> <p>Some trail sections may be constructed with the assistance of motorised carriers and wheelbarrows.</p> <p>These units can be electric or petrol and can include a dumping body.</p> <p>Wheelbases will be < 1 m.</p>	

<p>ebike</p> <p>ebikes may be suitable for some trail sections to more efficiently transport personnel to and from work sites.</p>	
<p>Motorised hand tools</p> <p>Small motorised tools will be used: chain saws, brush cutters, drills, vacuums, circular saws etc.</p> <p>Small generators and power packs may also be required.</p> <p>For sections without machinery access, all work will be carried out with hand tools only.</p>	
<p>Hand tools</p> <p>The contractor will be required to use several specialist hand tools; rake hoe, mattock, shovels, shears, hammers etc.</p> <p>For sections without machinery access, all work will be done with hand tools only.</p>	
<p>Camping in the field</p> <p>The contractor may be required to camp in the field to reduce travel times to the site each day. Camp management will be consistent with minimal impact camping procedures as recently applied in Kosciuszko National Park. This may include the heli-lifting of materials, including a toilet and small shelter.</p>	

7.2.5. Carrying out works

The NPWS intend to engage contractors to carry out the majority of the construction phase of the proposed activity, with some work being undertaken by NPWS field staff. It is intended that the regular maintenance of the proposed activity will be carried out by NPWS staff.

7.2.6. Sustainability measures

The proposed activity will be consistent with NPWS policy and best practice procedures in relation to infrastructure design and the sourcing of materials. Design specifications take into account minimal maintenance requirements and minimal use of energy. For instance:

- FRP is constructed from recycled products and has a working life of < 25 years and will not rust, warp or weather.
- Stainless steel fittings will be marine grade, have a long life and will not rust in the coastal environment.
- Rock used for the proposed activity has a long life.

7.2.7. Construction timetable and staging, and hours of operation

Work for the proposed activity is scheduled to commence in mid-2021 with the initial focus on the construction of the trail components and the recommissioning of the Oaky Beach Camping Area. Work at Yellow Rock and Maloneys Beach would be undertaken after Summer 2021/22 to minimise disruption to these precincts.

Work will be restricted to standard construction hours:

- Monday to Friday 7.00 am to 6.00 pm.
- Saturdays 8.00 am to 1.00 pm.
- No construction on Sundays or Public Holidays

Work hours at Maloneys Beach will be specified in consultation with local residents.

7.3. Environmental safeguards and mitigation measures

The following environmental safeguards and mitigation measures are to be implemented as part of the proposed activity:

1. A Construction Environmental Management Plan (CEMP) is to be prepared for the construction phase of the proposed activity prior to commencement of any works. The relevant environmental safeguards and mitigation measures in this REF are to be incorporated and implemented as strategies and actions in the plan. In addition, all trail components will be subject to an Environmental Work Method Statement. The statement will be prepared prior to work and approved by the Principal and will include detail on: access; refuelling; daily checks; security; and extraction.
2. An Operational Environmental Management Plan (OEMP) will be developed and implemented within six months of the construction phase commencing. The OEMP will include relevant measures detailed below such as those related to rehabilitation, visitor monitoring and threatened shorebird monitoring and the relevant safeguards to address potential impacts.
3. Site inductions and contractual arrangements are to ensure that all relevant personnel are made aware of: their responsibilities of carrying out works in a conservation reserve and a marine park; the key ecological values (including threatened shorebirds) and Aboriginal cultural heritage values; and the procedures and practices to reduce impact on the values, including adopting appropriate hygiene procedures for toileting and preventing the spread of weeds and pathogens.
4. In accordance with NSW Government procurement guidelines, ensure all contractors associated with the construction phase have environmental management systems that comply with the documentation requirements of *AS/NZS 14001:2004 Environmental management systems*, or the equivalent.
5. All works are to comply with the NPWS safety procedures.

6. All works associated with the proposed activity are to be limited to the subject site. If the proposed activity extends beyond the subject site, further ecological and archaeological assessments, including consultation with the RAPs for the latter, are required to be undertaken.
 7. If the scope of the works changes at any time, then a consistency review is to be undertaken to determine if any new mitigation measures or safeguards are required.
 8. Contractors are to have, and be competent in the use of, petrochemical spill kits for use of any spillage during the construction. Temporary bunds must be used for all refuelling activities. The NPWS is to be notified of any spills and the action taken to contain them.
 9. Maintenance and replacement schedules are to take into account the life cycle of materials that may harm the environment prior to any obvious signs of decay e.g. FRP, and are to be incorporated into the NPWS Asset Management System and regularly inspected and maintained.
 10. All machinery, equipment and personal items used or worn in the construction and operation phases of the proposed activity, are to be in good working condition, clean, weed and pathogen free and machinery is to be fitted with muffling devices if available and free from any fuel and other pollutant residues, with connections and hoses inspected regularly. The NPWS is to inspect such machinery, equipment and items prior to arrival at the construction site, and make regular inspections.
 11. Erosion and sediment control measures are to be in place prior to any vegetation clearing and earthworks commencing and are to be maintained until run-off catchments are stabilised. Erosion and Sediment controls are to be inspected regularly by the relevant contractor and by NPWS staff. Erosion and sediment control measures are also to be in place for the storage of any spoil as required.
 12. Disturbed areas must be progressively stabilised during construction.
 13. The use of vehicles in the construction and operation phases of the trail components of the proposed activity is to be confined to the existing vehicle tracks.
 14. No earthworks are to be carried out for the proposed activity during or within two days of heavy rainfall.
 15. Work must be restricted to standard construction hours:
 - a. Monday to Friday 7.00 am to 6.00 pm.
 - b. Saturdays 8.00 am to 1.00 pm.
 16. No construction works are to be carried out on Sundays or Public Holidays.
 17. Work hours at Maloneys Beach must be specified in consultation with local residents.
 18. The NPWS will develop a notification procedure prior to any works commencing, and review as required.
 19. A temporary wind break/barrier is to be installed adjacent to neighbouring residential properties during the construction phase of the precinct upgrade at Maloneys Beach. A permanent vegetation barrier is to be established in this area to reduce any potential visual impact on neighbouring residences.
 20. The NPWS will ensure work and ancillary sites are secured and left safe outside of work hours.
 21. An independent ecologist is to carry out pre-clearing inspection to:
 - a. Microsite the trail alignment components to an appropriate distance (i.e. 10 m), from hollow-bearing trees, hollow logs and, in accordance with Standards Australia (2009) AS 4970-2009 *Protection of trees on development sites*, so that there is no disturbance within the Tree Protection Zone and Root Protection Zone of any known feed trees and hollow-bearing trees. The alignment for the trail components is to be marked clearly with bunting or flagging.
 - b. Identify and realign the trail components away from any Scrub Turpentine trees.
 22. The extent of vegetation modification or clearing is to be clearly marked on site prior to any works commencing. Such marking may comprise star pickets with bunting or flagging to clearly demarcate the limit.
-

23. Removal or modification of logs and tree stumps is to be avoided.
24. Cleared vegetation is to be stored within or adjacent to the subject site on already cleared areas for a maximum of one week. The cleared vegetation material may be used for rehabilitating areas or be strategically disposed of in the surrounding area.
25. Machinery, vehicles, materials or equipment are not to be stored in adjacent areas of native vegetation which are not part of the subject site of the proposed activity or in areas of high fuel loads e.g. long grass. Existing cleared areas are to be utilised for this purpose.
26. Construction works for the proposed activity are to minimise the disturbance to riparian corridors. This includes ensuring that any stormwater run-off is managed before discharging into the corridors.
27. Spoil is to be stockpiled in cleared areas immediately adjacent to the subject site of the proposed activity. No spoil is to be stored or dispersed in riparian corridors, beaches or on rock platforms. Spoil will be managed in accordance with the *Waste Avoidance and Resource Recovery Act 2001* (NSW).
28. Excess materials e.g. FRP off-cuts, are to be stockpiled in bulka bags to contain fines and ready for transport from work sites.
29. Rock is to be sourced from a registered quarry off-site for the construction of rock retaining walls and stepping-stones and is to be consistent with the geology of the site.
30. Materials used in the construction and operation phases of the proposed activity are to be free of any potential invasive species, pathogens or diseases. For instance, any fill for the proposed activity is to be certified free from contaminants or weed propagules that could negatively affect adjacent habitats. All imported materials for the proposed activity are to be in accordance with NPWS bio-security management procedures.
31. Any landscaping of the subject site should utilise native species currently growing within the study area.
32. Weed and pest management for the proposed track is to be carried out in accordance with the NPWS standard policy and procedures, as part of routine operations.
33. Any fencing or barriers installed during the construction and operation phases of the proposed activity are to be of 'wildlife friendly' construction, i.e. shall not contain barbed wire, shall not impede the movement of fauna, through the subject site or adjacent areas.
34. Native vegetation is not to be removed for fence construction.
35. A pre-clearance survey is to be carried out by NPWS staff prior to any construction works in the area of the heritage item, *Site of former huts*, near Honeysuckle Beach. If the heritage site is observed, then exact location and a description is to be recorded and the track re-aligned away from the heritage item. Information recorded is to be used to update the HHIM listing.
36. If any historic heritage items or places are observed during the construction phase of the proposed activity, then work is to cease immediately and the NPWS are to be notified and appropriate measures are to be implemented.
37. In consultation with Eurobodalla Shire Council and Shoalhaven City Council, develop and implement schedule to monitor use of council facilities as a result of the Murramarang South Coast Walk.
38. Track and road counters will be used to monitor visitation and identify park usage habits.
39. The NPWS will promote the multi-day walk as an off-peak experience.
40. The NPWS will consult with licenced commercial fishers and make arrangements for them to be able to undertake their licenced activities at Maloneys Beach and that they have the correct permits to undertake these activities on-park.
41. Interpretive material aimed at promoting an immersive visitor experience and positive visitor behaviour is to be made available on and off-site, with key messages on:

- a. The natural and cultural values of the area.
 - b. The importance of staying on formed tracks.
 - c. The risks associated with cliffs, bushfire and using the foreshore alignments during high tides.
 - d. The requirement for appropriate hygiene measures e.g. taking rubbish out; clean boots and equipment; appropriate toileting procedures.
 - e. The requirement for the use of fuel stoves only.
 - f. The need to limit excessive noise and lighting, including near residential areas.
 - g. The prohibition of hand-gathering and fishing in Marine Park Sanctuary Zones.
42. The Aboriginal cultural values to be interpreted are to be identified and defined with the RAPs and local Aboriginal people.
 43. In addition to the above, interpretive material is to be made available to visitors prior to the walk, i.e. NPWS website, brochures) and on signs at either end of known threatened shorebird nesting beaches, to help mitigate potential adverse impacts on nesting success. Key messages are to include: no stopping on nesting beaches; keeping to shorelines/intertidal areas; and staying away from fenced areas during the nesting season.
 44. The NPWS will explore opportunities to support local Aboriginal businesses in tourism, hospitality, and education in relation to the walk.
 45. A visitor monitoring program for the walk is to be implemented to obtain data on visitor numbers, usage and satisfaction levels. This visitor monitoring program will be included in the OEMP.
 46. The NPWS will continue to work with volunteer groups and local councils to help protect the threatened shorebirds. This work will include fencing off breeding areas, installing signs and monitoring the threatened shorebirds.
 47. The threatened shorebird monitoring program is to continue and will include as a minimum, those areas where there are previous records of nesting i.e., Dawsons Beach, Island Beach, Oaky Beach, North Durras Beach, Pebbly Beach and Durras Lake Entrance. The threatened shorebird monitoring program will be included in the OEMP.
 48. The NPWS will evaluate results to ensure the existing shorebird program maintains or improves shorebird outcomes. As part of this the NPWS will develop, and implement as required, a Trigger, Action and Response Plan (TARP). The development of the TARP will be guided by the advice of the Saving our Species Program. The TARP may include a range of trigger and response levels, and for response levels may include increased monitoring, increased fencing and regulating track use. The threatened shorebird TARP will be included in the OEMP.
 49. The NPWS is to apply for an AHIP to conduct subsurface testing at the Maloneys Beach and Pretty Beach precincts. The subsurface testing is to be carried out in accordance with the methodologies detailed in the NGH (2021).
 50. The NPWS is to apply for an AHIP for all the trail components (existing trails, upgraded trails, new trails and redundant trails) and the Yellow Rock and Oaky Beach precinct upgrades of the proposed activity, including an allowance for the management phase.
 51. If any Aboriginal sites are observed during the construction phase of the proposed activity, then work is to cease immediately and the NPWS is to be notified to allow for the site to be recorded. A thorough assessment is to be carried out in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011), the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b), and NGH (2021).

52. Any salvage of Aboriginal cultural heritage materials required for the trail alignment and the Oaky Beach and Yellow Rock components of the proposed activity are to be carried out in accordance with the ACHAR (NGH 2021).
53. Aboriginal community representatives, as chosen by the NPWS, will be invited to participate in any salvage and in the subsurface testing processes.
54. All cultural material recovered from the salvage surface collection and/or the subsurface testing is to be held in temporary care at the relevant NPWS or NGH office for analysis until it can be returned to site to be buried in accordance with Requirement 26 of the *Code of Practice for Archaeological Investigations of Aboriginal Objects in New South Wales*, and in an appropriate location within the study area that will not be subject to ground disturbance. The burial location of the cultural material recovered during the salvage and subsurface testing is to be submitted to the AHIMS database.
55. An Aboriginal Site Impact Recording Form must be completed and submitted to AHIMS following the salvage process.
56. In the event that human remains are discovered, all work must cease in the immediate vicinity and NSW Police and Heritage NSW (where it is possible that the remains are Aboriginal Ancestral Remains) must immediately be notified. Further assessment is to be undertaken to determine if the remains are Aboriginal or non-Aboriginal. If the remains are found to be Aboriginal in origin, then Heritage NSW will provide advice on the Aboriginal community representative that are to be advised of the find. No works are to continue at the location until directed to so in writing by Heritage NSW.
57. An Aboriginal Heritage Management Plan is to be prepared for the Aboriginal cultural heritage along the track and must include Murramarang National Park and Murramarang Aboriginal Area. The Plan is to be developed in consultation with the Aboriginal community and will include protocols for consulting with the RAPs on the future management of the track and managing unexpected finds for unearthing unexpected significant stratified midden cultural deposits and burials during the construction and operation of the proposed activity.

7.4. Objectives of the proposed activity

The aim of the proposed activity is to create a new multi-day walking experience. It is intended that the walk will become a signature walk in NSW. The objectives of the walk are to increase walker targeted tourism to the coastal villages it connects and become a key regional walking attraction which promotes enjoyment and use of national parks, appreciation of the natural and cultural heritage of the region, and conservation. The proposed activity is expected to benefit the local villages as well as the regional economy by bringing an increased number of visitors, particularly during the off-peak tourism season i.e. outside of summer. Although the project is for a multi-day walk, it is expected that some visitors may wish to only complete sections and spend time and their tourism dollars in the local villages or larger centres of Batemans Bay and Ulladulla. It is anticipated that the proposed walk, and hence the proposed activity, will assist with the growth and sustainability of local tourism related business such as tour operators and transport logistics, accommodation and hospitality providers. The proposed activity also aims to rationalise visitor use and improve the scenic amenity of the NPWS sections at Maloneys Beach.

With a formal walking experience along the spectacular Murramarang coastline the proposed activity will offer visitors a recreational opportunity not provided elsewhere in the region. Interpretation is to be provided to enhance the visitor experience, particularly interpretation that promotes an immersive and positive engagement

with the local Aboriginal cultural heritage, such as provision of Aboriginal guided experiences, which would also provide social and economic benefits to the local community.

8. Reasons for the activity and consideration of alternatives

The proposed activity will:

- increase the number and type of visitors to Murramarang National Park, Murramarang Aboriginal Area and the region and therefore increase the enjoyment and appreciation of national parks consistent with the objectives of the NPW Act
- provide for a range of formal walking opportunities in the reserves and region, from short walks to a multi-day walk
- increase the number of visitors to the coastal villages of the region resulting in increased social and economic benefits from the public reserves
- increase the opportunities for local accommodation and tourism operators, including Aboriginal owned businesses
- improve the condition of a number of existing tracks ensuring less negative impact on the natural and cultural heritage of the reserves
- rationalise and formalise unofficial tracks that already exist which are both an environmental risk and a public safety risk as many of them lead to exposed and fragile headlands
- rationalise visitor use and improve the scenic amenity of the NPWS sections at Maloneys Beach
- provide for a low-cost maintenance and whole of life program for the track system with limited infrastructure to maintain and replace over time
- ensure that walking tracks along the coastal sections of Murramarang National Park and Murramarang Aboriginal Area meet Australian Standard (AS) 2156 on walking track classes by using AWTGS
- increase the interpretation available to visitors to the reserves through improved and additional interpretive material and opportunities
- be consistent with the Plan of Management

Alternatives of the proposed activity and the reasons why they are not feasible are:

- “do nothing”. This alternative would result in increased erosion of the existing tracks leading to visitor safety issues and visitor dissatisfaction with tracks needing to be closed, resulting in less recreational opportunities available. This option is inconsistent with the Park’s Plan of Management.
- Improve the existing official walking tracks to meet AS 2156. This alternative would improve visitor experience for those visitors wishing to do short walks in the region. However, this option does not address the existence of extensive unofficial tracks, and environmental and public safety risks associated with them, and the cultural sensitivities of some areas. It also does not provide for a range of walking opportunities in the reserves, or the region. This option only partially meets the requirements of the Park’s Plan of Management.
- Close numerous existing tracks because of erosion issues. This alternative would reduce the recreational opportunities for visitors to the public reserves and to the region. It would be less expensive than the preferred option, however it is not consistent with the Park’s Plan of Management.

- Extend the proposal to Batemans Bay. Budgetary constraints do not allow for the extension of the proposed activity, particularly with the requirement to cross Cullendulla Creek in Cullendulla Creek Nature Reserve.
- Upgrade the proposed activity to provide for mountain bikes and kayaks. This alternative is not consistent with the Park's Plan of Management. Under the Plan, facilities provided within natural areas are limited to walking tracks, visitor information and, if necessary, basic toilet facilities.

9. Description of the existing environment

9.1. Subject site, study area and locality

The 'subject site' is the area to be directly affected by the proposed activity (Department of Environment and Conservation 2004; Office of Environment and Heritage 2018). The subject site is within Murramarang National Park and Murramarang Aboriginal Area. Some areas of the subject site are also within the Batemans Marine Park. For this assessment, the subject site is as follows:

- **Trail alignment components:** The trail components of the proposed activity include sections of existing trail, new linking trail sections, upgraded trail sections, beach and rock platform sections and redundant trail sections.
 - **New linking trail sections and upgraded trail sections:** These components of the subject site take into account the 600 – 1200 mm width of the proposed trail corridor. This trail alignment component of the subject site equates to approximately 1.90 ha.
 - **Beaches and rock platform sections:** The proposed and existing trail alignment across the beaches and rock platforms. It is proposed that visitors walk along the intertidal areas to avoid threatened shorebird nesting habitat on the higher areas. As the width of the intertidal area is not consistent along the coastline, and no spatial layers depicting the intertidal area are available, the subject site for these sections is the same width as the study area (see below, i.e. 21.2 m). The subject site for this trail alignment component amounts to approximately 21.90 ha. These areas do not require any vegetation modification or clearing, or earthworks. However, they are included in this assessment as some sections are known threatened shorebird foraging habitat and/or they are adjacent to known threatened shorebird nesting habitat, and, with formalisation and promotion of the walk, will be subject to increased visitor use.
 - **Redundant trail sections:** The redundant trail sections are to be rehabilitated as part of the project over the long-term. The subject site for redundant trail is approximately 0.70 ha.
 - **Existing trail sections:** The existing trail sections that will be maintained as part of the Murramarang South Coast Walk. These components of the subject site take into account the 600 – 1200 mm width of the proposed trail corridor. This trail alignment component of the subject site equates to approximately 1.11 ha.
- **Precinct components:** The areas requiring works at Maloneys Beach; Yellow Rock; Oaky Beach Camping Area; and Pretty Beach. The proposed precincts are already disturbed, have existing infrastructure and are subject to existing visitor use. However, they are included in this assessment as they will require works such as modification or clearing of ground cover and/or understory vegetation and/or minor earthworks. The subject site for the precincts is less than 0.05 ha.

The total subject site is approximately 23.87 ha.

The 'study area' is the subject site with additional areas that are likely to be affected by the proposed activity, directly and indirectly (DEC 2004; OEH 2018). For this assessment, the study area includes the subject site as described above, the proposed remainder of the precinct areas which total approximately 4.2 ha, and, on advice from the NPWS, 10 metres either side of the off beach/rock platform trail components of the subject site. The total study area for the assessment is approximately 91.83 ha. To assist with defining the track alignment, matters of conservation significance in the immediate surrounds of the study area, i.e. a few metres away, were included in the assessment.

The 'locality' is defined in this assessment as the area of land within a 10 km radius of the subject site.

The assessment also considers the context of the study area in relation to the bioregion. The bioregional approach provides a useful way of understanding and interpreting the biodiversity of an area. Under the Interim Biogeographic Regionalisation of Australia (IBRA), the study area is situated in the Jervis subregion of the Sydney Basin Bioregion and the Bateman subregion of the South East Corner Bioregion.

9.2. Determining the existing environment

9.2.1. Methods

Determining the existing environment of the study area involved the following methods:

- reviewing relevant literature
- searching government databases for listed natural and cultural heritage matters of conservation significance
- reviewing mapping of vegetation, geology, soils and watercourses
- understanding ecology and distribution of species within the bioregion
- seeking advice from the NPWS
- seeking advice from local Aboriginal people
- conducting field surveys and analysing survey results
- evaluating the character of the study area
- evaluating the likelihood of matters of conservation significance to occur

9.2.2. Database searches, and literature and mapping review

Database searches

Searches of the following databases relating to matters of conservation significance were conducted:

- the NSW Office of Environment and Heritage (OEH) BioNet Atlas for species and populations listed as threatened under the NSW *Biodiversity Conservation Act 2016* (BC Act) recorded for Murramarang National Park and Murramarang Aboriginal Area (<http://www.bionet.nsw.gov.au>) (last accessed 1 February 2021)
- the NSW OEH BioNet Atlas for ecological communities listed as threatened under the BC Act recorded for Murramarang National Park and Murramarang Aboriginal Area (<http://www.bionet.nsw.gov.au>) (last accessed 1 February 2021)
- the Australian Government Protected Matters Search Tool (PMST) for matters of national environmental significance and other matters protected by the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) known or likely to occur within a 10 km radius of the subject site (<http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf>) (last accessed 1 February 2021)

- the Atlas of Living Australia for records of flora and fauna for the locality (<http://www.ala.org.au/>) (last accessed 4 February 2021)
- the Aboriginal Heritage Information Management System (AHIMS) was carried out as part of the Aboriginal cultural heritage assessments (see Feary and Niemoeller 2020 and NGH 2021)
- Australian Heritage Database for places on the World Heritage List, National Heritage List, Commonwealth Heritage list and Register of the National Estate (RNE). (<http://www.environment.gov.au/heritage/publications/australian-heritage-database>) (last accessed 10 March 2021)
- State Heritage Inventory for declared Aboriginal Places, heritage items on the State Heritage Register and State Agency Heritage Registers, and heritage items of local significance on Eurobodalla and Shoalhaven Local Environmental Plans (<http://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx>) (last accessed 10 March 2021)
- NSW Historic Heritage Information Management System (HHIMS) for NPWS/OEH owned heritage including those listed under s. 170 of the Heritage Act. (<https://www.environment.nsw.gov.au/licences/HistoricHeritageInformationManagementSystem.htm>) (last accessed 10 March 2021)
- NSW Maritime Heritage Database for shipwrecks, aircraft and maritime heritage sites (<https://www.environment.nsw.gov.au/maritimeheritageapp/WebsiteSearch.aspx>) (last accessed 10 March 2021)

Copies of the database search reports from the BioNet Atlas and the PMST are at Appendix E, F, G, H and I.

Literature review

A review of relevant literature was undertaken prior to the field surveys. Key literature reviewed included:

- NSW National Parks and Wildlife Service (1998). *Murramarang Aboriginal Area Plan of Management*. The Plan of Management provides a broad description of the flora and fauna values of Murramarang Aboriginal Area.
- Nicholas Graham Higgs Pty Ltd (2002). *Murramarang National Park, Brush, Belowla and Tollgate Islands Nature Reserves Vegetation Survey and Mapping*. A report to the NSW NPWS. This report details the surveying and re-mapping of vegetation communities within the national park and surrounding NPWS estate area. It includes maps detailing the vegetation communities of the park. The community types are broadly consistent with those used for the Southern Comprehensive Regional Assessment surveys undertaken in 1999. The report lists Priority Forest Ecosystems for conservation purposes. A hard copy of the report was provided.
- NSW National Parks and Wildlife Service (2002a). *Murramarang National Park, Brush Island Nature Reserve, Belowla Island Nature Reserve and Tollgate Islands Nature Reserve Plan of Management*. The Plan of Management provides a broad description of the flora and fauna values of Murramarang National Park.
- NSW National Parks and Wildlife Service (2002b). *Review of Environmental Factors – Coastal walking track works Murramarang National Park, Murramarang Aboriginal Area, Meroo National Park, Barnunj State Recreation Area*. The REF was prepared for the construction of most of the existing tracks. It includes database search results and the eight-part test (now five-part test) for threatened species listed under NSW legislation.
- Van der Ree (2002). *Review of information to guide the management of the Squirrel Glider *Petaurus norfolcensis* population in Murramarang National Park*. A report to the NSW NPWS. This report reviews

the research and survey efforts in relation to the threatened Squirrel Glider and recommends research and monitoring actions to inform and improve management to minimise adverse impacts on the habitat of the species.

- Literature cited in the Aboriginal Cultural Heritage Assessment reports

Mapping review

Numerous maps were reviewed to help develop an understanding of the flora and fauna values of the study area. Maps were reviewed prior to the field surveys, and if available in digital form, were loaded onto the mobile collection app, Collector for ArcGIS, to enable reference and verification in the field.

The following maps were reviewed:

- Google Earth Engine Burnt Area Map (GEEBAM)
- Southeast NSW Native Vegetation Classification and Mapping (SCIVI)
- SEED (The Central Resource for Sharing and Enabling Environmental Data in NSW) Vegetation and EEC Maps
- Verified vegetation maps in Nicholas Graham Higgs Pty Ltd (2002)
- NSW State Environmental Planning Policy (Coastal Management) *Coastal wetlands and littoral rainforest map* (Department of Planning and Environment 2018)
- NSW Resources and Geosciences Ulladulla 1:250 000 Geological Map (Rose 1966)
- Shoalhaven 1: 100 000 and 1: 25 000 Coastal Quaternary Geology Map (Troedson and Hashimoto 2013a)
- Eurobodalla 1:100 000 and 1:25 000 Coastal Quaternary Geology Map (Troedson and Hashimoto 2013b)
- Soil profile mapping under eSPADE (OEH 2019)
- Acid sulfate soils risk mapping (OEH 1998)
- Water Management (General) Regulation 2018 Hydroline spatial data 1.0 for stream orders (Department of Primary Industries 2018)
- Eurobodalla Shire Council's LEP online maps
- Shoalhaven City Council's LEP 2014 online maps
- Coastal Risk Australia 2100 mapping (NGIS 2017)
- NSW Maritime Heritage mapping
- Batemans Marine Park Zoning Map

9.2.3. Ecological field surveys

9.2.3.1. Survey schedule and objectives

The schedule and objectives of field surveys were as outlined below in Table 14. Consultant ecologists Heather Moorcroft (hjm consulting) and Dave Coombes (Eco Logical Australia) were accompanied on the field surveys in 2020 by the NPWS Senior Project Officer Tom Pinzone, and Biodiversity and Conservation staff Angela Jenkins and Nat O'Rourke of the NSW Department of Planning, Industry and Environment. The effort indicated in the table below is limited to the consultant ecologists' hours.

Table 14: Survey schedule and objectives

Murramarang South Coast Walk (NPWS Estate) Final alignment - Review of Environmental Factors

Survey type	Objectives	Area surveyed	Dates	Weather conditions *	Effort (person hours)
General diurnal survey	Identify and record: <ul style="list-style-type: none"> • threatened flora species • threatened fauna species • threatened species habitat Validate existing vegetation mapping including threatened ecological community mapping Assess habitat refugia for post-fire recovery	Maloneys Beach to North Head	15/11/2018	Min: 15.2°C Max: 17.9°C Rain: 4.8 mm Rain total for preceding 2 weeks: 35.6 mm	15
		North Head to Richmond Beach	16/11/2018	Min: 13.4°C Max: 19.4°C Rain: 0 mm Rain total for preceding 2 weeks: 40.4 mm	15
		Richmond Beach to Pebbly Beach	06/12/2018	Min: 14.4°C Max: 22.2°C Rain: 0 mm Rain total for preceding 2 weeks: 91.4 mm	15
		Pebbly Beach to Merry Beach/Pretty Beach	07/12/2018	Min: 16.9°C Max: 24.3°C Rain: 0 mm Rain total for preceding 2 weeks: 91.2 mm	15
		Murramarang Aboriginal Area	13/02/2019	Min: 15.7°C Max: 21.9°C Rain: 0 mm Rain total for preceding 2 weeks: 10.8 mm	3
		Maloneys Beach to North Head	3/12/2020	Min: 15.3°C Max: 21.3°C Rain: 0 mm Rain total for preceding 2 weeks: 9.4 mm	12
		Honeysuckle Beach area, and Oaky Beach area including Oaky Beach Camping Area	4/12/2020	Min: 15.8°C Max: 33.4°C Rain: 0 mm Rain total for preceding 2 weeks: 9.4 mm	12
		Pretty Beach to Pebbly Beach; and Point Upright (Depot Beach	7/12/2020	Min: 14.1°C Max: 26.9°C Rain: 0 mm Rain: total for preceding 2 weeks:	10

		Headland)		9.0 mm	
		Myrtle Beach to Murramarang Resort	8/12/2020	Min: 12.2°C Max: 19.8°C Rain: 0.2 mm Rain total for preceding 2 weeks: 2.2 mm	3
Targeted/ seasonal orchid surveys	Identify suitable habitat, survey and record threatened orchid <i>Cryptostylis hunteriana</i> that is known to occur in the locality (and other threatened orchids that may occur in the locality)	Point Upright/Depot Headland	17/01/2019	Min: 21.7°C Max: 27.4°C Rain: 0 mm Rain total for preceding 2 weeks: 17.8 mm	4
		Headland north of Pebbly Beach towards Pebbly Beach North	17/01/2019	Min: 21.7°C Max: 27.4°C Rain: 0 mm Rain total for preceding 2 weeks: 17.8 mm	2

9.2.3.2. Flora and plant community surveys

General diurnal flora and plant community surveys were completed within the study area using a combination of the parallel field traverse survey technique (see Department of Planning, Industry and Environment 2020) and the random meander survey (Cropper 1993). The surveys followed the alignments, as advised and ground truthed by NPWS, and extended out approximately 10 m either side. The survey was to record any threatened species, identify threatened species habitat, verify vegetation communities and identify plant community boundaries. Flora samples were collected to accurately identify species against reference sources where required.

Vegetation communities in the study area were cross-referenced to vegetation mapping. Discrepancies with the vegetation mapping, particularly in relation to the presence or absence, and boundaries, of Threatened Ecological Communities (TECs) under the BC Act and the EPBC Act, were checked against verified vegetation maps (Nicholas Graham Higgs Pty Ltd 2002), the SEPP Coastal Management: Coastal wetlands and littoral rainforest map (Department of Planning and Environment 2018) and the Southeast NSW Native Vegetation Classification and Mapping - SCIVI VIS_ID 2230 20030101S (Department of Environment, Climate Change and Water 2010c), based on Tozer *et al.* (2010).

During the 2018/2019 general diurnal flora and plant community surveys, numerous non-threatened orchid species *Cryptostylis subulata* (Large Tongue Orchid) and/or *C. erecta* (Tartan Tongue Orchid) were observed in three locations within the study area. The cryptic threatened species *C. hunteriana* (Leafless Tongue Orchid) is often associated with these species (OEH 2017c), and, taking the dominant plant community type into account, two of the three locations within the study area were identified as having suitable habitat for the Leafless Tongue Orchid: Depot Headland north from Point Upright, and the headland immediately north of Pebbly Beach. Additional targeted surveys were carried out for the Leafless Tongue Orchid at these two locations when the species was known to be in flower at nearby reference sites within the southern Shoalhaven LGA (Meroo National Park and Sussex Inlet). The targeted orchid surveys combined parallel field traverses with random meanders.

The Large Tongue Orchid and/or Tartan Tongue Orchid were observed during the 2020 general diurnal flora and plant community surveys. As these surveys coincided with known flowering of the cryptic threatened Leafless Tongue Orchid in the region, additional targeted surveys were not carried out in these areas.

9.2.3.3. Fauna and habitat surveys

Diurnal fauna surveys were conducted of the study area in association with the flora and plant community surveys. As the type and condition of habitat in an area influences the diversity and abundance of fauna (DEC 2004), the diurnal fauna surveys also included a habitat search. The study area was traversed to identify habitat components, particularly for breeding, sheltering and foraging resources. These components were recorded and described and included information on the type of vegetation present and the presence and/or absence of tree hollows, streams, foraging substrates, rocky outcrops, beach and rock platform environments and other features likely to attract threatened fauna. Characteristic signs supporting the presence of threatened fauna such as feeding signs, nests, dens, scats, cough pellets, whitewash and diggings were also sought during the survey. The results of the habitat search were incorporated in the evaluation of likelihood occurrence to help predict whether threatened fauna is likely to occur or have potential to occur in the study area.

9.2.4. Likelihood of occurrence

Using data obtained from the methods above, an evaluation on the likelihood of ecological matters of conservation significance occurring in the study area was carried out. The evaluation was based on:

- identification of species, habitat and vegetation communities during field surveys
- records of threatened entities for the locality and/or study area identified from database searches
- advice from NPWS staff
- bioregional particulars for species including distribution
- preferred habitat and ecology of species and communities
- geological mapping for plant community verification

The following five categories for the likelihood of occurrence evaluation are used in this report:

- ‘yes’ = the matter of conservation significance was or has been observed in the study area or immediate surrounds
- ‘likely’ = there is a medium to high probability that the matter of conservation significance uses or occurs in the study area or immediate surrounds
- ‘potential’ = suitable habitat/plant community type for the matter of conservation significance occurs in the study area, but there is insufficient information to categorise the matter of conservation significance as likely or unlikely to occur
- ‘unlikely’ = there is a low to very low probability that the matter of conservation significance uses or occurs in the study area or immediate surrounds
- ‘no’ = the habitat/environment within the study area or immediate surrounds is unsuitable for the matter of conservation significance

Likelihood of occurrence for threatened species and threatened ecological communities are at Appendix J and Appendix K. Those matters of conservation significance that are known, likely or have potential to occur within the study area are subject to statutory impact assessments as required under relevant legislation, both NSW and Commonwealth. The precautionary principle was applied to determine if a matter of conservation significance

occurred in the study area. Therefore, even if the potential for a matter of conservation significance was low then it was included in the assessment.

9.2.5. Limitations

9.2.5.1. Spatial data inconsistencies

Multiple spatial data sets have been used for this assessment. The spatial data for the proposed activity was provided by the NPWS. The trail alignment does not always exactly match with existing aerial photography. Spatial data for the plant community types, mapped threatened ecological communities (TECs) and threatened species are from public domains such as NSW Government's central resource for Sharing and Enabling Environmental Data (SEED). The mapping of these layers does not always align with on-ground occurrences i.e. patches of a threatened ecological community or a record for threatened terrestrial fauna record are mapped immediately off-shore. The spatial data for the Currowan Fire Footprint has been sourced from the NPWS fire history layer. The data was originally captured by the Rural Fire Service during the 2019/2020 bushfire season and has been given an accuracy rating of *Fair* by NPWS.

It should also be noted that search results and existing records do not necessarily provide an accurate picture of the existing environment and what may currently exist within an area. Data provided reflects only where surveys have been conducted and items have been found and entered onto a database. Also, databases do not always include updated information on specific records.

9.2.5.2. Field surveys

The results of flora and fauna surveys can be optimised by conducting investigations using multiple methods over the longest practicable period. This approach is more likely to compensate for the effect of unfavourable weather, seasonal changes, and climatic variation than surveys over a shorter period. In general, the longer the survey period the more species will be detected. However, due to time constraints and the scope of the project, the presence of fauna species, particularly threatened fauna species known or likely to occur, has been assumed where suitable habitats or resource features occur within the study area. Adoption of the precautionary approach in context of the survey effort and methods applied is considered adequate to gather the data necessary to assess the impacts of the proposed activity on the flora and fauna found in the study area.

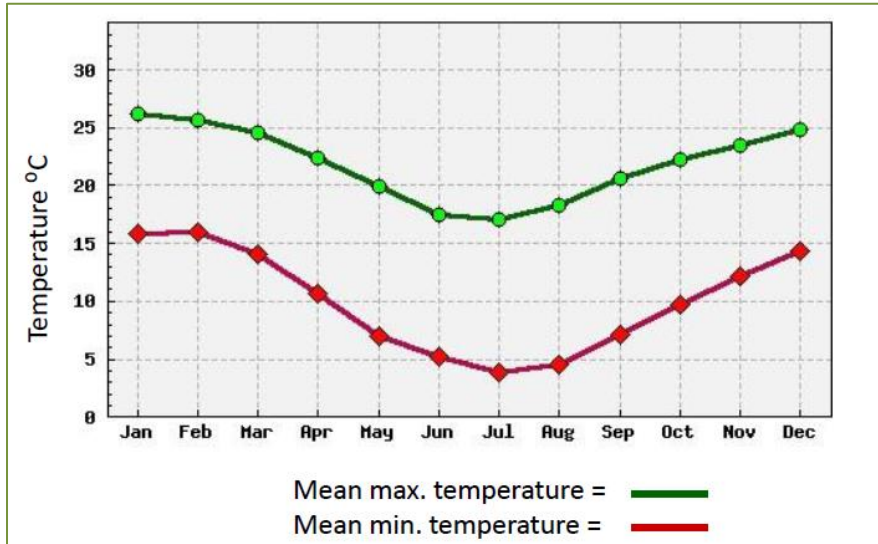
9.2.5.3. Plant community determination

The precautionary approach was also adopted for determining plant community types and TEC occurrence. Determining where one community finishes and another community starts can be complex. Existing mapping of plant communities was not at a scale appropriate to help with this determination, and on occasion the mapping was found to be inaccurate with mapped communities not consistent with communities observed during the field surveys. Despite this, the most accurate digital mapping available was the Shoalhaven and Eurobodalla BioMetric Vegetation Mapping (OEH 2013), and it is this mapping that is used in the assessment. Detailed floristic surveys including condition assessment and soil sampling were not conducted for this assessment.

9.3. Meteorological data

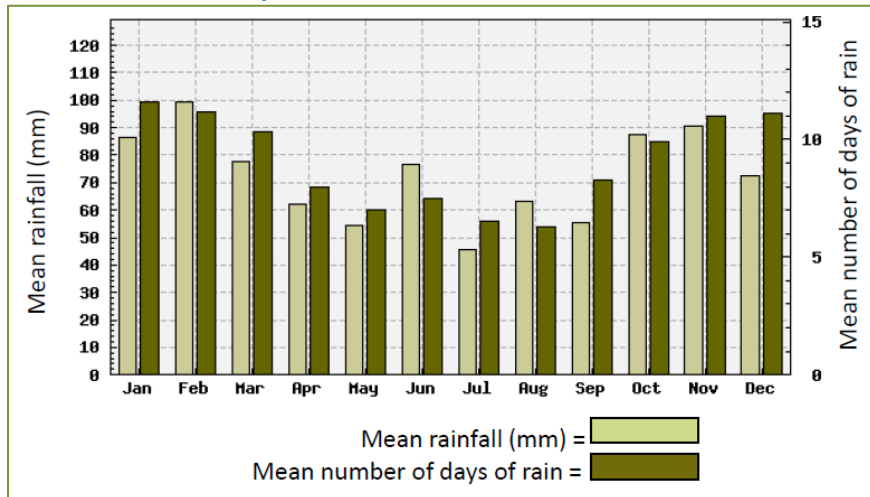
The nearest meteorological data for the study area is from Batemans Bay. Batemans Bay has a temperate climate with a mean maximum temperature of 21.9°C and a mean minimum 10°C (see Figure 33). The mean annual rainfall is 912 mm, falling throughout the year (see Figure 34).

Figure 33: Average temperatures for Batemans Bay



Source: Bureau of Meteorology (2021)

Figure 34: Average rainfall for Batemans Bay



Source: Bureau of Meteorology (2021)

9.4. Topography

The study area falls from a maximum height of approximately 40 m ASL to sea level, with most of the study area being less than 15 m ASL. The study area is predominantly undulating, rising over headlands and falling to beaches, and includes crossing a number of small ephemeral drainage lines. There are a number of steeper sections, namely near the commencement of the proposed walk adjacent to Maloneys Beach and at Point Upright near Depot Beach, where the proposed walking track climbs the headland directly from Durras Beach.

9.5. Surrounding land and sea use

The surrounding land use of the study area is primarily lands reserved under the NPW Act as national park and Aboriginal area. The lands reserved under the NPW Act are heavily vegetated, with park infrastructure, such as picnic areas, toilets and camping areas. Parts of the study area are also part of Batemans Marine Park.

Adjacent to the proposed track head precinct at Maloneys Beach are Crown lands zoned *RE1 Public recreation* and *E2 Environmental conservation* under Eurobodalla LEP. These are managed by Eurobodalla Shire Council as public reserves. Near the proposed track head are residential lands in the suburb of Maloneys Beach. Lands in the northern part of the proposed walk are zoned under the Shoalhaven LEP. In the vicinity of Merry Beach headland are Crown lands zoned *RE1 Public recreation* with lands further north towards the Murramarang Aboriginal Area zoned as *E3 Environmental management*, and *RE1 Public recreation* on the walking track alignment to Bawley Point. These areas are managed by Shoalhaven City Council as public reserves.

9.6. Geology/geomorphology

The geology of the study area includes two major formations: the younger Permian Sydney Basin and the older Ordovician beds of the Lachlan Fold Belt. The geology in the southern part of the study area, between Maloneys Beach and Dark Point, is composed of Cambrian age Wagonga beds of chert, conglomerate, agglomerate, slate, sandstone and phillite of the early Ordovician period. In the central part of the study area, from Merry Beach to Dark Point, the geology consists of Permian sedimentary beds of siltstone, sandstone and conglomerates of the Conjola Formation in the Shoalhaven Group. A third geological formation, the Termeil Essexite from the Mesozoic period, is at the northern part of the study area at Murramarang Aboriginal Area. The three major geological formations are mapped for the study area (see Map 8). The geology of Durras Mountain is basalt.

The geology of Murramarang National Park is considered scientifically important (NPWS 2002a). It is scientifically important because of the evidence of a transition from a glacial to a non-glacial period, and the unconformity between the rocks of the Permian sedimentary beds of the Sydney Basin and the older Ordovician Wagonga beds. There are also: sedimentary breccias; fossil logs; ironstone boxwork; shell fossils including a type locality; and examples of differential erosion in a varied assemblage of geological structures. The Myrtle Beach – Wasp Head geological formations contain many of these important geological features, and are recognised, and protected, under the Eurobodalla LEP as a heritage item (refer to Section 9.23).

9.7. Soil types and properties

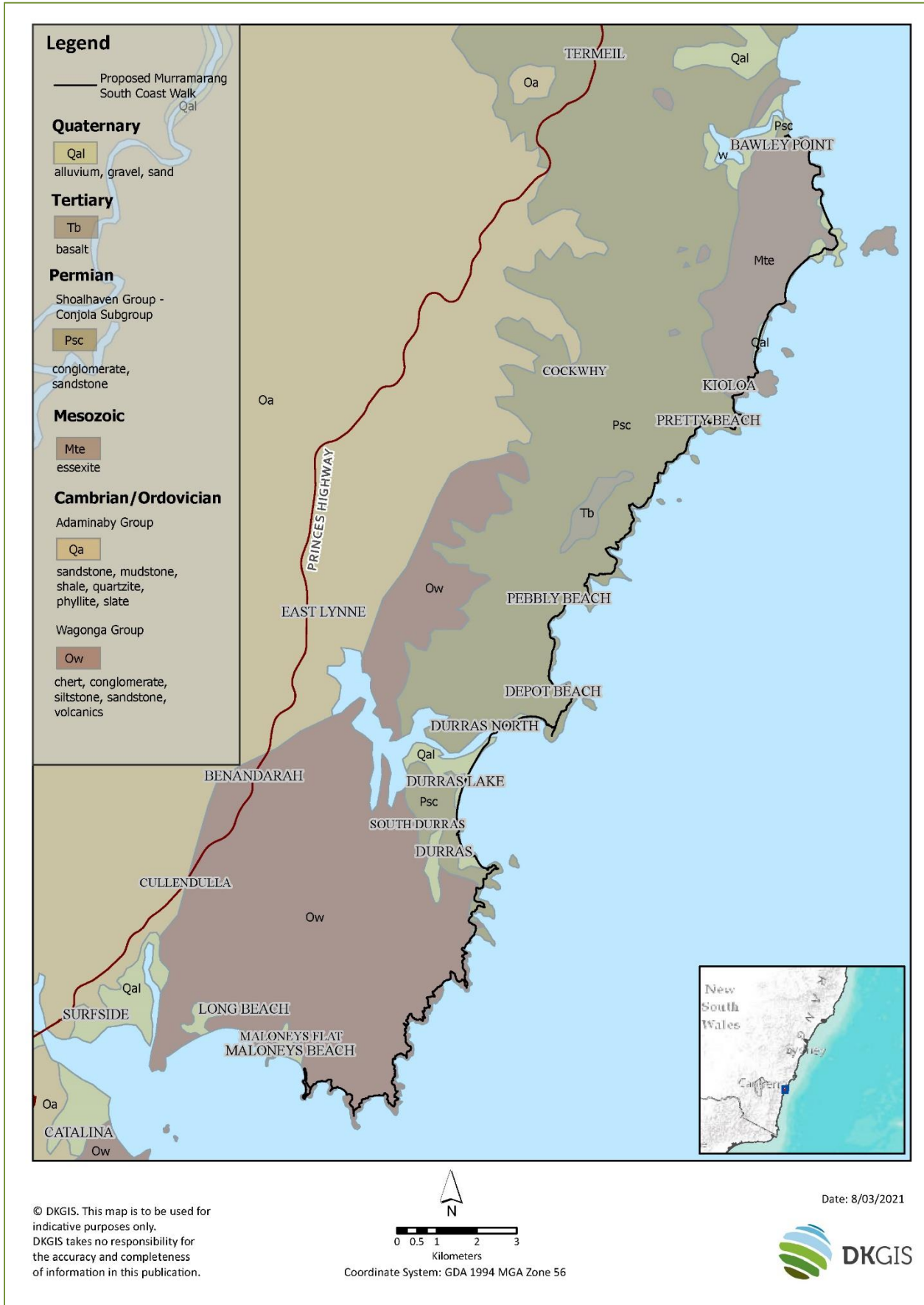
The major soil groups of the study area are derived from the Ordovician and Permian sediments. The main soil groups of the study area are Grey Brown and Yellow Podzols, Brown Earth and Siliceous Sand. Quaternary soils are mapped for the beaches and other low-lying areas in the locality. These soils can also be found on some headlands. The soil groups are shown in Map 9. The soils in the study area are generally well drained. In parts of the study area, particularly on exposed headlands, the soils are skeletal with the bed rock exposed. There are also areas of erosion, particularly associated with old and existing tracks.

9.8. Waterways including wild and scenic rivers

The Clyde River Estuary is immediately adjacent to the study area near the commencement of the proposed walk at Maloneys Beach. There are no Wild Rivers, as declared under the *National Parks and Wildlife Act 1974*.

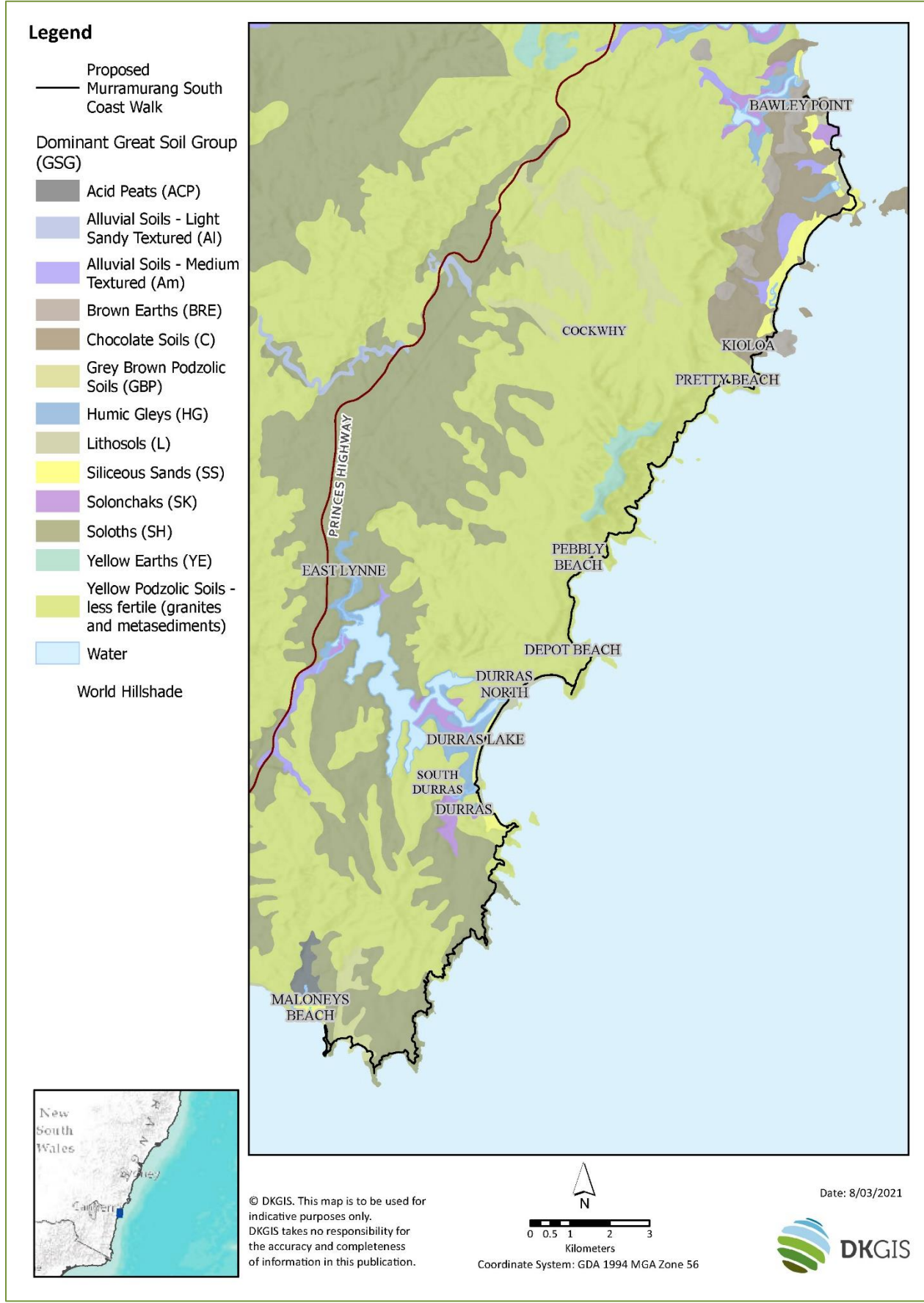
Numerous small watercourses traverse the study area. Field observations suggest that the majority of these are intermittent or ephemeral; most of them were dry during the field surveys and would probably only flow during significant rainfall events or, if close to the tidal influence, on very high tides. The riparian corridors of these small watercourses may perform a range of important environmental functions such as providing habitat diversity for terrestrial, riparian and aquatic flora and fauna and connecting fauna habitats. Protecting riparian corridors assists in maintaining the ecological function of a watercourse or aquatic environment.

Map 8: Geology of the study area



© DKGIS. This map is to be used for indicative purposes only. DKGIS takes no responsibility for the accuracy and completeness of information in this publication.

Map 9: Soils of the study area



The Clyde River Estuary and these small watercourses are 'rivers' under the WM Act and the adjoining areas are waterfront land. Waterfront land includes the bed and bank of any river, lake or estuary and all land within 40 metres of the highest bank of the river, lake or estuary (Department of Industry 2018). The width of the riparian corridor buffering waterfront land, including the watercourse channel (bed and banks), and the vegetated riparian zone is pre-determined according to the watercourse order under the Strahler System. The relevant 1:25,000 topographic map confirms that the small watercourses include 1st and 2nd order streams. Under the WM Act, the riparian corridors for these are streams are 10 m, 20 m and 30 m respectively, either side of the channel plus the channel width.

9.9. Catchment values

At a regional level, the proposed activity is within the South East Local Land Service Region. Under the South East Local Strategic Plan 2016-2021 the study area is within the major river catchment of the Clyde River. The southern sections of the study area are located immediately adjacent to the Clyde River Estuary. There are also catchment values associated with the numerous small watercourses that traverse the study area.

9.10. Coastal risk areas

The study area for the proposed activity is within the coastal zone. The majority of the proposed activity is immediately adjacent to or along the coastline. The study area includes areas influenced by coastal processes such as: tidal influences; wave action; salt spray; and wind shear.

The study area is also subject to coastal risk by sea level rise and storm surge. Coastal Risk Australia mapping shows that the predicted highest tide in 2100 will result in increased inundation within the study area along the rock platforms and in low lying areas such as in the small watercourses and drainage lines.

The proposed activity is subject to the Coastal Management SEPP 2018. The *Coastal vulnerability mapping* under the Coastal Management SEPP 2018 is not yet available.

9.11. Ecological communities

A report generated from the NSW OEH BioNet Atlas returned eleven TECs listed under the BC Act for Murramarang National Park (see Appendix E). A report generated from the NSW OEH BioNet Atlas returned ten TECs listed under the BC Act for Murramarang Aboriginal Area (see Appendix F). A report generated from the Australian Government's Protected Matters Search Tool for matters of national environmental significance and other matters protected by the EPBC Act returned a total of seven TECs that are likely to occur in the locality (see Appendix I).

The likelihood of occurrence evaluation of ecological communities of conservation significance (see Appendix K) identified four TECs as potentially occurring within, or associated with, the study area. The occurrence of these communities within the study area cannot be verified without further investigation of condition assessment and soil sampling. However, for the purposes of this assessment they are mapped as potentially occurring.

9.11.1.1. Bangalay Sand Forest of the Sydney Basin and South East Corner Bioregions (NSW TEC)

This TEC potentially occurs in numerous sections of the study area. The environment where it potentially occurs suggests that it prefers undulating slopes, often very close to the coastline. Potential occurrence in the study area was determined by the presence of Bangalay (*Eucalyptus botryoides*), Old-man Banksia (*Banksia serrata*) and Coast Banksia (*Banksia integrifolia* subsp. *integrifolia*). Blackbutt (*Eucalyptus pilularis*), which can be a

characteristic dominant canopy species of this community, was rarely observed within the study area during the field surveys. The existing BioMetric mapping did not accurately reflect the presence or absence of this community in some sections of the study area. However, all areas, except for one, shown as Bangalay Sand Forest of the Sydney Basin and South East Corner Bioregions TEC on existing BioMetric mapping have been considered as potentially occurring, despite the absence of characteristic canopy species. The one exception is the Maloneys Beach precinct which is mapped as this TEC. The native vegetation in the area that remains has no characteristic species of the TEC yet has characteristics of the Commonwealth's equivalent TEC to Swamp Oak Floodplain Forest TEC (see below). Following the field surveys additional areas of this community have been added as potentially occurring.

9.11.1.2. Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (NSW TEC)/Littoral Rainforest and Coastal Vine Thicket of eastern Australia (Commonwealth TEC)

This TEC potentially occurs in small patches within or adjacent to the study area. The patches mapped as potential Littoral Rainforest TEC are: east of Three Islet Point near Yellow Rock; Snake Bay; behind Oaky Beach; adjacent to Depot Beach; and adjacent to the Snapper Point Walking Track at Pretty Beach. Potential occurrence of the TEC was determined by landform, a closed forest canopy, the presence of key canopy species such as Lilly Pilly (*Syzygium smithii*) and Cabbage-tree Palm (*Livistona australis*) and Coachwood (*Ceratopetalum apetalum*), and existing mapping. The existing BioMetric mapping did not accurately reflect the presence or absence of this community. However, all areas on the existing BioMetric mapping shown as this TEC have been considered as potentially occurring. In addition, areas mapped as Littoral Rainforest under the SEPP Coastal Management (Department of Planning and Environment 2018) have been considered as potentially occurring.

9.11.1.3. Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (NSW TEC)/Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community (Commonwealth TEC)

This TEC potentially occurs in three locations in the study area in the Maloneys Beach vicinity. These potential occurrences are in low-lying areas close to or behind the beach. Potential occurrence was determined by existing BioMetric mapping, landform, soil mapping and the presence of *Casuarina glauca* (Swamp Oak) observed during field surveys. One is a stand in the middle of the Maloneys Beach precinct. Another is nearby on a narrow dune terrace east of the commencement of the trail along the shoreline (see Figure 35), with the terrain rising steeply behind the *C. glauca* stand. Neither of these areas are shown as Swamp Oak Floodplain Forest TEC on existing BioMetric mapping. While the vegetation is generally consistent with the TEC determination (NSW Scientific Committee 2011), the soils and landform do not appear to meet NSW criteria. However, the soils and landforms do appear to meet the EPBC Act criteria being a minor occurrence on a dune flat, and meeting the minimum patch size (Commonwealth Threatened Species Scientific Committee 2018). Therefore, in the absence of vegetation condition assessments, including soil sampling, this community is considered as potential Swamp Oak Floodplain Forest for this assessment. The next beach east also has a low-lying area of *C. glauca*. This area is shown as Swamp Oak Floodplain Forest on the BioMetric mapping and extends along drainage lines behind the beach. In the absence of vegetation condition assessments, including soil sampling, this community is also considered as potential Swamp Oak Floodplain Forest TEC for this assessment.

9.11.1.4. Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions (NSW TEC)

This TEC is identified in the BioMetric vegetation mapping as occurring in one location in the study area; near the southern end of Island Beach, above the rock platform. Field surveys could not verify this community as many

characteristic species were not observed. However, adopting the precautionary approach, this TEC is considered as potentially occurring.

9.12. Wetland communities

Clyde River Estuary, which is adjacent to the study area near the commencement of the proposed walk at Maloneys Beach, is a Nationally Important Wetland. The wetland is considered to be a representative example of estuarine wetland on the south coast. There are no Wetlands of International Importance in or near the study area.

SEPP 14 Wetlands is now covered by the SEPP Coastal Management 2018. An area behind the village of Maloneys Beach, an area inland from the village of South Durras and Lake Durras are mapped as a Coastal Wetland (and/or Proximity of Coastal Wetland). The Maloneys Beach and the South Durras Coastal Wetlands are inland from the study area. The Durras Lake Coastal Wetland is mapped as upstream of the lake opening, above the intertidal zone along the beach. There are no Coastal Wetlands mapped under SEPP Coastal Management 2018 in the study area.

9.13. Littoral rainforest or equivalent

SEPP 26 Littoral Rainforest is now covered by the SEPP Coastal Management 2018. There are two patches of Littoral Rainforest (and/or Proximity of Littoral Rainforest) mapped under SEPP Coastal Management 2018 in the study area. These areas are in the vicinity of Carriages Slip Bay and Snake Bay. There are also areas mapped as Littoral Rainforest adjacent to the study area at Durras Beach and Depot Beach and an area within the study area at Oaky Beach was mapped as Littoral Rainforest during the field survey. All these areas are included as potential TEC Littoral Rainforest for mapping purposes.

9.14. Flora

9.14.1. Vegetation and plant community types

The study area has been subject to logging activities in the past, and there are existing vehicle tracks and walking tracks, some of which are part of the proposed activity. Despite this history, the vegetation is predominantly intact. At a broad formation scale, the vegetation communities of the study area are made up of wet and dry forest, woodland, coastal scrub and littoral rainforest. These formations are relatively common across the locality, with forest communities dominant.

Plant community types observed within the study area regularly intergrade into one another, creating an ecotone between adjacent communities. Determining where one community finishes and another community starts proved complex, and the boundaries on existing community mapping were not consistent with boundaries in the field. Also, some communities that were observed in the field at particular locations were not shown as occurring in that location on the existing mapping.

Without detailed floristic surveys that include condition assessments and soil sampling, the presence and distribution of plant community types in the study area remains approximate. However, the mapping is adequate for the purposes required for this assessment in relation to threatened species and ecological communities. The plant community types and their estimated extent in the study area are shown in tables 15, 16 and 17.

Table 15: Plant community types for new and upgraded trail sections of the study area

Plant Community Type (PCT)	Approx. extent in study area (ha)
Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin Bioregion and South East Corner Bioregion	9.10
Bracelet Honey-myrtle - Coast Tea-tree tall shrubland on headlands, South East Corner Bioregion	5.65
Coast Banksia – Coast Tea-tree low moist forest on coastal sands and headlands, Sydney Basin Bioregion and South East Corner Bioregion	0.02
Coast Banksia - Coast Wattle dune scrub, Sydney Basin Bioregion and South East Corner Bioregion	0.61
Hairpin Banksia – Slender Tea-tree heath on coastal sandstone plateaux, Sydney Basin Bioregion	0.31
Lilly Pilly - Coachwood gully warm temperate rainforest on sandstone ranges of the Sydney Basin Bioregion	0.35
Mountain Grey Gum - Yellow Stringybark moist shrubby open forest in gullies of the coastal ranges, northern South East Corner Bioregion	0.21
Spotted Gum - Blackbutt shrubby open forest on the coastal foothills, southern Sydney Basin Bioregion and northern South East Corner Bioregion	4.16
Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills, northern South East Corner Bioregion	22.1
Swamp Paperbark – swamp Oak tall shrubland on estuarine flats, Sydney Basin Bioregion and South East Corner Bioregion	0.12

Note: Areas above rounded to the nearest hundredth of a hectare.

Table 16: Plant community types for the redundant trail sections of the study area

Plant Community Type (PCT)	Approx. extent in study area (ha)
Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin Bioregion and South East Corner Bioregion	1.58
Bracelet Honey-myrtle - Coast Tea-tree tall shrubland on headlands, South East Corner Bioregion	0.28
Coast Banksia - Coast Wattle dune scrub, Sydney Basin Bioregion and South East Corner Bioregion	0.03
Spotted Gum - Blackbutt shrubby open forest on the coastal foothills, southern Sydney Basin Bioregion and northern South East Corner Bioregion	1.97
Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills, northern South East Corner Bioregion	8.62

Note: Areas above rounded to the nearest hundredth of a hectare.

Table 17: Plant community types for precinct components of the study area

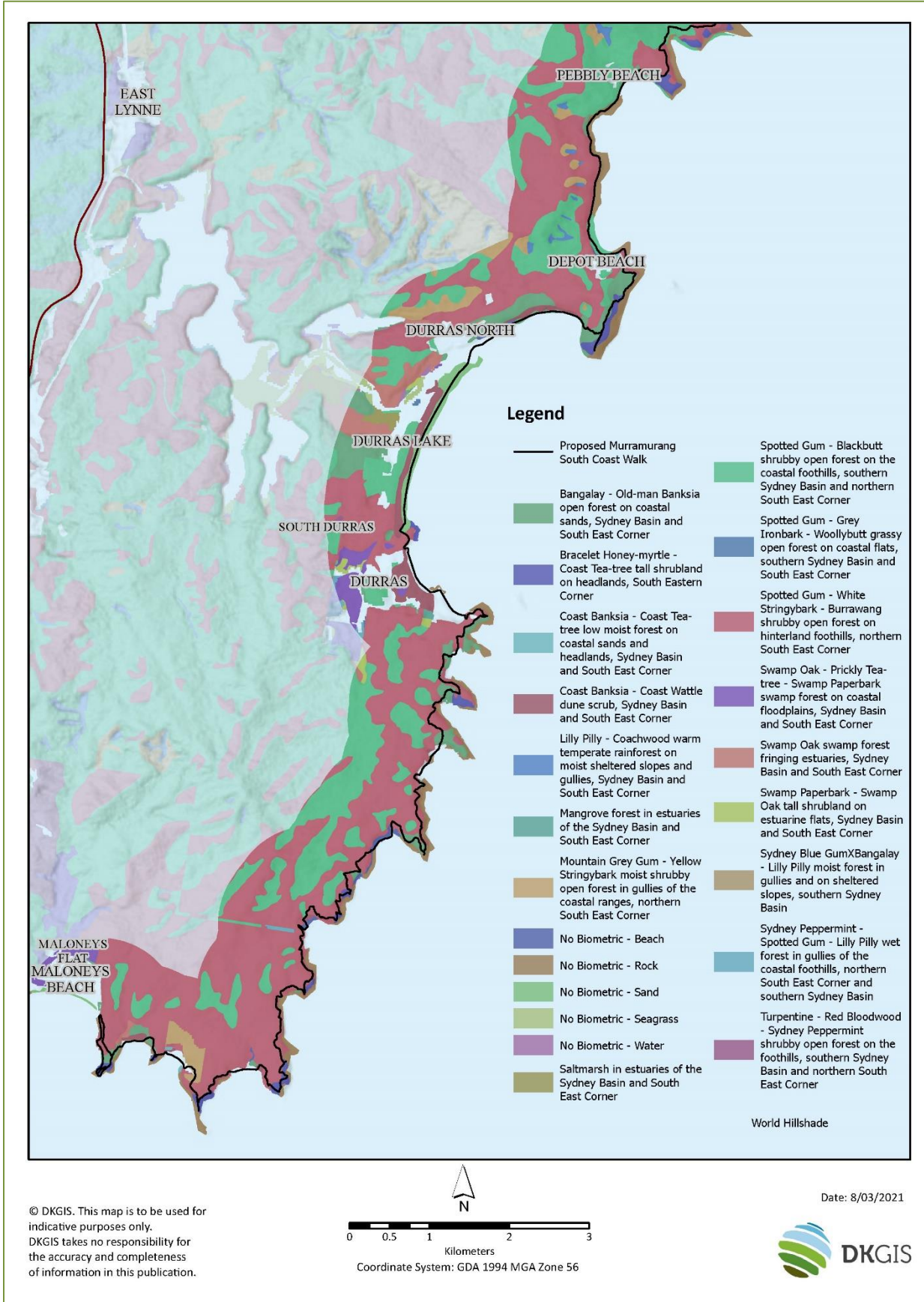
Plant Community Type (PCT)	Approx. extent in study area (ha)
Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin Bioregion and South East Corner Bioregion	0.33
Mountain Grey Gum - Yellow Stringybark moist shrubby open forest in gullies of the coastal ranges, northern South East Corner Bioregion	1.41
Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills, northern South East Corner Bioregion	2.46

Note: Areas above rounded to the nearest hundredth of a hectare.

Plant communities for the study area shown in maps 10 and 11.

Figures 35 to 37 show images of some of the vegetation within and adjacent to the study area.

Map 10: Plant communities of the southern parts of the study area



Map 11: Plant communities of the northern parts of the study area

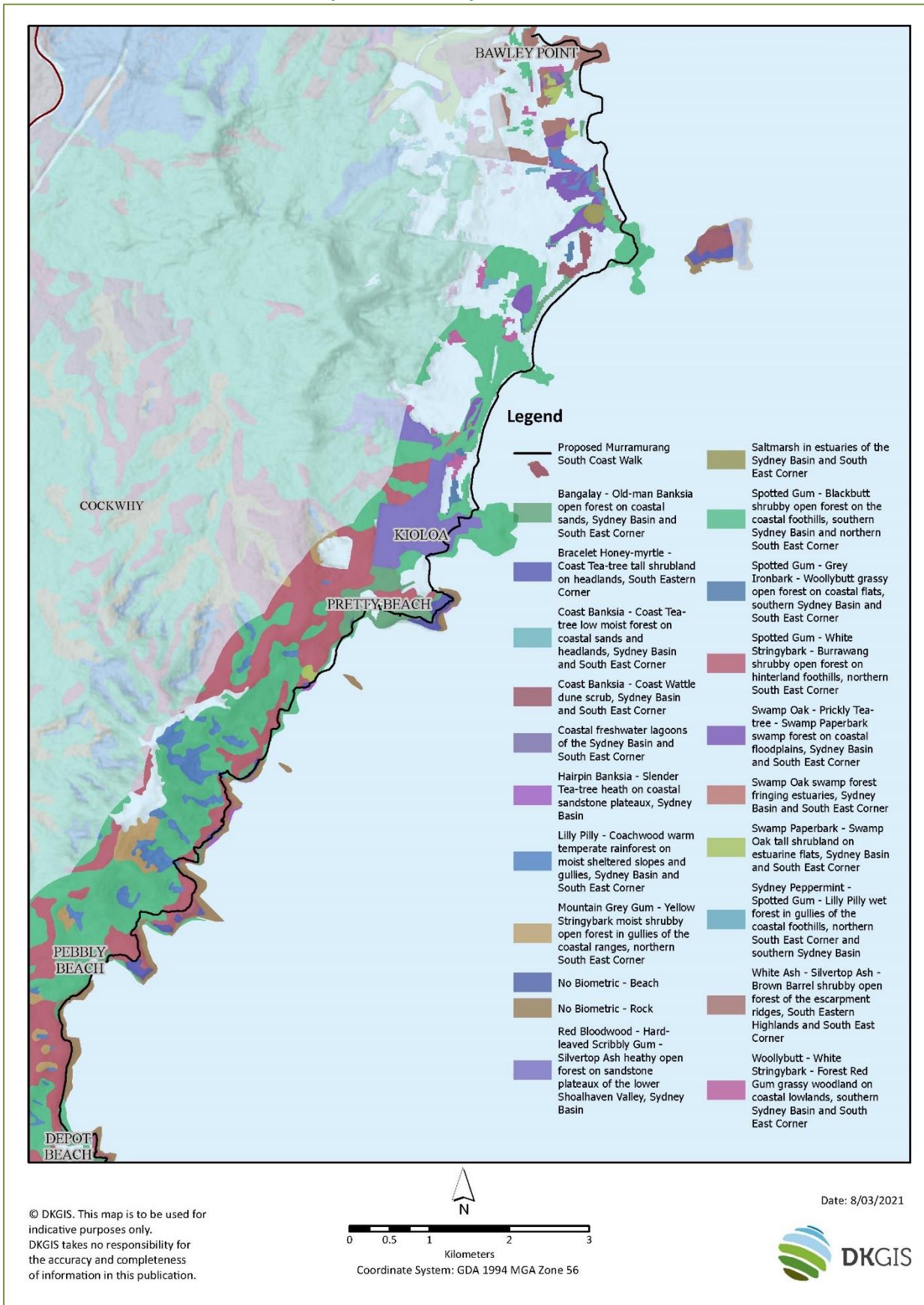


Figure 35: Potential Swamp Oak Floodplain Forest adjacent to study area near Maloney's Beach



Figure 36: Spotted Gum - White Stringybark – Burrawang shrubby open forest



Figure 37: Spotted Gum - White Stringybark - Burrawang shrubby open forest integrating with Bangalay - Old-man Banksia open forest on coastal sands - Depot Headland pre-fire



9.14.2. Flora of conservation significance

A report generated from the NSW OEH BioNet Atlas returned a total of three threatened plant species recorded for Murramarang National Park (see Appendix E). A report generated from the NSW OEH BioNet Atlas returned a total of no threatened plant species recorded for Murramarang Aboriginal Area (see Appendix F). A report generated from the Australian Government’s Protected Matters Search Tool for matters of national environmental significance and other matters protected by the EPBC Act returned a total of 14 threatened plant species or their habitat that are known, likely or may occur within the locality (see Appendix I).

The field surveys, which included targeted orchid surveys, found no threatened flora in the study area. The likelihood of occurrence evaluation of species of conservation significance (see Appendix J) identified one threatened flora species as occurring or potentially occurring within the study area: *Rhodamnia rubescens* (Scrub Turpentine).

9.15. Fauna

9.15.1. General fauna habitat

The potential habitat of the study area, particularly in relation to breeding, foraging, and sheltering habitat for threatened fauna species, is considered in Table 18 below.

Table 18: Habitat evaluation summary

Habitat component	Evaluation	Habitat values or limitations
Logs and debris	Logs are present in the study area. They range in size from small fallen branches of < 20 cm to large logs 50 – 100 cm lying on the ground, the latter of which are uncommon. Some of these are hollowed out. There are also stumps remaining from previous forestry activity.	Large logs, which are limited, provide foraging substrate for vertebrate prey such as small rodents, mammals and reptiles. There is limited sheltering and denning resources for <i>Dasyurus maculatus</i> (Spotted-tailed Quoll), <i>Cercartetus nanus</i> (Eastern Pygmy Possum) and <i>Sminthopsis leucopus</i> (White-footed Dunnart).
Burrowing substrate	The study area generally has sandy soils which appear well drained.	Potential for burrowing species such as bandicoots.
Leaf litter	The leaf litter in the study area ranges from very deep of more than 5 cm in woodlands and forest communities, to absent on rock platforms/rocky shorelines.	Potential to provide sheltering and foraging resources for a range of common species, such as a range of common reptile, amphibian and invertebrate and fungi species.
Groundcover	The ground cover in the study area ranges from very thick, particularly in heath/woodland areas, to absent on rock platforms/rocky shorelines.	Potential to provide cover for small mammals, reptiles, birds and frogs. The areas where there is a mix of patchy ground cover with open spaces may be habitat for granivorous species such as parrots, pigeons, finches, doves, as well as for Long-nosed Potoroo (<i>Potorous tridactylus tridactylus</i>) and White-footed Dunnart.
Beaches	The study area includes numerous beaches. Some of these are large beaches with areas that would not be subject to regular inundation from high tides.	A number of beaches are known nesting and foraging habitat for threatened shorebirds such as <i>Haematopus longirostris</i> (Pied Oystercatcher) and <i>Thinornis rubricollis</i> (Hooded Plover).

Murramarang South Coast Walk (NPWS Estate) Final alignment - Review of Environmental Factors

Habitat component	Evaluation	Habitat values or limitations
Rocky outcrops, shelves etc.	The study area includes rock platforms/rocky shorelines. Small rocky outcrops and shelving are also present upstream on some of the small watercourse gullies, but these are limited in their extent.	The rocky shorelines are known foraging habitat for shorebirds like <i>Haematopus fuliginosus</i> (Sooty Oystercatcher) and Pied Oystercatcher. Potential sheltering and basking sites for rock-dependent species that can tolerate salt spray.
Culverts, caves, cliffs, abandoned structures	The study area does not incorporate coastal cliffs, or overhangs/caves that are at the back of a few beaches.	Lack of habitat for obligate bats and other species that may use caves for denning e.g. Spotted-tailed Quoll.
Nectar sources	The study area has a range of nectar sources, including: <i>Banksia ericifolia</i> (Heath-leaved Banksia), Coast Banksia, Old-man Banksia, <i>Corymbia maculata</i> (Spotted Gum), <i>E. globoidea</i> (White Stringybark), <i>E. paniculata</i> (Grey Ironbark) and <i>E. tereticornis</i> (Forest Red Gum).	Range of canopy nectar sources preferred by arboreal mammals including threatened species such as <i>Petaurus australis</i> (Yellow-bellied Glider), <i>Petaurus norfolcensis</i> (Squirrel Glider), Eastern Pygmy Possum, and <i>Pteropus poliocephalus</i> (Grey-headed Flying-fox). Includes key wintering flowering nectar sources for seasonal migrants such as <i>Lathamus discolor</i> (Swift Parrot).
Sap, gum and lerp sources	The study area has sap trees e.g. Spotted Gum and Forest Red Gum. Lerps are common in eucalypt species found within the study area.	Preferred sap source trees for Squirrel Glider and Yellow-bellied Glider are present, although no typical incisions were observed during field surveys. Eucalypts with lerps preferred by Swift Parrot.
Koala browse species	Scattered presence of a Primary Koala Feed Tree, Forest Red Gum mostly in the southern sections of the study area, being rare elsewhere. Range of vegetation communities in study area.	Two vegetation communities that occur in the study area (<i>Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills, northern South East Corner</i> and <i>Lilly Pilly - Coachwood warm temperate rainforest on moist sheltered slopes and gullies</i>), are known <i>Phascolarctos cinereus</i> (Koala) vegetation communities. However, the study area has only scattered and limited presence of only one primary feed tree species and no records. No sightings or evidence of Koalas observed during field surveys. BioNet search shows limited records for the locality with closest record more than 10 years old.
Woody cones/seeds	<i>Allocasuarina littoralis</i> (Black She-oak) and <i>A. distyla</i> (Scrub She-oak) present. Numerous <i>Acacia</i> species also present in study area.	Foraging resources for <i>Calyptorhynchus lathami</i> (Glossy Black-Cockatoo) and <i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo). One <i>Allocasuarina</i> feed tree of Glossy Black-Cockatoo with chewed cones was noted in study area near the beginning of the track near Maloneys Beach precinct.
Fruiting species	Some rainforest patches, mainly in gullies, with fruiting species such as <i>Syzygium smithii</i> (Lilly Pilly) and Cabbage Tree Palm.	Resources in study area for foraging for threatened frugivores such as Grey-headed Flying Fox and Eastern Pygmy Possum. However, these foraging resources are very limited in their extent.

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Habitat component	Evaluation	Habitat values or limitations
Tree hollows and decorticated bark	The canopy tree species that are present in the study area do provide decorticated bark but not extensively. Many hollow-bearing trees are present in the study area (including one hollow-bearing tree at a proposed walk-in camp site at Oakey Beach Camping Area). These trees have a range of aperture sizes, although there are few very large hollows.	The tree hollows in the study area may offer potential roost and nest sites for a range of microbats, but the smaller aperture size of most hollows, the angle, low height and exposed location of most hollows in most areas, limits the suitability for threatened species such as Greater Gliders, Yellow-bellied Gliders, cockatoos and large forest owls.
Passerine bird habitat	Varied shrub layer across study area with some grassy woodland offers passerine bird habitat.	Potential for threatened passerines.
Aquatic	<p>The study area contains a small number of ephemeral freshwater aquatic habitats associated with small drainage lines.</p> <p>Much of the study area is immediately adjacent to, or in some sections e.g. on the beaches and rock platforms, within the Batemans Marine Park – which extends to the mean high-water mark.</p> <p>The study area contains a small section of estuarine aquatic habitat near Maloney's Beach where, under the proposed activity, there is an option for visitors to walk along the foreshore on low tide.</p> <p>The study area includes a number of small and intermittently open and closed lagoons.</p>	<p>Study area has no significant potential breeding habitat for <i>Litoria aurea</i> (Green and Golden Bell Frog). Only small ephemeral creeks.</p> <p>No waterfowl habitat or foraging habitat for <i>Myotis macropus</i> (Southern Myotis).</p> <p>Threatened shorebird habitat within study area (see above).</p> <p>Limited threatened wader habitat within study area.</p> <p>The study area traverses intertidal area of the Batemans Marine Park - Murramarang Coast Special Purpose Zone from north of Pebbly Beach to O'Hara Island. No fishing is permitted in the Special Purpose Zone, except for commercial abalone collecting.</p>
Prey abundance and diversity	Ground cover ranging from limited to thick in study area suggests constraints for predators for ground dwelling species with arboreal species more likely to be prey.	Study area may form part of larger foraging territory for range of species.

Images of potential threatened fauna habitat features within the study area are shown in figures 38 to 42.

Figure 38: Sandy beach in study area



Figure 39: Hollow-bearing tree in study area



Figure 40: Hollow-bearing tree in study area



Figure 41: Hollowed log in study area



Figure 42: Rocky shoreline in study area



9.15.2. Fauna of conservation significance

A report generated from the NSW OEH BioNet Atlas returned a total of 42 threatened fauna species recorded for Murramarang National Park (see Appendix E). A report generated from the NSW OEH BioNet Atlas returned a total of three threatened fauna species recorded for Murramarang Aboriginal Area (see Appendix F). A report generated from the Australian Government's Protected Matters Search Tool (PMST) for matters of national environmental significance and other matters protected by the EPBC Act returned a total of returned a total of 63 threatened fauna species or their habitat and 61 listed migratory species that are known to occur, are likely to occur or may occur for the locality (see Appendix I). Review of Atlas of Living Australia records and additional mapping showed additional species not included in BioNet or PMST search result reports.

Threatened and migratory fauna recorded or likely to occur in the locality due to suitable habitat were evaluated for potential to occur in the study area (see Appendix J). Species that are solely dependent on marine environments, such as cetaceans, fish and marine turtles, and seabirds that are dependent on marine environments and offshore islands such as shearwaters, albatross and petrels etc, were omitted from the occurrence evaluation due to lack of suitable habitat in the study area. The evaluation identified 37 listed threatened fauna species, one of which is also an endangered population, and eight listed migratory fauna species as occurring or potentially occurring within the study area. These species are listed below in Table 19.

Table 19: Fauna of conservation significance that occur or potentially occur in the study area

Scientific name	Common name	BC Act	EPBC Act
<i>Anthochaera phygia</i>	Regent Honeyeater	CE	CE
<i>Arctocephalus pusillus doriferus</i>	Australian Fur-Seal	V	-
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V	-
<i>Calamanthus fuliginosus</i>	Striated Fieldwren	E	-
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	-	M
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	-
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V	-
<i>Cercartetus nanus</i>	Eastern Pygmy Possum	V	-
<i>Charadrius bicinctus</i>	Double-banded Plover	-	M
<i>Cuculus optatus</i>	Oriental Cuckoo	-	M
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E
<i>Esacus magnirostris</i>	Beach Stone-curlew	CE	M
<i>Glossopsitta pusilla</i>	Little Lorikeet	V	-
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V	-
<i>Haematopus longirostris</i>	Pied Oystercatcher	E	-
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	V	-
<i>Hieraaetus morphnoides</i>	Little Eagle	V	-

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<i>Hirundapus caudacutus</i>	White-throated Needletail	-	M
<i>Lathamus discolor</i>	Swift Parrot	E	CE
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bent-wing Bat	V	-
<i>Monarcha melanopsis</i>	Black-faced Monarch	-	M
<i>Mormopterus norfolkensis</i>	Eastern Freetail Bat	V	-
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	-	M
<i>Ninox connivens</i>	Barking Owl	V	-
<i>Ninox strenua</i>	Powerful Owl	V	-
<i>Onychoprion fuscata</i>	Sooty Tern	V	-
<i>Petauroides volans</i>	Greater Glider	EP	V/EP
<i>Petaurus australis</i>	Yellow-bellied Glider	V	-
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	-
<i>Petroica boodang</i>	Scarlet Robin	V	-
<i>Petroica phoenicea</i>	Flame Robin	V	-
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V	-
<i>Phascolarctos cinereus</i>	Koala	V	V
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo (SE mainland)	V	V
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V
<i>Rhipidura rufifrons</i>	Rufous Fantail	-	M
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	-
<i>Sminthopsis leucopus</i>	White-footed Dunnart	V	-
<i>Sternula albifrons</i>	Little Tern	E	-
<i>Thinornis rubricollis</i>	Hooded Plover	CE	V
<i>Tyto novaehollandiae</i>	Masked Owl	V	-
<i>Tyto tenebricosa</i>	Sooty Owl	V	-

CE = Critically Endangered; E = Endangered; EP = Endangered population; V = Vulnerable; M = Migratory

9.15.3. Threatened fauna habitat

9.15.3.1. Hollow-bearing trees and hollowed logs

The field surveys identified many hollow-bearing trees and numerous hollowed logs within the study area. The hollow-bearing trees are predominantly within the forest communities. The majority of these hollow-bearing trees have potential to be used as habitat by a range of fauna. Most of the hollows would not be considered optimal habitat for fauna of conservation significance, such as forest owls, cockatoos, gliders and bats, because of the size of the aperture, the angle of the hollow, low hollow height and hollow exposure/location. However,

adopting the precautionary approach, they are considered constraints to the proposal. Fauna that utilise the hollows may be subject to indirect impacts associated with the proposal e.g. from anthropogenic disturbances.

Fallen timber and tree stumps with hollows were also observed within the study area, although little in number. The hollows observed in these resources were not considered optimal habitat for threatened species.

9.15.3.2. Threatened fauna feed trees

There are numerous flora species within the study area that are preferred foraging habitat for a number of threatened species. These species include canopy and understory species such as Spotted Gum, various eucalyptus species and banksias.

There are also two flora species in particular that occur in the study area which may be important habitat resources for fauna species of conservation significance. During the field surveys one active Glossy Black-Cockatoo feed tree, a Black She-oak, was recorded within the study area. This feed tree is located adjacent to the proposed trail alignment immediately after the commencement of the track at Maloneys Beach. No other Glossy Black-Cockatoo feed trees were observed in the study area. The Koala feed tree, Forest Red Gum, is scattered in low numbers within the study area, mostly in the forest communities in the southern sections.

9.15.3.3. Threatened shorebird habitat

Threatened shorebirds *Thinornis rubricollis* (Hooded Plover) and *Haematopus longirostris* (Pied Oystercatcher) are known to nest and forage along the Murramarang coastline, including in the study area. Sooty Oystercatchers are known to nest outside of the study area on the Murramarang offshore islands e.g. Brush Island, and forage on rock platforms nearby including those within the study area.

NPWS staff and dedicated local volunteers have carried out a longitudinal monitoring program for the threatened shorebirds during the nesting season between August and February/March. The program has included twice weekly monitoring of the beach sections between Pretty Beach and Dawsons Beach from 2006 to 2015, and then once per week; regular, i.e. at least four times per week, monitoring of the Durras Lake Entrance area since the early 2000s; and one season at Oaky Beach. Key metrics collected as part of the monitoring program are: numbers of breeding pairs; number of fledglings; and percentage of breeding pairs impacted by critical threats.

Hooded Plovers have been recorded nesting within the study area at Dawsons Beach and Island Beach, and adjacent to the study area at Durras Lake Entrance. Pied Oystercatchers have been recorded nesting within the study area at Oaky Beach and North Durras Beach, and recorded at Pebbly Beach during the 2020/2021 season. They are also recorded outside the study area at Durras Lake Entrance and areas around the lake. (J Dunn pers. Comm. 2021). Both Hooded Plovers and Pied Oystercatchers may also nest on other beaches along the Murramarang coastline outside of the monitoring program area. Both species are also known to forage within the study area on the beaches and rock platforms.

Consistent with NPWS records and advice, numerous threatened shorebirds were observed within the study area and in adjacent areas during the field surveys.

9.16. Area of outstanding biodiversity value declared under the BC Act

There are no Areas of Outstanding Biodiversity Values listed under the BC Act for the study area.

9.17. SEPP Koala Habitat Protection 2020

At the time of preparing this REF, the *State Environmental Planning Policy (Koala Habitat Protection) 2020* applies. The *State Environmental Planning Policy Koala Habitat Protection 2020* does not apply to land dedicated under the *National Parks and Wildlife Act 1974* or the *Forestry Act 1916*. However, in accordance with NPWS policy, this REF applies the SEPP.

Both the Shoalhaven and Eurobodalla LGAs are listed on Schedule 1 of the SEPP. The identification of an area of land as SEPP Potential Koala Habitat is determined by the presence of Koala feed tree species listed within Schedule 2 of the policy. Potential Koala Habitat is defined as areas where the tree species listed under Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component. An area of land to which the policy applies must be at least 1 ha in area (and may include adjoining land in the same ownership). If Potential Koala Habitat is present, then it must be further evaluated to determine whether it represents Core Koala Habitat.

The study area is greater than 1 ha. One tree species listed under Schedule 2 of the SEPP occurs in the study area: Forest Red Gum. This species is scattered mostly in the southern sections of the study area, being rare elsewhere. However, the study area does not contain Potential Koala Habitat as defined under Schedule 2 of the SEPP 44 Forest Red Gum does not constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.

Therefore, an assessment on the impact of the proposed activity on the SEPP koala habitat is not required.

9.18. Wilderness (either nominated or declared)

There are no Wilderness Areas, either nominated or declared under the *Wilderness Act 1987*, within the study area.

9.19. Post-fire habitat refugia

The Currowan Fire impacted the study area. Unburnt areas of habitat in and around the study area may have experienced an influx of some fauna species from burnt areas. Any such changes are expected to be temporary as habitat in burnt areas recovers and was not obvious in and around the study area during the fieldwork. No areas were recognised as post-fire refugia habitat needing additional protection considering the minimal and linear nature of ground cover and understory habitat to be affected by the proposed activity.

9.20. Matters of National Environmental Significance under the EPBC Act

Table 20 lists the MNES that occur or potentially occur in the study area.

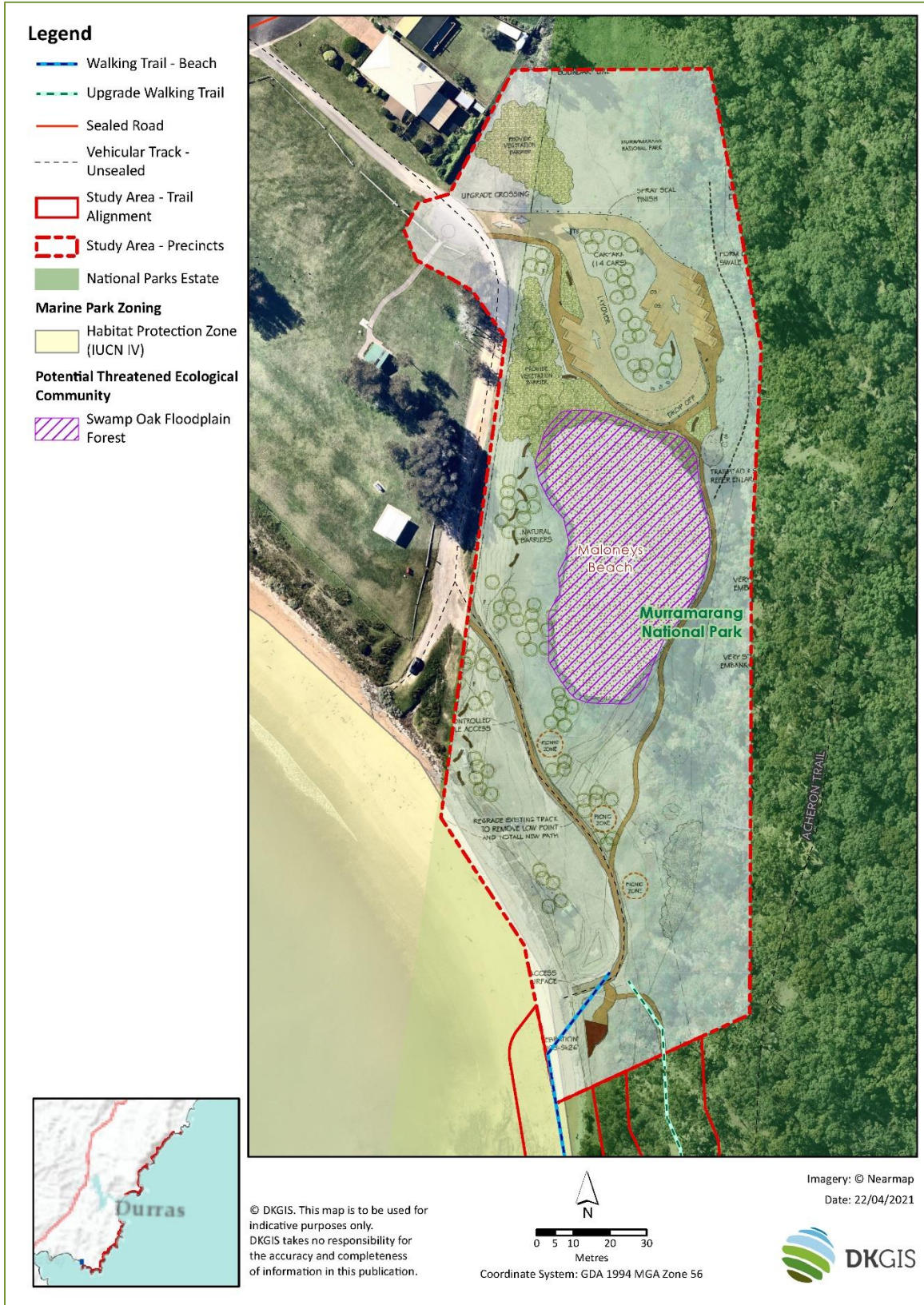
Table 20: MNES that occur or potentially occur in the study area

MNES	Scientific Name/Common Name	EPBC Act status
Threatened species	<i>Anthochaera phygia</i> , Regent Honeyeater	CE
	<i>Dasyurus maculates</i> , Spotted-tailed Quoll	E
	<i>Lathamus discolor</i> , Swift Parrot	CE
	<i>Petauroides volans</i> , Greater Glider	V
	<i>Phascolarctos cinereus</i> , Koala	V
	<i>Potorous tridactylus tridactylus</i> , Long-nosed Potoroo (SE mainland)	V
	<i>Pteropus poliocephalus</i> , Grey-headed Flying-fox	V
	<i>Thinornis rubricollis</i> , Hooded Plover	V
Migratory species	<i>Calidris acuminata</i> , Sharp-tailed Sandpiper	M
	<i>Charadrius bicinctus</i> , Double-banded Plover	M
	<i>Cuculus optatus</i> , Oriental Cuckoo	M
	<i>Esacus magnirostris</i> , Beach Stone-curlew	M
	<i>Hirundapus caudacutus</i> , White-throated Needletail	M
	<i>Monarcha melanopsis</i> , Black-faced Monarch	M
	<i>Myiagra cyanoleuca</i> , Satin Flycatcher	M
	<i>Rhipidura rufifrons</i> , Rufous Fantail	M
Threatened ecological community	Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	CE
	Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community	E

CE = Critically Endangered; E = Endangered; M = Migratory; V = Vulnerable

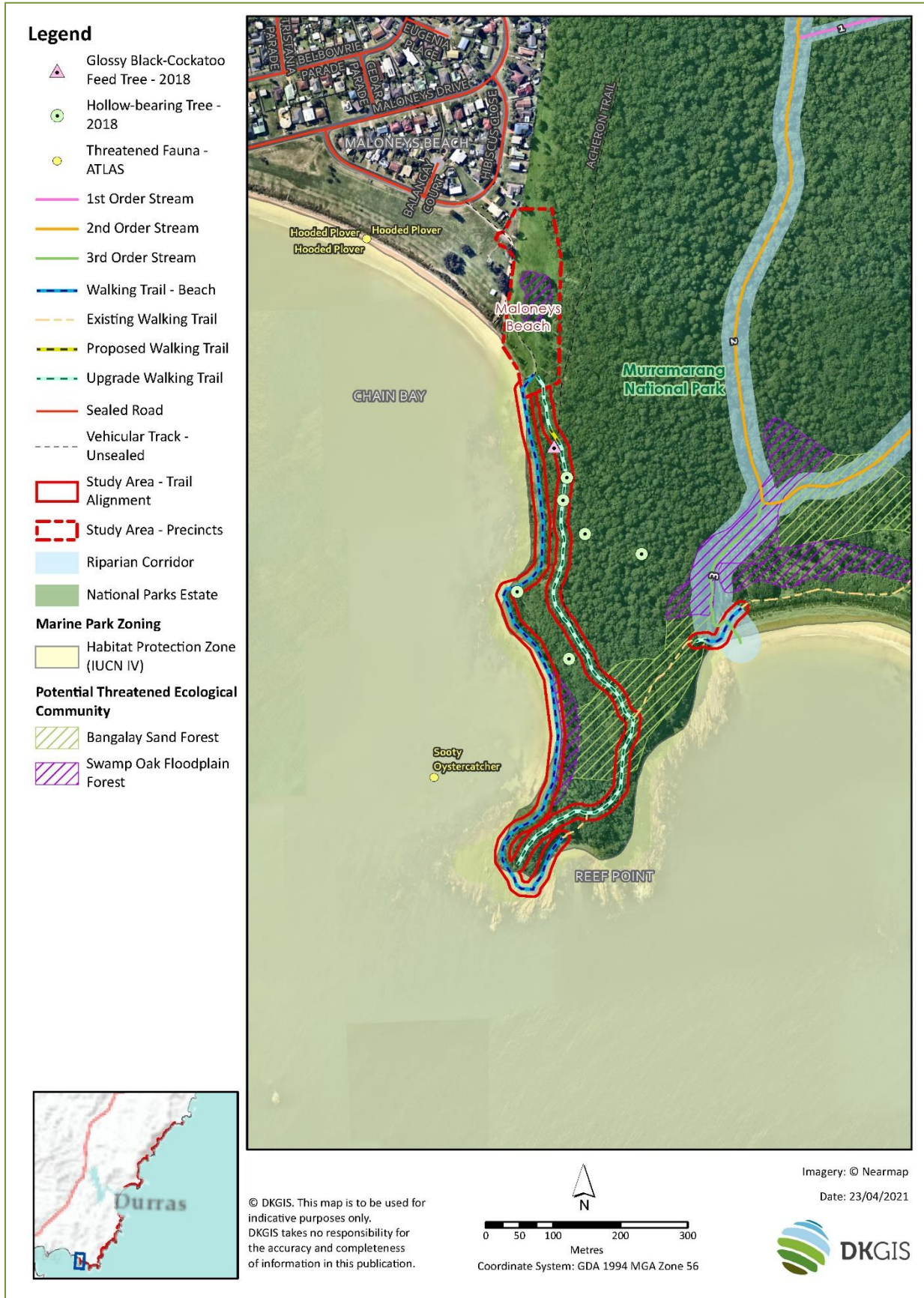
9.21. Maps of key flora and fauna considerations

Map 12: Key ecological considerations for construction and beach – Maloneys Beach precinct



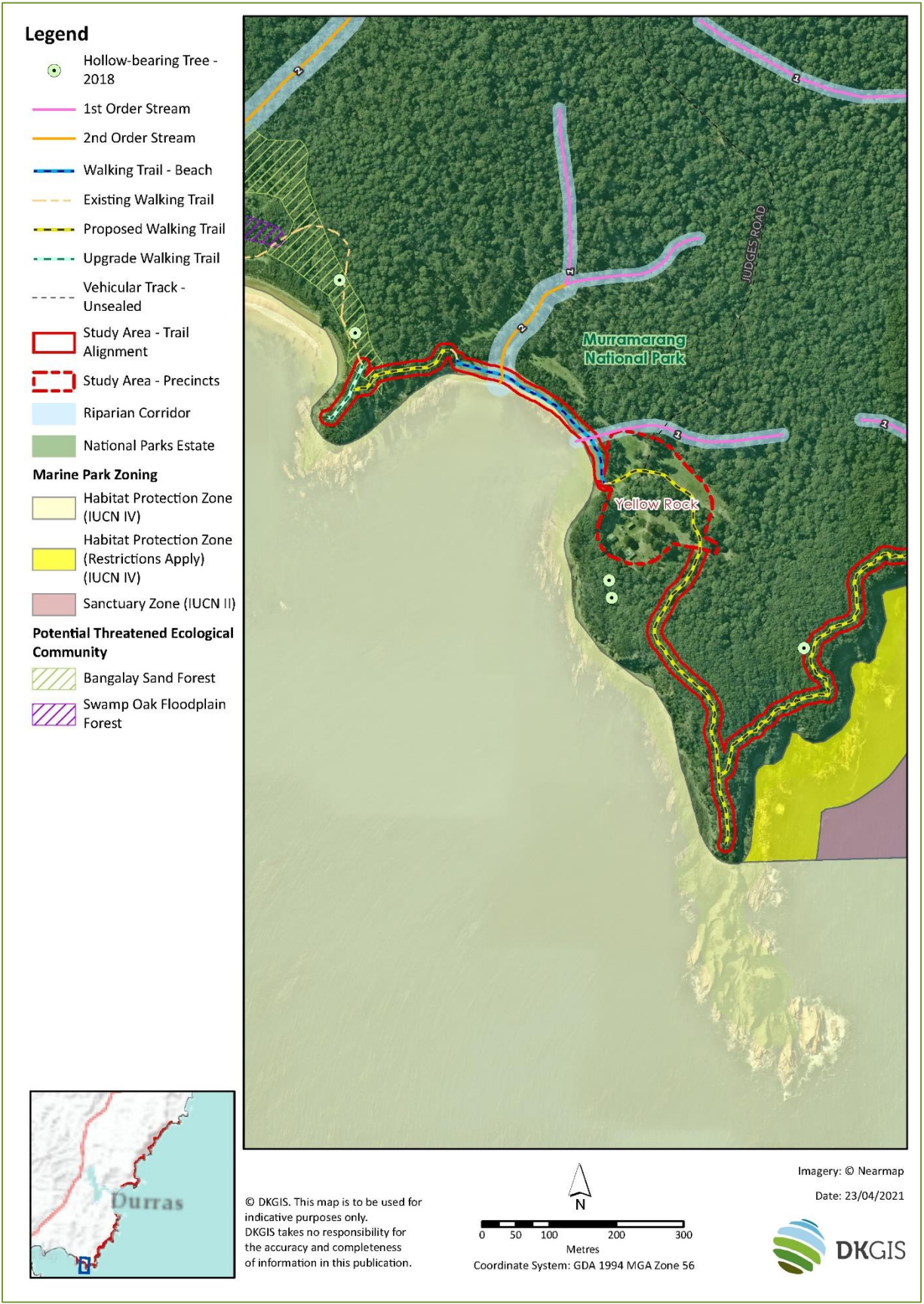
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 13: Key ecological considerations for construction and beach - Maloneys Beach - Reef Point



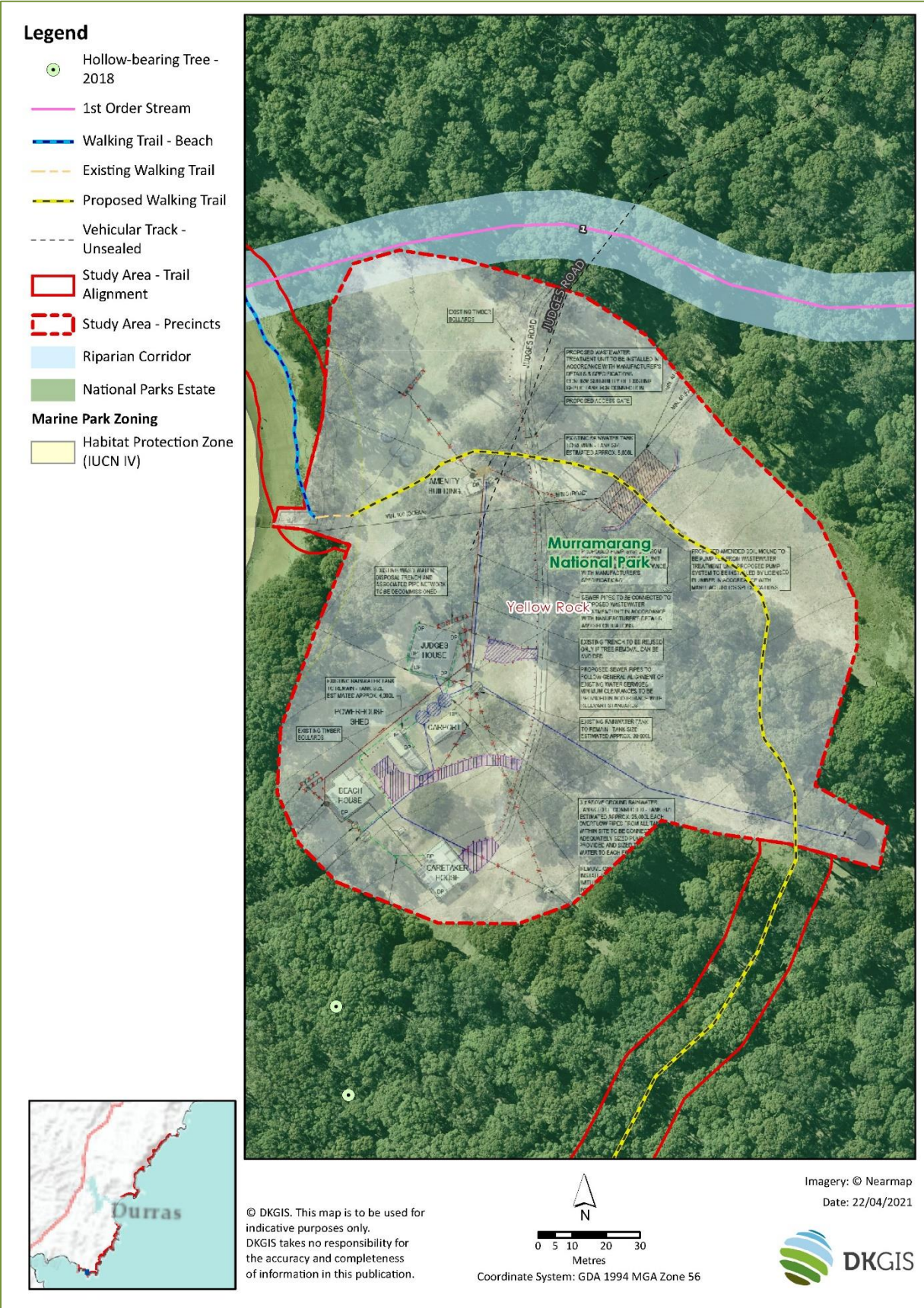
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 14: Key ecological considerations for construction and beach – Yellow Rock - Three Islet Point



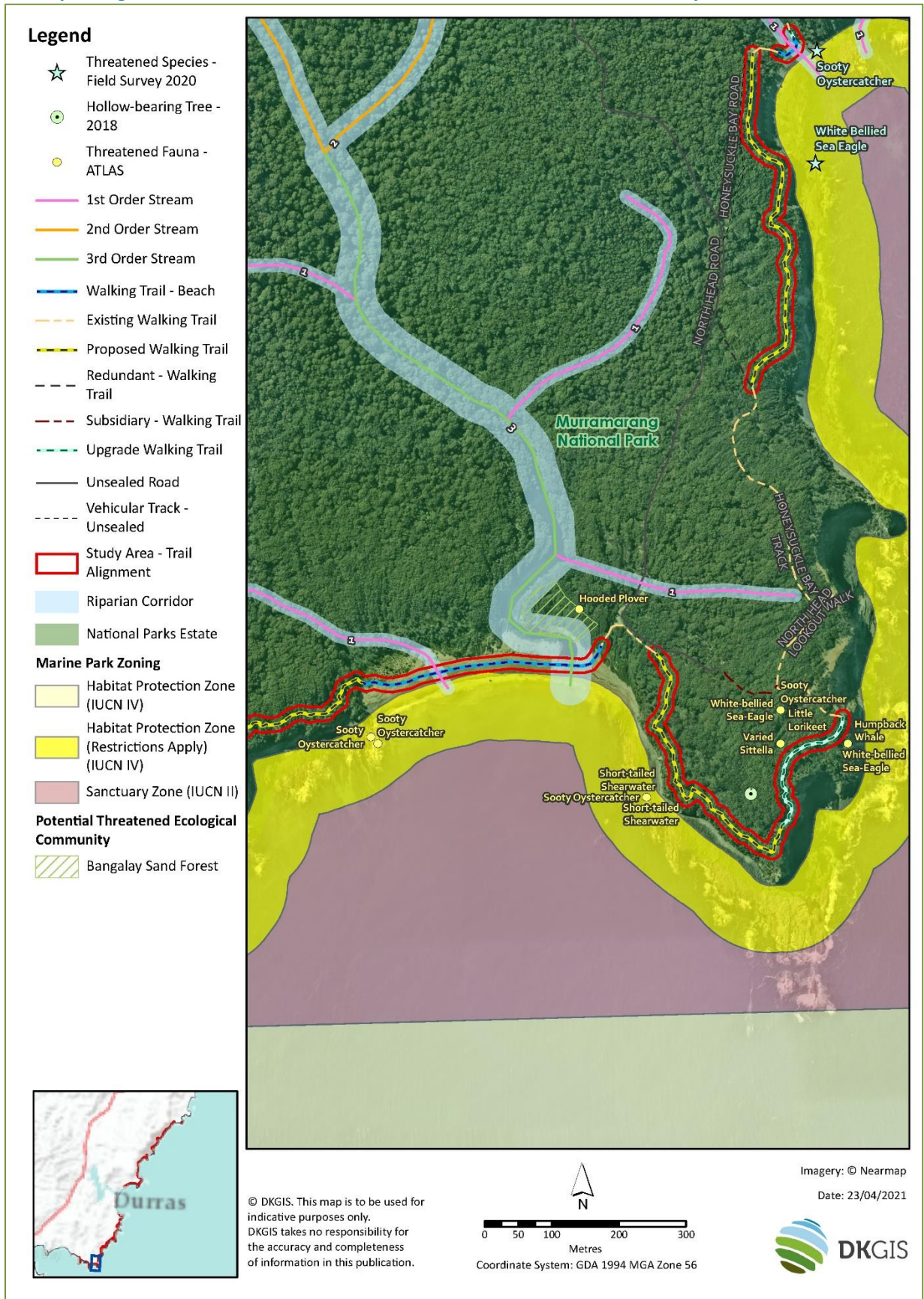
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 15: Key ecological considerations for construction and beach – Yellow Rock precinct



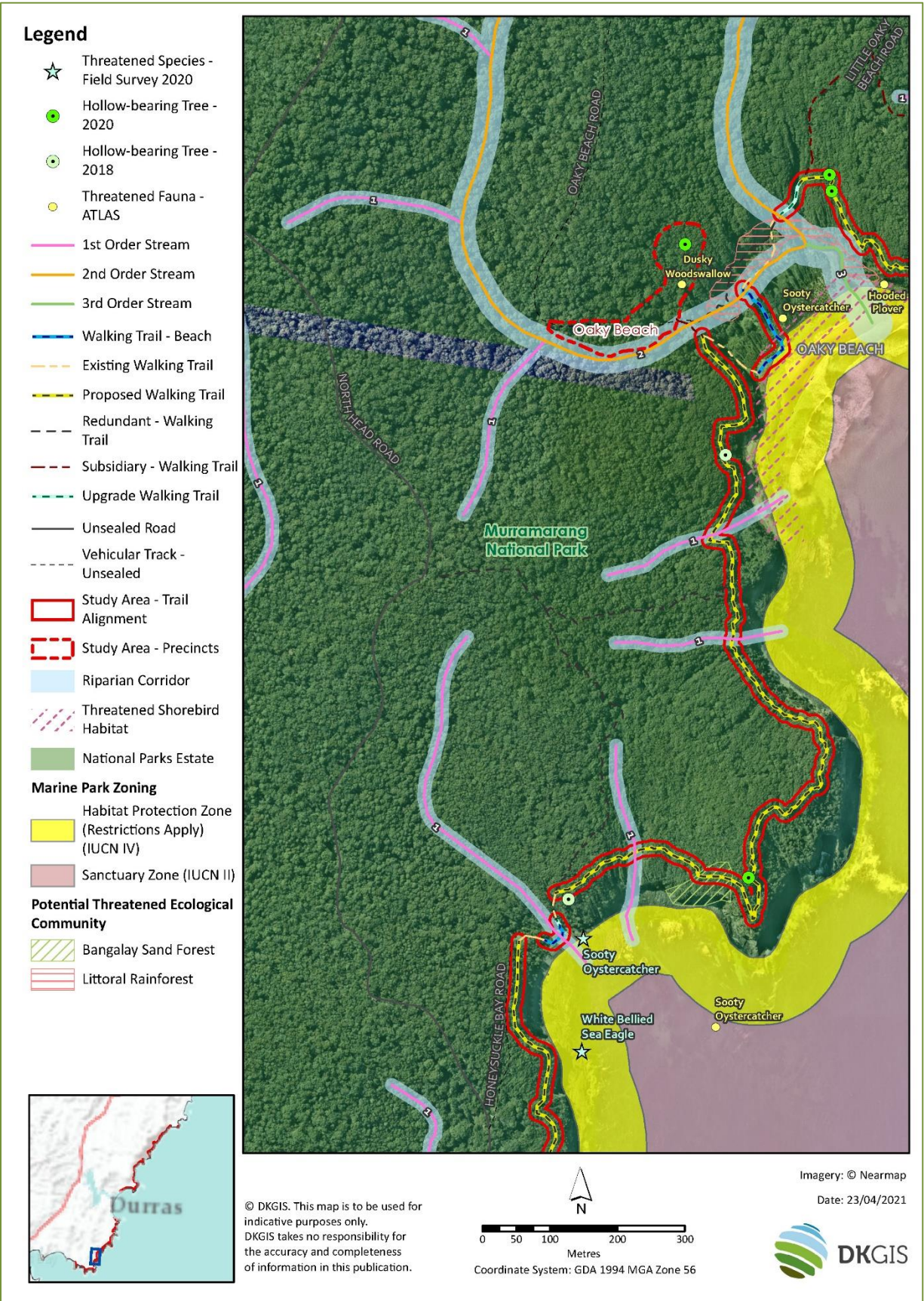
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 16: Key ecological considerations for construction and beach - North Head to Honeysuckle Beach



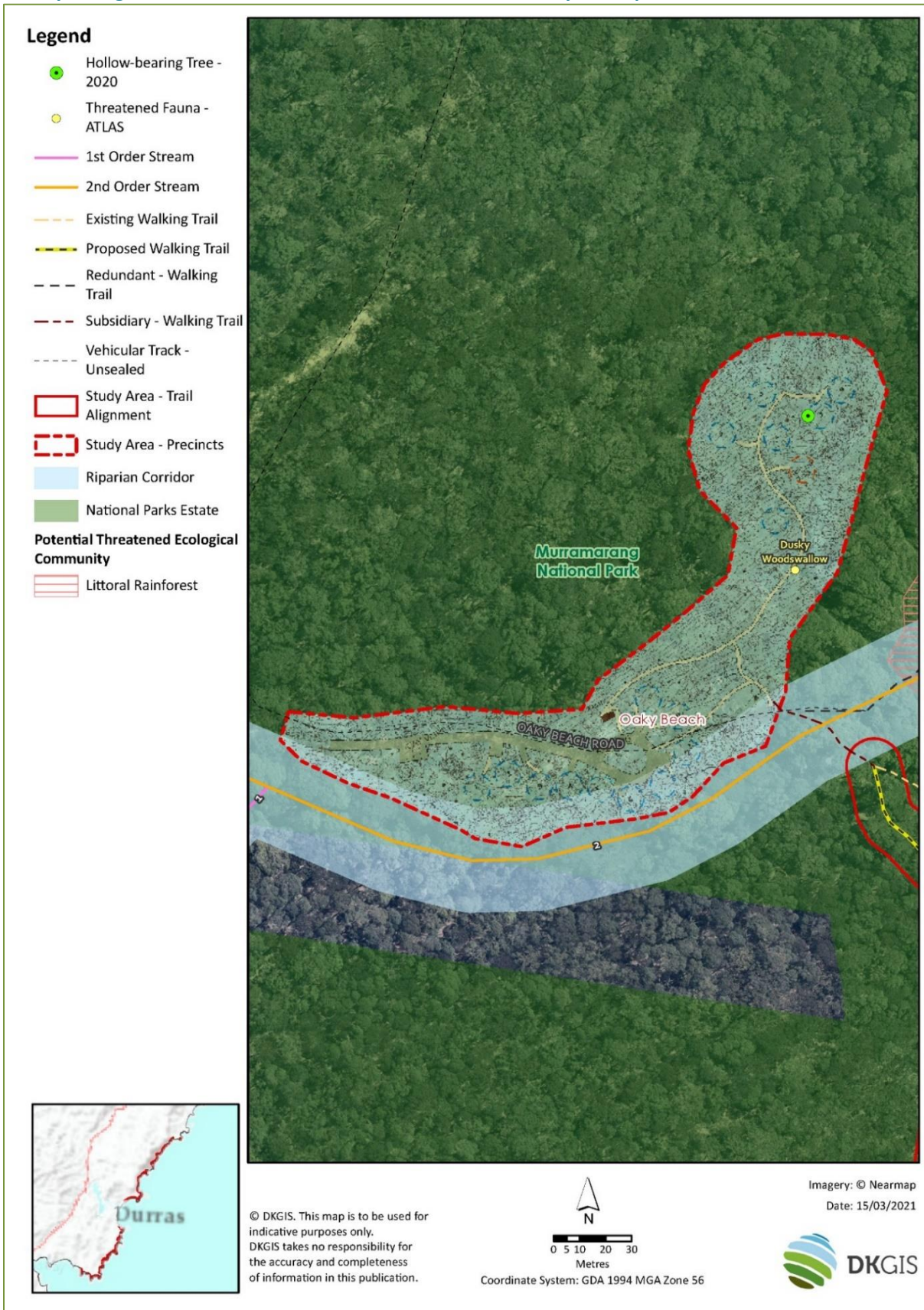
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 17: Key ecological considerations for construction and beach - Honeysuckle Beach – Oaky Beach



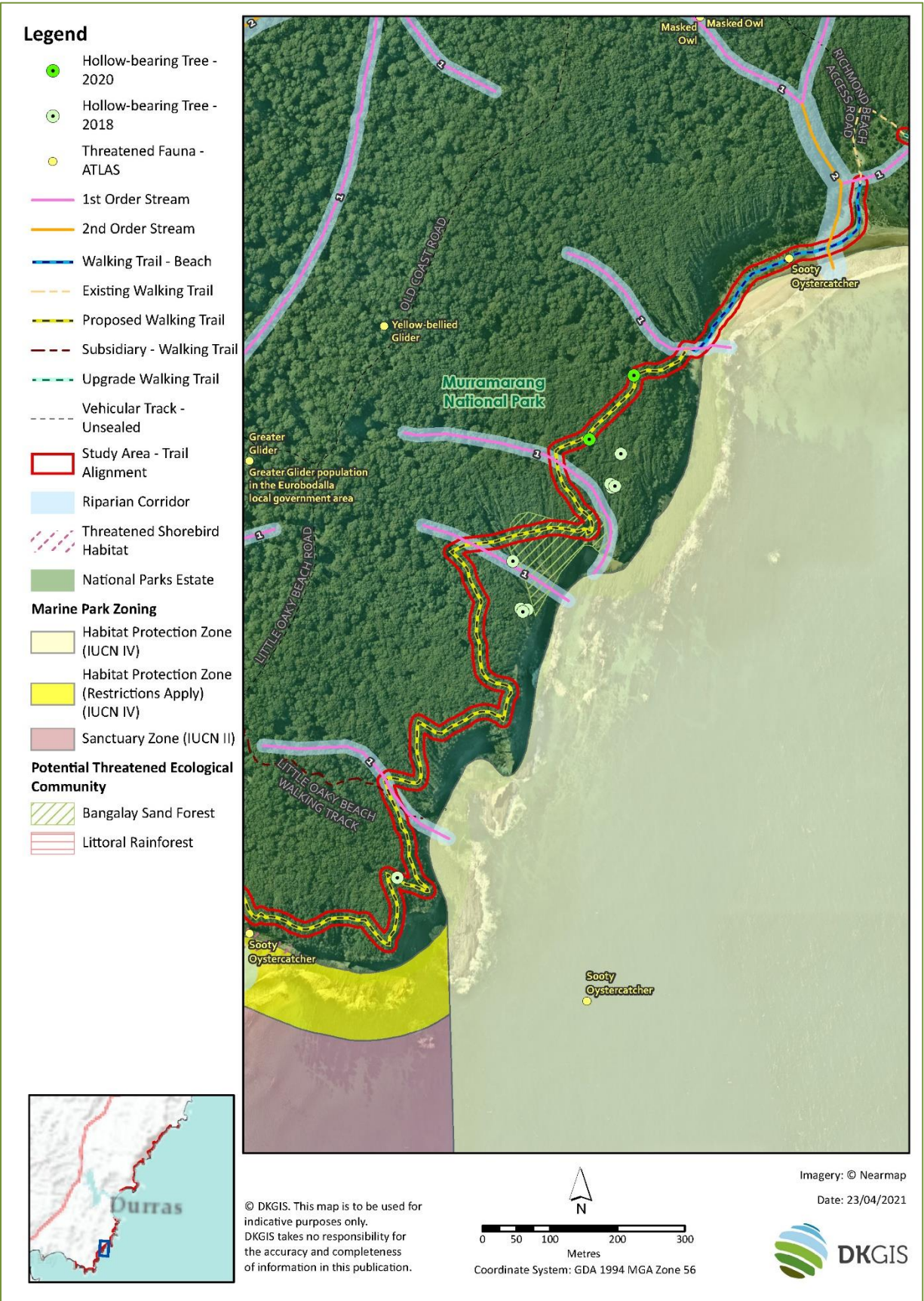
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 18: Key ecological considerations for construction and beach - Oaky Beach precinct



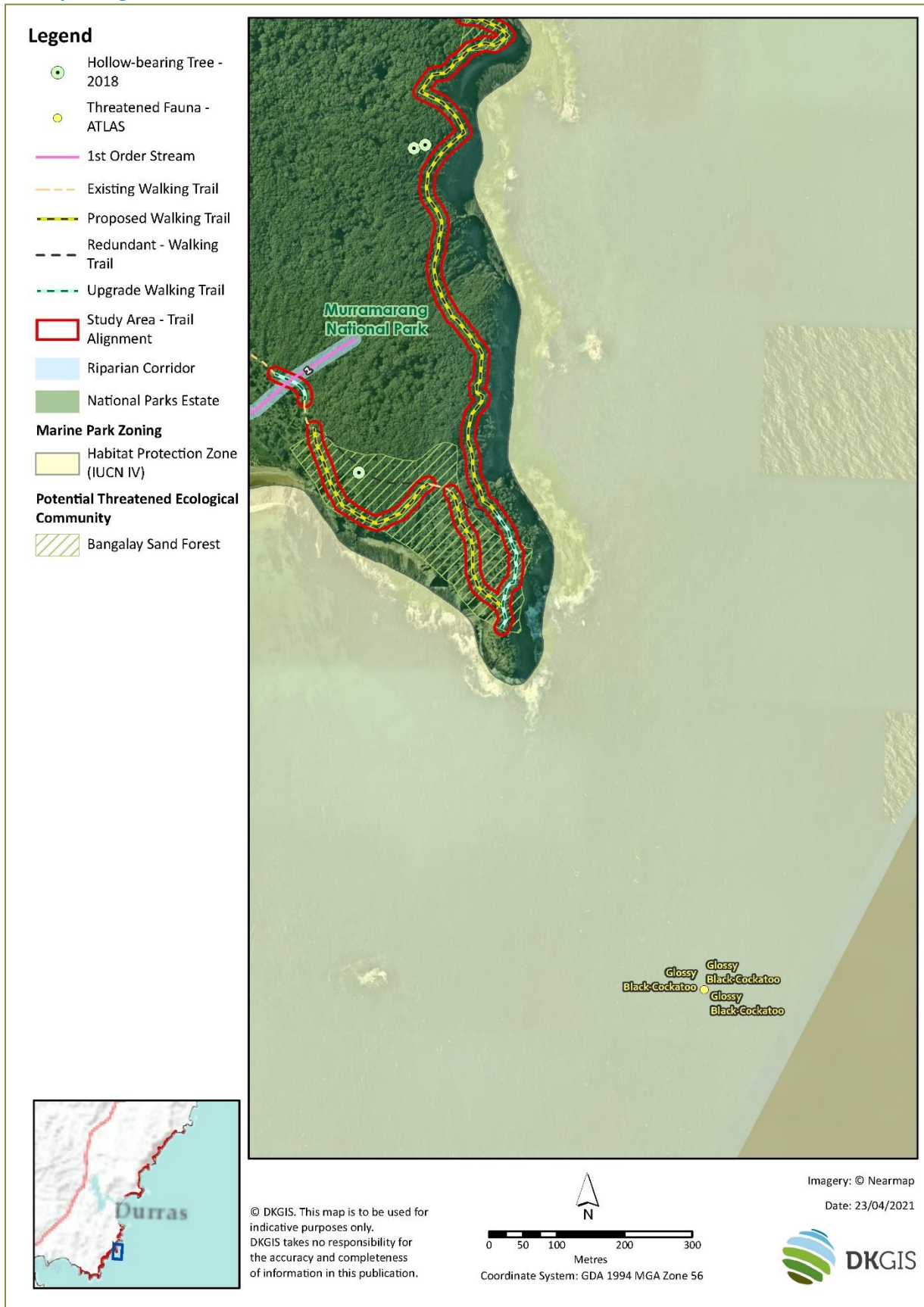
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 19: Key ecological considerations for construction and beach - Oaky Beach - Richmond Beach



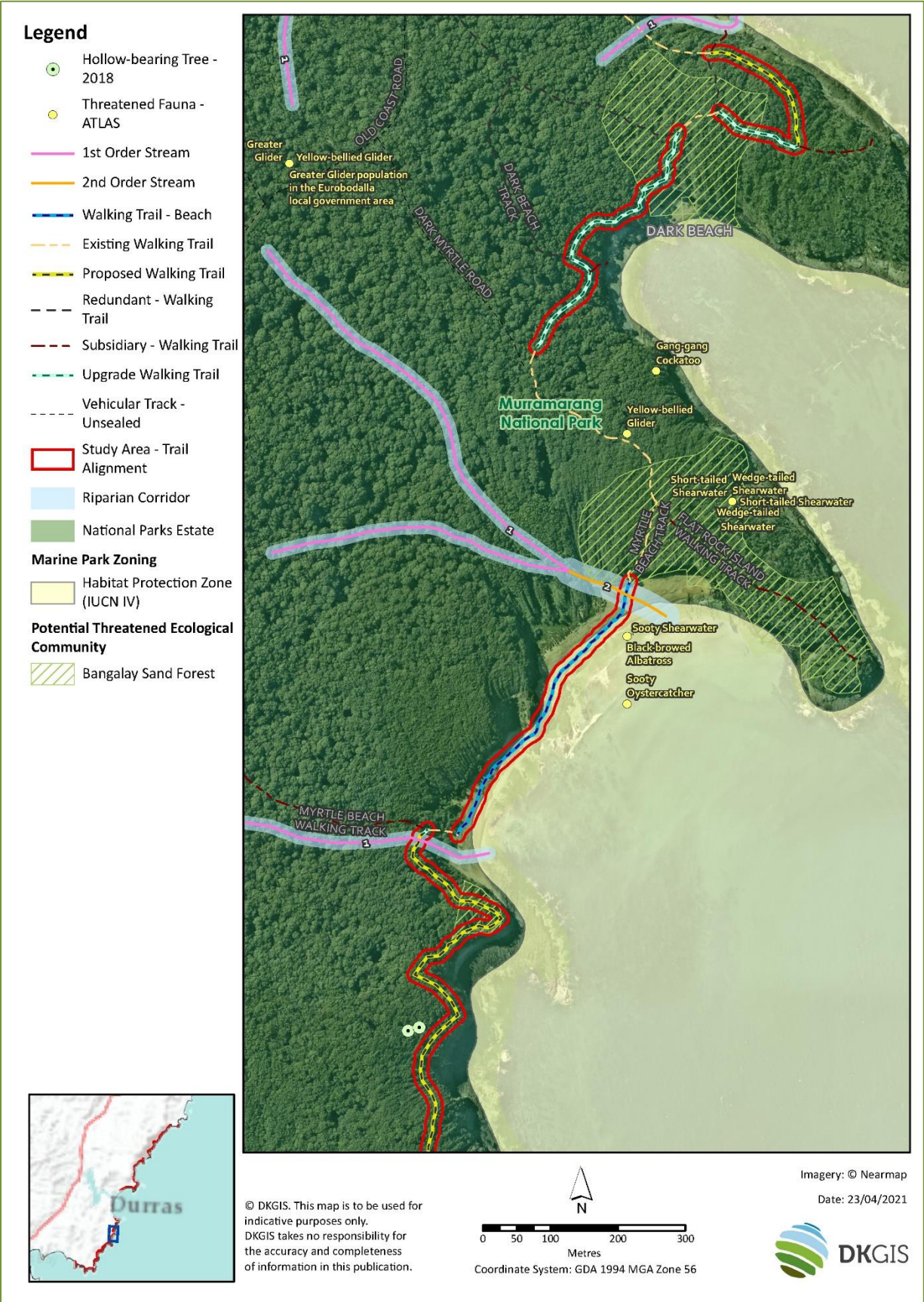
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 20: Key ecological considerations for construction and beach - Richmond Beach Headland



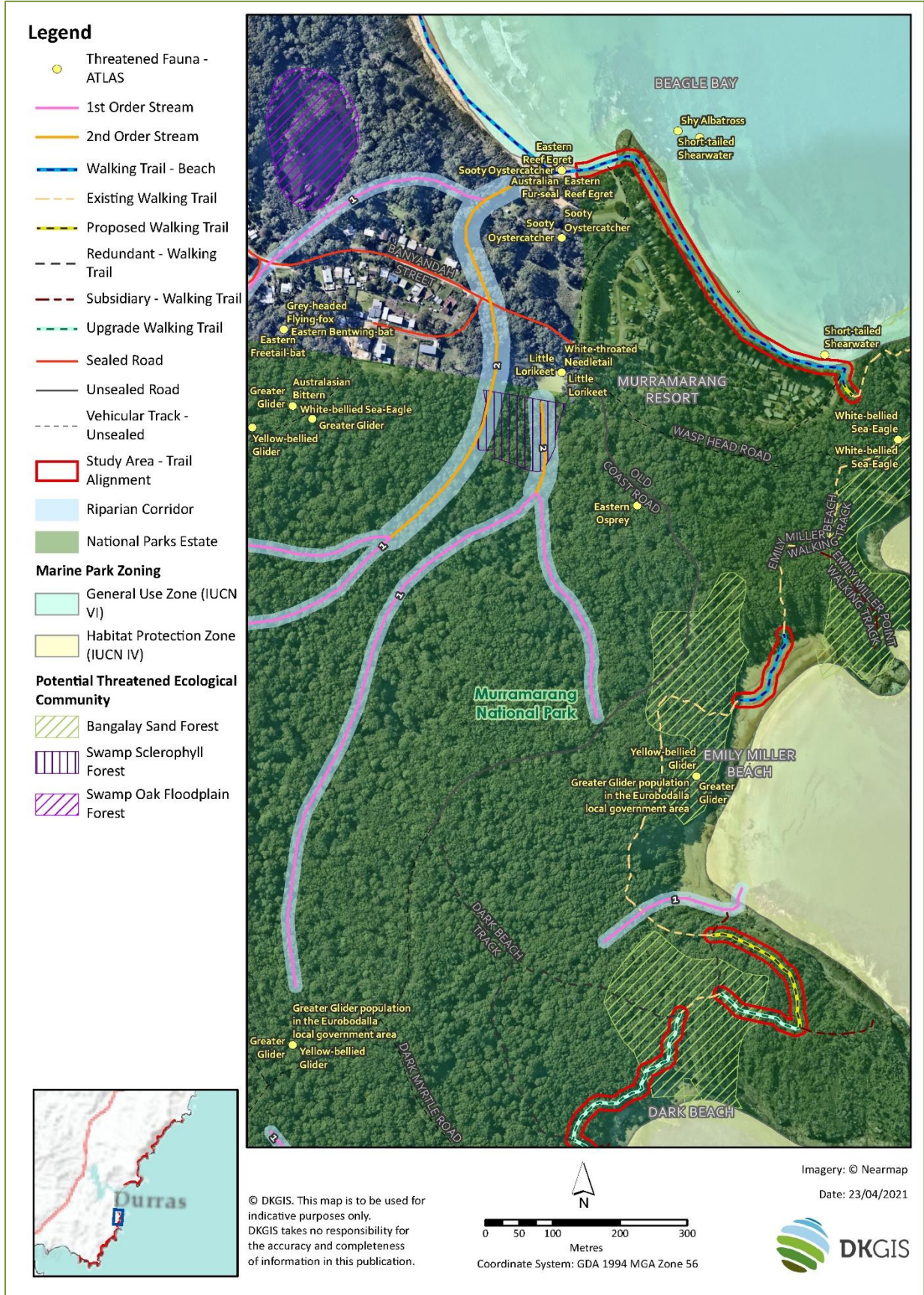
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 21: Key ecological considerations for construction and beach - Myrtle Beach – Dark Beach



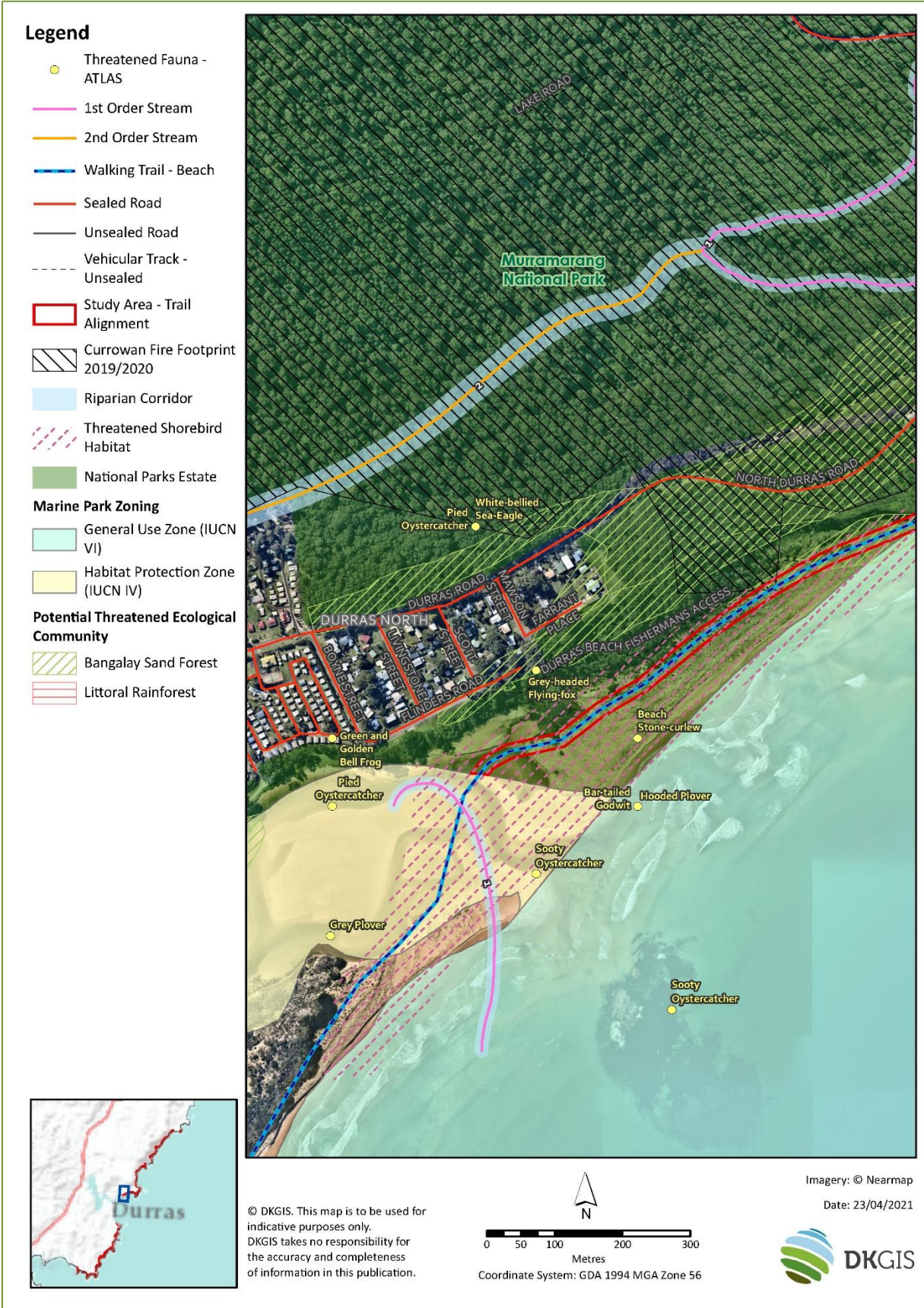
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 22: Key ecological considerations for construction and beach – Dark Beach to Mill Beach



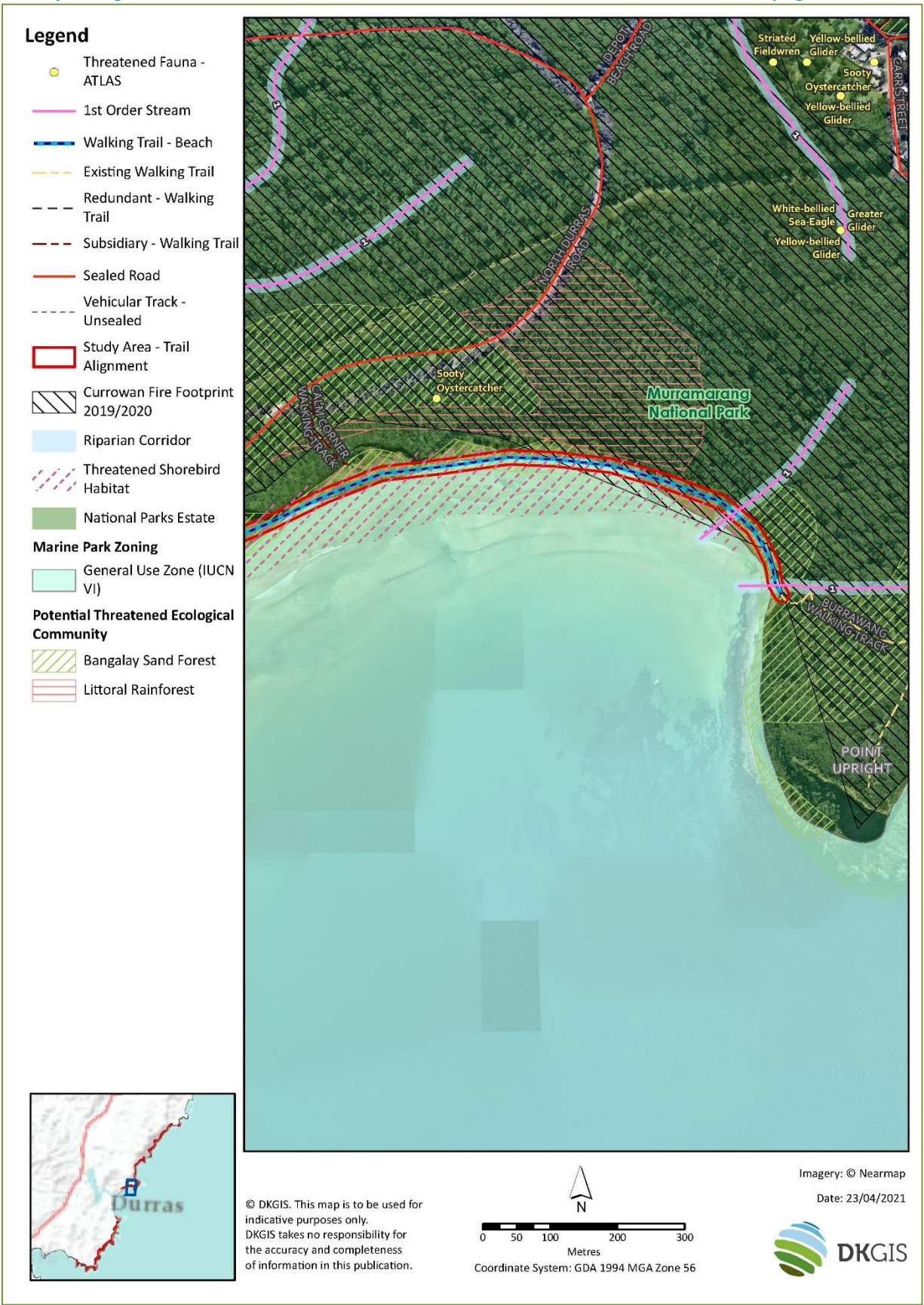
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 23: Key ecological considerations for construction and beach – Durras Lake Entrance -North Durras Beach area



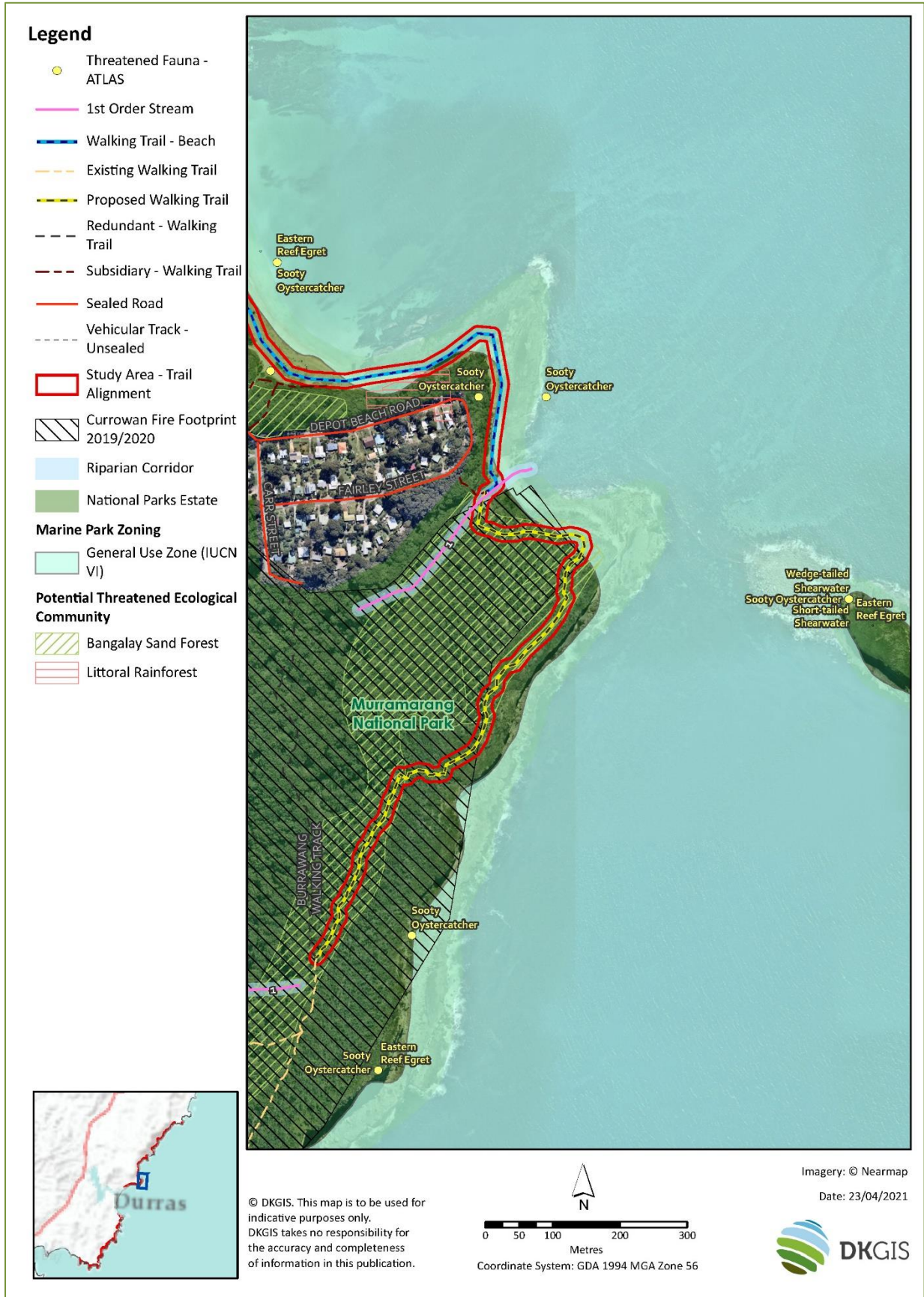
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 24: Key ecological considerations for construction and beach – North Durras Beach – Point Upright



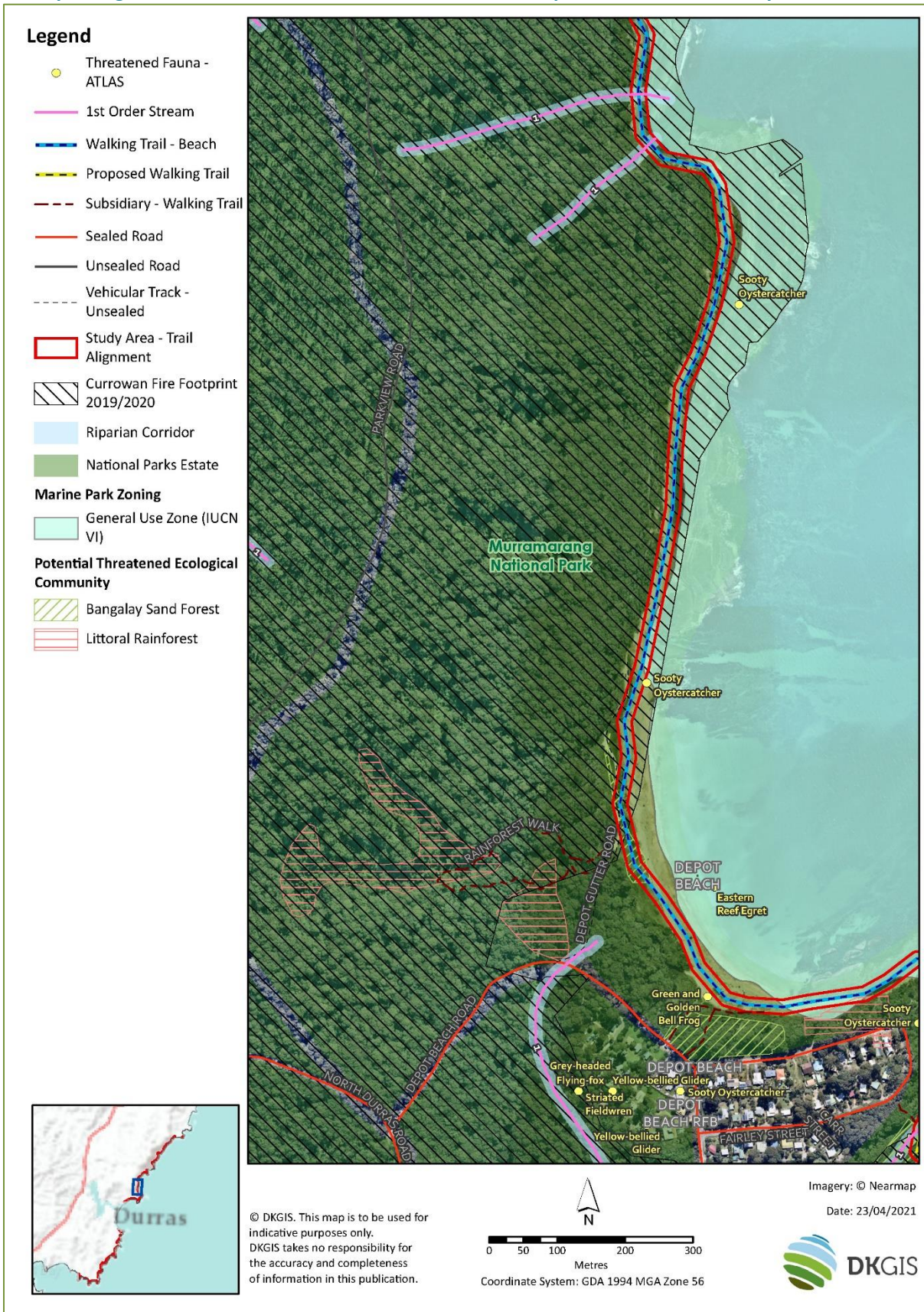
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 25: Key ecological considerations for construction and beach - Point Upright to Depot Beach



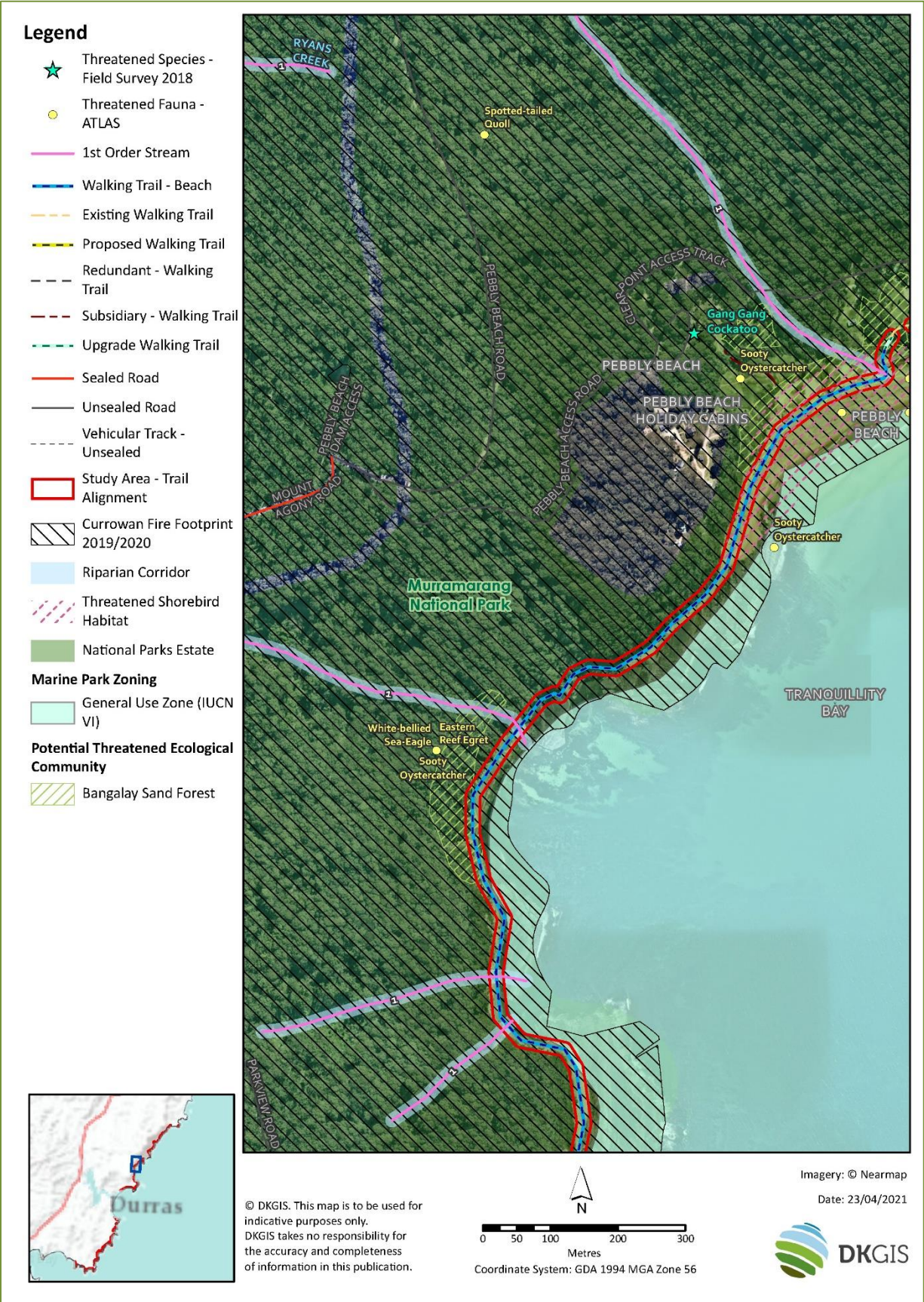
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 26: Key ecological considerations for construction and beach - Depot Beach towards Peppy Beach



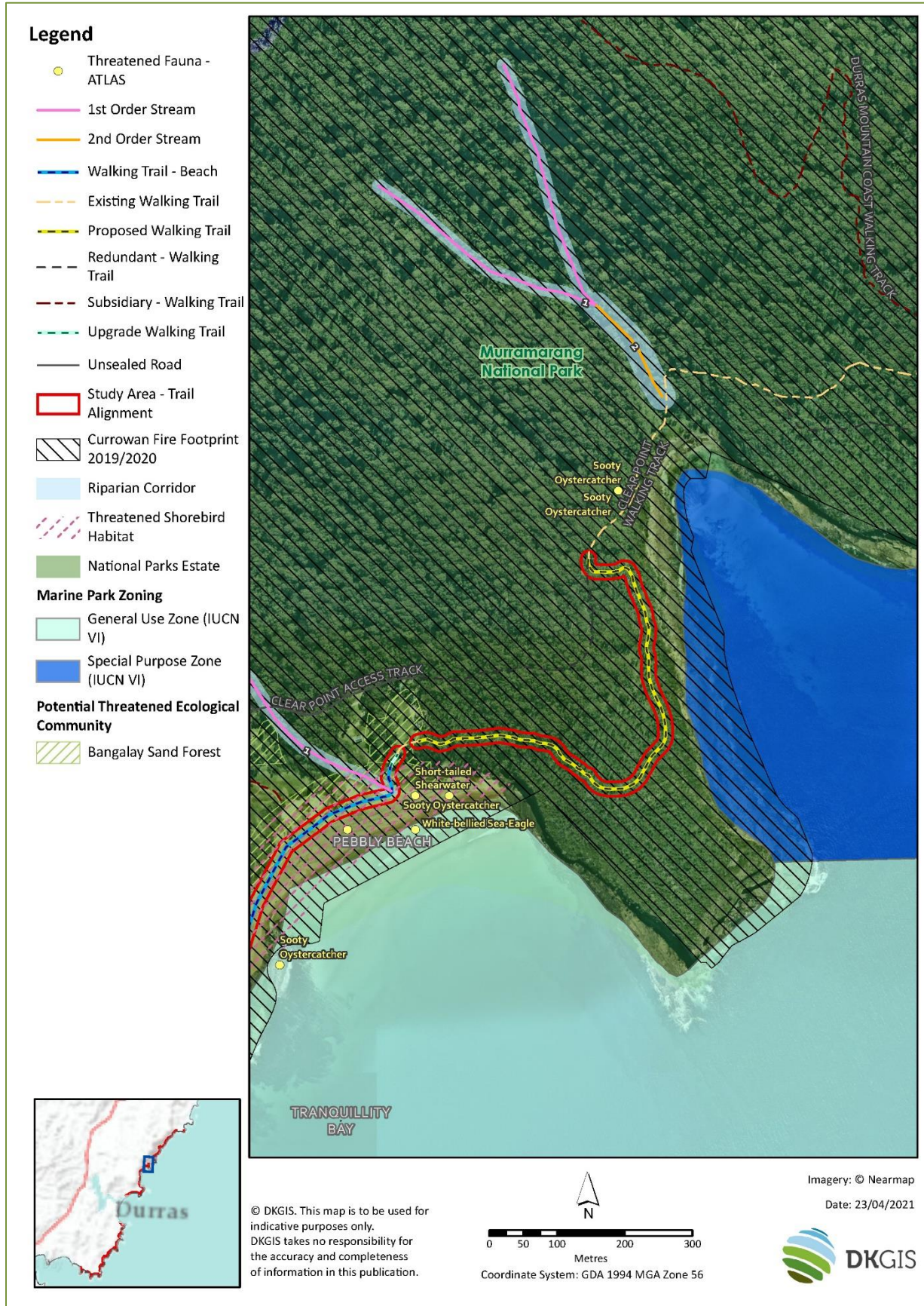
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 27: Key ecological considerations for construction and beach - Pebbly Beach area



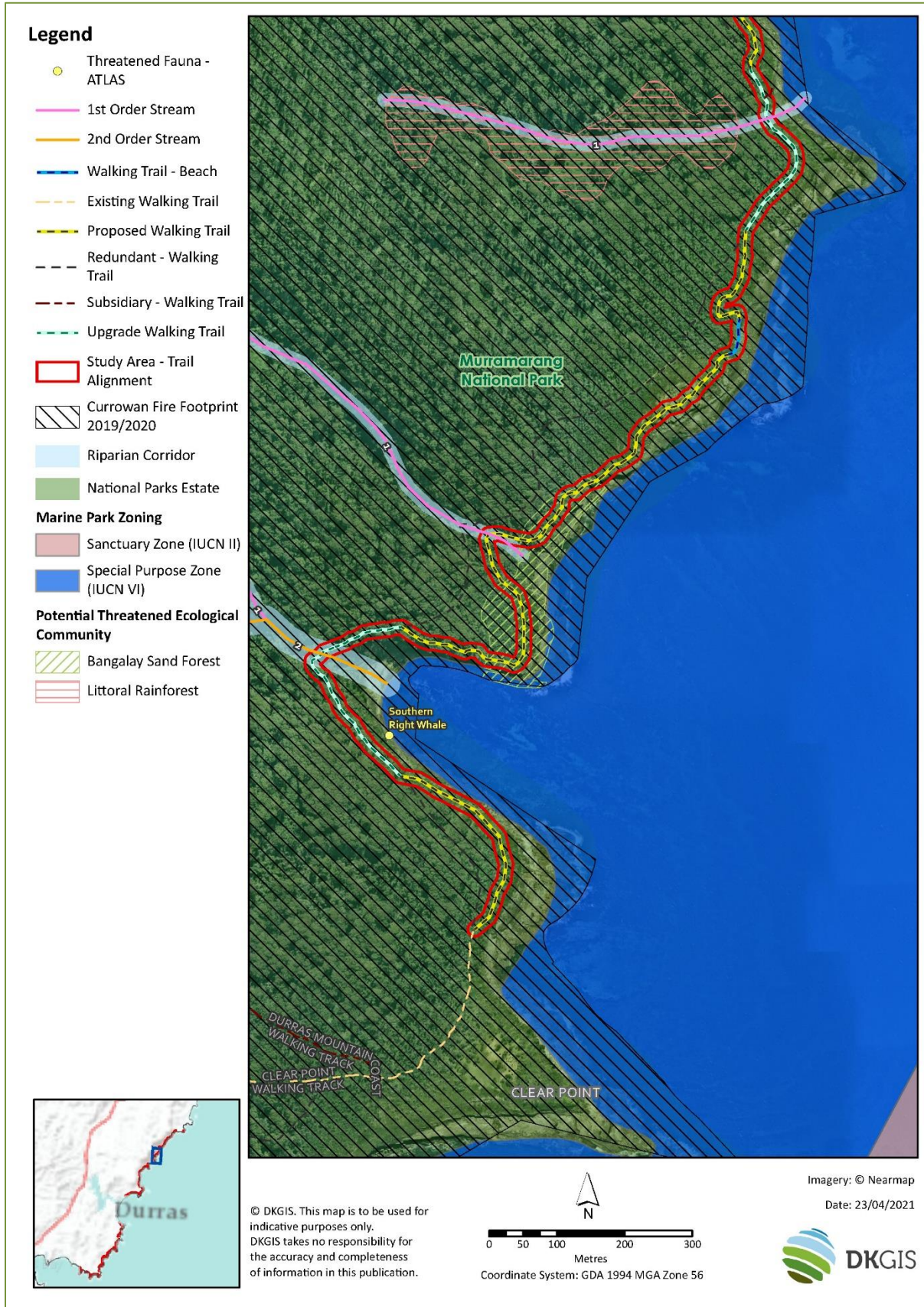
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 28: Key ecological considerations for construction and beach – Pebbly Beach towards Clear Point



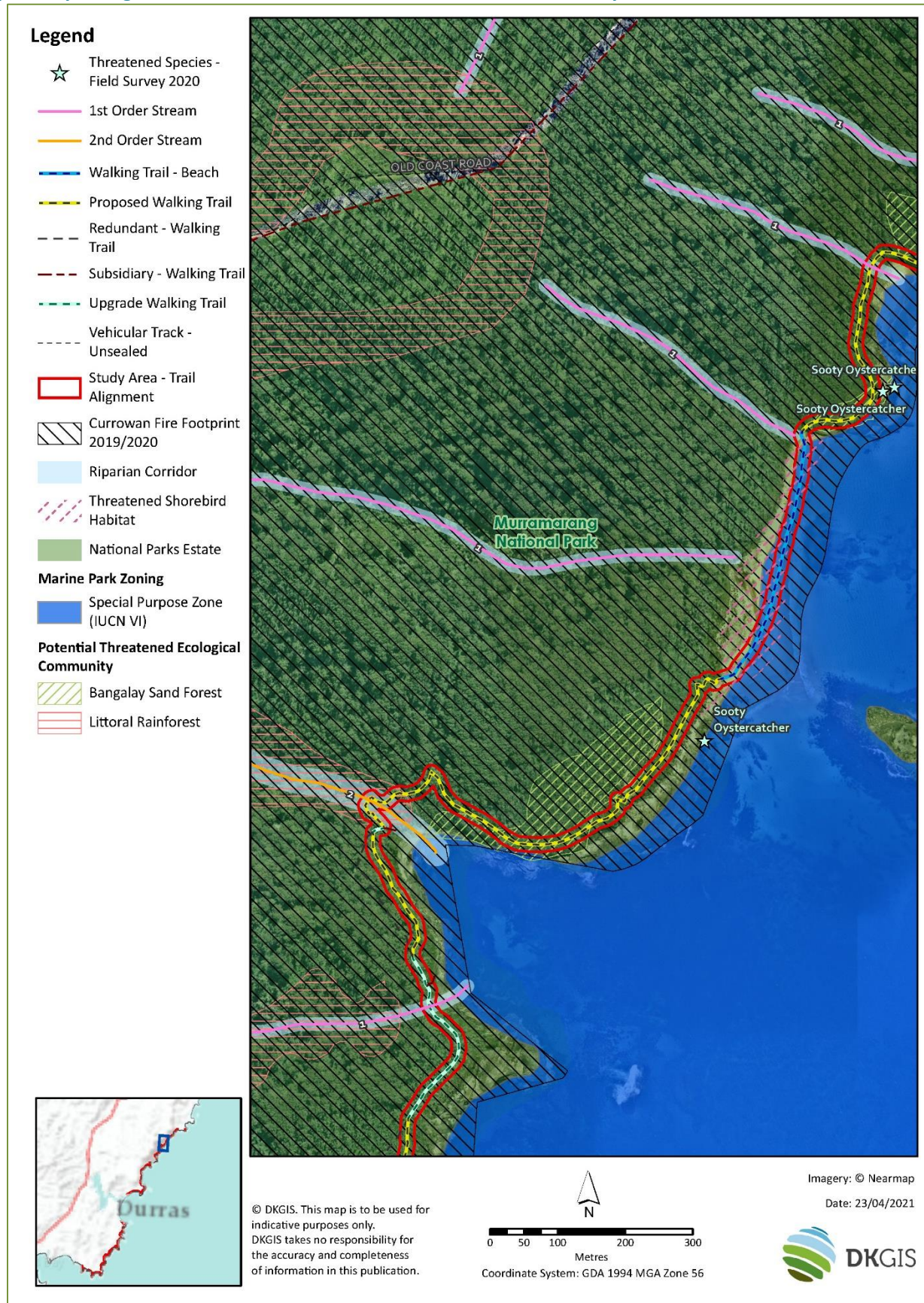
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 29: Key ecological considerations for construction and beach – Clear Point towards Snake Bay



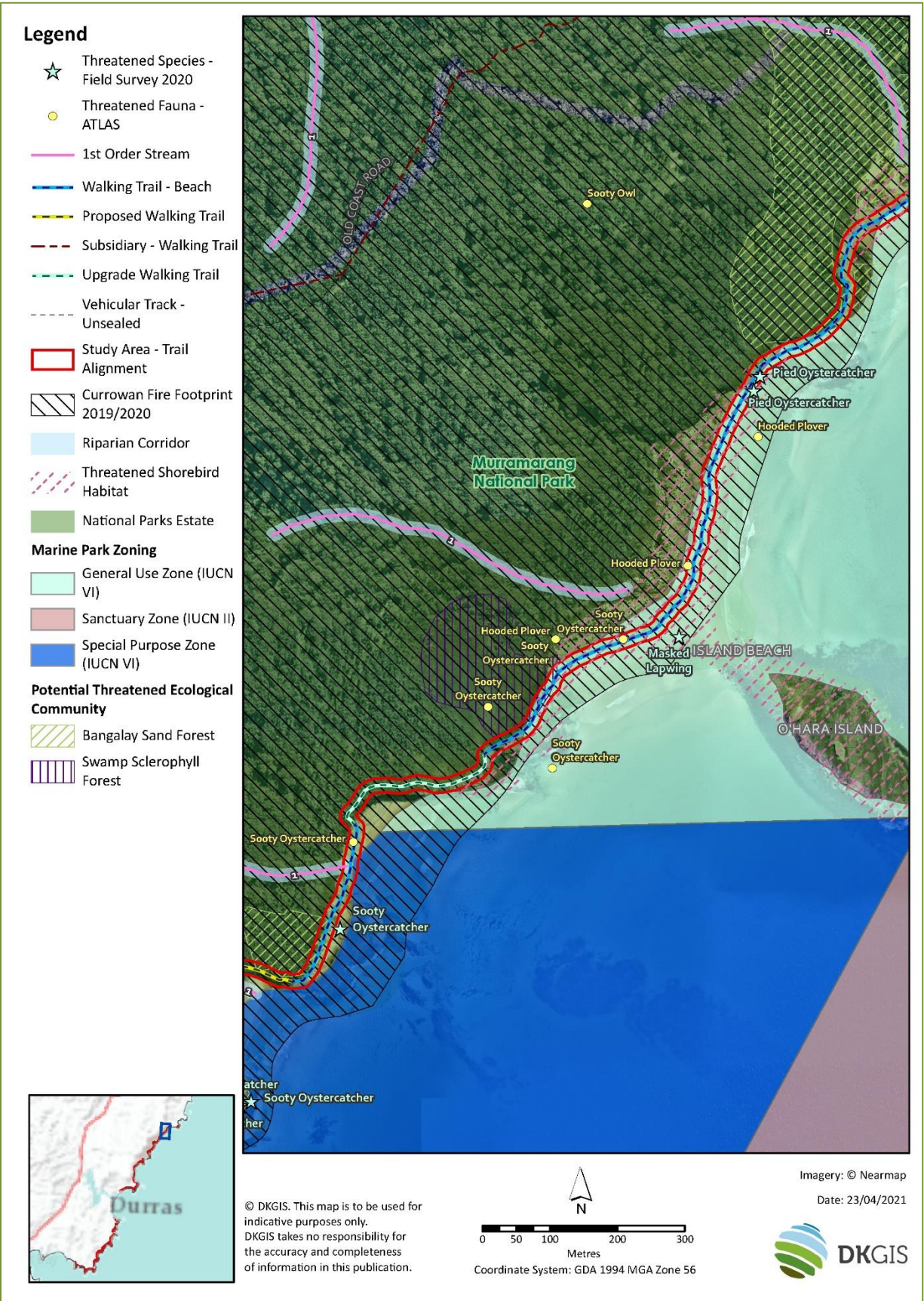
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 30: Key ecological considerations for construction and beach – Snake Bay to Dawsons Beach



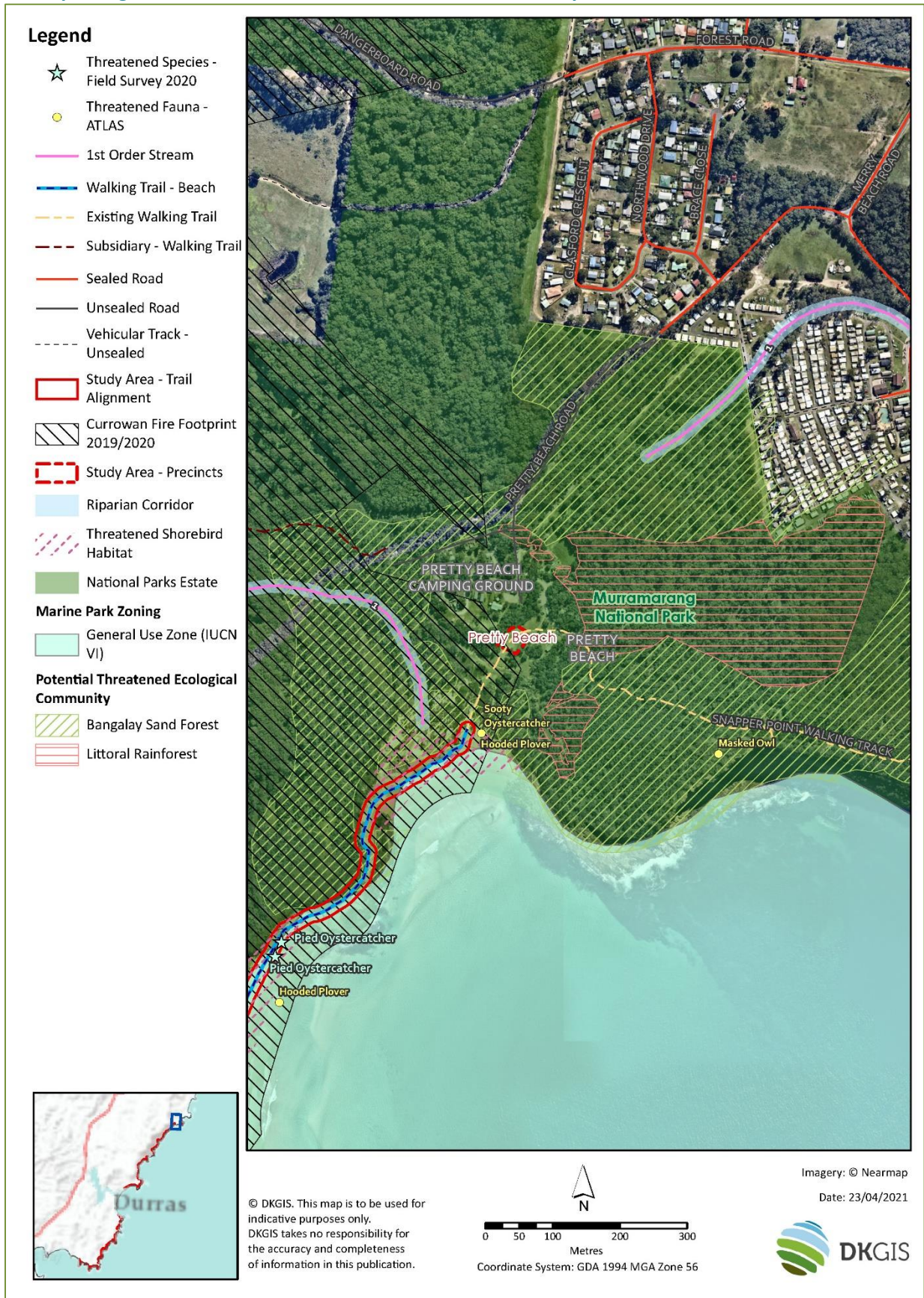
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 31: Key ecological considerations for construction and beach – Island Beach



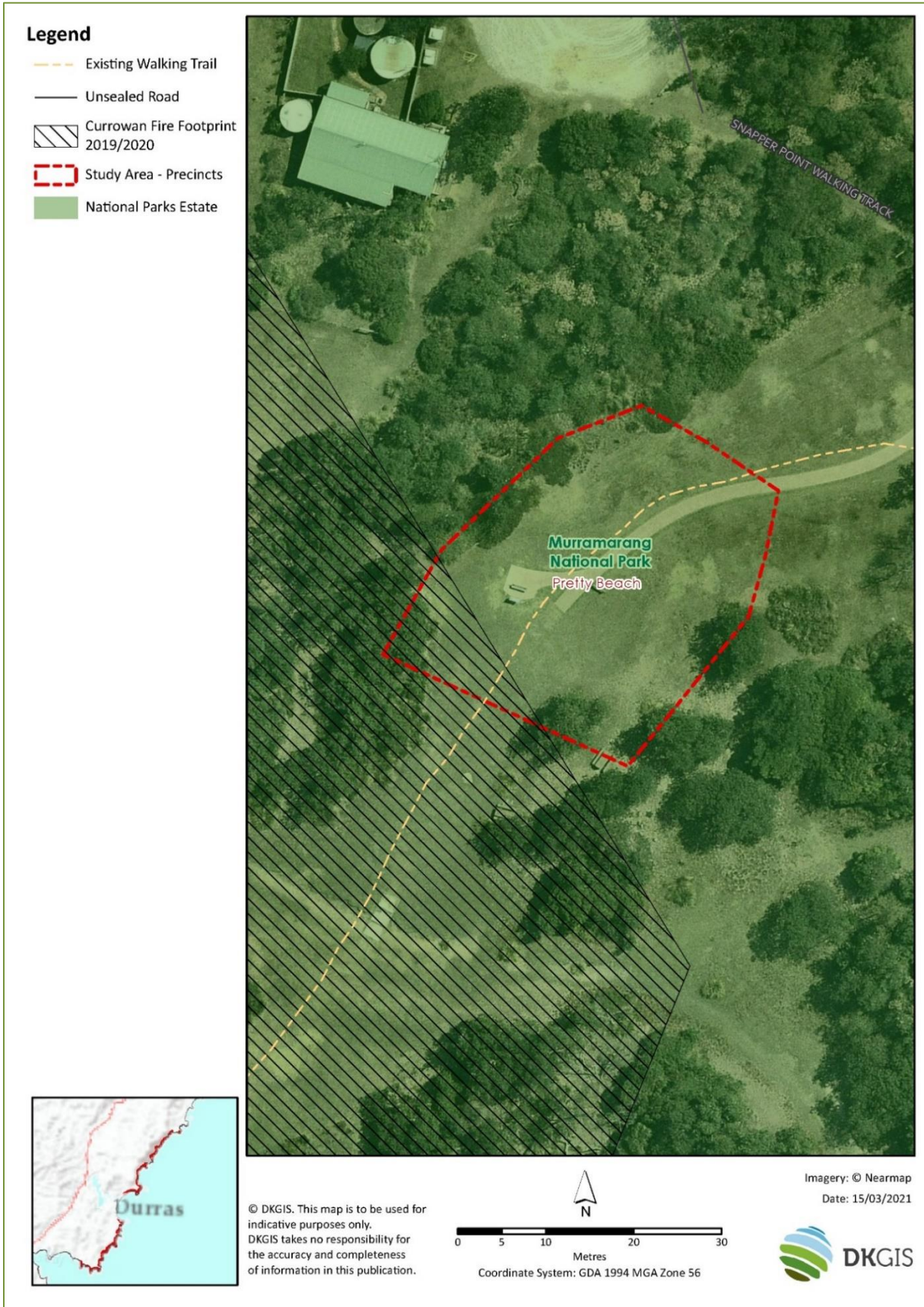
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 32: Key ecological considerations for construction and beach – Pretty Beach surrounds



Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 33: Key ecological considerations for construction and beach – Pretty Beach precinct



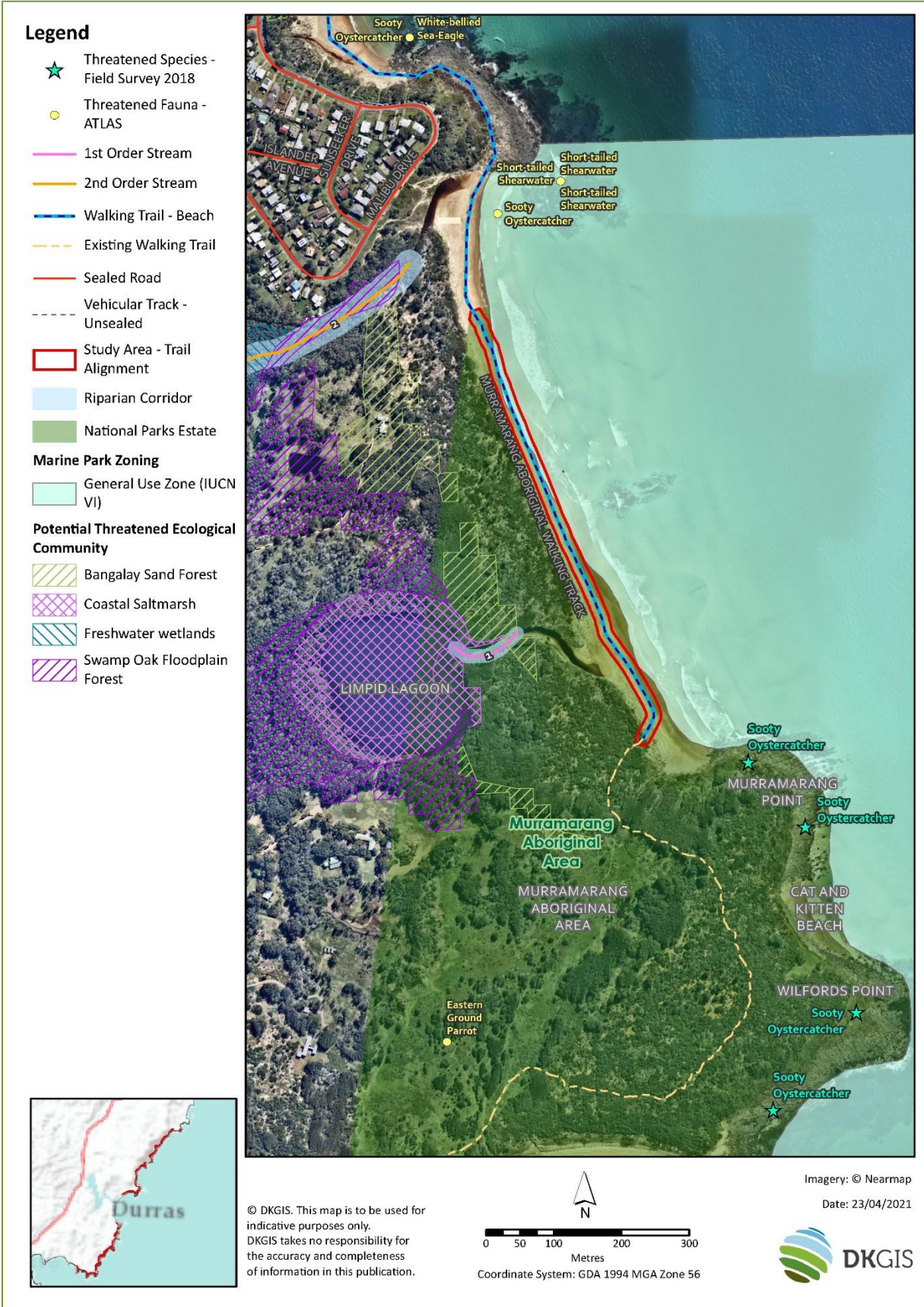
Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 34: Key ecological considerations for construction and beach – Snapper Point



Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

Map 35: Key ecological considerations for construction and beach – Murramarang Aboriginal Area north



Note: The spatial layers used in preparing the above map do not always align with on-ground occurrences.

9.22. Aboriginal cultural heritage values

The general land and seascape of this part of the coastline is considered significant by many local Aboriginal people. Archaeological evidence suggests that Aboriginal people have been present in the area for at least 20,000 years (Feary and Niemoeller 2020). Aboriginal sites and artefacts are common, and the evidence suggests a resource rich area which Aboriginal people used for many generations. Beach terraces, hind dunes and headlands with rock platforms nearby support a considerable number of recorded sites. The most common site type is midden, which range from a collection of small shell deposits to large complexes that contain a range of shells and stone artefacts scatters, with some also containing burials or cremated remains (NGH 2021).

Aboriginal cultural heritage assessments were carried out for the proposed activity (Feary and Niemoeller 2020 and NGH 2021). Assessments were carried out in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011), and the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b). The final ACHAR details the consultations carried out with the relevant Aboriginal community in relation to the proposed activity in accordance with the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010a). The findings of the Aboriginal cultural heritage assessments reflect the evidence of previous archaeological surveys. Numerous artefact scatters and shell middens were recorded. The assessments helped define the final alignment of the walking trail components. The track alignment has been amended to avoid a number of significant middens and artefact scatters on some headlands and hind dunes.

The preliminary assessment noted that “discussions with Walbanga women indicate that the Pebbly Beach or Depot Beach area contains burials of relative with a tree marking the grave. The Oaky Beach area was also identified as a place of traditional camping and resource collecting” (Feary and Niemoeller 2020; p 120). The track has been aligned to avoid these and other potentially culturally sensitive areas at Oaky Beach and at the north Oaky Beach track.). The precinct design has been developed to utilise existing disturbed areas to minimise impacts to cultural sites. During consultation with the Aboriginal community during the final assessment it was noted that the whole area has intangible and cultural value. However, no specific cultural or social values of the area were made known to the consultant archaeologist conducting the final assessment (NGH 2021). Today local Aboriginal people are actively involved in the management of the national park, and particularly in the management of the Aboriginal Area.

The archaeological scientific value of the area, as noted above, is considerable with an important Holocene record of Aboriginal land use that provides research opportunities into changes over time (NGH 2021). The further investigations of the test pitting at Pretty Beach and Maloneys Beach may add to the scientific (archaeological) value of the area.

Consistent with NPWS policy and advice, further details on Aboriginal heritage items are not included in this REF.

9.23. Other heritage values

The results from the heritage database searches are in Appendix L. The search found 28 heritage items or places located within the vicinity of the study area (the exact location of a number of these items or places cannot be confirmed). The heritage items listed in Appendix L reflect the changes in land and sea use of the area and the socio-economic drivers of the times; from the period of early settlement and farming, through to the timber

industry era, to the more recent dependence on tourism and conservation with the declaration of the National Park.

Post-contact settlement, which commenced in the late 1820s/early 1830s, saw a number of farms around Kiola and Bawley Point established, as well as one at Durras Mountain, which is now in Murramarang National Park, in the 1860s. The late 1880s saw the beginning of the timber industry with the establishment of small sawmills and villages at Kiola, Bawley Point, Pebbly Beach and South Durras with logs sourced from the nearby forests. These early timber industry days were served by ships transporting timber and supplies up and down the coast, with the rugged Murramarang coastline claiming and wrecking several ships. Development of roads in the early 1900s led to an increase in road transport for timber, with the Forestry Department building roads in the 1920s and 1930s. Remnants of these early and more recent timber industry days are evident in the national park and surrounding areas with relics of the old mills, huts, and ship wrecks, and the presence of old town sites, school houses and logging roads. Development of the road network also opened up the area to holiday makers and a number of guest houses established from the 1930s. In 1973 Murramarang National Park was declared with approximately 1,970 ha gazetted (NPWS 2002a). Murramarang Aboriginal Area was declared in 1976. In 2001, as a result of the NSW and Australian governments Southern Regional Forest Agreement, the national park was extended by a further 10,000 ha. In 2006 the Batemans Marine Park was declared.

An evaluation of likelihood occurrence to help predict whether listed heritage items and places are likely to occur or have potential to occur in the study area was carried out. The evaluation found nine items or places occurred or potentially occurred within or immediately adjacent to the study area. These items and places are in Table 21. As the detail in most of the listings is lacking, it is possible that some listings are duplicated across the different databases. The Aboriginal cultural heritage of the area is discussed in Section 9.22 above.

Table 21: Listed heritage items within or immediately adjacent to the study area

Context	Item name
HHIMS/NPWS/OEH Heritage and Conservation Register (s. 170 Heritage Act)	Site of Former Huts (Element of Huts and Gravel Pit Complex) (s.170 potential)
	Eaglehawk House Site Wasp Head (Element of Durras Historic Sites Complex) (s. 170 potential)
	Pebbly Beach Town Site (Element of Pebbly Beach Complex) (s. 170 listed)
	Pebbly Beach Mooring Rings (Element of Pebbly Beach Complex) (s. 170 listed)
	Ocean View; Pebbly Beach Cabins (Element of Pebbly Beach Complex) (s. 170 listed)
	Cabin 01; Depot Beach (Element of Depot Beach Cabins Complex) (s. 170 listed)
	Depot Beach Mooring (Element) (s. 170 potential)
	Wasp Head (Element) (s. 170 potential)
Local Councils' LEPs	Pebbly Beach Sawmill Complex, including sawmill remnants, town and school site

Notes: Consistent with NPWS advice the exact location details of heritage items are not included in this REF.

9.24. Recreation values

Murramarang National Park and Murramarang Aboriginal Area are public reserves that have a range of recreational values for visitors to experience. These include walking, picnicking, general appreciation of natural and cultural heritage through onsite and interactive interpretation opportunities, nature appreciation, camping, bird watching, whale watching and educational. The NPWS provides many facilities to support the recreational values of the reserves, including walking tracks, picnic areas, toilets, camping areas, cabin accommodation, and lookouts. Infrastructure that supports some of these recreational activities is found within the study area; namely walking tracks, lookouts and seats.

The study area is also adjacent to, or in the vicinity of, public reserves managed by Shoalhaven City Council and Eurobodalla Shire Council. Maloneys Beach precinct is immediately adjacent to a public recreation reserve managed by Eurobodalla Shire Council. There are also privately owned and operated tourism facilities in the locality. These public reserves and privately owned facilities include camping areas, toilets and picnic areas.

Pebbly Beach is listed for State social significance under s. 170 of the Heritage Act as a special natural place valued by the Moruya and Batemans Bay communities, and also by holiday-makers from Canberra and Sydney, especially for its flora and fauna values and its scenic qualities. There is a strong degree of community attachment arising from long use of the areas as a place for recreation and holiday-making (particularly sightseeing, picnicking, holidaying, bush walking, whale watching, water activities).

9.25. Scenic and visually significant areas

The study area encompasses the dramatic Murramarang coastline which offers spectacular views north and south. The study area has views out to sea, of sheer cliff lines and angular rocky ledges with unusual geological features. It overlooks and crosses secluded sandy beaches nestled in bays with rainforest pockets, across to the culturally significant Durras Mountain. The scenery extends from the tree lined headlands to the rocky platforms and out to islands; the latter of which are important bird sanctuaries. There are numerous vantage points along the study area that provide vistas of this spectacular scenery, as well as the opportunities to watch whales and see birds of prey soaring overhead on thermal breezes. The spectacular scenery of the study area is often within the backdrop of the giant spotted gum forest that is scattered with burrawangs. Pebbly Beach has been afforded particular recognition for its scenic qualities (see Section 9.24 above).

9.26. Education and scientific values

Murramarang National Park and Murramarang Aboriginal Area have long been the venue for educational and interpretive activities conducted by the NPWS, with regular Discovery Ranger programs being held in both reserves most holiday seasons. Many of these programs have centred on areas that are part of the study area.

The national park and the Aboriginal area have also been ongoing educational resources, at least since the early 1980s, for the Australian National University. The university field station is located at nearby Kioloa, and as part of the field studies there has been extensive archaeological investigations in both the park and the Aboriginal area (Feary and Niemoeller 2020)), as well as investigations by other academic disciplines. A number of the archaeological sites within the Murramarang National Park and the Aboriginal Area, including in the study area, are considered scientifically significant (Feary and Niemoeller 2020)). A site at Murramarang Aboriginal Area is considered the most significant site on the south coast of NSW (Feary and Niemoeller 2020)). Although the proposed activity is within the vicinity of this site, there are no works planned for the Aboriginal area for the proposed activity.

As discussed in Section 9.6, the geology of Murramarang National Park is considered scientifically important because of evidence of transition from a glacial to a non-glacial period, and the unconformity between the rocks of the Permian sedimentary beds of the Sydney Basin and the older Ordovician Wagonga beds. There are also: sedimentary breccias; fossil logs; ironstone boxwork; shell fossils including a type locality; and examples of differential erosion in a varied assemblage of geological structures. The exposed features of these geologically important formations are not within the study area.

9.27. Interests of external stakeholders (e.g. adjoining landowners, leaseholders)

Adjacent lands of the study area include public lands managed as reserves by Eurobodalla Shire Council and Shoalhaven City Council (see Section 9.24). Eurobodalla Shire Council and Shoalhaven City Council have an interest in the proposed activity and are seeking funding to construct new walks that will connect to the Murramarang South Coast Walk. The NPWS has been in discussion with both councils and will provide them with a copy of this REF.

The suburb of Maloneys Beach is adjacent to track head precinct, at the southern end of the study area. Visitors to the track head precinct will pass through the suburb. The proposed carpark at the track head is close to nearby houses. The adjoining suburb of Long Beach is within a few kilometres of the study area. These suburbs are zoned *R2 Low density residential* under the Eurobodalla LEP. Similarly, the villages of South Durras, North Durras, Depot Beach and Merry Beach are all close to the study area. The lands at South Durras are zoned *R2 Low density residential* under the Eurobodalla LEP and the lands for the other villages are all zoned *RU 5 Village* under the Shoalhaven LEP.

A lease area in the national park for NRMA Murramarang Beachfront Holiday Resort at South Durras is immediately adjacent to the study area, with the proposed activity alignment on the beach below the lease. It is expected that users of the proposed multi-day walk may access the track from, or use the accommodation of, the resort. There is a freehold lot near Pebbly Beach cabins. This property is zoned *RU2 Rural landscape* under the Shoalhaven LEP. The property is adjacent to the study area of the proposed activity where the proposed alignment follows the rock platform around the headland and then along the beach.

The Batemans Marine Park adjoins, and sometimes, overlaps, the study area. The Marine Park extends from the three-nautical-mile offshore limit of NSW waters to the mean high-water mark. The Marine Park has a “large expanses of rocky reef that support a diverse array of fish, invertebrates and algae. Rocky shores, offshore rocky reefs, kelp beds, seagrasses, mangroves, sponge gardens, sandy beaches, estuaries and open waters are key habitats.” (Department of Primary Industries n.d.). The zoning that applies along the Murramarang coastline is detailed in Table 22.

Table 22: Batemans Marine Park zoning applicable to the Murramarang coastline

Zone	Description	Activity
General Use Zone	Provide for a wide range of environmentally sustainable activities.	Recreational and commercial activities (including recreational and commercial fishing), scientific research and educational activities.
Habitat Protection Zone	Protect physical and biological habitats by reducing high impact activities.	Recreational and commercial activities (including recreational fishing and some forms of commercial fishing), scientific

		research, educational activities and other activities.
North Head Habitat Protection Zone (Restricted)	Protect physical and biological habitats by reducing some high impact activities.	Shore-based recreational line fishing permitted. No other type of fishing or collecting allowed.
Murramarang Coast Special Purpose Zone	Provide high level of biodiversity conservation whilst allowing for the sustainable commercial harvest of abalone in areas of critical importance to the abalone fishery in the marine park.	No taking or attempting to take fish except harvesting in the course of commercial fishing of abalone.

There is interest in the project from the non-government conservation sector (e.g. the National Parks Association, the NSW National Trust), the outdoor and tourism sector (e.g. bushwalking clubs) and the business sector (Shoalhaven Chamber of Commerce, Batemans Bay Business and Tourism Chamber) to develop the concept of the Great South Coast Walk from Royal National Park near Sydney to the Victorian border (see Great South Coast Walk 2016). If this concept is developed it is expected that it would incorporate the proposed Murramarang South Coast Walk.

10. Impact assessment

The level, type, nature and extent of the impacts of the proposed activity are detailed in the following sections. Other considerations include whether the proposed activity complies with relevant policies and standards and whether there is adequate information to make a confident assessment of the impact.

To minimise the negative impact the proposed activity may have on the existing environment, environmental safeguards and mitigation measures are recommended. **The proposed activity is to incorporate the environmental safeguards and mitigation measures.**

10.1. Physical and chemical impacts

The level, type, nature and extent of the physical and chemical impacts of the proposed activity are detailed in Table 23.

Table 23: Physical and chemical impacts during construction and operation

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
<p>1. Is the proposed activity likely to impact on soil quality or land stability?</p>	<p>Yes</p>	<p>Negligible</p>	<p>The soils in much of the study area are prone to erosion as evidenced by the erosion on old and existing tracks.</p> <p>Earthworks associated with construction and maintenance of the walking trail components of the proposed activity will be carried out by handheld tools, small plant and machinery e.g. chainsaws and brush cutters, and mini excavators. Larger machinery will be used for works associated with the precinct upgrades. The NPWS will advise on the permitted use of any non-handheld machinery.</p> <p>The construction phase of the proposed activity will result in minor and temporary disturbance to the soil structure/land stability with: ground cover and mid-story vegetation clearing for development of new track, upgrading sections of existing tracks and development of the proposed track head precincts; and earthworks associated with benching, installation of grade dips and rock retaining walls on steep sections, and minor drainage works. Impacts will generally be contained within the subject site. These disturbances may also impact on fauna, including soil fauna.</p> <p>There is a potential negative impact from petrochemical spills associated with the use of machinery and equipment.</p> <p>The soil quality may be negatively impacted by the operation phase of the proposed activity by insufficient maintenance of the track; and visitors developing unofficial tracks.</p>	<p>Erosion and sediment controls are to be in place prior to any vegetation clearing and earthworks commencing and is to be maintained until run-off catchments are stabilised. Erosion and sediment controls are to be inspected regularly by the relevant contractor and by NPWS staff. Sediment control measures are also to be in place for the storage of any spoil as required.</p> <p>Disturbed areas must be progressively stabilised during construction.</p> <p>All machinery is to be free from any fuel and other pollutant residues, with connections and hoses inspected regularly and records kept.</p> <p>Contractors are to have, and be competent in the use of, petrochemical spill kits for use of any spillage during the construction. Temporary bunds must be used for all refuelling activities. The NPWS is to be notified of any spills and the action taken to contain them.</p> <p>Maintenance and replacement schedules are to take into account the life cycle of materials that may harm the environment prior to any obvious signs of decay e.g. FRP, and are to be incorporated into NPWS asset management system.</p> <p>Spoil is to be stockpiled in cleared areas immediately adjacent to the subject site of the proposed activity. No spoil is to be stored or dispersed in riparian corridors, beaches or on rock platforms. Spoil will be managed in</p>

Murramarang South Coast Walk (NPWS Estate) Final alignment - Review of Environmental Factors

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			<p>Soil quality/land stability will be improved in the areas where existing redundant track is to be closed and rehabilitated. This would be a positive impact.</p> <p>Rocks for stepping-stone and retaining walls could be fauna habitat.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall negligible impact on soil quality and/or land stability as a result of the proposed activity.</p>	<p>accordance with the <i>Waste Avoidance and Resource Recovery Act 2001</i> (NSW).</p> <p>Rock is to be sourced off-site from a registered quarry for the construction of rock retaining walls and stepping-stones and is to be consistent with the geology of the site.</p> <p>Earthworks are not to be carried out for the proposed activity during or within two days of heavy rainfall.</p> <p>Interpretation material is to be include information on importance of staying on formed tracks.</p> <p>The use of vehicles in the construction and operation phases of the trail components of the proposed activity is to be confined to the existing vehicle tracks.</p>
<p>2. Is the activity likely to affect a waterbody, watercourse, wetland or natural drainage system?</p>	<p>Yes</p>	<p>Negligible</p>	<p>The Clyde River Estuary is a Nationally Important Wetland and is adjacent to the study area. There are numerous small drainage systems/creeks within the study area. These are intermittent and/or ephemeral.</p> <p>The trail components of the proposed activity will not directly impact the estuary i.e. the low tide options along the shoreline of the river requires no earthworks. Indirect impacts of the trail components of the proposed activity on the river may include anthropogenic impacts such as rubbish left by walkers.</p> <p>The Maloneys Beach and Yellow Rock precinct upgrades do involve earthworks adjacent to the estuary i.e. closing and rehabilitating an informal track at Maloneys Beach and stopping general vehicle beach access and removal of the broken boat ramp at Yellow Rock. The result of these earthworks is likely to restore the natural drainage of the area.</p> <p>The trail components of the proposed activity follow the contours as much as possible and have been aligned to cross</p>	<p>Erosion and sediment controls are to be in place prior to any vegetation clearing and earthworks commencing and is to be maintained until run-off catchments are stabilised. Erosion and sediment controls are to be inspected regularly by the relevant contractor and by NPWS staff. Sediment control measures are also to be in place for the storage of any spoil as required.</p> <p>Disturbed areas must be progressively stabilised during construction.</p> <p>All machinery is to be free from any fuel and other pollutant residues, with connections and hoses inspected regularly.</p> <p>Contractors are to have, and be competent in the use of, petrochemical spill kits for use of any spillage during the construction. Temporary bunds must be used for all</p>

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			<p>the drainage systems/creeks upstream to avoid the need to construct bridges or causeways etc. Benching work has the potential to affect these small drainage systems/creeks. Where it is not possible to align the trail upstream and crossing downstream is unavoidable, stepping- stones are to be installed. Minor flooding may occur in drainage systems/creeks where stepping-stones will be installed. These could alter the waterflow of the drainage systems/creeks when it is running.</p> <p>Indirect impacts of the proposed activity on the Clyde River may include anthropogenic impacts such as pollutants such as fuels and oils from machinery during construction, as well as rubbish left my walkers may enter the small drainage systems/creeks. Vegetation clearing and earthworks could result in some sedimentation into these drainage systems/creeks. These impacts could also affect aquatic fauna.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall negligible impact on waterbodies, watercourses, wetlands or natural drainage systems as a result of the proposed activity.</p>	<p>refuelling activities. The NPWS is to be notified of any spills and the action taken to contain them.</p> <p>Maintenance and replacement schedules are to take into account the life cycle of materials that may harm the environment prior to any obvious signs of decay e.g. FRP, and are to incorporated into NPWS asset management system.</p> <p>Spoil from track construction is to be stockpiled in cleared areas immediately adjacent to the subject site of the proposed activity. No spoil is to be stored or dispersed in riparian corridors, beaches or on rock platforms. Spoil will be managed in accordance with the <i>Waste Avoidance and Resource Recovery Act 2001</i> (NSW).</p> <p>Rock is to be sourced off-site from a registered quarry for the construction of rock retaining walls and stepping-stones and is to be consistent with the geology of the site.</p> <p>Earthworks are not to be carried out for the proposed activity during or within two days of heavy rainfall.</p>
<p>3. Is the activity likely to change flood or tidal regimes, or be affected by flooding?</p>	<p>Yes</p>	<p>Negligible</p>	<p>No flood prone land was identified for the study area. The proposed activity is unlikely to alter the flood or tidal regime as no barriers to waterflow will be installed. The proposed activity is unlikely to change flood or tidal regimes.</p> <p>Minor flooding may occur in drainage lines where stepping-stones will be installed. Any such flooding would be ephemeral and any impact on the proposed activity would be temporary and insignificant.</p> <p>Some rock platforms may be inundated due to spring tides or large swells.</p>	<p>Interpretive material aimed at promoting an immersive visitor experience and positive visitor behaviour is to be made available prior to the walk, with key messages including the importance of staying on formed tracks and the risks associated with cliffs, bushfire and using the foreshore alignments during high tides.</p>

Murramarang South Coast Walk (NPWS Estate) Final alignment - Review of Environmental Factors

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall negligible impact to flood and/or tidal regimes as a result of the proposed activity.	
4. Is the activity likely to affect coastal processes and coastal hazards, including those projected by climate change (e.g. sea level rise)?	No	N/A	<p>The study area includes areas influenced by coastal processes. The study area is also subject to coastal risk by sea level rise and storm surge. Coastal Risk Australia mapping shows that the predicted highest tide in 2100 will result in increased inundation within the study area along the rock platforms and in low lying areas such as some of the small drainage systems/creeks. The proposed activity will not affect these process and risks.</p> <p>Increased coastal activity will contribute to accelerated rates of cliff collapse. Preliminary assessments use to help define the final alignment of the trail components of the proposed activity included geo-technical assessments. These assessments resulted in the alignment being moved inland in a number of places and located away from these high potential sites.</p> <p>The trail components of the proposed activity will pass through the active coastal zone but no work is proposed at these locations.</p>	No additional safeguards or mitigation measures are necessary.
5. Does the activity involve the use, storage, or transport of hazardous substances or the use or generation of chemicals, which may build up residues in the environment?	Yes	Negligible	<p>Earthworks associated with construction and maintenance of the walking trail components of the proposed activity will be carried out by handheld tools, small plant and machinery e.g. chainsaws and brush cutters, and mini excavators. Larger machinery will be used for works associated with the precinct upgrades. The NPWS will advise on the permitted use of any non-handheld machinery.</p> <p>The proposed activity does involve the use and transport of hazardous substances and the use of chemicals which may build up residues in the environment, including waterways,</p>	<p>All machinery is to be free from any fuel and other pollutant residues, with connections and hoses inspected regularly.</p> <p>Contractors are to have, and be competent in the use of, petrochemical spill kits for use of any spillage during the construction. The NPWS is to be notified of any spills and the action taken to contain them.</p> <p>Spoil from track construction is to be stockpiled in cleared areas immediately adjacent to the subject site of</p>

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			<p>and may potentially harm fauna. The hazardous substances and chemicals to be used include fuels and oils for machinery, used primarily in the construction phase of the proposed activity.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall negligible impact by the use and transport of such hazardous substance and chemicals as a result of the proposed activity.</p>	<p>the proposed activity. No spoil is to be stored or dispersed in riparian corridors, beaches or on rock platforms. Spoil will be managed in accordance with the <i>Waste Avoidance and Resource Recovery Act 2001</i> (NSW).</p> <p>Maintenance and replacement schedules are to take into account the life cycle of materials that may harm the environment prior to any obvious signs of decay e.g. FRP, and are to be incorporated into NPWS asset management system.</p> <p>Excess materials e.g. FRP off-cuts, are to be stockpiled in bulka bags to contain fines and ready for transport from work sites.</p> <p>Earthworks are not to be carried out for the proposed activity during or within two days of heavy rainfall.</p> <p>Materials to be stockpiled in bulka bags to contain fines and ready for transport from work sites.</p>
<p>6. Does the activity involve the generation or disposal of gaseous, liquid or solid wastes or emissions?</p>	<p>Yes</p>	<p>Negligible</p>	<p>Earthworks associated with construction and maintenance of the walking trail components of the proposed activity will be carried out by handheld tools, small plant and machinery e.g. chainsaws and brush cutters, and mini excavators. Larger machinery will be used for works associated with the precinct upgrades. The NPWS will advise on the permitted use of any non-handheld machinery.</p> <p>The proposed activity may involve the generation of gaseous, solid wastes and emissions. There will be gaseous waste generated from the use of the machinery and equipment, primarily in the construction phase of the proposed activity. Dust and other airborne fine particle may result from the construction works, and the vegetation modification and clearing.</p>	<p>All machinery is to be free from any fuel and other pollutant residues, with connections and hoses inspected regularly.</p> <p>Contractors are to have, and be competent in the use of, petrochemical spill kits for use of any spillage during the construction. The NPWS is to be notified of any spills and the action taken to contain them.</p> <p>Maintenance and replacement schedules are to take into account the life cycle of materials that may harm the environment prior to any obvious signs of decay e.g. FRP, and are to be incorporated into NPWS asset management system.</p>

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			<p>Solid waste may be generated with rubbish and human waste during the construction and operation phase of the proposed activity.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall negligible impact by the generation or disposal of gaseous, liquid or solid wastes or emissions as a result of the proposed activity.</p>	<p>Earthworks are not to be carried out for the proposed activity during or within two days of heavy rainfall.</p>
<p>7. Will the activity involve the emission of dust, odours, noise, vibration or radiation in the proximity of residential or urban areas or other sensitive locations?</p>	<p>Yes</p>	<p>Low; Negative</p>	<p>The construction phase of the precinct upgrade components of the proposed activity is likely to produce dust, odours and noise, and maybe vibrations, including near the residential area of Maloneys Beach.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall low negative impact by the emission of dust, odours, noise and vibration adjacent to the residential area at Maloneys Beach as a result of the proposed activity.</p>	<p>All machinery is to be in good working condition and be fitted with muffling devices if available.</p> <p>Work must be restricted to standard construction hours:</p> <ul style="list-style-type: none"> • Monday to Friday 7.00 am to 6.00 pm. • Saturdays 8.00 am to 1.00 pm. • No construction on Sundays or Public Holidays <p>Work hours at Maloneys Beach must be specified in consultation with local residents.</p> <p>The NPWS will develop a notification procedure prior to any works commencing, and review as required.</p> <p>A temporary wind break/barrier is to be installed adjacent to neighbouring residential properties during the construction phase of the precinct upgrade at Maloneys Beach, and a permanent vegetation barrier is to be established in this area.</p>

10.2. Biological impacts

The level, type, nature and extent of the biological impacts of the proposed activity are detailed in Table 24.

Table 24: Biological impacts during construction and operation

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
<p>1. Is any vegetation to be cleared or modified? (includes vegetation of conservation significance or cultural landscape value)</p>	<p>Yes</p>	<p>Low; Negative</p>	<p>The proposed activity requires modification or clearing of up to a maximum of 1.95 ha native ground cover and/or understory vegetation with construction of new trail sections (approx. 12.77 km), upgrading of existing trail sections (approx. 3.08 km), and the works associated the precinct upgrades. This impact is spread across 48 km.</p> <p>The existing trails to be made redundant by the proposed activity will result in up to approximately 0.7 ha of native vegetation being restored from the closure and rehabilitation of redundant track.</p> <p>The native forested vegetation to be cleared or modified consists of a number of communities, with the dominant plant community being <i>Spotted Gum - White Stringybark – Burrawang shrubby open forest on hinterland foothills, northern South East Corner Bioregion</i>. All vegetation communities directly affected by the proposed activity are relatively widespread elsewhere within Murramarang National Park and Murramarang Aboriginal Area. The plant communities affected are also common in the locality and the bioregion. The linear nature of the impacts means that for flora values that transcend the study area, the proposed activity may have minimal impact. However, for flora that is specific to a small number of locations within the study area or involves discrete populations, there is potential for more impact. However, given the extent of similar plant communities in the locality, particularly in the Murramarang National Park and Murramarang Aboriginal Area, the impacts to flora and plant communities are considered relatively minor e.g. low.</p>	<p>An independent ecologist is to carry out pre-clearing inspection to:</p> <p>a. Microsite the trail alignment components to an appropriate distance (i.e. 10 m), from hollow-bearing trees, hollow logs and, in accordance with Standards Australia (2009) <i>AS 4970-2009 Protection of trees on development sites</i>, that there is no disturbance within the Tree Protection Zone and Root Protection Zone of any known feed trees and hollow-bearing trees. The alignment for the trail components is to be marked clearly with bunting or flagging.</p> <p>b. Identify and realign the trail components away from any Scrub Turpentine trees.</p> <p>Removal or modification of logs and tree stumps is to be avoided.</p> <p>Vegetation modification or clearing is to be restricted to that required to develop and maintain the proposed activity. The extent of vegetation modification or clearing is to be clearly marked on site prior to any works commencing. Such marking may comprise star pickets with bunting or flagging to clearly demarcate the limit.</p> <p>Native vegetation is not to be removed for fence construction.</p> <p>Cleared vegetation is to be stored within the subject site on already cleared areas. The cleared vegetation material may be used for rehabilitating areas or be strategically disposed of in the surrounding area.</p>

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Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			<p>A number of riparian corridors within the study area will be impacted by the proposed activity. This impact includes the modification or clearing of a small amount of ground cover and/or understory vegetation in a number of riparian corridors, potentially decreasing the ecological functioning of the corridors and reducing fauna habitat, although at a negligible level. As the riparian corridors connect with the surrounding vegetation, connectivity of the riparian corridors to the surrounding area will remain.</p> <p>The flora and fauna assessments identified one threatened flora species as occurring or potentially occurring within the study area: <i>Rhodamnia rubescens</i> (Scrub Turpentine). This species is listed as Critically endangered under NSW legislation. No species listed as having <i>Cultural landscape value</i> under the NSW Heritage Register were identified as potentially occurring within the study area.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall low negative impact by the modification and clearing of vegetation as a result of the proposed activity.</p>	<p>Machinery, vehicles, materials or equipment are not to be stored in adjacent areas of native vegetation which are not part of the subject site of the proposed activity. Existing cleared areas are to be utilised for this purpose.</p> <p>Construction works for the proposed activity should seek to minimise the disturbance to riparian corridors.</p>
<p>2. Is the activity likely to have a significant effect on threatened flora species, populations, or their habitats, or area of outstanding biodiversity value (refer to threatened species assessment of significance (5-part test))?</p>	<p>No</p>	<p>Negligible</p>	<p>Targeted surveys of threatened orchids at time of flowering failed to find any specimens.</p> <p>One threatened flora species, Scrub Turpentine, may occur or potentially occur in the study area.</p> <p>One threatened population, the Eurobodalla LGA Grater Glider, and its habitat may occur within the study area.</p> <p>There are no Areas of Outstanding Biodiversity Values listed under the BC Act for the study area.</p>	<p>An independent ecologist is to carry out pre-clearing inspection to:</p> <p>a. Microsite the trail alignment components to an appropriate distance (i.e. 10 m), from hollow-bearing trees, hollow logs and, in accordance with Standards Australia (2009) <i>AS 4970-2009 Protection of trees on development sites</i>, that there is no disturbance within the Tree Protection Zone and Root Protection Zone of any known feed trees and hollow-bearing trees. The alignment for the trail components is to be marked clearly with bunting or flagging.</p>

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
				b. Identify and realign the trail components away from any Scrub Turpentine trees.
3. Does the activity have the potential to endanger, displace or disturb fauna (including fauna of conservation significance) or create a barrier to their movement?	Yes	Low; Negative	<p>A number of flora species found within the study area and subject site may provide foraging habitat to a range of fauna, including fauna of conservation significance. Forest and woodland canopy and mid-story flora species may provide foraging habitat for threatened gliders, Eastern Pygmy Possums, Koala, Grey-headed Flying-fox, Swift Parrot, Glossy Black-Cockatoos and Gang Gang Cockatoos. Ground cover vegetation may provide foraging habitat for granivores and sheltering habitat for White Footed Dunnart. Some potential midstory foraging and sheltering resources may be modified or removed with the proposed activity.</p> <p>For the Koala, the known feed tree Forest Red Gum is scattered within the study area, particularly in the southern sections. It is likely that some of these occur in the subject site, although no mature canopy trees are to be removed as part of the proposed activity.</p> <p>Fauna may also be exposed to predation by predators due to displacement.</p> <p>Light spillage on habitat can impair behaviour of arboreal fauna species.</p> <p>The proposed activity will not create any barriers to fauna movement.</p> <p>Fauna species potentially occurring in the study area are unlikely to be pre-accustomed to the noise that will occur during the construction phase. The majority of fauna occurring in the study area is likely to be pre-accustomed to the noise during the operation phase of the proposed activity as much of the study area is part of an existing system of walking tracks. However, the proposed activity</p>	<p>An independent ecologist is to carry out pre-clearing inspection to:</p> <p>a. Microsite the trail alignment components to an appropriate distance (i.e. 10 m), from hollow-bearing trees, hollow logs and, in accordance with Standards Australia (2009) <i>AS 4970-2009 Protection of trees on development sites</i>, that there is no disturbance within the Tree Protection Zone and Root Protection Zone of any known feed trees and hollow-bearing trees. The alignment for the trail components is to be marked clearly with bunting or flagging.</p> <p>Construction works for the proposed activity should seek to minimise the disturbance to riparian corridors. This includes ensuring that any stormwater run-off is managed before discharging into the corridors.</p> <p>Work must be restricted to standard construction hours:</p> <ul style="list-style-type: none"> • Monday to Friday 7.00 am to 6.00 pm. • Saturdays 8.00 am to 1.00 pm. <p>Any fencing or barriers during the construction and operational phases of the proposed activity are to be of 'wildlife friendly' construction, i.e. shall not contain barbed wire, shall not impede the movement of fauna, through the subject site or adjacent areas.</p> <p>Interpretive material aimed at promoting an immersive visitor experience and positive visitor behaviour is to be made available prior to the walk, with key messages including the natural and cultural values of the area and the importance of staying on formed tracks. In addition, interpretive material is to be made available to visitors prior to the walk, i.e. NPWS website, brochures) and on signs at either end of known threatened shorebird nesting beaches,</p>

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Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			<p>is likely to increase the number of people visiting the study area.</p> <p>Hooded Plovers and Pied Oystercatchers in the important shorebird areas of Pretty Beach, Island Beach and Dawsons Beach may be disturbed by an increase in visitation to the area. These beaches are key breeding and foraging sites for Hooded Plover and Pied Oystercatcher. During spring there is potential for increased visitation to negatively impact these sites.</p> <p>Excluding the threatened shorebirds, the majority of fauna species of conservation significance that are known to occur, or that have potential to occur, in the study area and subject site are highly mobile and have a breeding and foraging range that extends to other areas within the immediate surrounds of the broader conservation estate, and elsewhere. Similar habitats to those affected by the proposed activity occur extensively in surrounding areas.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall low negative impact on the fauna of the study area as a result of the proposed activity.</p>	<p>to help mitigate potential adverse impacts on nesting success. Key messages are to include: no stopping on nesting beaches; keeping to shorelines/intertidal areas; and staying away from fenced areas during the nesting season.</p> <p>Site inductions and contractual arrangements are to ensure that all relevant personnel are made aware of: their responsibilities of carrying out works in a conservation reserve and a marine park; the key ecological values including threatened shorebirds and other matters.</p> <p>The NPWS will continue to work with volunteer groups and local councils to help protect the threatened shorebirds. This work will include fencing off breeding areas, installing signs and monitoring the threatened shorebirds.</p> <p>The threatened shorebird monitoring program is to continue and will include as a minimum, those areas where there are previous records of nesting i.e., Dawsons Beach, Island Beach, Oaky Beach, North Durras Beach, Pebbly Beach and Durras Lake Entrance. The NPWS will evaluate results to ensure the existing shorebird program maintains or improves shorebird outcomes.</p>
<p>4. Is the activity likely to have a significant effect on threatened fauna species, or their habitats, or areas of outstanding biodiversity value (refer to threatened species assessment of significance (5-part test))?</p>	<p>No</p>	<p>Low; negative</p>	<p>Taking into account the safeguards and/or mitigation measures, the 5-part test and MNES assessment of significance concluded that there will be no significant effect on any threatened fauna species, or their habitats by the proposed activity (see Section 11).</p> <p>There are no Areas of Outstanding Biodiversity Values listed under the BC Act for the study area.</p>	<p>As above.</p>

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
<p>5. Is the activity likely to impact on an ecological community of conservation significance?</p>	<p>Yes</p>	<p>Negligible</p>	<p>As noted earlier, all TECs are considered ‘potential’ as the available mapping has not been thoroughly ground-truthed, and the REF did not include soil sampling and condition assessments to verify the presence or absence of the TECs.</p> <p>Four TECs potentially occur within or immediately adjacent to the study area. These are: <i>Bangalay Sand Forest of the Sydney Basin and South East Corner Bioregions</i> (NSW TEC); <i>Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i> (NSW and Commonwealth TEC); <i>Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i> (NSW TEC)/<i>Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community</i> (Commonwealth TEC); and <i>Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions</i> (NSW TEC).</p> <p>The proposed activity will result in the modification or clearing of up to approximately 0.23 ha of potential Bangalay Sand Forest TEC. There are 11,200 ha extant of Bangalay Sand Forest TEC (Tozer <i>et al.</i> 2010).</p> <p>The proposed activity will result in an increase of up to approximately 0.08 ha of potential Littoral Rainforest TEC. There are 15,200 ha extant of Littoral Rainforest TEC (Tozer <i>et al.</i> 2010).</p> <p>The proposed activity will result in the modification or clearing of a negligible amount of potential Swamp Sclerophyll Forest TEC and no potential Swamp Oak Floodplain Forest/Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest TEC.</p>	<p>Vegetation modification or clearing is to be restricted to that required to develop and maintain the proposed activity. The extent of vegetation modification or clearing is to be clearly marked on site prior to any works commencing. Such marking may comprise star pickets with bunting or flagging to clearly demarcate the limit.</p> <p>Machinery, vehicles, materials or equipment is not to be stored in adjacent areas of native vegetation which are not part of the subject site of the proposed activity. Existing cleared areas are to be utilised for this purpose.</p> <p>Construction works for the proposed activity should seek to minimise the disturbance to riparian corridors. This includes ensuring that any stormwater run-off is managed before discharging into the corridors.</p>

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Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall negligible impact on ecological communities of conservation significance as a result of the proposed activity.	
6. Is the activity likely to have a significant effect on an endangered ecological community or its habitat (refer to threatened species assessment of significance (5 part test))?	No	Negligible	Refer to above. Taking into account the safeguards and/or mitigation measures, the 5-part test and MNES assessment of significance concluded that there will be no significant effect on any threatened ecological community or its habitat by the proposed activity (see Section 11).	N/A
7. Is the activity likely to cause a threat to the biological diversity or ecological integrity of an ecological community?	Yes	Negligible	The proposed activity requires modification or clearing of up to a maximum of 1.95 ha of native ground cover and/or understory vegetation directly impacted through construction of new trail sections, upgrading of existing trail sections, and precinct upgrades. This impact is spread across 48 km. The rehabilitation of redundant trail sections will result in the restoration of approximately 0.7 ha of native vegetation. Given the extent of similar communities and habitat in the locality, particularly in the conservation estate, it is unlikely that the proposed activity will cause a major threat to the biological diversity or ecological community of an ecological community. Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall negligible impact on the biological diversity or ecological integrity of an ecological community as a result of the proposed activity.	Vegetation modification or clearing is to be restricted to that required to develop and maintain the proposed activity. The extent of vegetation modification or clearing is to be clearly marked by an independent ecologist prior to any works commencing. Such marking may comprise star pickets with bunting or flagging to clearly demarcate the limit. Machinery, vehicles, materials or equipment are not to be stored in adjacent areas of native vegetation which are not part of the subject site of the proposed activity. Existing cleared areas are to be utilised for this purpose. Construction works for the proposed activity should seek to minimise the disturbance to riparian corridors. This includes ensuring that any stormwater run-off is managed before discharging into the corridors.

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
<p>8. Is the activity likely to introduce noxious weeds, vermin, feral species or genetically modified organisms into an area?</p>	<p>Yes</p>	<p>Negligible</p>	<p>Materials required for the construction of the proposed activity may increase the opportunities for weed invasion into the adjoining forested areas. This can impact on fauna and the integrity of TECs.</p> <p>As there are no garden plantings planned as part of the proposed activity, weed invasion from garden escapees is unlikely to be an issue during the construction or operation phases of the proposed activity.</p> <p>The importing of materials for the construction and ongoing maintenance of the proposed activity has the potential to introduce species, pathogens or disease.</p> <p>The proposed activity is unlikely to increase the occurrence of feral species in the study area. The NPWS undertakes regular feral animal control in the reserves.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall negligible impact with the introduction of noxious weeds, vermin, feral species and genetically modified organisms as a result of the proposed activity.</p>	<p>Use of vehicles in the construction and maintenance of the proposed activity is to be confined to the existing vehicle tracks.</p> <p>Site inductions and contractual arrangements are to ensure that all relevant personnel are made aware of: their responsibilities of carrying out works in a conservation reserve and a marine park; the key ecological values (including threatened shorebirds) and Aboriginal cultural heritage values; and the procedures and practices to reduce impact on the values, including adopting appropriate hygiene procedures for toileting and preventing the spread of weeds and pathogens.</p> <p>Interpretive material aimed at promoting an immersive visitor experience and positive visitor behaviour is to be made available prior to the walk, with key messages including the requirement for appropriate hygiene measures e.g. taking rubbish out; clean boots and equipment; appropriate toileting procedures.</p> <p>Materials used in the construction and operational phases of the proposed activity are to be free of any potential invasive species, pathogens or diseases. For instance, any fill for the proposed activity is to be certified free from contaminants or weed propagules that could negatively affect adjacent habitats. All imported materials for the proposed activity are to be in accordance with NPWS bio-security management procedures.</p> <p>Any landscaping of the subject site should utilise native species currently growing within the study area.</p> <p>Weed and pest management for the proposed track is to be carried out in accordance with the NPWS standard policy and procedures, as part of routine operations.</p>

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Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
				All machinery, equipment and personal items such as boots, used or worn in the construction and operation phases of the proposed activity, are to be clean and weed and pathogen free and inspected by NPWS staff before arrival at the construction site. The NPWS is also to make regular inspections of such machinery.
9. Is the activity likely to affect any declared area of outstanding biodiversity value?	No	N/A	There are no Areas of Outstanding Biodiversity Value declared for the study area. No safeguards and/or mitigation measures are necessary.	N/A
11. Is the activity likely to affect any joint management agreement under the BC Act?	No	N/A	There are no joint management agreements under the BC Act for the study area. No safeguards and/or mitigation measures are necessary.	N/A

10.3. Community impacts

The level, type, nature and extent of the community impacts of the proposed activity are detailed in Table 25.

Table 25: Community impacts during construction and operation

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
1. Is the activity likely to affect community services or infrastructure?	Yes	Low; Positive	The proposed activity may result in an increase in vehicle traffic flow during construction and operation in the local villages, particularly at Maloneys Beach, South Durras, Depot Beach and Merry Beach. The proposed activity may result in an increase in usage of the facilities in the Eurobodalla Shire Council managed public reserve at Maloneys Beach/Long Beach. The proposed activity will result in closure and rehabilitation of the unauthorized beach access track at Maloneys Beach. The closure and rehabilitation of the beach access may impact on licensed beach	The NPWS will continue to work with the Shoalhaven City Council and the Eurobodalla Shire Council to manage community impacts and usage of public facilities off-park. The NPWS will consult with licenced commercial fishers and make arrangements for them to be able to undertake their licenced activities at Maloneys Beach and that they have the correct permits to undertake these activities on-park.

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			<p>hauling operations. There is official beach access in the adjacent Eurobodalla Shire Council managed public reserve.</p> <p>The proposed activity will improve the visual amenity and facilities within the NPWS area at Maloneys Beach. The proposed track head precinct includes vegetation screening, closure and rehabilitation of unauthorised tracks, and installation of interpretive material and accessible walking tracks. The works will also halt the unauthorised camping which currently occurs in this area.</p> <p>The proposed activity will result in the majority of walking tracks within the national parks and Aboriginal area being compliant with Australian Standards.</p> <p>Taking the above reasons into account, there may be an overall low positive impact on community services or infrastructure as a result of the proposed activity.</p>	
<p>2. Does the activity affect sites of importance to local or the broader community for their recreational or other values or access to these sites?</p>	<p>Yes</p>	<p>Medium; Positive</p>	<p>The proposed activity affects sites of importance to the local and broader community. Pebbly Beach is a s. 170 listed place for its State social significance as a special natural place valued by the Moruya and Batemans Bay communities, and also by holidaymakers from Canberra and Sydney, especially for its flora and fauna values and its scenic qualities (as well as its historic significance). The proposed activity will encourage tourism to this area.</p> <p>The proposed activity does not directly impact the developed precinct of the Pebbly Beach area with the proposed track remaining on the beach until north of the cabins. However, associated with the proposed activity is the planned upgrading of the day use area at Pebbly Beach and continuing upgrades to the cabin accommodation as required, and vegetation screening.</p> <p>The proposed activity will result in closure and rehabilitation of the unauthorized beach access track at Maloneys Beach. The closure and rehabilitation of the beach access may impact on licensed beach</p>	<p>The NPWS will continue to work with the Shoalhaven City Council and the Eurobodalla Shire Council to manage community impacts and usage of public facilities off-park.</p> <p>The NPWS will consult with licenced commercial fishers and make arrangements for them to be able to undertake their licenced activities at Maloneys Beach and that they have the correct permits to undertake these activities on-park.</p> <p>The NPWS will actively promote the walk as an off-peak experience so as not to exacerbate any capacity issues in other park facilities and local villages.</p>

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Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			<p>hauling operations. There is official beach access in the adjacent Eurobodalla Shire Council managed public reserve.</p> <p>The proposed activity will improve access to local recreational sites. More remote areas of Murramarang National Park will become more accessible during the operation phase of the proposed activity, and there will be disabled access within the track head precinct at Maloneys Beach with interpretive material available.</p> <p>Submissions on the proposed activity during the public exhibition period identified the effect an increase in visitors could have on the local community, including on the lifestyle of residents and the character of the villages.</p> <p>Taking the above reasons into account there may be an overall medium positive impact to the broader community in relation to recreational and other values as a result of the proposed activity.</p>	
<p>3. Is the activity likely to affect economic factors, including employment, industry and property value?</p>	<p>Yes</p>	<p>Low; Positive</p>	<p>The proposed activity is likely to benefit the local and regional economies through increased tourism. This benefit is likely to result in an increase in employment with opportunities for the community members, particularly local Aboriginal people, in the construction phase as well as in the operation phase with guided activities, as well as in the hospitality sector with increased demand in the provision of accommodation and other services e.g. supermarkets, local food outlets, transport logistics.</p> <p>The proposed activity will result in closure and rehabilitation of the unauthorized beach access track at Maloneys Beach. The closure and rehabilitation of the beach access may impact on licensed beach hauling operations. There is official beach access in the adjacent Eurobodalla Shire Council managed public reserve.</p> <p>If the operation phase of the proposed activity results in the increased demand for holiday and short-term accommodation it may result in increased property values. Anecdotal evidence of the author suggests</p>	<p>The NPWS will continue to work with the Shoalhaven City Council and the Eurobodalla Shire Council to manage community impacts and usage of public facilities off-park.</p> <p>The NPWS will consult with licenced commercial fishers and make arrangements for them to be able to undertake their licenced activities at Maloneys Beach and that they have the correct permits to undertake these activities on-park.</p>

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			<p>that this may be the case elsewhere in Australia in the vicinity of other multi-day walks e.g. Great Ocean Walk in Victoria.</p> <p>Taking the above reasons into account there may be an overall low positive impact on the local community's economic factors as a result of the proposed activity.</p>	
<p>4. Is the activity likely to have an impact on the safety of the community?</p>	<p>Yes</p>	<p>Low; Negative</p>	<p>The construction and operation phase of the proposed activity will take workers and visitors near large cliffs and other hazards e.g. beaches/ocean waves.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall low negative impact on the safety of the community as a result of the proposed activity.</p>	<p>The NPWS will develop a notification procedure prior to any works commencing, and that such procedures will be reviewed as required.</p> <p>The proposed activity will comply with the NPWS safety procedures.</p> <p>Interpretive material is to include information on appropriate visitor behaviour near cliffs and other hazards.</p> <p>The NPWS will ensure work and ancillary sites are secured and left safe outside of work hours.</p>
<p>5. Is the activity likely to cause a bushfire risk?</p>	<p>Yes</p>	<p>Negligible</p>	<p>The proposed activity is likely to result in an increase in visitors to the area. With this increase comes an increase in potential bushfire risk.</p> <p>Submissions received during the public exhibition period raised concerns about the proposed activity increasing the risk of bushfires and uncontrolled campfires.</p> <p>However, this risk is minimised with smoking being prohibited in NPWS reserves and bushfire plans with strategies incorporating visitor activity restrictions during periods of high fire danger.</p> <p>The use of machinery for the construction and operation phases of the proposed activity does pose a bushfire risk.</p>	<p>Construction machinery and equipment are not to be stored in areas of high fuel loads e.g. long grass.</p> <p>Interpretive material is to include information on fire risk and the use of fuel stoves etc.</p> <p>The design for the walk-in campsites as part of the recommissioning of Oaky Beach Camping Area are not to include fire pits.</p> <p>Works associated with the proposed activity are only to be undertaken on high fire danger</p>

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Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			<p>During the operation phase of the proposed activity, visitors will be able to camp remotely in the national park with camping conditionally provided for in the Plan of Management. This may pose a fire risk. However, it is routine operation for the NPWS to close reserves during periods of high/extreme fire danger.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall negligible negative impact from bushfires as a result of the proposed activity.</p>	<p>days as directed by the NPWS or the NSW Rural Fire Service.</p>
6. Will the activity affect the visual or scenic landscape?	Yes	Low; Positive	<p>The proposed activity includes the installation of infrastructure including lookouts, camping area amenities, interpretive shelters, track head and other signage. Although the proposed activity has been designed to minimise the impact that such infrastructure may have on the visual amenity and scenic landscape, it is anticipated that there may be areas along the alignment where the infrastructure will be visible from a distance. However, the visibility of the infrastructure will not obstruct the views of the Murramarang coastline.</p> <p>There will be temporary signage in place during the construction phase of the proposed activity advising visitors not to enter certain areas and/or warning them of the dangers of entering work sites.</p> <p>The north-western edge of the carpark at the proposed track head at Maloneys Beach precinct is to be screened to reduce any potential visual impact on neighbouring residences.</p> <p>Taking the above reasons into account there may be an overall low positive impact to the visual or scenic landscape as a result of the proposed activity.</p>	N/A
7. Is the activity likely to cause noise, pollution, visual impact, loss of privacy, glare or overshadowing to members of the community, particularly adjoining landowners?	Yes	Negligible	<p>The construction and operation phases of the proposed activity are likely to cause increased noise and visual impact to a small number of adjoining landowners at Maloneys Beach. There may be a loss of privacy to the immediate neighbours at Maloneys Beach. However, anecdotal evidence suggests that the national park and other public reserves in this area appear to be already relatively popular, both day</p>	<p>Work hours at Maloneys Beach will be specified in consultation with local residents.</p> <p>The NPWS will develop a notification procedure prior to any works commencing,</p>

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			<p>visitors and illegal camping occurring. It is anticipated that the proposed activity will minimise the illegal camping occurring.</p> <p>The north-western edge of the carpark at the proposed track head at Maloneys Beach precinct is to be screened to reduce any potential visual impact on neighbouring residences.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall negligible impact to adjoining landowners caused by a potential increase in noise and visual impact as a result of the proposed activity.</p>	<p>and that such procedures will be reviewed as required.</p> <p>Interpretive material at the proposed track head at Maloneys Beach precinct is to include information on appropriate visitor behaviour next to a residential area.</p>

10.4. Natural resource impacts

The level, type, nature and extent of the natural resource impacts of the proposed activity are detailed in Table 26.

Table 26: Natural resource impacts during construction and operation

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
1. Is the activity likely to result in the degradation of the park or any other area reserved for conservation purposes?	Yes	Negligible	<p>The proposed activity has been designed to have minimal impact on the natural resources e.g. land, soil, water, air and minerals of the conservation reserves of Murramarang National Park and Murramarang Aboriginal Area. Also, the proposed activity will have negligible impact on the natural resources of the adjacent Batemans Marine Park.</p> <p>The proposed activity has been finalised through a process to minimise the impact on particular threatened flora and fauna and ecological communities, on archaeological sites, riparian corridors and the fragile geology in certain areas. The alignment generally follows the natural contours which will also minimise erosion issues.</p> <p>Despite the above, the proposed activity involves the modification or clearing of up to a maximum of 1.95 ha of groundcover and midstory native vegetation, and earthworks including benching etc. Extant vegetation of the same plant</p>	<p>Use of vehicles in the construction and maintenance of the trail components of the proposed activity is to be confined to the existing vehicle tracks.</p> <p>Contractors are to adopt appropriate hygiene procedures for camping and toileting and preventing the spread of weeds and pathogens.</p> <p>Materials used in the construction and operational phases of the proposed activity are to be free of any potential invasive species, pathogens or diseases. For instance, any fill for the proposed activity is to be certified free from contaminants or weed propagules that could negatively affect adjacent habitats. All imported materials for the proposed activity are to be in accordance with NPWS bio-security management procedures.</p>

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Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			<p>communities, and threatened ecological communities, is found within the remaining parts of the reserves, and nearby. Similar fauna habitats to those potentially affected by the proposed activity also occur extensively in the remaining areas of the reserves and in surrounding areas.</p> <p>There is a potential negligible impact by weeds on the study area as a result of the proposed activity.</p> <p>Eroded areas on existing track are to be remediated as part of the proposed activity either in upgrading track or in the closure and rehabilitation of redundant track. The area at Maloneys Beach is to be remediated as part of the proposed activity. This restorative action will have a positive impact.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be negligible degradation of the reserves as a result of the proposed activity.</p>	<p>Any landscaping of the subject site should utilise native species currently growing within the study area.</p> <p>Weed and pest management for the proposed track is to be carried out in accordance with the NPWS standard policy and procedures, as part of routine operations.</p> <p>All machinery, equipment and personal items such as boots, used or worn in the construction and operation phases of the proposed activity, are to be clean and weed and pathogen free and inspected by NPWS staff before arrival at the construction site. The NPWS is also to make regular inspections of such machinery.</p>
<p>2. Is the activity likely to affect the use of, or the community's ability to use, natural resources?</p>	<p>Yes</p>	<p>Medium; Positive</p>	<p>The proposed activity will allow the community increased and improved use of the Murramarang National Park and Murramarang Aboriginal Area whilst minimising the impacts on the natural and cultural heritage.</p> <p>The proposed activity is not within an area, including a reserve or Special Area, that has as its purpose the: protection of a water catchment for water supply; mineral exploration; soil or mineral extraction.</p> <p>The proposed activity will result in closure and rehabilitation of the unauthorized beach access track at Maloneys Beach. The closure and rehabilitation of the beach access may impact on licensed beach hauling operations. There is official beach access in the adjacent Eurobodalla Shire Council managed public reserve.</p>	<p>The NPWS will consult with licenced commercial fishers and make arrangements for them to be able to undertake their licenced activities at Maloneys Beach and that they have the correct permits to undertake these activities on-park.</p>

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			Taking the above reasons into account, there may be an overall medium positive impact to the community's use of natural resources as a result of the proposed activity.	
3. Is the activity likely to involve the use, wastage, destruction or depletion of natural resources including water, fuels, timber or extractive materials?	Yes	Negligible	<p>The proposed activity includes the modification or clearing of ground cover and/or midstory vegetation, and minor earthworks. No mature canopy trees will be removed.</p> <p>The proposed activity includes the installation of rock retaining walls and stepping-stones.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall negligible impact to natural resources as a result of the proposed activity.</p>	Rock is to be sourced from a registered quarry off-site for the construction of rock retaining walls and stepping-stones and is to be consistent with the geology of the site
4. Does the activity provide for the sustainable and efficient use of water and energy?	Yes	Negligible	<p>The proposed activity requires the use of vehicles, machinery and other equipment.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall negligible impact to the environment as a result of the proposed activity.</p>	All machinery is to be in good working condition.

10.5. Aboriginal cultural heritage impacts

The level, type, nature and extent of the Aboriginal cultural heritage impacts of the proposed activity are detailed in Table 27.

Table 27: Aboriginal cultural heritage impacts during construction and operation

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
1. Will the activity disturb the ground surface or any culturally modified trees?	Yes	Low; Negative	The alignment of the proposed walking track was defined taking into account the occurrence and potential occurrence of Aboriginal sites as part of an Aboriginal cultural heritage assessment.	<p>The recommendations of the ACHAR are incorporated as environmental safeguards and mitigation measures in this REF.</p> <p>The NPWS will apply for an AHIP to carry out test pitting at the Maloneys Beach and Pretty Beach precincts.</p>

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Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			<p>Despite the above, the proposed activity includes the disturbance to the ground surface for earthworks associated with the: new track; upgrading of existing track; development of the Maloneys Beach track head precinct; Oaky Beach camping area recommissioning; and upgrading of water and wastewater infrastructure at Yellow Rock.</p> <p>No culturally modified trees are recorded for the study area.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall low negative impact to the Aboriginal cultural heritage as a result of the proposed activity.</p>	<p>The NPWS will apply for the AHIP for the trail components of the proposed activity.</p> <p>If any Aboriginal sites are observed during the construction phase of the proposed activity, then work is to cease immediately and NPWS are to be notified. A thorough assessment is to be carried out in accordance with the <i>Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW</i> (OEH 2011), the <i>Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales</i> (DECCW 2010b), and NGH (2021).</p> <p>Aboriginal community representatives, as chosen by the NPWS, will be invited to participate in any salvage and in the subsurface testing processes.</p>
<p>2. Does the activity affect known Aboriginal objects or Aboriginal places?</p>	<p>Yes</p>	<p>Low; Negative</p>	<p>The alignment of the walking trail components of the proposed activity was defined taking into account the occurrence and potential occurrence of Aboriginal sites as part of an Aboriginal cultural heritage assessment.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall low negative impact to the Aboriginal cultural heritage objects as a result of the proposed activity.</p>	<p>The recommendations of the ACHAR are incorporated as environmental safeguards and mitigation measures in this REF.</p> <p>The NPWS will apply for an AHIP to carry out test pitting at the Maloneys Beach and Pretty Beach precincts.</p> <p>The NPWS will apply for the AHIP for the trail components of the proposed activity.</p> <p>If any Aboriginal sites are observed during the construction phase of the proposed activity, then work is to cease immediately and NPWS are to be notified. A thorough assessment is to be carried out in accordance with the <i>Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW</i> (OEH 2011), the <i>Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales</i> (DECCW 2010b), and NGH (2021).</p> <p>Aboriginal community representatives, as chosen by the NPWS, will be invited to participate in any salvage and in the subsurface testing processes.</p>

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
<p>3. Is the activity located within, or will it affect, areas :</p> <ul style="list-style-type: none"> - within 200m of waters; - within a sand dune system; - on a ridge top, ridge line or headland; - within 200m below or above a cliff face; - within 20m of or in a cave, rock shelter or a cave mouth? 	Yes	Low; Negative	<p>The proposed activity is located within, or will affect areas: within 200m of waters; within a sand dune system; on a ridge top, ridge line or headland; within 200m below or above a cliff face; and within 20 m of or in a cave, rock shelter or a cave mouth.</p> <p>The alignment of the walking trail components of the proposed activity was defined taking into account the occurrence and potential occurrence of Aboriginal sites as part of an Aboriginal cultural heritage assessment. The alignment was removed from numerous headlands to avoid Aboriginal sites and landforms, and several changes to the design specifications were made to protect other archaeologically sensitive areas. Aboriginal objects or landscape features that have been avoided or protected through this process include: middens and/or artefact scatters associated with Reef Point, Yellow Rock, Snake Bay, North Head, Clear Point, Granite Point, Blacks surf spot, Cookies Beach, Dawsons Beach, Depot Beach, Honeysuckle Beach and Oaky Beach; and possible burials at in two locations.</p> <p>In addition to the above, a number of Aboriginal sites will be protected through the closure and rehabilitation of redundant trail sections.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall low negative impact to these areas as a result of the proposed activity.</p>	<p>The recommendations of the ACHAR are incorporated as environmental safeguards and mitigation measures in this REF.</p> <p>The NPWS will apply for an AHIP to carry out test pitting at the Maloneys Beach and Pretty Beach precincts.</p> <p>The NPWS will apply for the AHIP for the trail components of the proposed activity.</p> <p>If any Aboriginal sites are observed during the construction phase of the proposed activity, then work is to cease immediately and NPWS are to be notified. A thorough assessment is to be carried out in accordance with the <i>Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW</i> (OEH 2011), the <i>Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales</i> (DECCW 2010b), and NGH (2021).</p> <p>Aboriginal community representatives, as chosen by the NPWS, will be invited to participate in any salvage and in the subsurface testing processes.</p>
<p>4. If Aboriginal objects or landscape features are present, can impacts be avoided?</p>	Yes	Low; Negative	<p>The alignment of the walking trail components of the proposed activity was defined taking into account the occurrence and potential occurrence of Aboriginal sites as part of an Aboriginal cultural heritage assessment. The alignment was removed from numerous headlands to avoid Aboriginal sites and landforms, and several changes to the design specifications were made to protect other archaeologically</p>	<p>The recommendations of the ACHAR are incorporated as environmental safeguards and mitigation measures in this REF.</p> <p>The NPWS will apply for an AHIP to carry out test pitting at the Maloneys Beach and Pretty Beach precincts.</p>

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Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			<p>sensitive areas. Aboriginal objects or landscape features that have been avoided or protected through this process include: middens and/or artefact scatters associated with Reef Point, Yellow Rock, Snake Bay, North Head, Clear Point, Granite Point, Blacks surf spot, Cookies Beach, Dawsons Beach, Depot Beach, Honeysuckle Beach and Oaky Beach; and possible burials at in two locations.</p> <p>In addition to the above, a number of Aboriginal sites will be protected through the closure and rehabilitation of redundant trail sections.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall low negative impact to Aboriginal cultural heritage objects as a result of the proposed activity.</p>	<p>The NPWS will apply for the AHIP for the trail components of the proposed activity.</p> <p>If any Aboriginal sites are observed during the construction phase of the proposed activity, then work is to cease immediately and NPWS are to be notified. A thorough assessment is to be carried out in accordance with the <i>Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW</i> (OEH 2011), the <i>Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales</i> (DECCW 2010b), and NGH (2021).</p> <p>Aboriginal community representatives, as chosen by the NPWS, will be invited to participate in any salvage and in the subsurface testing processes.</p>
<p>5. If the above steps indicate that there remains a risk of harm or disturbance, has a desktop assessment and visual inspection been undertaken.</p>	<p>Yes</p>	<p>Low; Negative</p>	<p>The alignment of the walking trail components of the proposed activity was defined taking into account the occurrence and potential occurrence of Aboriginal sites as part of an Aboriginal cultural heritage assessment.</p> <p>A number of Aboriginal sites will be protected through the closure and rehabilitation of existing tracks.</p> <p>The assessment included desktop assessment and field surveys (visual inspections) and was undertaken by experienced qualified archaeologists. The area was comprehensive assessed twice with preliminary investigations focused on the 20-metre corridor and the final assessment corridor at 30 metre for the trail components of the proposed activity, and alternative alignments, and the precinct areas. The field investigations involved four archaeologists and representation from the Batemans Bay Local Aboriginal Land Council, with assistance from NPWS staff. The field survey area was approximately 69.5 ha.</p>	<p>As above.</p>

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
			<p>The ACHAR found that the park has intact and complex archaeological sites particularly associated with Holocene deposits and low-lying headlands. Approximately 100 known sites occur within 50 metres of the proposed works, both existing and new trail sections, and the precincts. The sites include single artefacts, artefact scatters and middens. Where possible, the proposed activity has been designed to avoid these or mitigate harm. The ACHAR identified a risk of harm (including collection), either partially or completely, to approximately two-thirds of the sites, with a quarter being completely harmed.</p> <p>The ACHAR was prepared in accordance with the <i>Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW</i> (OEH 2011), and the <i>Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales</i> (DECCW 2010b).</p>	
<p>6. Is the activity likely to affect wild resources or access to these resources, which are used or valued by the Aboriginal community?</p>	<p>No</p>	<p>N/A</p>	<p>The proposed activity is not expected to affect wild resources used or valued by the local Aboriginal community or affect the access to such resources by the local Aboriginal community.</p>	<p>N/A</p> <p>Note: commercial fishers, some of whom are members of the local Aboriginal community, will be able to access Maloneys Beach to continue licenced activities. A gate will be installed at the new car park with keys provided for licenced commercial fishers. All access would require pre-approval from NPWS in accordance with the NPWS Commercial Fishing Access Policy.</p>

10.6. Other cultural heritage impacts

The level, type, nature and extent of other cultural heritage impacts of the proposed activity are detailed in Table 28.

Table 28: Other cultural heritage impacts during construction and operation

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
1. What is the impact on places, buildings, landscapes or moveable heritage items?	Yes	Negligible	<p>There are nine listed historic heritage items that occur or potentially occur within the study area. The alignment of the proposed activity has been identified taking into account the occurrence, or potential occurrence, of these heritage items, with the alignment avoiding the majority of these items and steering visitors away from some sites.</p> <p>Detail on the exact location of the 'Site of Former Huts' cannot be determined. Field surveys in the location failed to locate any evidence of the site. Therefore, the exact location of this heritage item has not been verified. For the purposes of this REF, the item is considered to potentially occur within the subject site and would be directly impacted by the proposed activity.</p> <p>The remains of moorings at Pebbly Beach and Depot Beach may be within the subject site (operation). The nature of these items suggests that there will be minimal if any impact to them as they are embedded into the rock platforms.</p> <p>Many other heritage items may be indirectly impacted by the operation phase of the proposed activity. For instance, the operation phase of the proposed activity will result in an increase in visitation to the Depot Beach and Pebbly Beach Cabin areas, and the Myrtle Beach - Wasp Head area. These areas have heritage items associated with them. Associated with the proposed activity is rationalisation of tracks at these sites.</p> <p>Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall negligible impact to other cultural heritage as a result of the proposed activity.</p>	<p>A pre-clearance survey is to be carried out by NPWS staff prior to any construction works in the area of the heritage item, <i>Site of former huts</i>, near Honeysuckle Beach. If the heritage site is observed, then exact location and a description is to be recorded and the track re-aligned away from the heritage item. Information recorded is to be used to update the HHIM listing.</p> <p>If any historic heritage items or places are observed during the construction phase of the proposed activity, then work is to cease immediately and the NPWS are to be notified and appropriate measures are to be implemented.</p>
2. Is any vegetation of cultural landscape value likely to be	No	N/A	No vegetation of cultural landscape value has been identified for the study area.	N/A

Question	Applicable?	Impact level	Reasons	Safeguards and mitigation measures
affected (e.g. gardens & settings etc?)			No safeguards and/or mitigation measures are necessary.	

10.7. Matters of National Environmental Significance under the EPBC Act

Matters of national environmental significance under the EPBC Act relevant to the proposed activity are noted in Table 29 below. The impact of the proposed activity on these MNES are assessed in Section 11.2 in accordance with the *Matters of National Environmental Significance - Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999* (Australian Government 2013). Please note the vulnerable species Koala is assessed in accordance with the EPBC Act Koala referral assessment in Section 11.3.

Table 29: Applicability of proposed activity on matters of national environmental significance under the EPBC Act

EPBC Act Matter	Impact level	Reasons
Is the proposed activity likely to impact on matters of national environmental significance as follows?		
- listed threatened species or ecological communities	Low; Adverse	Refer to sections 11.2 and 11.3.
- listed migratory species	Low; Adverse	Refer to Section 11.2.
- the ecology of Ramsar wetlands	N/A	N/A
- Commonwealth marine environment	N/A	N/A
- world heritage values of world heritage properties	N/A	N/A
- the national heritage values of national heritage places	N/A	N/A

11. Statutory assessments

11.1. NSW Threatened species assessment of significance (5-part test)

Under s. 7.3 of the BC Act, a test for determining whether the proposed activity is likely to significantly affect threatened species or ecological communities, or their habitats is carried out. The test, known as the five-part test, is applied to species, populations and ecological communities listed on schedules of the BC Act. All factors are considered and an overall conclusion made based on all factors in combination. An environmental impact statement is required if, through application of the five-part test, an action is considered likely to have a significant impact on a threatened species, population or ecological community.

Taking into account the environmental safeguards and mitigation measures in recommendation in Section 7.3, NSW listed threatened species, including threatened populations, and ecological communities that occur or potentially occur in the study area are subject to the five-part test.

- 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.**

Table 30: Likelihood of proposed activity to place viable populations of threatened species at risk of extinction

Name	BC Act listing	Assessment of proposed activity on threatened species
<i>Anthochaera phygia</i> Regent Honeyeater	CE	There is suitable foraging habitat e.g. Spotted Gum, for this species in the study area and three records for the locality. Taking into consideration no mature canopy trees are to be removed, and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will not remove or modify the species' foraging resources for the species. It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.
<i>Arctocephalus pusillus doriferus</i> Australian Fur-Seal	V	This species may occasionally haul out on the limited rock platforms or beaches of the study area. There are five records of this species for the locality. The study area does not contain any known colonies for the species. No modification or disturbance to the habitat resources in the study area for this species will result from the proposed activity. It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.
<i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow	V	There are numerous records of this species for the locality, including some in Murramarang National Park. There is some low value generic potential habitat in the study area. Taking into consideration no mature canopy trees are to be removed, and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will only remove a negligible amount of habitat for the species. It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.
<i>Calamanthus fuliginosus</i> Striated Fieldwren	E	A limited amount of habitat for this species occurs in the study area; at Snapper Point and in a few patches along the proposed activity as Bracelet Honey-myrtle - Coast Tea-tree tall shrubland on headlands, South East Corner Bioregion. There is only one record of the species near the study area adjacent to Depot Beach Camping Area, which is forest. This record is from 2001.

Name	BC Act listing	Assessment of proposed activity on threatened species
		<p>Under the proposed activity, the section of the study area with suitable habitat is mapped for upgrading of existing track as well as proposed new track development. The areas for track upgrade are regularly used by visitors, particularly the area close to Merry Beach. An increase in visitation to the study area may result from promotion of the walk, however any such impact is unlikely to be significant.</p> <p>Taking into consideration no mature canopy trees are to be removed, and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will only remove a negligible amount of habitat for the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Callocephalon fimbriatum</i> Gang-gang Cockatoo</p>	V	<p>There are many records for this species for the locality including one near the study area. The species may use the study area as a minor part of its foraging range. The species would need to spend most of its life cycle outside the study area to meet ecological requirements due to ecology and study area limitations. An increase in visitation to the study area may result from promotion of the walk, however any such impact is unlikely to be significant.</p> <p>Taking into consideration no mature canopy trees are to be removed, and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will only remove a negligible amount of habitat for the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Calyptorhynchus lathami</i> Glossy Black-Cockatoo</p>	V	<p>There are many records for this species for the locality. The preferred feed tree <i>Allocasuarina</i> spp. occurs within the study area. One active feed tree was observed during the field surveys, close to the track head at Maloney's Beach. An increase in visitation to the study area may result from promotion of the walk; however, taking into consideration the recommendation to microsite the track away from such habitat resource, any such impact from this is unlikely to be significant.</p> <p>Taking into consideration no mature canopy trees are to be removed, and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will only remove a negligible amount of habitat for the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Cercartetus nanus</i> Eastern Pygmy Possum</p>	V	<p>There are no records on the databases of this species occurring in the study area. NPWS advised that there is anecdotal evidence of one record for the species on the northern end of North Durras Beach/south-western Depot Headland, outside the study area. The study area does contain preferred habitat of woodlands and heath and there are potential sheltering resources with hollowed logs and stumps which could be impacted.</p> <p>Taking into consideration no mature canopy trees and hollowed logs will be removed, the environmental safeguards and mitigation measures on trail alignment, definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Daphoenositta chrysoptera</i> Varied Sittella</p>	V	<p>There are numerous records for this species for the locality and there is suitable habitat within the study area with eucalypt forests and woodlands, including rough-barked species and mature smooth-barked gums with dead branches.</p> <p>Taking into consideration no mature canopy trees are to be removed, and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>

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Name	BC Act listing	Assessment of proposed activity on threatened species
<i>Dasyurus maculatus</i> Spotted-tailed Quoll	V	<p>There are numerous records of the species for the locality. However, the study area has low quality potential foraging habitat.</p> <p>Taking into consideration no mature canopy trees are to be removed, and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<i>Esacus magnirostris</i> Beach Stone-curlew	CE	<p>There is one record of the species for the locality and the study area has some suitable habitat. However, the range of this species has contracted, and it is rarely observed in southern NSW. The preferred habitat in the study area of coastline and littoral zone will not be disturbed by the proposed activity. An increase in visitation to the study area may result from promotion of the walk, however any such impact is unlikely to be significant.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<i>Glossopsitta pusilla</i> Little Lorikeet	V	<p>There are numerous records of this species for the locality and a few near the study area. There is suitable foraging and nesting habitat in the study area within Eucalyptus forest and woodland canopies and vegetated riparian corridors, including Allocasuarina.</p> <p>Taking into consideration no mature canopy trees are to be removed, and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<i>Haematopus fuliginosus</i> Sooty Oystercatcher	V	<p>The study area includes important habitat for this species, particularly on the shoreline at Murramarang Aboriginal Area. However taking into consideration the recommendations to keep the walking track to the headland of Murramarang Aboriginal Area, walkers will be steered away from this area. The promotion of the walking track will direct visitors to the landward edge of other shore platforms. These areas are regularly visited by walkers already and it is not anticipated that the proposed activity will have an impact above what currently exists, nor will it impact upon rocky headlands and shelves of other known nesting sites.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<i>Haematopus longirostris</i> Pied Oystercatcher	E	<p>Murramarang is a key management site for this species under the OEH Saving our Species Program. The study area includes important nesting habitat for the species with known nesting beaches along the coastline. The species also nests on the dunes at the entrance to Durras Lake, near the study area. These areas are regularly visited by walkers already and it is not anticipated that the proposed activity will have an impact above what currently exists, nor will it impact upon rocky headlands and shelves of other known nesting sites.</p> <p>Taking into consideration the recommendations on monitoring, fencing and additional information on shorebird avoidance provided to walkers, the proposed activity is expected to have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<i>Haliaeetus leucogaster</i> White-bellied Sea-eagle	V	<p>This species is known to occur in the study area or immediate surrounds and was observed flying close to the study area during field surveys. The species has potential to use canopy trees in the study area for nesting although no nests were observed during the surveys. The species forages on wing at sea.</p>

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Name	BC Act listing	Assessment of proposed activity on threatened species
		<p>Taking into consideration no mature canopy trees are to be removed, and the recommendations track alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Hieraaetus morphnoides</i> Little Eagle</p>	V	<p>There are numerous records of the species from locality. There is suitable habitat in the study area although marginal and limited with the species preferring more open forest and woodland.</p> <p>Taking into consideration no mature canopy trees are to be removed, and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Lathamus discolor</i> Swift Parrot</p>	E	<p>The species has been previously recorded from the locality, and may seasonally use the study area for foraging depending on flowering abundance. A number of the species preferred winter flowering feed trees are present in the study area e.g. Spotted Gum and Forest Red Gum, and species susceptible to lerp infestations.</p> <p>Taking into consideration no mature canopy trees are to be removed, and the environmental safeguards and mitigation measures on trail alignment and definition of clearing, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Lophoictinia isura</i> Square-tailed Kite</p>	V	<p>There are numerous records for the species for the locality. There is suitable nesting habitat in the study area woodlands and open forests, and timbered watercourses.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Miniopterus schreibersii oceanensis</i> Eastern Bent-wing Bat</p>	V	<p>There are numerous records for the species for the locality. There is suitable habitat in study area with a range of vegetation types where it can forage for insects above and below the tree canopies.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Mormopterus norfolkensis</i> Eastern Freetail Bat</p>	V	<p>There are numerous records for the species for the locality. There is suitable foraging and roosting habitat in the study area with rainforest and sclerophyll forest and woodland, and numerous tree hollows.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Ninox connivens</i> Barking Owl</p>	V	<p>There are numerous records of the species for the locality. There is suitable habitat in the study area including with woodland and forest communities with hollow-bearing trees, as well as roosting habitat of Acacia and Casuarina species.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the</p>

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Name	BC Act listing	Assessment of proposed activity on threatened species
		<p>proposed activity will have a negligible impact on the nesting and roosting habitat for the species. The proposed activity will require the removal of understory vegetation, which may provide for habitat for prey of this species. The area of understory to be cleared or modified is insignificant relative to the remaining intact vegetation in Murramarang National Park. An increase in visitation to the study area may result from promotion of the walk. However, any impacts from an increase in visitation would be insignificant.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Ninox strenua</i> Powerful Owl</p>	<p>V</p>	<p>There are numerous records of the species for the locality. In the study area there is limited generic potential foraging habitat with forest types which may carry a high density of prey, such as arboreal mammals, large birds and flying-foxes. There is also limited suitable breeding and sheltering habitat with limited large hollows. The area behind Snake Bay may provide suitable roosting habitat, although no evidence of roosting was found during surveys. The study area could overlap with multiple pairs/territories. An increase in visitation to the study area may result from promotion of the walk. However, any impacts from an increase in visitation would be insignificant.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on any nesting and roosting habitat for the species. It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Onychoprion fuscata</i> Sooty Tern</p>	<p>V</p>	<p>The species is known from the locality however would only visit the study area on rare occasions. The species does not breed in the locality. An increase in visitation to the study area may result from promotion of the walk. However any impacts from an increase in visitation would be insignificant.</p> <p>Taking into consideration the environmental safeguards and mitigation measures on trail alignment, the proposed activity will have a negligible impact on any habitat the species may visit. It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Petauroides volans</i> Greater Glider</p>	<p>EP</p>	<p>A BioNet search resulted in numerous records of the species for the locality. A number of these are mapped as Eurobodalla Greater Glider Endangered Population. However, official OEH advice is that the Endangered Population is south of the Moruya River, with the river acting as a barrier to dispersal, isolating the population from other occurrences of the species. A search of the Atlas of Living Australia records found numerous records in the locality. Adopting a precautionary approach, the assessment concludes that the species may potentially occur and will assess the species as Vulnerable under the EPBC Act, and as part of the Endangered Population in the Eurobodalla LGA under NSW BC Act.</p> <p>There is suitable foraging habitat in the study area with mature eucalypt forest. Hollow-bearing trees in the study area only provide marginal shelter and nesting habitat because of a range of factors including the angle and aperture of the hollows, the low height of the hollows and their exposed locations in most areas. All mature native canopy trees are to be maintained. The species home range would mean that they would spend some of their life cycle outside study area to meet ecological requirements due to ecology and study area limitations. An increase in visitation to the study area may result from promotion of the walk. However, any impacts from an increase in visitation would be insignificant.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on any habitat the species may visit. It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>

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Name	BC Act listing	Assessment of proposed activity on threatened species
<p><i>Petaurus australis</i> Yellow-bellied Glider</p>	<p>V</p>	<p>There are many records for the species for the locality and there is suitable foraging habitat in the study area with mature eucalypt forest. However, there are limited suitable hollows for roosting or breeding. The species large home range would mean that they would need to spend most of life cycle outside study area to meet ecological requirements due to ecology and study area limitations. An increase in visitation to the study area may result from promotion of the walk. However, any impacts from an increase in visitation would be insignificant.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on any habitat the species may visit. It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Petaurus norfolcensis</i> Squirrel Glider</p>	<p>V</p>	<p>There are numerous records of the species from the locality, although no recent ones. There is marginal habitat in the study area with minimal forest/woodland with heath understory. An increase in visitation to the study area may result from promotion of the walk. However, any impacts from an increase in visitation would be insignificant.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Petroica boodang</i> Scarlet Robin</p>	<p>V</p>	<p>The species is recorded for the locality with higher numbers in the hinterland than near the coast. The species prefers open forests and woodlands where it can forage on or near the ground. There is limited foraging habitat in the study area.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Petroica phoenicea</i> Flame Robin</p>	<p>V</p>	<p>The species is recorded on the edge of the locality with higher numbers in the hinterland than on the coast. The species may use the study area for foraging.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Phascogale tapoatafa</i> Brush-tailed Phascogale</p>	<p>V</p>	<p>There are a few records of the species for the locality and suitable habitat in the study area with open forest with sparse ground cover of herbs, grasses, shrubs or leaf litter and some heath and rainforest. There is suitable foraging habitat with rough barked trees and limited nest and sheltering habitat of small tree hollows. An increase in visitation to the study area may result from promotion of the walk. However, any impacts from an increase in visitation would be insignificant.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Phascolarctos cinereus</i> Koala</p>	<p>V</p>	<p>There are a few records of the species for the locality. One feed tree species, Forest Red Gum, is present in study area. It is however found mostly scattered in the southern sections of the study area, being rare elsewhere. <i>Spotted Gum - White Stringybark - Burrawang shrubby open forest on</i></p>

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Name	BC Act listing	Assessment of proposed activity on threatened species
		<p><i>hinterland foothills</i>, and <i>Lilly Pilly - Coachwood warm temperate rainforest on moist sheltered slopes and gullies</i>, which occur in the study area, are known Koala vegetation communities. An increase in visitation to the study area may result from promotion of the walk. However, any impacts from an increase in visitation would be insignificant.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Potorous tridactylus tridactylus</i> Long-nosed Potoroo (SE mainland)</p>	V	<p>There are no records of the species for the locality. However, there is some suitable yet limited habitat in the study area with ecotones of coastal heath/woodland with dense understory and sandy loam soils. An increase in visitation to the study area may result from promotion of the walk. However, any impacts from an increase in visitation would be insignificant.</p> <p>Taking into consideration the lack of records for the locality, and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Pteropus poliocephalus</i> Grey-headed Flying-fox</p>	V	<p>There are numerous records of the species for the locality. The study area has seasonal foraging habitat only relative to the extent of habitat within this species local range and its ecology, and there will be no barriers to movement created.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Scoteanax rueppellii</i> Greater Broad-nosed Bat</p>	V	<p>There are a few records of the species for the locality. There is some suitable habitat in the study area with the presence of gullies in eucalypt forest, woodland and rainforest, and tree hollows.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Sminthopsis leucopus</i> White-footed Dunnart</p>	V	<p>There are a few records of the species for the locality. There is suitable habitat in the study area as the species is found in a range of habitat types although optimal habitat is drier vegetation communities with open understory, so it can feed on invertebrates and small lizards. The proposed activity does involve the modification or clearing of ground cover and/or understory vegetation that may provide habitat for prey species. However, the linear area to be cleared, up to 1.95 ha over a geographical range of 48 km for the proposed walk, is considered insignificant. The removal of small proportions of habitat from individual home ranges is also considered insignificant. The study area does contain potential sheltering resources with hollowed logs and stumps which could be impacted, although wherever possible these resources will be avoided or moved to adjacent areas. An increase in visitation to the study area may result from promotion of the walk. However, any impacts from an increase in visitation would be insignificant.</p> <p>Taking into consideration the retention of hollowed logs and the recommendation on track alignment, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>

Name	BC Act listing	Assessment of proposed activity on threatened species
<p><i>Sternula albifrons</i> Little Tern</p>	E	<p>There are records in the proximity of the locality for the species. There is very limited suitable habitat in study area.</p> <p>Taking into consideration the recommendation on track alignment the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Thinornis rubricollis</i> Hooded Plover</p>	CE	<p>Murramarang is a key management site for the species under the OEH Saving our Species Program. Hooded Plovers nest above the high-water mark at Pretty Beach and there are numerous records of the species along the coastline of Murramarang National Park. The species is also recorded on the beach in Murramarang Aboriginal Area. Known nesting sites are currently protected from beach visitors by temporary fencing, signage and monitoring.</p> <p>Taking into consideration the recommendations on monitoring, fencing and additional information on shorebird avoidance to be made available to walkers, the proposed activity is expected to have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Tyto novaehollandiae</i> Masked Owl</p>	V	<p>There are numerous records of the species for the locality. Generic potential foraging habitat in study area.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>
<p><i>Tyto tenebricosa</i> Sooty Owl</p>	V	<p>There are numerous records of the species for the locality. Generic potential foraging habitat in study area. The proposed activity requires the removal of understory vegetation, which may provide for habitat for prey of this species. The area of understory to be cleared or modified is insignificant relative to the remaining intact vegetation in Murramarang National Park.</p> <p>Taking into consideration no mature canopy trees are to be removed and the environmental safeguards and mitigation measures on trail alignment and definition of clearing limits, the proposed activity will have a negligible impact on the species.</p> <p>It is unlikely that the proposed activity will impact upon the life cycle of this species such that a viable population of the species is likely to be placed at risk of extinction.</p>

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.**

Four NSW TECs potentially occur within or immediately adjacent to the study area. These are: *Bangalay Sand Forest of the Sydney Basin Bioregion and South East Corner Bioregion*; *Littoral Rainforest in the New South Wales North Coast, Sydney Basin Bioregion and South East Corner Bioregion*; *Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast Bioregion, Sydney Basin Bioregion and South East Corner Bioregion*; and *Swamp Oak Floodplain Forest of the New South Wales North Coast Bioregion, Sydney Basin Bioregion and South East Corner Bioregion*. As detailed in Section 9.2.5, without detailed floristic surveys that include condition

assessments and soil sampling, the presence and distribution of these TECs in parts of the study area remains potential and approximate.

Taking into consideration the restorative actions with the rehabilitation of redundant trail sections, and the environmental safeguards and mitigation measures, the proposed activity may result in the modification or clearing of ground cover and/or understory vegetation of up to 0.23 ha of potential Bangalay Sand Forest TEC, a negligible amount of potential Swamp Sclerophyll Forest TEC, a net gain of up to 0.08 ha of potential Littoral Rainforest TEC and no direct impact on potential Swamp Oak Floodplain Forest TEC. No mature canopy trees and hollowed logs etc are to be removed.

The DECC (2007) guidelines define 'local occurrence' as the extent of a TEC within the study area but may include adjacent areas if the ecological community on the study area forms part of a larger contiguous area of that ecological community and the movement of individuals and exchange of genetic material across the boundary of the study area can be clearly demonstrated. In addition to these adjacent areas of the TEC, Keith *et al.* (1997) ascertain that genetic discontinuity between flora populations is > 1 km, which is the general limit for dispersal of propagules of most plants. Considering these criteria, the local occurrences of these TECs is more extensive than the community associated with the study area. The amount of potential TECs to be affected by the proposed activity represents an insignificant amount of the local occurrence of these TECs. The local occurrences of the TECs will remain within the conservation estate and surrounding areas.

Therefore, the assessment finds that it is unlikely that the proposed activity will have an adverse effect on the extent of the potential TECs such that local occurrences of TECs are likely to be placed at risk of extinction.

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

- i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**
- ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**
- iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.**

The proposed activity will require the modification or clearing of up to 1.95 ha of native ground cover and understory vegetation. No mature canopy trees are to be removed. The proposed activity may result in the modification or clearing of ground cover and/or understory vegetation of up to 0.23 ha of potential Bangalay Sand Forest TEC, a negligible amount of potential Swamp Sclerophyll Forest TEC, a net gain of up to 0.08 ha of potential Littoral Rainforest TEC and no direct impact on potential Swamp Oak Floodplain Forest TEC. No mature canopy trees and hollowed logs etc are to be removed. The vegetation to be removed or modified by the proposed activity includes limited foraging habitat for a number of wide ranging and mobile threatened fauna species. The vegetation to be removed or modified is unlikely to be breeding habitat for these threatened species areas. There is extensive and preferable habitat beyond the study area.

The proposed activity will not remove any shorebird habitat but may increase the number of walkers on beaches where shorebirds are known to nest, potentially leading to increased disturbances. While the shorebird nesting areas are important to the long-term survival of these species in the locality, they are already managed by a combination of fencing, signage, monitoring and public awareness, and recommendations have been made to increase these

protective measures as part of the proposed activity. The alignment for the proposed activity avoids the breeding areas of the higher dunes, and is along the intertidal area.

The proposed activity will not fragment or isolate habitat for any threatened fauna species or any threatened ecological communities considered in this assessment.

Therefore, the assessment finds that the habitat to be removed or modified is not considered important for the long-term survival of any of the threatened fauna species or the threatened ecological communities that may potentially occur.

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).

There are no Areas of Outstanding Biodiversity Values listed under the BC Act for the study area.

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.

The key threatening processes *Clearing of native vegetation* and *Removal of dead wood* will be involved with the proposed activity as it will involve modification or clearing of up to 1.95 ha of native ground cover and/or understory vegetation. Taking into account the recommendations in this report, the extent and impact of these key threatening processes is minimal, particularly in the context of the linear impact area with the length of the proposed track and the extent of native vegetation and dead wood within the conservation estate in the locality.

Therefore, it is considered that the contribution of the proposed activity to these key threatening processes is unlikely to increase the impact of the processes.

11.2. Assessment of MNES under the EPBC Act

Table 31: EPBC Act listed threatened and migratory species assessment against relevant significant impact criteria

Matters to be assessed	Impact (Commonwealth legislation)
World Heritage Property	The proposed action does not impact on a World Heritage Property. Conclusion: Referral not required for this matter.
Wetlands of International Importance (Ramsar Sites)	The proposed action will not affect any part of a Ramsar wetland. Conclusion: Referral not required for this matter.
Commonwealth listed critically endangered or endangered species	The study area provides foraging habitat for the following EPBC listed critically endangered and endangered species: Regent Honeyeater, Swift Parrot and Spotted-tailed Quoll. It provides marginal denning habitat for the Spotted-tailed Quoll. <u>Regent Honeyeater</u> The Regent Honeyeater has been previously recorded from the locality, and may seasonally use the study area for foraging e.g. on Spotted Gum, depending on flowering abundance. <u>Swift Parrot</u> The Swift Parrot has been previously recorded from the locality and may seasonally use the study area for foraging depending on flowering abundance. A number of the species preferred winter flowering feed trees are present in the study area e.g. Spotted Gum and Forest Red Gum, and lerp infested trees. <u>Spotted-tailed Quoll</u>

Matters to be assessed	Impact (Commonwealth legislation)
	<p>The Spotted-tailed Quoll has been previously recorded for the locality and there is suitable foraging habitat in the study area with a range of plant community types and relatively large intact areas of vegetation.</p> <p>The significant impact criteria are assessed below:</p> <p><i>a. lead to a long-term decrease in the size of a population</i></p> <p><u>Regent Honeyeater</u></p> <p>The proposed action will not significantly adversely affect the population size of the Regent Honeyeater as no breeding habitat for this species will be affected. Only up to 1.95 ha of native ground cover and/or understory vegetation is to be cleared or modified with larger flowering canopy trees not being removed. Relative to the extent of habitat within this species local range and its ecology, and with no barriers to movement, the proposed action does not have the capability of leading to a long term decrease of a population.</p> <p><u>Swift Parrot</u></p> <p>The proposed action will not significantly adversely affect the population size of the Swift Parrot as no breeding habitat for this species will be affected. Only up to 1.95 ha of native ground cover and/or understory vegetation is to be cleared or modified with larger flowering canopy trees not being removed. Relative to the extent of habitat within this species local range and its ecology, and with no barriers to movement, the proposed action does not have the capability of leading to a long term decrease of a population.</p> <p><u>Spotted-tailed Quoll</u></p> <p>The proposed action will not significantly adversely affect the population size of the Spotted-tailed Quoll. The study area offers generic value for foraging with limited and marginal denning resources for this species. Hollow-bearing trees and hollowed fallen logs which may be suitable for denning are not to be removed. There are no rock shelters or caves along the trail alignment. No new roads will be created, and no significant change to current road traffic will be generated, hence risk of vehicle collision should not increase as a result of the proposed action. The surrounding area and remainder of the national park will continue to provide habitat for a population of Spotted-tailed Quoll if one exists in the study area. Relative to the extent of habitat within this species local range and its ecology, and with no barriers to movement, the proposed action does not have the capability of leading to a long term decrease of a population.</p> <p><i>b. reduce the area of occupancy of the species</i></p> <p>As detailed in part (a), the study area is not likely to contain high quality habitat for the Regent Honeyeater, the Swift Parrot or the Spotted-tailed Quoll, with only generic value for foraging and marginal denning habitat for the Spotted –tailed Quoll. Taking into context the area of habitat likely to be used by these species in the locality, particularly in Murramarang National Park, the modification or clearing of up to 1.95 ha of ground cover and/or understory vegetation (mainly low-quality potential foraging habitat) is of no consequence to the long-term viability of these species. The proposed action is not likely to reduce the area of occupancy of these species.</p> <p><i>c. fragment an existing population into two or more populations</i></p> <p>The proposed action will not fragment existing populations of the Regent Honeyeater, Swift Parrot and the Spotted-tailed Quoll. The Regent Honeyeater and Swift Parrot are highly mobile and may only visit the study area during winter migration. There will be no barriers to the movement of these species by the proposed action. The Spotted-tailed Quoll has a large home range. The proposed action will not create any barriers to movement within the home range of any population of Spotted-tailed Quoll that may exist in the study area. The remaining native vegetation in the Murramarang National Park will be retained.</p> <p><i>d. adversely affect habitat critical to the survival of a species</i></p>

Matters to be assessed	Impact (Commonwealth legislation)
	<p>Given the above, it is clear that no habitat within the study area is considered to be critical to the survival of the subject species.</p> <p><i>e. disrupt the breeding cycle of a population</i> <u>Regent Honeyeater and Swift Parrot</u> No potential nesting sites of the Regent Honeyeater or Swift Parrot will be impacted by the proposed action. These species would only visit the study area for foraging. Given this, the proposed action will not disrupt the breeding cycle of a population of these species.</p> <p><u>Spotted-tailed Quoll</u> The study area is not likely to contain breeding habitat for the Spotted-tailed Quoll given the marginal hollow quality and lack of other denning resources. The proposed action does not have the capability to undermine the carrying capacity to the point of causing breeding failure given the extent of habitat retained within Murramarang National Park.</p> <p><i>f. modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</i> Given that no known or likely critical habitat is to be cleared or modified by the proposed action, and extensive foraging resources will remain within the wider Murramarang National Park and the locality within the local range of their populations, the proposed action is unlikely to impact on any of these species to the extent of species decline.</p> <p><i>g. result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat</i> The proposed action is not likely to result in invasive species becoming established given the existing invasive species management in place and the recommended bio-security measures.</p> <p><i>h. introduce disease that may cause the species to decline, or</i> The proposed action is not likely to introduce any diseases that will affect these species given the existing invasive species management in place and the recommended bio-security measures.</p> <p><i>i. interfere with the recovery of the species.</i> Given that no known or likely breeding habitat is to be cleared or modified and breeding resources and extensive foraging resources will remain within the wider Murramarang National Park and the locality within the local range of any populations, the proposed action is unlikely to substantially interfere with the recovery of these species.</p> <p>Conclusion: Referral not required.</p>
<p>EPBC Act listed vulnerable species</p>	<p>The study area contains potential or known habitat for the following EPBC Act listed vulnerable species: Greater Glider, Grey-headed Flying-fox, Long-nosed Potoroo and Hooded Plover.</p> <p><u>Greater Glider</u> The Greater Glider is restricted to eucalypt forests and woodlands of eastern Australia. The species is not known from the study area, but there are nearby records and suitable habitat occurs in parts of the study area. The important population for this species would be at least those in the locality, north of the Clyde River.</p> <p><u>Grey-headed Flying-fox</u> The Grey-headed Flying-fox inhabits a wide range of habitats including rainforest and wet and dry sclerophyll forests. Camps are often located in gullies with dense canopies and close to water. There are no records for the species in the study area. However, suitable foraging habitat is present, and they have been recorded elsewhere in the locality. The important population for this species would be that part of this seasonally nomadic species' population utilising roosts within foraging range of</p>

Matters to be assessed	Impact (Commonwealth legislation)
	<p>Murramarang National Park.</p> <p><u>Long-nosed Potoroo</u> There are no records of the species for the locality. However, there is some suitable yet limited habitat in the study area with ecotones of coastal heath/woodland with dense understory and sandy loam soils. The important population for this species would be at least those in Murramarang and the surrounding areas e.g. the locality.</p> <p><u>Hooded Plover</u> The Hooded Plover is known to occur within and immediately adjacent to the study area. There are numerous records for the species from the locality, including the Murramarang coastline. The species is a <i>Site managed species</i> under NSW Saving our Species Program, with Murramarang as a key management site for the species. The important population for this species would be at least those in Murramarang and the surrounding areas e.g. the locality.</p> <p>The significant impact criteria are assessed below:</p> <p><i>a. lead to a long-term decrease in the size of an important population of a species</i></p> <p><u>Greater Glider</u> The proposed action will not significantly adversely affect the population size of the Greater Glider as no breeding habitat for this species will be affected. Hollow-bearing trees in the study area, which only provide marginal habitat because of a range of factors including the angle and aperture of the hollows, the low height of the hollows and their exposed locations in most areas, will be maintained. Relative to the extent of habitat within this species’ local range and its ecology, and no barriers to movement being created, the proposed action does not have the capability of leading to a long-term decrease of an important population.</p> <p><u>Grey-headed Flying-fox</u> The proposed action will not significantly adversely affect the population size of the Grey-headed Flying-fox as no breeding or roosting habitat for this species will be affected. Only up to 1.95 ha of native ground cover and/or understory vegetation is to be cleared or modified with mature canopy trees not being removed. Relative to the extent of habitat within this species local range and its ecology, and no barriers to movement being created, the proposed action does not have the capability of leading to a long-term decrease of an important population.</p> <p><u>Long-nosed Potoroo</u> The proposed action will not significantly adversely affect the population size of any Long-nosed Potoroo. Taking into account the environmental safeguards and mitigation measures on track alignment and definition of clearing limits, the proposed action will have a negligible impact on the species. Relative to the extent of habitat within this species’ potential local range and its ecology, and no barriers to movement being created, the proposed action does not have the capability of leading to a long-term decrease of an important population.</p> <p><u>Hooded Plover</u> The proposed action will not significantly adversely affect the population size of the Hooded Plover. No beach or dune material is to be removed or altered, and no barriers to movement will be created. The proposed action does not involve an increase in predators but does involve an increase in people walking along beaches where the Hooded Plover is known to nest, with the potential for increased disturbance to nesting sites. Potential impact to known nesting sites by beach users are already managed by a combination of monitoring, fencing and signage. Taking into account the recommendations of increased monitoring, increased signage and increased visitor information and awareness, the proposed action is very unlikely to a long-term decrease of an important population.</p> <p><i>b. reduce the area of occupancy of an important population</i> The proposed action will affect only a negligible amount of potential foraging habitat in the context of that available in the locality for the Greater Glider and Grey-headed Flying-fox. The proposed action</p>

Matters to be assessed	Impact (Commonwealth legislation)
	<p>will not remove any potential denning or roosting sites for these species. Therefore, the proposed action will not reduce the area of occupancy of an important population for Greater Glider or the Grey-headed Flying-fox.</p> <p>The proposed action will affect only a negligible amount of potential habitat in the context of that available in the locality for the Long-nosed Potoroo. Taking into account the environmental safeguards and mitigation measures on track alignment and definition of clearing limits, the proposed action will not reduce the area of occupation of an important population for Long-nosed Potoroo.</p> <p>The proposed action will not affect the area of occupancy of the Hooded Plover as no beach or dune material is to be removed or altered, and no barriers to movement are involved. Therefore, the proposed action will not reduce the area of occupancy of an important population of the Hooded Plover.</p> <p><i>c. fragment an existing important population into two or more populations</i></p> <p>The proposed action will not fragment an existing important population of the Greater Glider or Grey-headed Flying-fox as it will affect only a negligible amount of seasonal foraging habitat. No denning or roosting habitat will be removed or altered. The subject site is well connected to a much broader network of habitat.</p> <p>The proposed action will affect only a negligible amount of potential habitat in the context of that available in the locality for the Long-nosed Potoroo. Taking into account the environmental safeguards and mitigation measures on track alignment and definition of clearing limits, the proposed action will not fragment any existing important population for Long-nosed Potoroo.</p> <p>The proposed action will not fragment an existing important population of the Hooded Plover as no habitat is to be removed or altered, and no barriers to movement are involved.</p> <p><i>d. adversely affect habitat critical to the survival of a species</i></p> <p>The study area is not considered to be critical to the survival of an important population of Grey-headed Flying-fox, Greater Glider or Long-nosed Potoroo, for reasons detailed above. With the environmental safeguards and mitigation measures in place, impacts on the Hooded Plover are expected to be minimal.</p> <p><i>e. disrupt the breeding cycle of an important population</i></p> <p>The proposed action will not affect any known breeding habitat for the Greater Glider as no hollow-bearing trees are to be removed and/or modified and any foraging habitat that would be removed and/or modified would only comprise a minute fraction of their dietary needs.</p> <p>The proposed action will not affect any known breeding habitat for Grey-headed Flying-fox as the habitat to be potentially removed or modified is not a camp site, and at best would only comprise a minute fraction of their seasonal needs.</p> <p>The environmental safeguards and mitigation measures relating to clearing limits and micro-siting will reduce the amount of Long-nosed Potoroo breeding habitat to be impacted. Any habitat that would be removed and/or modified would only comprise a minute fraction of their needs.</p> <p>The proposed action will not disrupt the breeding cycle of an important population of Hooded Plover as no beach or dune material is to be removed or modified, and environmental safeguards and mitigation measures (including increased monitoring, increased signage and increased visitor awareness) are to be put in place to minimise any potential disturbance by an increased number of visitors to foraging habitat.</p> <p><i>f. modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</i></p> <p>The proposed action would not impact the Grey-headed Flying-fox to the extent that the species is likely to decline, as it will affect only a negligible amount of potential seasonal foraging habitat. Extensive foraging resources would remain available within its local range.</p>

Matters to be assessed	Impact (Commonwealth legislation)
	<p>The proposed action would not impact the Greater Glider to the extent that the species is likely to decline, as it will affect only a negligible amount of potential foraging habitat and no breeding habitat e.g. hollow-bearing trees are to be retained. Extensive foraging resources would remain available within its local range.</p> <p>The environmental safeguards and mitigation measures relating to clearing limits and micro-siting will reduce the amount of Long-nosed Potoroo habitat to be impacted. Any habitat that would be removed and/or modified would only comprise a minute fraction of their needs.</p> <p>The proposed action would not impact the Hooded Plover to the extent that the species is likely to decline, as no habitat is to be modified, destroyed or removed. The environmental safeguards and mitigation measures will minimise the chance of indirect impacts to nesting.</p> <p><i>g. result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</i></p> <p>The proposed action is not likely to result in invasive species becoming established given the existing invasive species management in place and the recommended bio-security measures.</p> <p><i>h. introduce disease that may cause the species to decline</i></p> <p>The proposed action is not likely to introduce any diseases that will affect these species.</p> <p><i>j. interferes substantially with the recovery of the species.</i></p> <p>The proposed action will only affect a negligible amount of occasional general non-breeding foraging habitat so the recovery of these species will not be substantially impacted.</p> <p>Conclusion: Referral not required.</p>
<p>EPBC Act listed critically endangered and endangered ecological communities</p>	<p>The following EPBC Act listed TECs potentially occur immediately adjacent to the study area: Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community; and Littoral Rainforest and Coastal Vine Thicket of eastern Australia.</p> <p>The significant impact criteria in terms of listed critically endangered and endangered ecological communities are discussed below in relation to these communities.</p> <p><i>a. reduce the extent of an ecological community</i></p> <p>The proposed action will not reduce the geographical extent of the TECs. No Coastal Swamp Oak Forest is to be removed by the proposed action. A low number of Littoral Rainforest ground cover and understorey plants may need to be removed, but the proposed action will not reduce the extent of this community.</p> <p><i>b. fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines</i></p> <p>The proposed action will not fragment, or increase fragmentation of, the ecological communities. No Coastal Swamp Oak Forest is to be removed by the proposed action. A low number of Littoral Rainforest ground cover and understorey plants may need to be removed, but the community will not be fragmented by the proposed action.</p> <p><i>c. adversely affect habitat critical to the survival of an ecological community</i></p> <p>The proposed action will not adversely affect habitat critical to the survival of the ecological communities. No Coastal Swamp Oak Forest is to be removed, and only a tiny amount of Littoral Rainforest ground cover and understorey plants will be removed by the proposed action.</p> <p><i>d. 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</i></p> <p>The proposed action will not modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for the ecological communities' survival. No Coastal Swamp Oak Forest is to be removed by the proposed action. Only a tiny amount of Littoral Rainforest ground cover and understorey plants</p>

Matters to be assessed	Impact (Commonwealth legislation)
	<p>will be removed by the proposed action. There are limited ground works associated with the proposed action. There are recommendations to mitigate anthropogenic impacts.</p> <p><i>e. cause a substantial reduction in the quality or integrity 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</i></p> <p>The proposed action will not cause a substantial reduction in the quality or integrity of an occurrence of the ecological communities. The proposed action will not cause a decline or loss of functionally important species. No Coastal Swamp Oak Forest is to be removed by the proposed action. Only a tiny amount of Littoral Rainforest will be removed by the proposed action. There are recommendations in place to mitigate anthropogenic impacts.</p> <p><i>f. cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including but not limited to:</i></p> <ul style="list-style-type: none"> • <i>assisting invasive species, that are harmful to the listed ecological community, to become established, or</i> • <i>causing regular mobilization of fertilizers, herbicides or other chemicals or pollutants into the ecological community which kills or inhibit the growth of species in the ecological community, or</i> <p>The proposed action will not cause a substantial reduction in the quality or integrity of an occurrence of the ecological communities due to invasive species, fertilizers, herbicides or pollutants. No Coastal Swamp Oak Forest is to be removed by the proposed action. Only a tiny amount of Littoral Rainforest will be removed by the proposed action. There are recommendations in place to avoid pollutants and reduce the risk of invasive species becoming established by the proposed activity.</p> <p><i>g. interfere with the recovery of an ecological community</i></p> <p>The proposed action will not interfere with the recovery of the ecological communities. No Coastal Swamp Oak Forest is to be removed by the proposed action. Consistent with the objectives and strategies under the National Recovery Plan for the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia Ecological Community, the recommendations which form part of the proposed activity, are consistent with the objectives and strategies under the National Recovery Plan for the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia Ecological Community (Commonwealth of Australia 2019) e.g. avoid all impacts to patches of Littoral Rainforest. There is no recovery plan for the Coastal Swamp Oak Forest.</p>
<p>EPBC Act listed migratory species</p>	<p>The study area provides some generic foraging habitat for the following EPBC listed migratory species: Black-faced Monarch; Satin Flycatcher; Rufous Fantail; Oriental Cuckoo; White-throated Needletail; Beach Stone-curlew; Sharp-tailed Sandpiper; and Double-banded Plover. The first five species are included in the <i>Draft referral guidelines for 14 birds listed a migratory species</i> under the EPBC Act (Australian Government 2015).</p> <p>The significant impact criteria in terms of migratory species are discussed below in relation to these species.</p> <p><i>a. substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species</i></p> <p>The proposed action will not substantially modify, destroy or isolate an area of important habitat as only up to 1.95 ha of native ground cover and/or understory vegetation, across the 48 km of the proposed walk, is to be cleared or modified. Mature canopy trees will not be removed. The proposed action affects significantly less habitat than the area defined in the threshold guidelines for the first five species. No habitat for the remaining species is to be removed or modified.</p> <p>Therefore, the proposed action is unlikely to substantially modify, destroy or isolate an area of important habitat for any of these migratory species.</p> <p><i>b. result in an invasive species that is harmful to the migratory species becoming established in an area</i></p>

Matters to be assessed	Impact (Commonwealth legislation)
	<p><i>of important habitat for the migratory species, or</i></p> <p>The proposed action is not likely to result in invasive species becoming established with measures in place to mitigate this threat during construction and operation phases of the proposed action.</p> <p><i>c. seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.</i></p> <p>The proposed action does not impact breeding habitat for these species; only non-breeding foraging habitat, which would at most form a minute fraction of their range. The proposed action affects substantially less than the ecologically significant proportion of the population given in the guidelines for the first five species, so is unlikely to result in a significant impact. No habitat of the remaining species is to be removed so it is highly unlikely that the lifecycle of these species will be disrupted.</p> <p>Conclusion: Referral not required.</p>
Nuclear Action	N/A. The proposed action does not involve a Nuclear Action.
Commonwealth Marine Area	N/A. The proposed action will not impact on a Commonwealth Marine Area.
Commonwealth lands	N/A. The proposed action will not directly or indirectly impact on Commonwealth land.
Water resource in relation to coal seam gas and large coal mining development	N/A. The proposed action does not involve coal seam gas and large coal mining development.

* Consistent with the *Matters of National Environmental Significance - Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999* (Australian Government 2013) the assessment above uses the term ‘action’ for the proposed activity.

11.3. EPBC Act Koala referral assessment

As the study area falls within the coastal geographic context of the modelled distribution of the Koala, an assessment of impact on the Koala needs to be carried out to determine if a referral under the EPBC Act is required. In accordance with the *EPBC Act referral guidelines for the vulnerable koala* (Australian Government 2014), the assessment involves a staged process. This staged assessment is detailed below.

11.3.1.1. Critical Koala Habitat assessment

The habitat of the study area has been assessed in accordance with the tool from the Commonwealth referral guidelines (Australian Government 2014). The Critical Koala Habitat assessment is to determine if the impact area, in this case the study area, contains habitat critical to the survival of the Koala. To qualify as critical habitat, it must score 5 or more in the assessment. The assessment is shown in Table 32 below.

Table 32: EPBC Act Critical Koala Habitat assessment

Attribute	Score	Reason
Koala occurrence	0	<ul style="list-style-type: none"> EPBC Act PMST report identified Koala as ‘known to occur’ in the locality. The Atlas of Living Australia has one Koala record approximately 0.75 km of the study area from between 2004-2006. The NSW OEH BioNet Atlas has six records of Koala for the locality, with three records between 0.75 km – 1 km from the study area and none within the subject site or study area. Field surveys found no evidence (direct or indirect) of Koala within study area.

Attribute	Score	Reason
Vegetation structure and composition	+1	Vegetation mapping and field survey investigations confirmed forest community in the study area with the presence of Forest Red Gum, mostly in the southern sections. This species is a Primary Food Tree for the South Coast Koala Management Area (OEH 2018).
Habitat connectivity	+2	The study area forms part of a contiguous landscape > 500 ha within Murramarang National Park.
Key existing threats	+2	NPWS advise that there are no records of Koala mortality from vehicle strike or dog attack (score of 0 for Koala occurrence). Field surveys found no evidence of Koala mortality.
Recovery value	+2	The study area habitat is likely to be important for achieving interim recovery objectives for the relevant context.
Total	7	
Conclusion		Study area contains habitat critical to the survival of the Koala. An assessment of significance of the impact of the proposed action is required.

11.3.1.2. Impact on Critical Koala Habitat assessment

The critical habitat assessment above determined that the study area contains habitat critical to the survival of the Koala as defined by the *EPBC Act referral guidelines for the vulnerable koala* (Australian Government 2014). Therefore, the proposed action needs to be assessed to determine whether there will be adverse effects on the habitat critical to the survival of the Koala.

In accordance with the *EPBC Act referral guidelines for the vulnerable koala* (Australian Government 2014) the proposed action is assessed in Table 33 below to determine if there will be adverse effects on habitat critical to the survival of the Koala.

Table 33: EPBC Act - Impact of proposed action on habitat critical to the survival of the Koala

Impact criteria to be assessed	Proposed action impact
Clearing ≤ 2 ha of habitat containing known Koala food trees in an area with a habitat score of 5.	Yes
Clearing ≥ 20 ha of a habitat containing known Koala food trees in an area with a habitat score of ≥ 8.	No
Score calculated for the impact area (higher score = greater risk of significant impact).	Score of 7 = medium risk
Amount of Koala habitat being cleared (more habitat cleared = great risk of significant impact).	Only up to 1.95 ha of ground cover and/or understory vegetation over 48 km = low risk
Method of clearing (i.e. clear-felling has great risk of significant impact than selective felling with understory and Koala food tree retention).	Selective clearing with preferred food tree species retention.
Density or abundance of Koala (relatively high density or abundance for the region means greater risk of significant impact).	Low density and abundance.
Level of fragmentation caused by the clearing (greater degree of fragmentation has greater risk of significant impact).	Negligible fragmentation.
Conclusion	Proposed action will not adversely affect habitat critical to the survival of the Koala.

11.3.1.3. Impact on recovery assessment

As well as the assessments above, an assessment on the potential of the proposed action to interfere substantially with the recovery of the Koala is required. This assessment is detailed in Table 34 below.

Table 34: EPBC Act Assessment of proposed action to interfere substantially with recovery of the Koala

Impact criteria to be assessed	Proposed action impact
Increase in fatalities due to dog attacks to a level that is likely to result in multiple, ongoing mortalities.	No increase in fatalities from dog attacks predicted as within national park where dogs are not permitted, and wild dogs are controlled.
Increase in fatalities due to vehicle-strikes to a level that is likely to result in multiple, ongoing mortalities.	No increase in fatalities from vehicle strikes predicted as vehicle use in study area will be restricted to management purposes only.
Facilitate the introduction or spread of diseases or pathogens that are likely to significantly reduce the reproductive output of koalas or reduce the carrying capacity of the habitat.	No facilitation of introduction or spread of disease of pathogens predicted as construction and operation phases of proposed action are subject to quarantine and bio-security measures.
Create a barrier to movement to, between or within habitat that is likely to result in a long-term reduction in genetic fitness or access to habitat critical to the survival of the Koala.	No barriers will be created during construction and operation phases of the proposed action.
Change hydrology which degrade critical habitat to the extent that the carrying capacity of the habitat is reduced in the long-term.	Only negligible change to hydrology predicted with construction of step risers and small drainage lines. However, mitigation measures will be in place to control erosion.
Conclusion	The proposed action will not interfere substantially with the recovery of the Koala.

11.3.1.4. Koala referral assessment conclusion

The conclusion of the EPBC Act Koala referral assessment is that the proposed action will not result in a significant impact on critical Koala habitat and therefore does not need to be referred to the Commonwealth Minister for the Environment.

12. Summary of impacts

12.1. Summary of proposed activity impacts

Table 35 summarises the impacts identified in sections 10 and 11 above. It assists in deciding whether the proposed activity is likely to have a significant environmental impact and whether an Environmental Impact Statement is required. As in sections 10 and 11 above, Table 35 assumes that the recommended environmental safeguards and mitigation measures will be fully implemented should the proposed activity be approved.

Table 35: Summary of impacts

Category of impact	Significance of impacts		
	Extent of impact	Nature of impact	Environmentally sensitive features
Physical and chemical	Negligible Negligible Negligible N/A Negligible Negligible Low; Negative	Soil disturbance/Sourcing rock Anthropogenic/sedimentation Minor flooding N/A Fuels and oils; Waste from machinery and humans Dust, odours, noise	Soil/substrate fauna Fauna Waterways/Fauna Waterways/Fauna Soil/Waterways/Fauna Soil/Waterways/Fauna Urban interface/Neighbours
Biological	Low; Negative Negligible Low; Negative Low; Negative Negligible Negligible Negligible Negligible N/A N/A	Vegetation modification or clearing Vegetation modification or clearing Habitat removal Habitat removal Vegetation modification or clearing Vegetation modification or clearing Vegetation modification or clearing Weed introduction	Threatened species/TECs Threatened species Threatened species Threatened species TECs TECs Flora/Fauna Flora/Fauna
Community	Low; Positive Medium; Positive Low; Positive Low; Negative Negligible Low; Positive Negligible	Improved infrastructure Improved access Increased opportunities Clifflines and other hazards Fire risk Improved amenity Increased visitor use/Improved amenity	Visual amenity Conservation estate Local economy Park visitors Park visitor/Neighbours Visual and scenic amenity Neighbours
Natural resources	Negligible Medium; Positive Negligible Negligible	Vegetation modification or clearing/Ground disturbance Increased and improved visitor use Vegetation modification or clearing Water and energy efficiency	Conservation estate Conservation estate/Local community TECs/Threatened fauna
Aboriginal cultural heritage	Low; Negative Low; Negative Low; Negative Low; Negative N/A	Ground disturbance	Aboriginal objects
Other cultural heritage	Negligible	Ground disturbance	Historic items

12.2. Cumulative impacts

Cumulative impacts take into account the combined and associated impacts of the proposed activity with other development planned for the study area or adjacent areas. The planned works to upgrade and maintain facilities at Depot Beach and Pebbly Beach will impact on the proposed activity. It is likely that this impact will be positive for those using the walking track and for those using the accommodation and other facilities at Depot Beach and Pebbly Beach.

13. Conclusions

Significant effect on the environment and requirement of an environmental impact statement

In accordance with subdivisions 2 and 3 of the EP&A Act in relation to the NPWS considering the environmental impact of the proposed activity and determining if an environmental impact statement is required, this REF has taken into account the matters affecting or likely to affect the environment.

Conclusion: There is unlikely to be a significant effect on the environment and based on the summary of impacts in Table 35 an environmental impact statement is not required.

Significant impact on threatened species, populations, ecological communities or their habitats and requirement for a species impact statement

The five-part test indicates that it is unlikely that there will be a significant impact on threatened species, populations, ecological communities or their habitats.

Conclusion: There is unlikely to be a significant effect on threatened species, populations, ecological communities or their habitats and a species impact statement is not required.

Respect of land that is, or is part of, critical habitat and requirement for a species impact statement

There is no critical habitat within the study area.

Conclusion: The proposed activity is not in respect of land that is, or is part of, critical habitat and a species impact statement is not required.

High risk of resulting in significant impact on koala and requirement for a referral

Assessment against the EPBC Act referral guidelines for the koala determined that there was a low risk of the proposed activity resulting in significant impact on the koala.

Conclusion: The proposed activity is unlikely to result in a high risk of a significant impact on the Koala. Referral to the Commonwealth Minister for the Environment is not required.

Significant impact on matters of national environmental significance listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and requirement for referral to the Minister for Environment

Assessment against the significant impact criteria determined that none of the known or potentially occurring entities listed under the EPBC Act were likely to be significantly impacted.

Conclusion: The proposed activity is unlikely to significantly impact matters of national environmental significance listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Consequently, referral to the Commonwealth Minister for the Environment is not required.

Certification to the Building Code of Australia, Disability (Access to Premises – Buildings) Standards 2010 requirement for the proposed activity will require certification to the Building Code of Australia, Disability (Access to Premises – Buildings) Standards 2010 or Australian Standards in accordance with the OEH Construction Assessment Procedure.

Conclusion: The infrastructure associated with the proposed activity requires a New Works Certificate and Completed Works Certificate.

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Appendices

Appendix A: Murramarang South Coast Walk Master Plan Submissions Summary

Submissions summary

Exhibition of Murramarang South Coast Walk Draft Master Plan and Draft Review of Environmental Factors



Background

The National Parks and Wildlife Service (NPWS) is working with the community to deliver the Murramarang South Coastal Walk, a multi-day 48 kilometre walk between Maloneys Beach (near Batemans Bay) and Bawley Point (near Ulladulla).

The project is funded by the NSW Regional Growth – Environment and Tourism Fund program, an initiative of the NSW Department of Planning, Industry and Environment, that provides funding for infrastructure that supports regional economic growth, creates local employment opportunities, and drives growth in the visitor economy.

The project will upgrade existing coastal walking trails and create new connecting sections so walkers can traverse the length of Murramarang National Park and Murramarang Aboriginal Area. The walk will also traverse the beaches that connect the coastal villages of Maloneys Beach, Durras, Depot Beach, Kioloa and Bawley Point.

The draft master plan was placed on public exhibition in July and August 2020 so the community could comment on the types of changes and improvements proposed. This enables us to refine the vision for the Murramarang

South Coast Walk and identify actions required to deliver the walk to a high standard. A total of 105 submissions were received from a broad range of stakeholders. NPWS reviewed all submissions received before finalising the master plan. View the [Murramarang South Coast Walk Master Plan](#).

This summary outlines the main issues raised in submissions and NPWS response following the review.

We value your input

We appreciate everyone's ongoing interest in the project. During the public exhibition period we hosted a series of meetings with stakeholder group representatives. We also engaged with the community and other stakeholders about the project in the following ways:

- [Murramarang South Coast Walk webpage](#) and online register.
- Project progress updates and notifications sent to stakeholders.
- Tourism and visitor research and market sounding.

What you told us

We received a total of 105 submissions (one online petition) on the draft master plan from a range of stakeholders, including; residents and business operators, other NSW Government agencies, local governments, non-government organisations and private individuals. Of the 105 submissions received, 55 provided overall support and 50 submissions either raised objections to the proposal or detailed matters requiring consideration from NPWS.

The submissions raised a wide range of issues that required consideration from NPWS. These have been summarised into key themes:

Key themes raised in submissions



Summary of issues raised

Submissions were well considered and offered constructive input. Here's some of what people had to say:

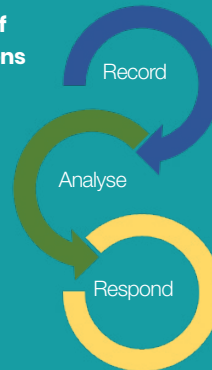
General support for the project

Many submissions provided overall support for the project as it was proposed in the draft plan, including the upgrades of key visitor sites at Maloneys Beach and Durras. With some noting that they liked the idea of linking the current trails and keeping the current natural surfaces. Further adding that this retains the experience of walking in nature and so not risking over development of the walk.

How submissions were analysed

All submissions were reviewed in full and every point raised was given full and proper consideration. We grouped similar issues into themes to allow us to present a succinct summary of the feedback and the changes that have resulted.

Analysis of submissions



- Record: Every point raised in every submission is carefully considered and recorded.
- Analyse: Every issue is reviewed to determine whether or not a change should be made to the plan.
- Respond: Where the need for change is identified, the relevant stakeholders are consulted before the master plan is finalised.

Change of park's character

Some submissions expressed concern that the walk might harm the park's environmental values or change the park's character. Whilst others were concerned walkers would disturb endangered shorebirds. The potential loss of the sense of remoteness and solitude was also raised.

Maloneys Beach precinct plan

Some submissions expressed concern about the proposed precinct design at Maloneys Beach. Many of these submissions wanted to retain vehicle access to the beach and/or expressed concern about a potential increase in traffic. Some of these submissions recommended the walk start at an alternative location.

Litter, waste, camping and campfires

Some submissions were concerned that there would be an increase in littering, human waste disposal and illegal camping. Some people were also concerned there would be an increase in illegal campfires – leading to an increased risk of bushfire.

Impact on local communities

Some submissions were concerned about the effect an increase in visitors would have on the life and wellbeing of residents, and on the character of the villages.

Expand the concept

Some submissions expressed the desire to expand the project. Many of these submissions recommended the walk continues to Batemans Bay. Others suggested that the walk be turned into a shared trail suitable for both mountain bikers and walkers. We also received submissions requesting that the requirements of sea kayakers be taken into consideration.

Walking track route

Some submissions suggested that the track route was too close to cliff edges, didn't adequately utilise existing tracks or allow visitors to experience a range of environments.

Concerns with Durras Lake

Some submissions were concerned that walkers may attempt to cross Durras Lake when it is not safe.

How has NPWS responded to issues?

We would like to thank everyone who submitted comments on the draft master plan. Every submission was reviewed in full to determine whether or not a change should be made to the plan. Where the need for change was identified, the relevant stakeholders were consulted before the master plan was finalised.

The following points describe where changes were made and outlines reasoning where changes were not made.

Change of park's character

The Murramarang South Coast Walk will be sympathetic with local concerns and the environment.

While activity may increase in areas of the park, much of the track is already in place. Where new track sections will be built, every effort will be made to retain the character of the landscape and minimise impacts on the environment and cultural heritage.

Where possible the track will be rerouted around known shorebird nesting locations. We will also erect shorebird education signs and place clear and prominent messages on our website to educate walkers about these birds and how walkers can lessen their impact.

Each concern raised about the environmental impact of the project will be reviewed through the Review of Environmental Factors assessment process to ensure all issues are adequately addressed.

Maloneys Beach precinct plan

In response to the submissions, we will reduce the size of the car park within the national park and seek to improve drainage along the access road. We will also plant native vegetation near the car park and access road to improve privacy for nearby houses.

We acknowledge some members of the community expressed a strong preference to retain vehicle access to the beach to launch small vessels. This activity is not permitted under the Plan of Management. After serious consideration, NPWS has determined it will not seek to amend the Plan of Management for several reasons. However, facilities will be provided to enable people to launch small watercraft such as kayaks.

We will also install a staircase to provide direct link to the Acheron Trail. To ensure that the planned facilities provided are appropriate for the area and in the right location, we will continue to work with the local community and council to refine the precinct plan.



Photo: Kangaroo at Pebbly Beach (Michael Jarman/DPIE)

Litter, waste, camping and campfires

NPWS has a zero tolerance for littering and are committed to ensuring that illegal human waste disposal, illegal camping and campfires are kept to a minimum.

We will provide clear and prominent messages on the NPWS visitor website and at public sites within the park about the negative impact of these activities and the risks associated with campfires.

We will monitor visitor use of the walk and implement strategies to mitigate negative environmental impacts. We will also seek to increase our compliance response. Additionally, we will increase the number of public facilities along the walk including BBQs. NPWS will continue to initiate, promote and enforce Park Fire Bans as well as uphold Total Fire Bans.

In response to the submissions, the toilet at Yellow Rock will be re-instated. This is in addition to installing new toilet facilities at Oaky Beach. NPWS will review public access to toilets and bins provided at Depot Beach and Pretty Beach Campgrounds with the intent on providing access to walkers.

NPWS remains committed to working closely with the local councils regarding potential improvements to public facilities along the walk.

Impact on local communities

The concerns of residents and other stakeholders will be explored in full during the detailed design phase of this project. Every attempt will be made to minimise the potential impact on residents.

NPWS are working with local councils and other stakeholders to address traffic and parking impacts.

Vegetation screens will be planted at Maloneys Beach to improve privacy for nearby houses.

Construction works will be tailored to ensure that the impact on residents is kept to a minimum.

Expand the concept

We support the notion of extending the walking track from Maloneys Beach to Batemans Bay. We are willing to continue to work with the other land managers and residents to explore options to extend the walk.

NPWS has a mountain bike policy that supports mountain biking in some national parks. Mountain biking however, can have impacts on a park's environment and must be managed consistent with the relevant legislation and the objectives for which a park is reserved. In the case of Murramarang National Park, a dual-purpose walking and mountain bike track is not consistent with the Plan of Management.

Walking track route

The track alignment has been re-surveyed to ensure a diverse range of landscapes are covered along the walk. In sections where the existing tracks are adequate they will be used.

A detailed geotechnical assessment has been undertaken following public exhibition to ensure safety and stability matters were thoroughly addressed in the final track alignment.

Concerns with Durras Lake

Durras Lake is an intermittently closed and open lake. When the lake is open to the ocean, walkers will need to get their feet wet or arrange transfers by water or vehicle. NPWS is investigating the feasibility of these transfers being undertaken by commercial operators.

We will explore options to ensure walkers are informed of any safety risks along the route. If conditions are deemed unsafe, NPWS will close the track within the national park using existing online channels, media release and alert systems. There are no plans to install a crossing of Durras Lake or alternative walking track.

Next steps

Further detailed planning

The Murramarang South Coast Walk Master Plan has been updated to address comments received and is available to view on the [Murramarang South Coast Walk webpage](#).

The master plan will guide the detailed design phase of the project and associated improvements to visitor facilities, while remaining consistent with the Plan of Management.

Assessment process and finalising details

Before work commences, NPWS will finalise comprehensive and detailed environmental and cultural heritage assessments to determine the impact of the proposal.

The draft Review of Environmental Factors that was exhibited was prepared before the Curowan Fire which burnt much of the Murramarang National Park over the 2019–20 summer.



Photo: Walking between Pebbly Beach to Pretty Beach (B Webster/DPIE)

Additional field work is being undertaken to better understand the bushfire impacts.

We have also engaged a consultant to work with the Aboriginal community to survey the proposed walking route area and prepare an Aboriginal Heritage Impact Permit to avoid potential impacts to the greatest extent possible.

The draft Review of Environmental Factors will be updated to incorporate the outcomes of the post-fire environmental and cultural heritage assessments and the public consultation before being submitted for approval. This approval process will determine whether further changes are required to the Murramarang South Coast Walk and outline appropriate mitigation measures.

Anyone who has not yet registered their interest in the project can do so on the [Murramarang South Coast Walk webpage](#).

More information

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W: www.environment.nsw.gov.au/murramarang-south-coast-walk

Department of Planning, Industry and Environment,
Locked Bag 5022, Parramatta NSW 2124.

Phone: 1300 361 967 (environment and national parks enquiries)

email: info@environment.nsw.gov.au;

website: www.environment.nsw.gov.au.

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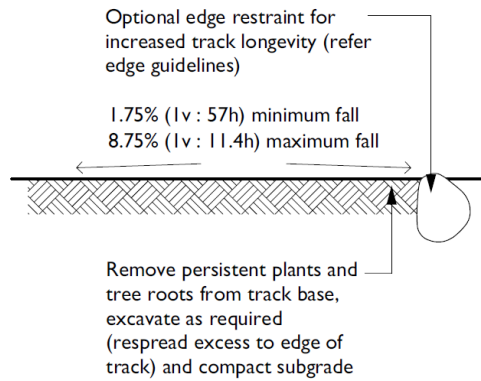
Cover photo: Depot Beach at Murramarang National Park. J Yurasek/DPIE.

Appendix B: Park Facilities Manual – relevant sections



Park Facilities Manual 5.3 Tracks

5.3.3 Natural surface



Typical section



Location

Suitable for class 4–5 tracks

See also 5.1.5 Track siting and alignment

Principles

- Least costly and simplest form of track construction
- With adequate drainage this will often be adequate to carry normal intermittent foot traffic
- If the natural soil is deemed unsuitable due to structural weakness or unacceptable slipperiness etc. then some form of surfacing will be required
- Existing soil profile can be stabilised (optional)

Technical

Track surface

- Natural soil found in situ

Edging

Should be minimal, but can be provided to minimise erosion:

- Timber
- Rock

Stabilisation of wearing surface (optional)

- Variety of stabilisation mixes can be added – refer 5.3.8 Lime stabilisation and 5.3.9 Cement stabilisation

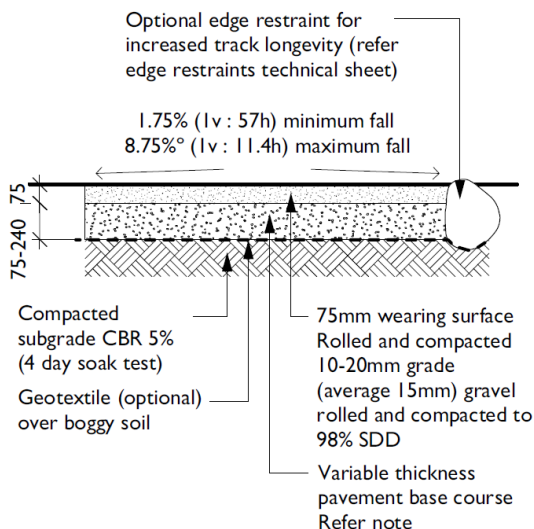
All dimensions in millimetres unless otherwise noted



Park Facilities Manual

5.3 Tracks

5.3.4 Gravel



Base course thickness:

- Pedestrian – 75mm compacted thickness fine crushed rock (DGS20) or equivalent
- Light vehicle (ute) – 160mm compacted thickness fine crushed rock (DGS20) or equivalent (80% confidence)
- Heavy vehicle (single axle) – 240mm compacted thickness fine crushed rock (DGS20) or equivalent (80% confidence)
- Site-specific engineering advice required in areas of problem soil condition, steep grades, etc

Typical section

Using geotextile

Geotextile is a non-woven polyester semi-permeable membrane cloth that separates the gravel surfacing material (or fill) from the soft soil below.

Geotextile material can be easily placed directly on a weakly structured soil surface to create an initial base layer to improve track stability.

The cloth acts to allow free movement of water but inhibits the downward movement of gravel into the boggy soil below. Consequently hard setting gravel can be laid directly over geotextile on soft clay soils, however adequate drainage must first be provided.

Installation of geotextile onto ground as base layer in track construction allows for removal of track at a later date without disturbance to the site soil below. This is particularly useful for archaeological sites.

Location

Suitable for class 3–5 tracks

See also 5.1.5 Track siting and alignment

Principles

- Blends well with natural environment
- Use of locally occurring gravel preferred
- Can be susceptible to erosion from surface water especially on tracks with longitudinal gradients steeper than 1 vertical to 8 horizontal
- Can be stabilised with additives to improve longevity
- Track surface should be compacted and profiled to minimise surface depressions and ponding
- Integrate turnpiking of alignment where appropriate to more effectively manage drainage to steeply sloping sites

Technical

Gravel

- Gravel to be well graded material of nominal size range as listed and of uniform colour including:
 - crushed rock
 - decomposed granite
 - shell grit

Edging

- Stone
- Rock
- Timber edge (200x38mm)

Geotextile (optional)

- A24 BIDIM geotextile (or equal) for most general applications – consider heavier fabric for sharp irregular sub base or base course (over 50mm ϕ)

Base course

- Fine crushed rock
- Recycled concrete or brick

Stabilisation of wearing surface (optional)

- Variety of stabilisation mixes can be added – refer 5.3.9 Lime stabilisation and 5.3.9 Cement stabilisation

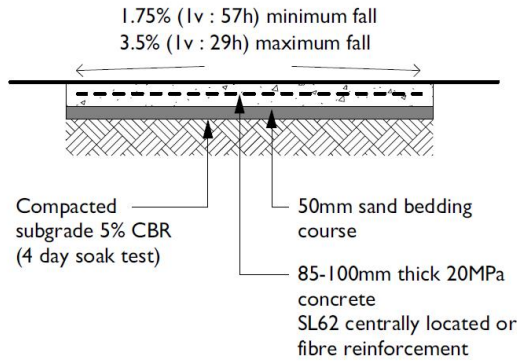
All dimensions in millimetres unless otherwise noted



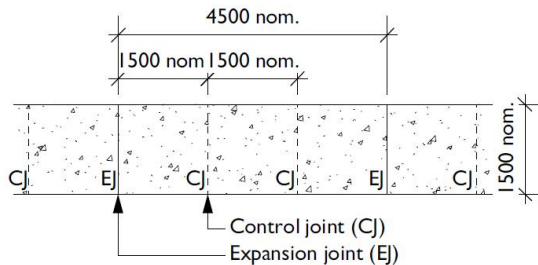
Park Facilities Manual

5.3 Tracks

5.3.10 Concrete

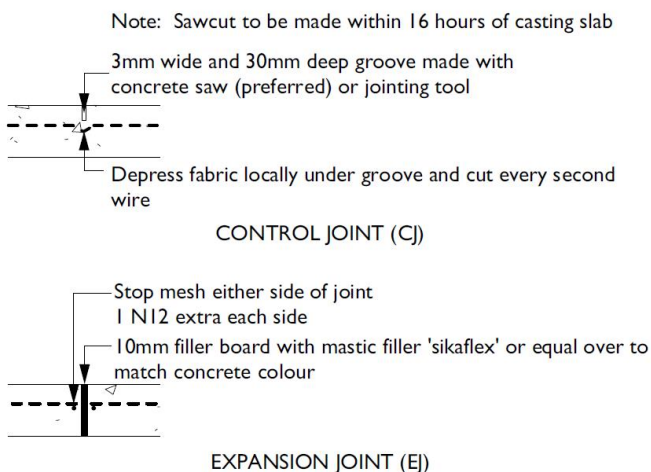


Typical section



The distance between concrete joints varies, generally depending on the width of the path. As a general rule aim to make squares with concrete joints, with every third joint being an expansion joint and all in between joints being control joints
Eg. For a 1500mm wide concrete path (shown above – joints should be at 1500mm centres. Therefore each expansion joint is 4500mm apart.

Typical plan – jointing example



All dimensions in millimetres unless otherwise noted



Exposed aggregate surface at Meeting Place Precinct, Botany Bay NP



Breadcrumb oxide colour used at Three Sisters Walking Track, Blue Mountains NP

Location

Suitable for class 1 and 2 tracks, generally high-use tracks adjoining park focal points such as visitor centres, lookouts etc.

See also 5.1.5 Track siting and alignment

Principles

- Hard-wearing path with long life expectancy and low ongoing maintenance requirements
- Suitable for wheelchair use
- Consider visibility from adjoining areas – if critically viewed and likely to be of visual impact, consider asphalt or other track surface

Technical

- Concrete and reinforcement in accordance with Australian Standards
- Monitor joints to avoid settlement causing deflections greater than 5mm

Finishes

Range of approved finishes – refer 10.2.8 Concrete for details:

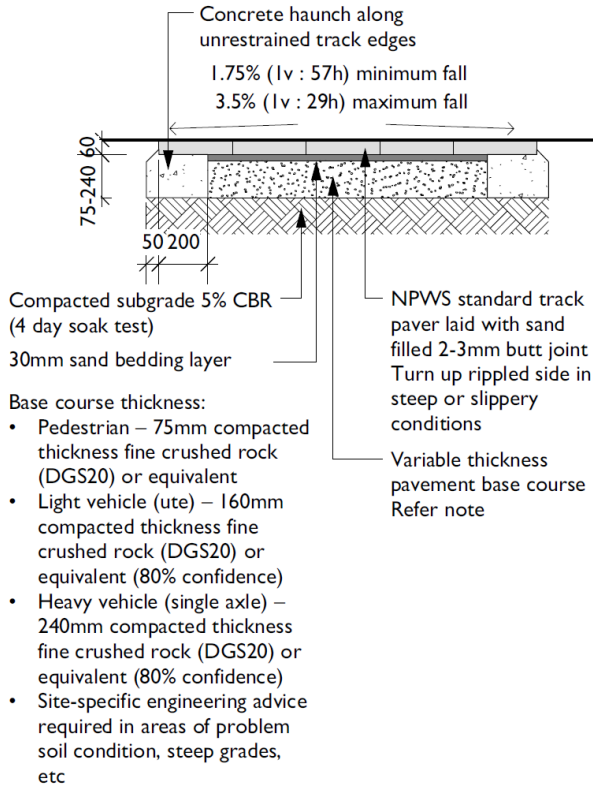
- Exposed aggregate by light 'washing' or 'honing' of concrete surface
- Broom finish (tooled edges followed by broom finish over top)
- Cove (wood float) finish provides a good non-directional finish
- Coloured oxide may be added to any of the above finishes, however only a few colours are approved for use in park areas



Park Facilities Manual

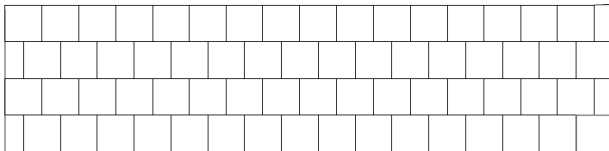
5.3 Tracks

5.3.13 Paver

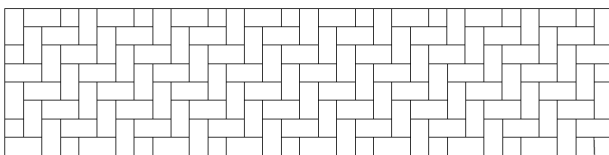


Typical section

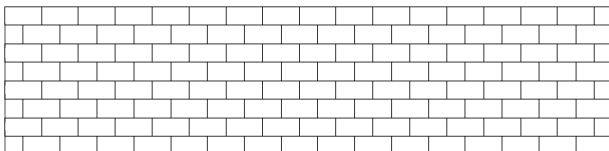
Typical laying patterns



300x300 stretcher bond pattern



300x150 herringbone pattern



300x150 stretcher bond pattern

All dimensions in millimetres unless otherwise noted



Location

Suitable for class 1 and 2 tracks

Principles

- Standard size paver that is easily transportable and can be laid in a curved alignment
- Concrete paver with dark grey colour to blend with a range of natural settings
- A custom made paver with rippled surface has been made previously for NPWS to provide extra grip in slippery conditions
- Smooth surface shall be compliant with class V of AS/NZS 4586 and provide adequate slope resistance for gradients up to 1:14 in general applications (i.e. not damp)
- Clay brick pavers commonly used in domestic landscapes are not to be used due to the need to promote an image identifiable from other open space managers, the limited colour range, and potential to lose slip resistance over time.

Technical

Paver colour

- Dark grey / charcoal colour

Paver size

- 300x300x60mm or
- 300x150x60mm

Rippled finish

- Optional custom rippled surface on top face

Base course

- Fine crushed rock
- Recycled concrete or brick

Maintenance

- Monitor joints to avoid settlement/ deflections greater than 5mm



Park Facilities Manual

5.5 Steps and stairways

5.5.5 Sleeper



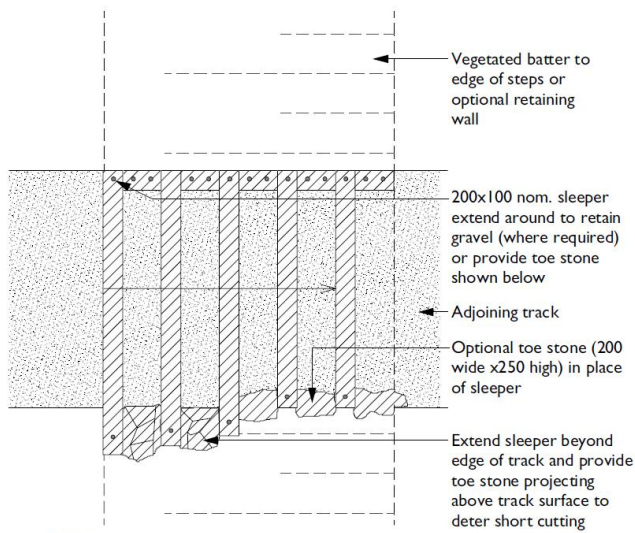
1200 long half rounds are typically used in the Blue Mountains



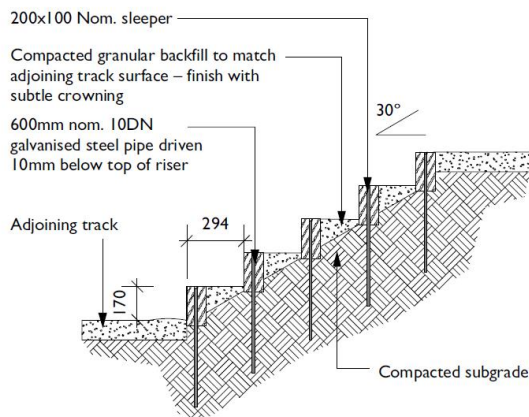
600 long rectangular profile at Sublime Point



Rectangular profile at Royal NP



Plan



Cross section

Location

Class 3,4 and 5 tracks

Principles

- Traditional construction technique that blends well with most natural setting
- Concrete riser provides hard wearing treatment with long life expectancy – not affected by bushfires
- Suitable for use with bitumen, gravel and mulch tracks (refer technical sheets – 5.3 Tracks)
- Gravel step treads should be finished level (no cross fall) to minimise erosion
- Return riser at step edges where required, or install with toe stone to reduce erosion of tread material

Technical

Sleeper

- Timber riser or precast concrete step riser
- Fix with galvanised steel pipe driven through precast hole in riser
- 200 high x 1200 long half rounds typically used in Blue Mountains
- 200 high x 100 wide x 600 long sleepers used in Illawarra Area
- Timber to be class 1–2 hardwood or preservative-treated softwood (e.g. Copper Azole, ACQ)

Maintenance

- Top up gravel treads periodically
- Check stability of risers and make sure that pipe is not projecting above track surface
- Check condition of riser top edge – can be turned upside down when it becomes worn

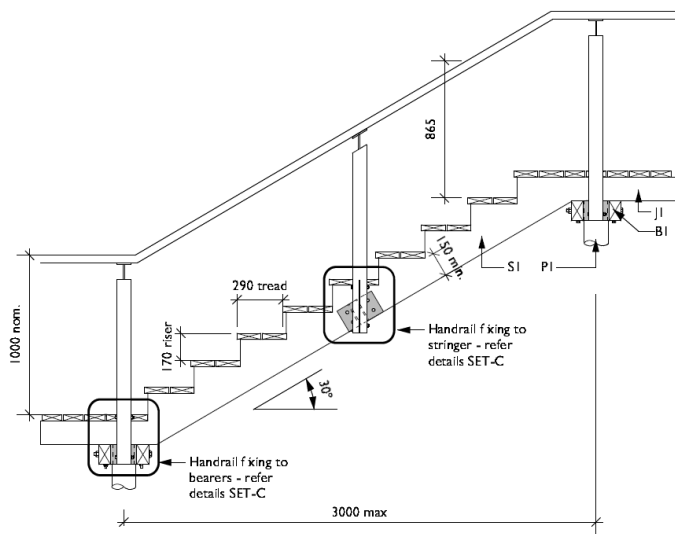
Riser/going dimensions

- The stair slope (30°) and riser/going dimensions shown on detail are indicative. Refer *Steps and stairways / 5.5.1 General requirements / Preferred step ratios* for a number of predefined ratios compliant with AS 2156 and the BCA

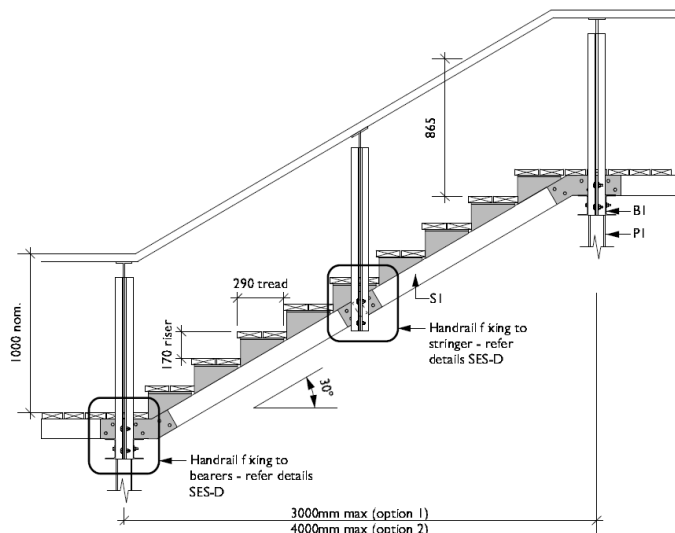


Park Facilities Manual 5.5 Steps and stairways

5.5.6 Elevated stairs



Timber



Steel

Location

Class 1–3 tracks in all park areas

Principles

- Provides minimal-impact access through natural areas once installed
- Provides smooth and consistent walking surface for safe and easy access
- Post height can be modified to provide greater flexibility in response to undulating ground
- Stairs must conform to the BCA where they form part of access to or between buildings
- Stairs must conform to AS 2156 *Walking Track* for all applications in national parks
- Provide 2.5m vertical clearance free from obstructions (e.g. tree branches etc.) above deck level

Technical

- Timber or steel posts, beams and joists
- Decking material options:
 - 125x38 hardwood
 - 125x50 recycled plastic
 - galvanised steel mesh grate
 - fibreglass mesh grate

Riser/going dimensions

- The stair slope (30°) and riser/going dimensions shown on detail are indicative.
- Refer *Steps and stairways / 5.5.1 General requirements / Preferred step ratios* for a number of predefined ratios compliant with AS 2156 and the BCA

Refer A3 technical sheets:

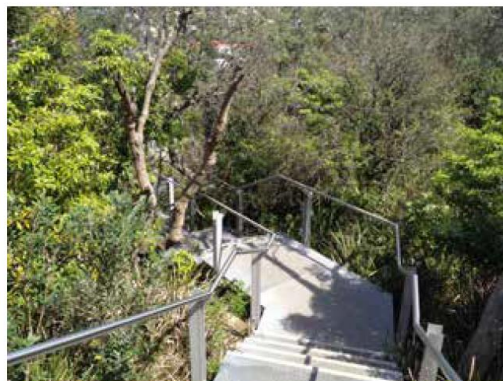
SET for timber

SES for steel



Park Facilities Manual

5.5 Steps and stairways



Gap Bluff

- Access upgrade to cliff top lookouts at Sydney's South Head
- Stainless steel structure that incorporates woven wire mesh balustrade and FRP micro mesh decking
- Refer [Gap Bluff](#) drawings



Grand Canyon Walk

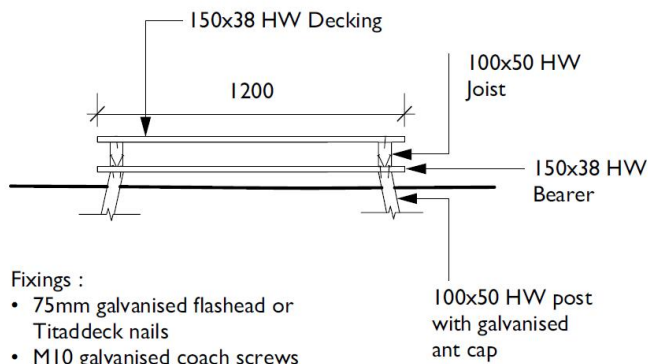
- Steel frame structure with timber posts and step treads, and uni-fit barrier system
- Long stair flight was required to fit within existing track limitations at top and bottom of the stairs
- Refer [Grand Canyon](#) drawing



Park Facilities Manual

5.9 Boardwalks and bridges

5.9.2 Duck board



Location

- Class 2-4 tracks in all duck areas

Principles

- Relatively cheap and quick to install
- Used extensively in Tasmania's World Heritage national parks
- Simple construction with traditional materials
- Timber blends well with a range of park settings
- Can be slippery – needs a non-slip surface in wet, shady and icy locations, for example chicken wire or asphalt

Technical

- Class 1-2 Australian hardwood (HW) or treated softwood
- Hot-dip galvanised nails and bolts
- Grade 316 stainless steel nails and bolts in marine environments

Refer A3 technical sheet:

[BDB](#)

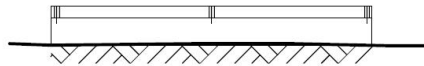
All dimensions in millimetres unless otherwise noted



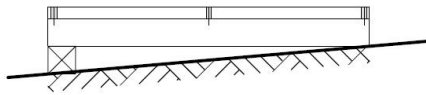
Park Facilities Manual

5.9 Boardwalks and bridges

5.9.3 Floating grate



Minimal cross slope



Maximum cross slope 1:11.5

Typical sections



Location

- Class 2–4 tracks in all park areas

Principles

- Reduces environmental impacts of bush walking
- Relatively cheap and quick to install
- No footing or penetration of the ground surface required
- Can be easily removed and relocated
- Grate allows light and water to penetrate through the deck
- Fibreglass grate is quiet to walk on and corrosion resistant
- Grate surface prevents goats entering sensitive areas such as Aboriginal art sites

Technical

- Galvanised steel mesh grate
- Fibreglass mesh grate (colored grey)
- Recycled plastic bearers

Refer case study:

5.2.6 Henry Head, Botany Bay NP
(La Perouse) case study

Refer A3 technical sheet:

BFG

Design by Peter Donahoe (NPWS Illawarra Area)

All dimensions in millimetres unless otherwise noted

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5.9 Boardwalks and bridges

5.9.5 Elevated boardwalk



Steel frame and timber deck boardwalk at the Weir Precinct, Lane Cove NP

Location

Class 1–3 tracks in all park areas

Principles

- Provides minimal-impact access through natural areas once installed
- Provides smooth and consistent walking surface for safe and easy access
- Post height can be modified to provide greater flexibility in response to undulating ground
- Where boardwalks cross water the beams should be above the high water mark
- Provide 2.5m vertical clearance free from obstructions (e.g. tree branches, etc.) above deck level
- Timber deck can be slippery – needs a non-slip surface in wet, shady and icy conditions, for example chicken wire or asphalt

Technical

Building codes and standards

- Can extend over water
- Boardwalks must conform to the BCA where they form part of access to or between buildings
- Boardwalks must conform to AS 2156 Walking Track for all applications in national parks
- Boardwalks on class I tracks must comply with AS 1428 Design for Access and Mobility

Materials

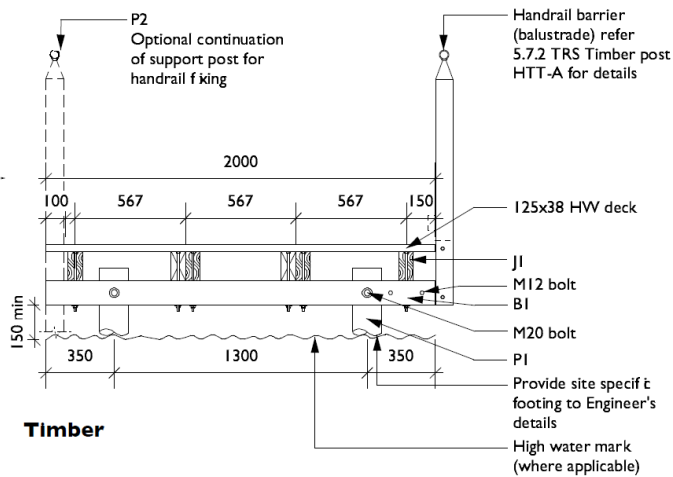
- Timber or steel posts, beams and joists
- Decking material options:
 - 125x38 hardwood
 - 125x50 recycled plastic
 - galvanised steel mesh grate
 - fibreglass mesh grate

Refer A3 technical sheets:

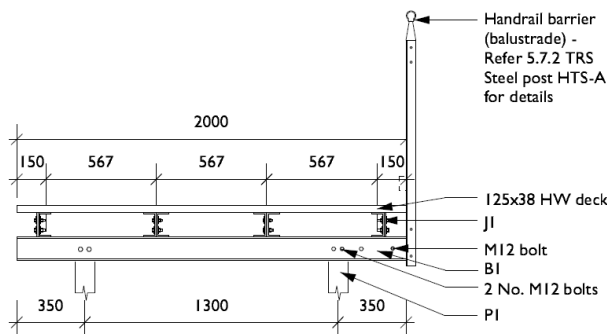
BET for timber

BES for steel

MMB for mini mesh



Timber



Steel



Park Facilities Manual 5.9 Boardwalks and bridges



Royal NP Coast Walk

- Composite frame boardwalk with FRP decking
- 2.4m spans between post
- Doesn't require concrete for footings
- Refer [Coast Walk](#) technical package



Hermitage Foreshore Walk, Sydney Harbour NP

- Composite frame with timber decking
- Closely follows the ground surface
- Can incorporate steps and curved timber handrail (laminated)



Floating elevated boardwalk, Maddens Plains (Illawarra)

- Sits on timber sleepers and doesn't require footings
- Removable
- Refer [Maddens Plains](#) technical package



Park Facilities Manual

6.4 Toilets

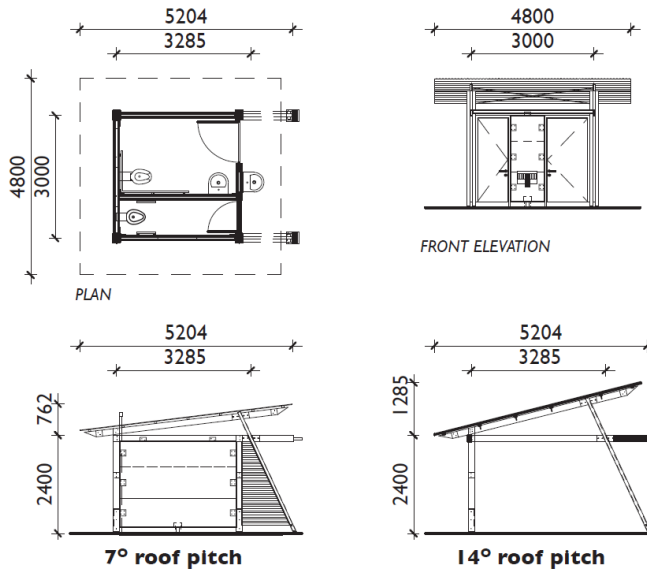
6.4.7 Skillion double stall



Timber frame



Steel frame



All dimensions in millimetres unless otherwise noted

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Location

Park areas where a double-stall toilet is required

Principles

- Designed to accommodate various sewage treatment systems
- Vehicle access required for pumpout and/or servicing
- Install with a range of ancillary elements to suit site-specific physical and character requirements
- Two buildings can be installed side by side to create a central breezeway which can be used for outdoor showers etc.
- Select frame materials based on suitability for environmental conditions, visual settings, existing structures etc.
- Select roof pitch based on visual settings, level of exposure, views etc.
- Toilets, showers and taps (where applicable) should be 4-star WELS rated
- Where possible, rainwater tanks should be plumbed to toilets

Technical

- Refer 6.1.8 Shelters & toilets drawing matrix for guidance in assembling A3 technical drawing packages
- Refer 6.5 Shelter & buildings ancillaries for structural components and engineering considerations required for shelters and buildings and optional fixtures that supplement the function, usage and look of the standard shelters
- Refer 10.2 Colours and finishes for coating systems, corrosion protection, graffiti protection, external paint, internal paint, timber, corrugated steel and concrete technical sheets

A3 technical sheets

SSD for steel stall

SSDC for steel conc stall

TSD for timber stall



Park Facilities Manual

6.3 Shelters

6.3.5 Skillion standard



Timber frame

A3 technical sheets

- SS7 for steel 7°
- SSI4 for steel 14°
- TS7 for timber 7°
- TSI4 for timber 14°



Steel frame



Standard timber skillion at Bonnie Vale campground, Royal NP

Location

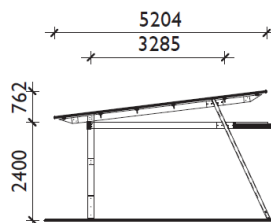
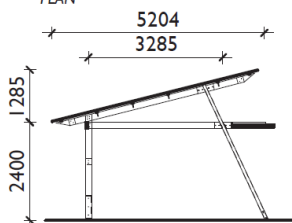
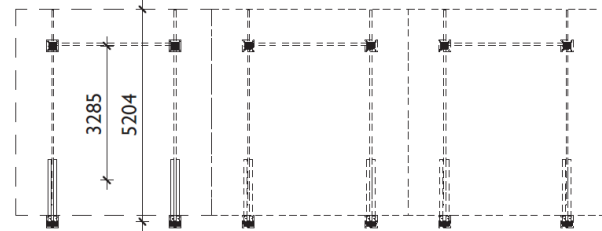
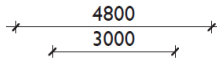
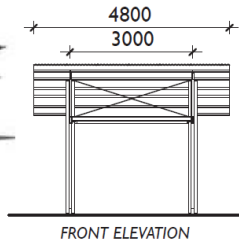
Park areas where a standard size shelter is required

Principles

- Standard-size shelter for family and small-party use when installed with a picnic table
- Can also be used as a centralised cooking facility when installed with BBQs
- Join several shelters together to create a larger shelter
- Install with a range of ancillary elements to suit site-specific physical and character requirements
- Select frame materials based on suitability with environmental conditions, visual settings, existing structures etc.
- Select roof pitch based on visual settings, level of exposure, views etc. – e.g. 7° roof for flatter landscapes with dominant horizon, 14° roof for undulating landscapes and semi-enclosed settings



Extended shelter



All dimensions in millimetres unless otherwise noted

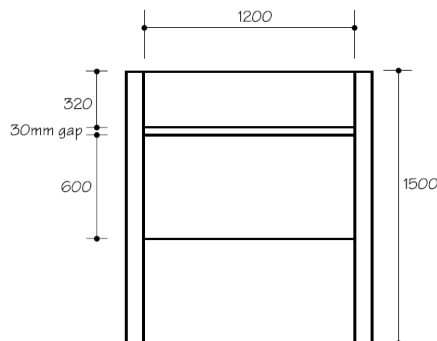
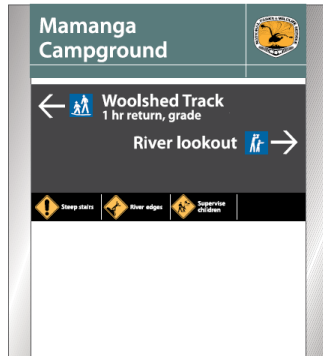
Appendix C: Park Signage Manual - relevant sections



Park Signage Manual

7.3 Orientation signs / Directional signs

7.3.4 Track head sign – standard



All dimensions in millimetres unless otherwise noted – not to scale

Function

Used to signpost an entrance to a smaller precinct or inform visitor of destinations and distances, track difficulty rating, directions to points of interest and amenities. May also be combined with a map of the walking track system or precinct.

Location

Locate at the beginning of a track and when the number of destinations required within a smaller precinct area is less than required for a track head sign.

Content / message

Header panel: name of park or precinct and NPWS logo.

Body panel: directional arrows, information symbols, destinations, distances, difficulty and time estimates (for walking tracks).

Symbol bar: may indicate hazard warnings, where the warnings are precinct-wide and not site-specific, and can be adequately explained by a symbol and few words.

Danger messages require a stand-alone sign.

Design guidelines

Construction principles: refer to Section 10.1

Graphics rules: refer to Section 6.2

Messages and text rules: refer to Section 6.4

Printing options: refer to Section 10.2

Siting and locating principles: refer to Section 2.6

Materials information: refer to Section 10.5

Symbol catalogue: refer to Section 9.1

Refer to A3 technical sheets

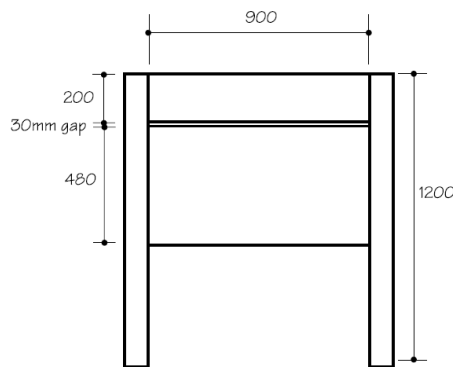
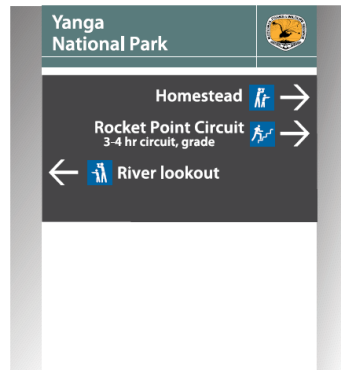
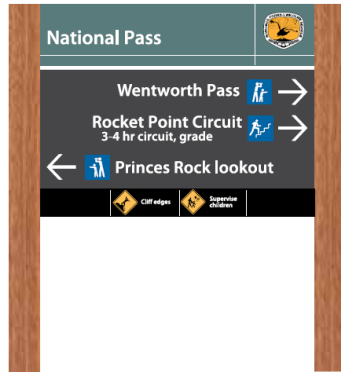
Construction	
timber posts	
fixed aluminium panels	PPT – C1 PPT2 – C1 PPTF – C1, C2 PPTF2 – C1
changeable aluminium panels	PPT – C1 PPT2 – C1 PPTC – C1, C2 PPTC3 – C1
footing	PPT – F1, F2
aluminium posts	
fixed/changeable aluminium panels	PPA – C1, C2 PPA3 – C1
footing	PPA – F1, F2
Layouts	PP H12 – G1 PP B12 – G1, G2, G3, G4



Park Signage Manual

7.3 Orientation signs / Directional signs

7.3.5 Track junction sign



All dimensions in millimetres unless otherwise noted – not to scale

Function

Inform and direct visitors to destinations, provide distances, track difficulty rating, and directions to points of interest and amenities. Symbol bar to inform of hazards.

Location

Located at track junctions and in areas where there may be limited space without compromising viewing distance and legibility.

Content / message

Header panel: Name of park, precinct or track and NPWS logo.

Body panel: directional arrows, information symbols, destinations, distances, difficulty and time estimates (for walking tracks).

Symbol bar: may indicate hazard warnings, where the warnings are precinct-wide and not site-specific, and can be adequately explained by a symbol and few words. Danger messages require a stand-alone sign.

Design guidelines

Construction principles: refer to Section 10.1

Graphics rules: refer to Section 6.2

Messages and text rules: refer to Section 6.4

Printing options: refer to Section 10.2

Siting and locating principles: refer to Section 2.6

Materials information: refer to Section 10.5

Symbol catalogue: refer to Section 9.1

Refer to A3 technical sheets

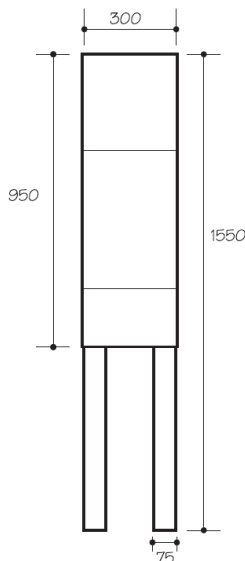
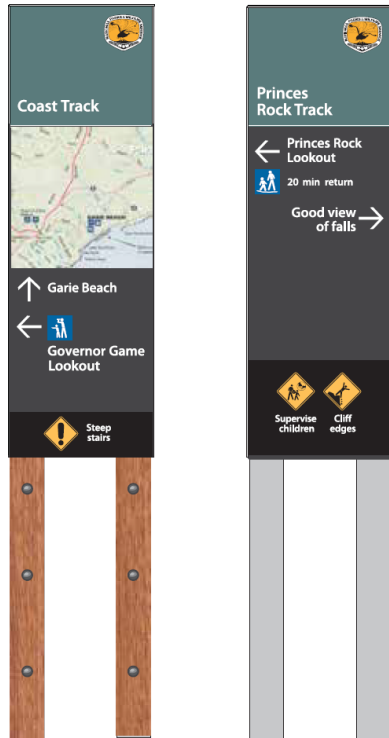
Construction	
timber posts	
fixed aluminium panels	PPT – C1 PPT2 – C2 PPTF – C1, C2 PPTF2 – C1
changeable aluminium panels	PPT – C1 PPT2 – C2 PPTC – C1, C2 PPTC3 – C1
footing	PPT – F1, F2
aluminium posts	
fixed/changeable aluminium panels	PPA – C1, C2 PPA3 – C1
footing	PPA – F1, F2
Layouts	
	PP H9 – G1 PP B9 – G1, G2, G3, G4



Park Signage Manual

7.3 Orientation signs / Directional signs

7.3.6 Minor directional sign



All dimensions in millimetres unless otherwise noted – not to scale

Function

Additional navigational signs along walking tracks and within pedestrian circulation areas where there is little space but users may be able to access and look closely at the maps and messages.

Location

Track junctions.

Content / message

Detailed maps may be contained on these signs. The precinct name is shown on the header and is combined with messages, information symbols and directional arrows.

Changeable panels are recommended particularly for map sections.

Symbol bar: may indicate hazard warnings, where the warnings are precinct-wide and not site-specific, and can be adequately explained by a symbol and few words. Danger messages require a stand-alone sign.

Design guidelines

Construction principles: refer to Section 10.1

Graphics rules: refer to Section 6.2

Messages and text rules: refer to Section 6.4

Printing options: refer to Section 10.2

Siting and locating principles: refer to Section 2.6

Materials information: refer to Section 10.5

Symbol catalogue: refer to Section 9.1

Refer to A3 technical sheets

Construction	DIR 6 – CI, C2
Footing	PPA – FI
Layouts	DIR 6 – GI
	DIR 6M – GI



Park Signage Manual

7.3 Orientation signs / Directional signs

7.3.7 Standard totem



Function

Used in small precinct areas and along walking tracks to assist pedestrians with locating amenities or on walking tracks to reinforce direction, track names and distances to destinations.

Location

To be located at relevant decision points and junctions. The contrast of the lettering and symbol colour on the dark background make it easy to recognise a totem from a distance. However the totems should not be located too far away from the track or route edge.

Content / message

NPWS logo always portrayed on totems to reinforce location; background colour reinforces park type. Arrow followed by symbol followed by message, if required, on a vertical format. As there is limited space only essential information should be provided. Using symbols and arrows may be more appropriate than too many words. Totems are not to be used for hazard or regulatory symbols.

Design guidelines

Construction principles: refer to Section 10.1

Graphics rules: refer to Section 6.2

Messages and text rules: refer to Section 6.4

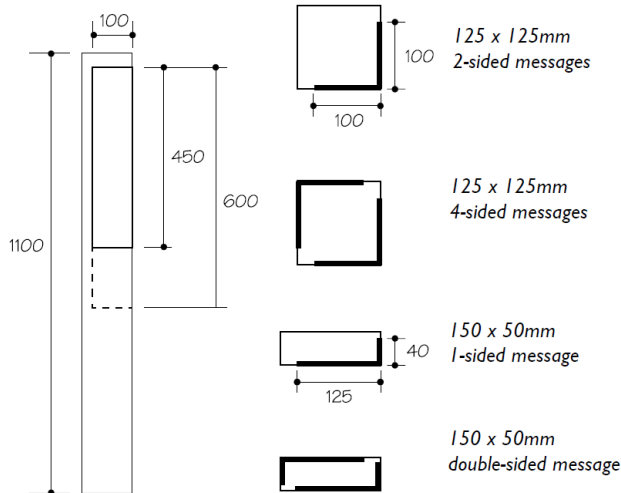
Printing options: refer to Section 10.2

Siting and locating principles: refer to Section 2.6

Materials information: refer to Section 10.5

Symbol catalogue: refer to Section 9.1

Options



Refer to A3 technical sheets

Construction	
timber totem	TOTT – C1, C2, C3
footing timber totem	PPT – F1, F2
steel totem (square)	TOTS – C1 TOTSS – C1
steel totem (rectangular)	TOTS – C1 TOTSR – C1
footing steel totem	P – F1, F2
Layouts	TOT 1 – G1 TOT 2 – G1

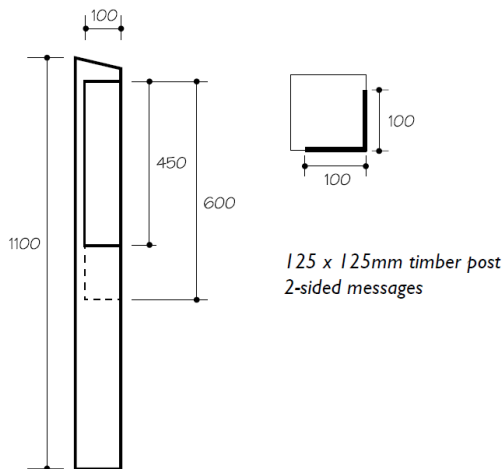
All dimensions in millimetres unless otherwise noted – not to scale



Park Signage Manual

7.3 Orientation signs / Directional signs

7.3.8 Map totem



All dimensions in millimetres unless otherwise noted – not to scale

Function

Used in small precinct areas and along walking tracks to assist pedestrians find amenities or on walking tracks to reinforce direction, track names and distances to destinations. Visitors are further assisted by a map fixed to the top of the totem.

Location

To be located at relevant decision points and junctions. The contrast of the lettering and symbol colour on the dark background make it easy to recognise a totem from a distance. However the totems are not to be located too far away from the track or route edge.

Content / message

NPWS logo always portrayed on totems to reinforce location; background colour reinforces park type. Arrow followed by symbol followed by message, if required, on a vertical format. As there is limited space, only essential information should be provided. Using symbols and arrows may be more appropriate than too many words. Totems are not to be used for hazard or regulatory symbols.

Design guidelines

Construction principles: refer to Section 10.1

Graphics rules: refer to Section 6.2

Messages and text rules: refer to Section 6.4

Printing options: refer to Section 10.2

Siting and locating principles: refer to Section 2.6

Materials information: refer to Section 10.5

Symbol catalogue: refer to Section 9.1

Refer to A3 technical sheets

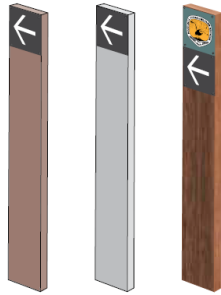
Construction	
timber totem	TOTM1 – CI TOTM2 – CI TOTTM1 – CI TOTTM2 – CI
footing timber totem	PPT – F1, F2
steel totem	TOTM1 – CI TOTM2 – CI
footing steel totem	P – F1, F2
Layouts	
	TOT 1 – G1 TOT 2 – G1



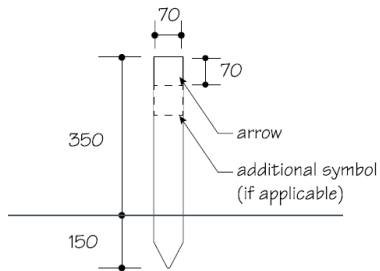
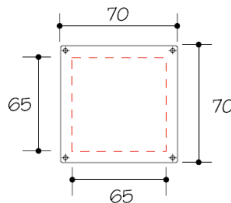
Park Signage Manual

7.3 Orientation signs / Directional signs

7.3.9 Walking track marker



Shown with optional logo panel, with background colour matching park type.



Dimensions are recommendations only. The above-ground height of post is dependant on the environment.

All dimensions in millimetres unless otherwise noted – not to scale

Function

This sign is specifically designed for use in areas where it is impractical to carry in the heavier totems. It can be used in conjunction with totems at the beginning of a track.

Location

Used as a reassurance guide for visitors that they are following the correct track.

Content / message

Simply an arrow reinforcing the direction of the path. An arrow may be used on both sides of the sign if required.

Design guidelines

Construction principles: refer to Section 10.1

Graphics rules: refer to Section 6.2

Printing options: refer to Section 10.2

Siting and locating principles: refer to Section 2.6

Materials information: refer to Section 10.5

New designs suitable for producing in recycled plastic are in development.

Construction

Posts

Timber

Closest size to 70x20x500mm timber slat. Trim one end to a triangle to aid in embedding the sign.

Aluminium

Closest size to 76x25mm rectangular hollow section cut into 500mm lengths. Trim one end to a triangle to aid in embedding the sign.

Recycled plastic

Closest size to 70x20x1500mm post cut into three equal lengths (500mm long). Trim one end to a triangle to aid in embedding the sign.

Symbols

1.6mm thick aluminium plate cut to 70x70mm square. Background colour to match Dulux 'Namadji' PG1.F8, arrow to be white. Screw fixed to post. Screws not to cover symbol artwork. Symbol size 65x65mm.

Printing can be one of three options: mask and spray, vinyl arrow on a painted background arrow or a digital print fixed to the sign plate.



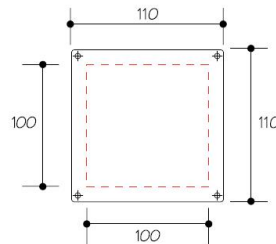
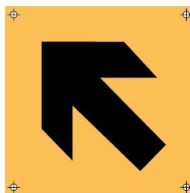
Park Signage Manual

7.3 Orientation signs / Directional signs

7.3.10 Waymarker - plaque



Shown attached to rock where no other markers are appropriate.



Function

This arrow marker is intended for remote grade 4 and 5 tracks and wilderness areas where it is impractical or impossible to install totems in the ground and/or where visibility may be poor.

Location

Used as a safety measure for visitors in remote areas to ensure they are following the correct route, or areas with poor visibility.

An arrow marker applied correctly to rock (where appropriate and available) may be less intrusive than the installation of a totem or marker. Cannot be attached to trees or other objects which constitutes vandalism.

Content / message

AS 2156 walking track directional arrow to be used instead of triangular markers.

Design guidelines

Construction principles: refer to Section 10.1

Graphics rules: refer to Section 6.2

Printing options: refer to Section 10.2

Siting and locating principles: refer to Section 2.6

Materials information: refer to Section 10.5

The design is currently being tested for future endorsed state-wide applications

Construction

1.6mm thick aluminium plate cut to either 110x110mm or 90x90mm square depending on placement. The arrow should be on a square background of minimum size 90x90mm.

Background colour AS 2156 specified golden yellow. Arrow black for greatest contrast. Screw fixed to post. Screws not to cover symbol artwork..

Printing can be one of three options: mask and spray, vinyl arrow on a painted background or a digital print fixed to the sign plate.

All dimensions in millimetres unless otherwise noted – not to scale



Park Signage Manual

7.3 Orientation signs / Directional signs

7.3.11 Waymarker - post

Function

This marker is intended for remote grade 4 and 5 tracks and wilderness areas where it is preferable to install totems in the ground and/or where visibility may be poor.

The sign type is currently in progress and is proposed to be developed for future endorsed state-wide applications

All dimensions in millimetres unless otherwise noted – not to scale

Appendix D: Track sections and scope

Section	Track Type	Length	On Park	Location	Work	Portion	Work Location	Equipment Access
1	Beach	709	Yes	Maloneys Beach	No work, track follows beaches	A		
2	Beach	264	Yes	Acheron Ledge	Follow rock shelf around Reef Point, low tide only, no work	A		
3	Existing	58	Yes	Reef Point	No work. Existing track to beach.	A		
4	Upgrade	134	Yes	Reef Point	Trim vegetation utilising existing footpad to create track to headland lookout point. Use boardwalk for wet sections or to restrict access to cliff edge.	A	Acheron Trail	Yes
5	Upgrade	177	Yes	Reef Point	Utilise existing Acheron Trail. Reduce track width using mulch and woody debris. Install drains to improve track condition. Hand tools or small machine.	A	Acheron Trail	Yes
6	Existing	153	Yes	Reef Point	No work utilise existing track	A		
HT 1-1	Upgrade	27	Yes	Maloneys Beach	Formalise existing footpad by installing stairs up slope	A	Maloneys Beach	Difficult access
HT 1-2	Upgrade	13	Yes	Maloneys Beach	Formalise existing footpad by installing stairs up slope	A	Maloneys Beach	Difficult access
HT 1-3	Upgrade	42	Yes	Maloneys Beach	Formalise existing footpad by installing stairs up slope	A	Maloneys Beach	Difficult access
HT 2	New Track	23	Yes	Maloneys Beach	Utilise existing footpad to connect to Acheron Trail	A	Acheron Trail	Yes
HT 3	Upgrade	457	Yes	Maloneys Beach	Utilise existing Acheron Trail, minor work to reduce track width by spreading dead wood and mulch and encouraging regrowth	A	Acheron Trail	Yes
7	Upgrade	17	Yes	Quirruga Beach	Install rock stairs at existing footpad and eroding slope. Stabilise adjacent disturbed areas with mulch and woody debris.	A	Acheron Trail	Yes
8	Beach	78	Yes	Quirruga Beach	No work	A		
9	Existing	314	Yes	Quirruga Beach	No work utilise existing track	A		
10	Existing	186	Yes	No Name Headland	No work utilise existing track	A		
11	Existing	79	Yes	No Name Headland	No work utilise existing track	A		
12	Upgrade	99	Yes	No Name Headland	Formalise existing footpad at headland. Reduce width and restrict general access to cliff edges and other areas by covering disturbed areas with mulch and woody debris to stabilise ground and using boardwalk to encourage visitors to stay on track.	A	Yellow Rock Stockyards	Yes
13	New Track	169	Yes	No Name Headland	Construct new track by trimming vegetation and forming track with hand tools or small machine.	A	Yellow Rock Stockyards	Yes

Murramarang South Coast Walk (NPWS Estate) Final alignment - Review of Environmental Factors

Section	Track Type	Length	On Park	Location	Work	Portion	Work Location	Equipment Access
14	Existing	22	Yes	No Name Headland	No work, existing track to connect to previous section and then existing grassed area to connect to beach.	A		
15	Beach	312	Yes	Yellow Rock Beach	No work	A		
16	Existing	10	Yes	Yellow Rock Beach	No work utilise existing boat ramp location	A		
17	New Track	201	Yes	Yellow Rock	Construct new track through Yellow Rock precinct around rear of cottages. Minor veg trimming required. Demarcate track edge with woody debris and rock.	A	Yellow Rock	Yes
18	New Track	186	Yes	Yellow Rock	Construct new track by trimming vegetation and forming track with hand tools or small machine.	A	Yellow Rock	Yes
19	New Track	224	Yes	Yellow Rock	Construct new track by trimming vegetation and forming track with hand tools or small machine.	A	Yellow Rock	Yes
20	New Track	105	Yes	Yellow Rock	Construct new spur track by trimming thick vegetation and forming track, difficult access. Restrict access to cliff edges, rock isthmus and midden by using boardwalk and woody debris.	A	Yellow Rock	Difficult access
21	New Track	707	Yes	Yellow Rock	Construct new track by trimming vegetation and forming track with hand tools or small machine benching if required. Vegetation is thick at southern and northern ends.	A	Yellow Rock	Yes
22	New Track	15	Yes	Yellow Rock	Trim vegetation and carefully construct new stairs at headland incorporating natural rock bands with hand tools. Track must be on alignment. Sensitive cultural zone.	A	Yellow Rock	Yes, from above only
23	Beach	378	Yes	North Head Beach	No work	A		
24	Existing	30	Yes	North Head	No work utilise existing beach stairs	A		
25	Existing	82	Yes	North Head	No work utilise road for short distance	A		
26	New Track	470	Yes	North Head	Construct new track by trimming vegetation and forming track with hand tools or small machine benching if required. Restrict access to rock isthmus and midden by using boardwalk and woody debris.	A	North Head	Yes
27	Upgrade	229	Yes	North Head	Utilise existing footpad to create track. Restrict cliff access with boardwalk and woody debris if required.	A	North Head	
28	Existing	120	Yes	North Head	No work utilise existing track. Ground stabilisation required for some adjacent disturbed areas. Mark track edge with woody debris and rocks.	A	North Head	
29	Existing	529	Yes	North Head	No work utilise existing track	A		
30	Existing	31	Yes	North Head	No work existing short track to lookout	A		
31	New Track	568	Yes	Honeysuckle Beach	Construct new track by trimming vegetation and forming track with hand tools or small machine. Some existing footpad can be used. Veg thick at southern and northern ends. Disturbed woodland at middle headland. Small boardwalk sections may be required	A	North Head	Yes
32	Existing	13	Yes	Honeysuckle Beach	No work utilise car park and access	A		
33	Existing	16	Yes	Honeysuckle Beach	First set of existing stairs. Minor maintenance required, difficult access.	A	Honeysuckle Beach	Difficult access

Murramarang South Coast Walk (NPWS Estate) Final alignment - Review of Environmental Factors

Section	Track Type	Length	On Park	Location	Work	Portion	Work Location	Equipment Access
34	Existing	13	Yes	Honeysuckle Beach	Second set of existing stairs. Minor maintenance required, difficult access.	A	Honeysuckle Beach	Difficult access
35	Beach	48	Yes	Honeysuckle Beach	No work	A		
36	Upgrade	9	Yes	Honeysuckle Beach	Minor repair work to existing stairs	A	Honeysuckle Beach	Difficult access
37	Existing	42	Yes	Honeysuckle Beach	No work utilise existing track	A		
38	New Track	658	Yes	Honeysuckle Beach	Construct new track by trimming vegetation and forming track with hand tools or small machine benching. Vegetation is thicker at southern extent. Drainages present in middle section and some dangerous cliffs may require boardwalk.	A	Honeysuckle Beach	Yes, use R02
39	New Track	819	Yes	Oaky Beach	Construct new track by trimming vegetation and forming track with hand tools, difficult access. Drainages present in south and dangerous cliffs may require boardwalk. Track to pick up existing footpads to reduce impacts.	A	Oaky Beach	Middle section difficult, northern extent can be accessed from Oaky Beach
40	New Track	52	Yes	Oaky Beach	Connect down to existing Oaky Beach track by utilising existing footpad with hand tools or small machine. Stairs and drains may be required.	A	Oaky Beach	Yes
41	Existing	102	Yes	Oaky Beach	No work utilise existing track to beach	A		
42	Beach	165	Yes	Oaky Beach	No work utilise beach and existing beach tracks	A		
43	Existing	134	Yes	Oaky Beach	No track work required, vegetation needs trimming, difficult access.	A	North Oaky	Difficult access
44	Upgrade	57	Yes	Oaky Beach	Existing track is in poor condition and requires upgrading by removing and replacing stairs or using boardwalk with hand tools and small machine. Track to be narrowed by stabilising edges with mulch and logs.	A	North Oaky	Yes
45	New Track	786	Yes	Oaky Beach	Construct new track by trimming vegetation and forming track with hand tools or small machine. Drainages and dangerous cliffs may require boardwalk.	A	North Oaky	Yes
46	New Track	441	Yes	Little Oaky	Construct new track by trimming vegetation and forming track, difficult access. Restrict access and stabilise cliff edges as required using boardwalk and woody debris.	A	Little Oaky	Difficult access
47	New Track	783	Yes	Little Oaky	Construct new track by trimming vegetation and forming track, difficult access. Boardwalk required for boggy sections. Prevent access to dangerous cliff edge with woody debris.	A	Little Oaky	Difficult access
48	New Track	16	Yes	Richmond Beach	Carefully construct track to beach, difficult access. Stairs and drains may be required.	A	Richmond Beach	Difficult access
49	Beach	392	Yes	Richmond Beach	No work	A		
50	Existing	122	Yes	Richmond Beach	No work utilise existing stairs	A		
51	Existing	72	Yes	Richmond Beach	No work utilise existing track	A		

Murramarang South Coast Walk (NPWS Estate) Final alignment - Review of Environmental Factors

Section	Track Type	Length	On Park	Location	Work	Portion	Work Location	Equipment Access
52	Upgrade	63	Yes	Richmond Beach	Use existing track and install stairs or boardwalk to fix erosion issue and stabilise artefacts. Reduce width of track by stabilising edges with woody debris and mulch.	A	Richmond Beach	Yes
53	Existing	48	Yes	Richmond Beach	No work utilise existing track	A		
54	New Track	279	Yes	Richmond Beach	Construct new track by trimming vegetation and forming track with hand tools or small machine.	A	Richmond Beach	Yes
55	Existing	37	Yes	Richmond Beach	No work utilise existing track	A		
56	New Track	197	Yes	Richmond Beach	Construct new track by trimming vegetation and forming track, difficult access. Dangerous cliffs may require boardwalk.	A	Richmond Beach	Yes
57	Upgrade	187	Yes	Richmond Beach	Formalise existing footpad by trimming vegetation, difficult access. Dangerous cliffs may require boardwalk and woody debris to prevent access.	A	Richmond Beach	Difficult access
58	New Track	1099	Yes	Richmond Beach	Construct new track by trimming vegetation and forming track, difficult access. Boardwalk required for boggy sections. Access to cliff edges to be restricted with woody debris.	A	Richmond Beach	Difficult access
59	Upgrade	9	Yes	Myrtle Beach	Formalise existing footpad to beach access track by trimming vegetation, difficult access. Slope is gentle minimal stairs. Boardwalk required for boggy sections. Restricted machine access.	A	South Myrtle Beach	Difficult access for southern section. Northern can be accessed from South Myrtle Beach carpark
60	Existing	46	Yes	Myrtle Beach	No work utilise existing track	A		
61	Beach	470	Yes	Myrtle Beach	No work	A		
62	Existing	475	Yes	Myrtle Beach	No work utilise existing track	A		
63	Upgrade	177	Yes	Dark Beach	Use existing track and install/repair stairs and drains to stop erosion. Reduce track width by stabilising edges with mulch and woody debris.	A	Dark Beach	Yes
64	Upgrade	163	Yes	Dark Beach	Trim vegetation and formalise existing footpad. Boardwalk for boggy sections. Stairs and drains may also be required. Hand tools and small machine access.	A	Dark Beach	Yes
65	Upgrade	58	Yes	Dark Beach	Trim vegetation and formalise existing footpad. This section requires rock steps and gravel to prevent ongoing erosion and restrict access to cliff edges. Hand tools and small machine access.	A	Dark Beach	Yes
66	Upgrade	62	Yes	Dark Beach	Trim vegetation and formalise existing footpad. Stairs and drains may be required. Hand tools and small machine access.	A	Dark Beach	Yes
67	Existing	70	Yes	Dark Beach	No work. AHIP needed for continuing use as artefact scatter present	A		
68	Upgrade	133	Yes	Dark Beach	Reduce width of track by stabilising edges with mulch and woody debris. Appears to be old road.	A	Dark Beach	Yes
69	New Track	216	Yes	Emily Miller Beach	Construct new track by trimming vegetation and forming track with hand tools or small machine benching.	A	Dark Beach	Yes
70	Existing	600	Yes	Emily Miller Beach	No work utilise existing track	A		

Section	Track Type	Length	On Park	Location	Work	Portion	Work Location	Equipment Access
71	Beach	137	Yes	Emily Miller Beach	No work	A		
72	Existing	125	Yes	Emily Miller Beach	No work utilise existing track	A		
73	Existing	551	Yes	Wasp Head	No work utilise existing track	A		
74	Existing	374	Yes	Wasp Head	No work utilise existing track	A		
75	New Track	22	Yes	Mill Beach	Lower section install stairs with returns on both sides to build up to bedrock slope. Chisel steps into bedrock for upper section.	A	Mill Beach	Yes from bottom only
76	Beach	541	Yes	Mill Beach	No work	A		
77	Beach	738	No	Cookies Beach	No work	A		
78	Existing	377	No	South Durras	No work utilise existing track	A		
79	Beach	2468	No	South Durras	No work	A		
80	Beach	1607	Yes	Durras North	No work	B		
81	Existing	55	Yes	Point Upright	Stairs require basic maintenance following bushfire, difficult access.	B	North Durras	Difficult access
82	Existing	613	Yes	Point Upright	No work utilise existing track	B		
83	New Track	307	Yes	Point Upright	Construct new track by trimming vegetation and forming track, difficult access. Severe fire damage.	B	Depot Beach	Difficult access
84	New Track	81	Yes	Depot Beach	Trim vegetation and traverse high side of erosion gully, install simple boardwalk drainage crossing if required. Carefully construct track down adjacent to drainage incorporating sandstone rocks. Severe fire damage.	B	Depot Beach	Difficult access
85	New Track	74	Yes	Depot Beach	Carefully construct track through heath connecting boulders and rock sections. Small sections of boardwalk and rock stepping stones. Severe fire damage.	B	Depot Beach	Difficult access
86	New Track	74	Yes	Depot Beach	Construct new track by trimming vegetation and carefully forming track, difficult access. Severe fire damage.	B	Depot Beach	Difficult access
87	New Track	188	Yes	Depot Beach	Majority of this section follows sandstone rock band. Carefully construct connecting sections using rock stepping stones. Severe fire damage.	B	Depot Beach	Difficult access
88	New Track	258	Yes	Depot Beach	Construct new track by trimming vegetation and carefully forming track, difficult access. Severe fire damage. Avoid immediate headland areas as cultural sites observed following fires.	B	Depot Beach	Difficult access
89	New Track	58	Yes	Depot Beach	Trim vegetation and install rock steps down to beach. Track must be located on alignment. Boardwalk crossing may be required over ephemeral creek. Sensitive cultural zone.	B	Depot Beach	Difficult access
90	Beach	3285	Yes	Depot Beach	No work	B		
91	Upgrade	23	Yes	Pebble Beach	Existing stairs in fair condition and need some minor repairs. Fire damaged.	C	Pebble Beach	Yes

Murramarang South Coast Walk (NPWS Estate) Final alignment - Review of Environmental Factors

Section	Track Type	Length	On Park	Location	Work	Portion	Work Location	Equipment Access
92	Existing	36	Yes	Pebbly Beach	No track work required. Planting required to screen walkers from cabin guests. Track to be demarcated with logs and rock.	C	Pebbly Beach	Yes
93	New Track	772	Yes	Pebbly Beach	Construct new track by trimming vegetation and carefully forming track with hand tools or small machine. Stone stairs required at northern extent to meet existing track. Severe fire damage.	C	Pebbly Beach	Yes
94	Existing	934	Yes	Pebbly Beach	Reinstate severely fire damaged track. Repair stairs and drains and narrow track width using mulch and woody debris.	C	Pebbly Beach	Difficult access
95	Existing	234	Yes	Pebbly Beach	Reinstate severely fire damaged track. Repair stairs and drains and narrow track width using mulch and woody debris.	C	Pebbly Beach	Difficult access
96	New Track	328	Yes	Clear Point	Construct new track by trimming vegetation and forming track with hand tools only. Severe fire damage.	C	Pebbly Beach	Difficult access
97	Upgrade	220	Yes	Clear Point	Reinstate severely fire damaged track by removing fallen trees and replacing stairs and drains. Reduce width of track by stabilising edges with mulch and woody debris.	C	Pebbly Beach	Difficult access
98	Upgrade	35	Yes	Clear Point	Reinstate severely fire damaged track, remove fallen trees over creek crossing and fix existing stairs on northern side of creek.	C	Pebbly Beach	Difficult access
99	Upgrade	22	Yes	Clear Point	Reinstate severely fire damaged track by removing fallen trees. Reduce width of track by stabilising edges with mulch and woody debris.	C	Pebbly Beach	Difficult access
100	Upgrade	37	Yes	Clear Point	Reinstate severely fire damaged track by removing fallen trees and replacing stairs and drains. Reduce width of track by stabilising edges with mulch and woody debris.	C	Pebbly Beach	Difficult access
101	Upgrade	51	Yes	Clear Point	Reinstate severely fire damaged track. Reduce width of track by stabilising edges.	C	Pebbly Beach	Difficult access
102	New Track	33	Yes	Granite Point	Construct new track by trimming vegetation and forming track, difficult access. Severe fire damage.	C	Pebbly Beach	Difficult access
103	New Track	349	Yes	Granite Point	Construct new track by trimming vegetation and forming track, difficult access. Restrict access to cliff edges using woody debris. Severe fire damage.	C	Pebbly Beach	Difficult access
104	New Track	34	Yes	Granite Point	Trim vegetation and install elevated boardwalk drainage crossing with connecting track and boardwalk.	C	Pebbly Beach	Difficult access
105	New Track	72	Yes	Granite Point	Trim vegetation and carefully bench track along cross slope coming up from drainage back to coastal edge.	C	Pebbly Beach	Difficult access
106	New Track	126	Yes	Granite Point	Construct new track by trimming vegetation and forming track, difficult access. Passes small drainage that requires single boardwalk crossing. Severe fire damage.	C	Pebbly Beach	Difficult access
107	New Track	61	Yes	Granite Point	Majority of this section follows sandstone rock band. Carefully construct connecting sections using rock stepping stones. Severe fire damage.	C	Pebbly Beach	Difficult access
108	New Track	25	Yes	Granite Point	Construct rock steps and chiselled rocks steps up from sandstone rock band. Incorporate existing rocks into stairs. Severe fire damage.	C	Pebbly Beach	Difficult access
109	New Track	164	Yes	Granite Point	Construct new track by trimming vegetation and forming track with hand tools. Severe fire damage. Utilise existing footpad that is partly present.	C	Pebbly Beach	Difficult access
110	New Track	27	Yes	Granite Point	Trim vegetation and carefully construct new rock stairs down to rock shelf incorporating existing footpad sandstone rocks.	C	Pebbly Beach	Difficult access
111	Beach	59	Yes	Granite Point	No work track is on rock shelf	C	Pebbly Beach	Difficult access

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Section	Track Type	Length	On Park	Location	Work	Portion	Work Location	Equipment Access
112	New Track	183	Yes	Granite Point	Construct new track by trimming vegetation and forming track, difficult access. Small sections of rock stairs and climbing turns required for southern extent. Severe fire damage.	C	Pebbly Beach	Difficult access
113	Upgrade	152	Yes	Granite Point	Reinstate severely fire damaged track, replace stairs and drains.	C	Pebbly Beach	Difficult access
114	Upgrade	92	Yes	Granite Point	Reinstate severely fire damaged track, replace stairs and drains.	C	Pebbly Beach	Difficult access
115	Upgrade	45	Yes	Granite Point	Reinstate severely fire damaged track, replace stairs and drains. Stabilise erosion issues using mulch and woody debris.	C	Pebbly Beach	Difficult access
116	New Track	206	Yes	Snake Bay	Construct new track by trimming vegetation and forming track, difficult access. Severe fire damage.	C	Pebbly Beach	Difficult access
117	Upgrade	16	Yes	Snake Bay	Reinstate severely fire damaged existing track to rear of Snake Bay including stairs and drainage structures, difficult access.	C	Pebbly Beach	Difficult access
118	New Track	47	Yes	Snake Bay	Construct new track by trimming vegetation and forming track, difficult access. Severe fire damage.	C	Pebbly Beach	Difficult access
119	New Track	16	Yes	Snake Bay	Trim vegetation and install elevated boardwalk drainage crossing with connecting track and boardwalk.	C	Pebbly Beach	Difficult access
120	New Track	28	Yes	Snake Bay	Construct new track by trimming vegetation and forming track, difficult access. Severe fire damage.	C	Pebbly Beach	Difficult access
121	New Track	78	Yes	Snake Bay	Construct new track by trimming vegetation and forming track, difficult access. Severe fire damage.	C	Pebbly Beach	Difficult access
122	New Track	15	Yes	Snake Bay	Trim vegetation and install elevated boardwalk drainage crossing with connecting track and boardwalk.	C	Pebbly Beach	Difficult access
123	New Track	245	Yes	Snake Bay	Construct new track by trimming vegetation and forming track, difficult access. Short stair sections and drains required. Severe fire damage.	C	Pebbly Beach or Pretty Beach	Difficult access
124	New Track	312	Yes	Snake Bay	Construct new track by trimming vegetation and forming track, difficult access. Short stair sections and drains required. Severe fire damage.	C	Pebbly Beach or Pretty Beach	Difficult access
125	New Track	49	Yes	Dawsons Beach	Trim vegetation and carefully construct new rock stairs at headland incorporating natural rock bands. Track must be on alignment. Sensitive cultural zone.	C	Pebbly Beach or Pretty Beach	Difficult access
126	Beach	404	Yes	Dawsons Beach	No work	D		
127	New Track	15	Yes	Snake Rock	Formalise existing track from beach up to rock escarpment by chipping existing bedrock steps and installing additional rock steps.	D	Pretty Beach	Difficult access
128	New Track	401	Yes	Snake Rock	Construct new track by trimming vegetation and forming track with hand tools. Short stair sections and drains required. Small boardwalk crossing required in middle. Northern section has steeper crossfall. Severe fire damage.	D	Pretty Beach	Difficult access
129	New Track	19	Yes	Snake Rock	Trim vegetation and install short section of rock steps to rock shelf.	D	Pretty Beach	Difficult access
130	Beach	267	Yes	Singing Stones Beach	No work	D		
131	Upgrade	39	Yes	Singing Stones Beach	Reinstate fire damaged stairs using elevated stairs and chiselled rock at top section. Chisel steps into bedrock.	D	Pretty Beach	Difficult access
132	Upgrade	230	Yes	Singing Stones Beach	Reinstate fire damaged boardwalk, difficult access.	D	Pretty Beach	Difficult access

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Section	Track Type	Length	On Park	Location	Work	Portion	Work Location	Equipment Access
133	Beach	894	Yes	Island Beach	No work	D		
134	Beach	319	Yes	Pretty Beach	No work	D		
135	Existing	246	Yes	Pretty Beach	No work utilise existing stairs and track	D		
136	Existing	893	Yes	Snapper Point	Maintenance required on existing track	D	Pretty Beach	Yes
137	New Track	91	Yes	Snapper Point	Construct new track by trimming vegetation and forming track with hand tools or small machine	D	Merry Beach	Yes
138	Existing	595	Yes	Snapper Point	Maintenance required on existing track	D	Merry Beach	Yes
139	Beach	389	No	Merry Beach	No work	D		
140	Existing	1200	No	Kioloa	No work utilise existing tracks, footpaths and roads	D		
141	Beach	1504	No	Kioloa Beach	No work	D		
142	Beach	587	No	Shelley Beach	No work	D		
143	Beach	1496	No	Racecourse Beach	No work	D		
144	Existing	1296	Yes	Murramarang Aboriginal Area	No work utilise existing tracks and boardwalks in Murramarang Aboriginal Area	D		
145	Beach	1035	No	Murramarang Beach	No work	D		
146	Beach	793	No	Gannet Beach	No work	D		
147	Beach	657	No	Cormorant Beach	No work	D		
148	Existing	1039	No	Bawley Point	No work utilise existing track	D		
149	Beach	238	No	Bawley Beach	No work	D		
150	Existing	39	No	Bawley Beach	No work utilise existing grassed area to car park	D		
R01	Redundant	113	Yes	North Head	Remove track infrastructure, fix drainage and erosion issues, cover with mulch and woody debris and leave to revegetate. Extra effort required at section ends to prevent continuing access.	A	North Head	Yes
R02	Redundant	1160	Yes	Oaky Beach	Inspect track and stabilise surface with woody debris and leave to revegetate naturally. South extent requires additional woody debris to prevent continuing access.	A	Oaky Beach	Yes
R03	Redundant	213	Yes	Oaky Beach	No work required track has naturally revegetated	A		

Section	Track Type	Length	On Park	Location	Work	Portion	Work Location	Equipment Access
R04	Redundant	197	Yes	Richmond Beach	Fix drainage and erosion issues, cover with mulch and woody debris and leave to revegetate. Extra effort required at section ends to prevent continuing access and encourage visitors to use new track.	A	Richmond Beach	Yes
R05	Redundant	69	Yes	Richmond Beach	Fix drainage and erosion issues, cover with mulch and woody debris and leave to revegetate. Extra effort required at section ends to prevent continuing access and encourage visitors to use new track.	A	Richmond Beach	Yes
R06	Redundant	808	Yes	Dark Beach	Inspect track and stabilise surface with woody debris and leave to revegetate naturally. Section ends require additional effort and woody debris to prevent continuing access and encourage visitors to use new track.	A	Dark Beach	Yes
R07	Redundant	93	Yes	Dark Beach	Fix drainage and erosion issues, cover with mulch and woody debris and leave to revegetate. Extra effort required at section ends to prevent continuing access and encourage visitors to use new track.	A	Dark Beach	Yes
R08	Redundant	624	Yes	Point Upright	Remove track infrastructure, fix drainage and erosion issues, cover with mulch and woody debris and leave to revegetate. Extra effort required at section ends to prevent continuing access and encourage visitors to use new track.	B	Depot Beach	Difficult access
R09	Redundant	405	Yes	Pebbly Beach	Severely fire damaged. Remove remaining infrastructure, fix drainage and erosion issues, stabilise with mulch and woody debris, leave to revegetate. Extra effort required at section ends to prevent access and encourage visitors to use new track.	C	Pebbly Beach	Difficult access
R10	Redundant	362	Yes	Clear Point	No work required track has naturally revegetated	C		
R11	Redundant	265	Yes	Clear Point	Severely fire damaged. Remove remaining infrastructure, fix drainage and erosion issues, stabilise with mulch and woody debris, leave to revegetate. Extra effort required at section ends to prevent access and encourage visitors to use new track.	C	Pebbly Beach	Difficult access
R12	Redundant	895	Yes	Granite Point	Severely fire damaged. Remove remaining infrastructure, fix drainage and erosion issues, stabilise with mulch and woody debris, leave to revegetate. Extra effort required at section ends to prevent access and encourage visitors to use new track.	C	Pebbly Beach	Difficult access
R13	Redundant	219	Yes	Snake Bay	Severely fire damaged. Remove remaining infrastructure, fix drainage and erosion issues, stabilise with mulch and woody debris, leave to revegetate. Extra effort required at section ends to prevent access and encourage visitors to use new track.	C	Pebbly Beach	Difficult access
R14	Redundant	317	Yes	Snapper Point	Remove track infrastructure, fix drainage and erosion issues, cover with mulch and logs and leave to revegetate. Extra effort required at section ends to prevent continuing access and encourage visitors to use new track.	D	Pebbly Beach	Difficult access
R15	Redundant	63	Yes	Snapper Point	Remove stairs in very poor condition, fix drainage and erosion issues, cover with mulch and woody debris and leave to revegetate.	D	Pebbly Beach	Difficult access
S	Subsidiary	44	Yes	Emily Miller Beach	Existing stairs to beach	A		
S	Subsidiary	386	Yes	Flat Rock	Existing track to headland	A		
S	Subsidiary	176	Yes	Emily Miller Beach	Existing track to headland	A		

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Section	Track Type	Length	On Park	Location	Work	Portion	Work Location	Equipment Access
S	Subsidiary	31	Yes	Dark Beach	Existing beach access track	A		
S	Subsidiary	365	Yes	Myrtle Beach	Existing beach access track	A		
S	Subsidiary	162	Yes	North Durras	Existing beach access track	B		
S	Subsidiary	53	Yes	Bumholes Beach	Existing beach access track	B		
S	Subsidiary	255	Yes	Depot Beach	Existing beach access tracks	B		
S	Subsidiary	602	Yes	Depot Beach	Existing rainforest loop	B		
S	Subsidiary	102	Yes	Pebbly Beach	Existing Pebbly Beach access track	C		
S	Subsidiary	6633	Yes	Durras Mountain	Existing Durras Mountain Track	C		
S	Subsidiary	181	Yes	Oaky Beach	Existing beach access track	A		
S	Subsidiary	121	Yes	Dark Beach	Existing track to headland	A		
S	Subsidiary	386	Yes	Little Oaky Beach	Existing beach access track	A		
S	Subsidiary	96	Yes	North Head	Existing access track from campground	A		
S	Subsidiary	25	Yes	Snake Bay	Existing beach access track	C		
S	Subsidiary	47	Yes	Oaky Beach	Existing beach access track	A		
S	Subsidiary	20	Yes	Snake Bay	Existing beach access track	C		
S	Subsidiary	204	Yes	No Name Headland	Former Yellow Rock stockyard tracks	A		

Appendix E: NSW BioNet Atlas search results – threatened species in Murramarang National Park

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria : Public Report of all Valid Records of Threatened (listed on BC Act 2016) or Commonwealth listed Entities in Murramarang NP NPWS Reserve returned a total of 708 records of 47 species.

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Kingdom	Class	Family	Scientific Name	Common Name	NSW status	Comm. status	Records
Animalia	Amphibia	Hylidae	<i>Litoria aurea</i>	Green and Golden Bell Frog	E1,P	V	2
Animalia	Aves	Apodidae	<i>Hirundapus caudacutus</i>	White-throated Needletail	P	V,C,J,K	7
Animalia	Aves	Diomedidae	<i>Thalassarche melanophris</i>	Black-browed Albatross	V,P	V	1
Animalia	Aves	Ardeidae	<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1,P	E	1
Animalia	Aves	Ardeidae	<i>Ixobrychus flavicollis</i>	Black Bittern	V,P		1
Animalia	Aves	Accipitridae	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V,P		24
Animalia	Aves	Accipitridae	<i>Hieraetus morphnoides</i>	Little Eagle	V,P		7
Animalia	Aves	Accipitridae	^^ <i>Pandion cristatus</i>	Eastern Osprey	V,P,3		13
Animalia	Aves	Burhinidae	<i>Esacus magnirostris</i>	Beach Stone-curlew	E4A,P		1
Animalia	Aves	Haematopodidae	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V,P		48
Animalia	Aves	Haematopodidae	<i>Haematopus longirostris</i>	Pied Oystercatcher	E1,P		9
Animalia	Aves	Charadriidae	<i>Thinornis cucullatus cucullatus</i>	Eastern Hooded Dotterel	E4A	V	12
Animalia	Aves	Cacatuidae	^^ <i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V,P,3		37
Animalia	Aves	Cacatuidae	^ <i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	V,P,2		28
Animalia	Aves	Psittacidae	<i>Glossopsitta pusilla</i>	Little Lorikeet	V,P		23
Animalia	Aves	Psittacidae	^^ <i>Lathamus discolor</i>	Swift Parrot	E1,P,3	CE	6
Animalia	Aves	Strigidae	^^ <i>Ninox connivens</i>	Barking Owl	V,P,3		1
Animalia	Aves	Strigidae	^^ <i>Ninox strenua</i>	Powerful Owl	V,P,3		50
Animalia	Aves	Tytonidae	^^ <i>Tyto novaehollandiae</i>	Masked Owl	V,P,3		23
Animalia	Aves	Tytonidae	^^ <i>Tyto tenebricosa</i>	Sooty Owl	V,P,3		55
Animalia	Aves	Climacteridae	<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V,P		1

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Animalia	Aves	Acanthizidae	<i>Calamanthus fuliginosus</i>	Striated Fieldwren	E1,P		1
Animalia	Aves	Meliphagidae	<i>Anthochaera phrygia</i>	Regent Honeyeater	E4A,P	CE	1
Animalia	Aves	Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella	V,P		10
Animalia	Aves	Pachycephalidae	<i>Pachycephala olivacea</i>	Olive Whistler	V,P		1
Animalia	Aves	Artamidae	<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V,P		12
Animalia	Aves	Petroicidae	<i>Petroica boodang</i>	Scarlet Robin	V,P		4
Animalia	Mammalia	Dasyuridae	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V,P	E	5
Animalia	Mammalia	Dasyuridae	<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V,P		1
Animalia	Mammalia	Dasyuridae	<i>Sminthopsis leucopus</i>	White-footed Dunnart	V,P		2
Animalia	Mammalia	Phascolarctidae	<i>Phascolarctos cinereus</i>	Koala	V,P	V	1
Animalia	Mammalia	Burramyidae	<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V,P		2
Animalia	Mammalia	Petauridae	<i>Petaurus australis</i>	Yellow-bellied Glider	V,P		154
Animalia	Mammalia	Petauridae	<i>Petaurus norfolcensis</i>	Squirrel Glider	V,P		16
Animalia	Mammalia	Pseudocheiridae	<i>Petauroides volans</i>	Greater Glider	P	V	50
Animalia	Mammalia	Pteropodidae	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	V	2
Animalia	Mammalia	Vespertilionidae	<i>Myotis macropus</i>	Southern Myotis	V,P		7
Animalia	Mammalia	Vespertilionidae	<i>Phoniscus papuensis</i>	Golden-tipped Bat	V,P		1
Animalia	Mammalia	Vespertilionidae	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V,P		1
Animalia	Mammalia	Miniopteridae	<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V,P		1
Animalia	Mammalia	Otariidae	<i>Arctocephalus pusillus doriferus</i>	Australian Fur-seal	V,P		1
Animalia	Mammalia	Balaenidae	<i>Eubalaena australis</i>	Southern Right Whale	E1,P	E	1
Animalia	Mammalia	Balaenopteridae	<i>Megaptera novaeangliae</i>	Humpback Whale	V,P	V	2
Animalia	Mammalia	Physeteridae	<i>Physeter macrocephalus</i>	Sperm Whale	V,P		1
Plantae	Flora	Myrtaceae	<i>Rhodamnia rubescens</i>	Scrub Turpentine	E4A		59
Plantae	Flora	Orchidaceae	<i>^Cryptostylis hunteriana</i>	Leafless Tongue Orchid	V,P,2	V	1
Plantae	Flora	Orchidaceae	<i>^Genoplesium vernale</i>	East Lynne Midge Orchid	V,P,2	V	21

Appendix F: NSW BioNet Atlas search results - threatened species in Murramarang Aboriginal Area

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria : Public Report of all Valid Records of Threatened (listed on BC Act 2016) Entities in Murramarang AA NPWS Reserve returned a total of 5 records of 3 species.

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Kingdom	Class	Family	Scientific Name	Common Name	NSW status	Comm. status	Records
Animalia	Aves	Haematopodidae	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V,P		2
Animalia	Aves	Charadriidae	<i>Thinornis rubricollis</i>	Hooded Plover	E4A,P	V	2
Animalia	Aves	Psittacidae	^^ <i>Pezoporus wallicus wallicus</i>	Eastern Ground Parrot	V,P,3		1

Appendix G: NSW BioNet Atlas search results – threatened ecological communities in Murramarang National Park

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria: Public Report of all Valid Records of Communities in Murramarang NP NPWS Reserve.

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Kingdom	Scientific Name	Common Name	NSW status	Comm. status	Records
Community	<i>Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions</i>	Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions	E3		K
Community	<i>Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	V	K
Community	<i>Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		K
Community	<i>Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion</i>	Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion	E3	CE	K
Community	<i>Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	CE	K
Community	<i>Lowland Grassy Woodland in the South East Corner Bioregion</i>	Lowland Grassy Woodland in the South East Corner Bioregion	E3	CE	K

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Community	<i>Milton Ulladulla Subtropical Rainforest in the Sydney Basin Bioregion</i>	Milton Ulladulla Subtropical Rainforest in the Sydney Basin Bioregion	E3	CE	K
Community	<i>River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	CE	K
Community	<i>Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	E	K
Community	<i>Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		K
Community	<i>Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions</i>	Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	E3		K

Appendix H: NSW BioNet Atlas search results – threatened ecological communities in Murramarang Aboriginal Area

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria: Public Report of all Valid Records of Communities in Murramarang AA NPWS Reserve.


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Kingdom	Scientific Name	Common Name	NSW status	Comm. status	Records
Community	<i>Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions</i>	Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions	E3		K
Community	<i>Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	V	K
Community	<i>Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		K
Community	<i>Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion</i>	Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion	E3	CE	K
Community	<i>Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	CE	K
Community	<i>Milton Ulladulla Subtropical Rainforest in the Sydney Basin Bioregion</i>	Milton Ulladulla Subtropical Rainforest in the Sydney Basin Bioregion	E3	CE	K

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Community	<i>River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	CE	K
Community	<i>Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	E	K
Community	<i>Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		K
Community	<i>Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions</i>	Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	E3		K

Appendix I: Australian Government EPBC Act Protected Matters Search Report



Australian Government
Department of Agriculture,
Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

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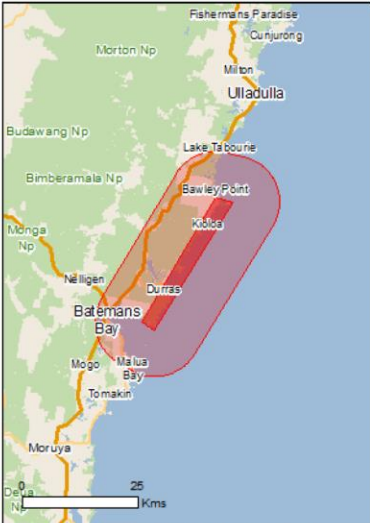
[Summary](#)

[Details](#)

- [Matters of NES](#)
- [Other Matters Protected by the EPBC Act](#)
- [Extra Information](#)

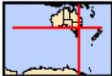
[Caveat](#)

[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)
Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	7
Listed Threatened Species:	77
Listed Migratory Species:	61

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	3
Commonwealth Heritage Places:	None
Listed Marine Species:	81
Whales and Other Cetaceans:	27
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	9
Regional Forest Agreements:	1
Invasive Species:	43
Nationally Important Wetlands:	7
Key Ecological Features (Marine)	1

Details

Matters of National Environmental Significance

Commonwealth Marine Area

[Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name

EEZ and Territorial Sea

Marine Regions

[Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name

[Temperate East](#)

Listed Threatened Ecological Communities

[Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area
Illawarra and south coast lowland forest and woodland ecological community	Critically Endangered	Community likely to occur within area
Illawarra-Shoalhaven Subtropical Rainforest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area
Lowland Grassy Woodland in the South East Corner Bioregion	Critically Endangered	Community likely to occur within area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species

[Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur

Name	Status	Type of Presence
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	within area Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Fregatta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis cucullatus cucullatus Hooded Plover (eastern), Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area
Fish		
Epinephelus daemeli Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat known to occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat may occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Isodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
Correa baeuerlenii Chef's Cap [17007]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat known to occur within area
Genoplesium baueri Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528]	Endangered	Species or species habitat may occur within

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Name	Status	Type of Presence area
Genoplesium vernale East Lynne Midge-orchid [68379]	Vulnerable	Species or species habitat known to occur within area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat known to occur within area
Melaleuca biconvexa Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat known to occur within area
Prasophyllum affine Jervis Bay Leek Orchid, Culburra Leek-orchid, Kinghorn Point Leek-orchid [2210]	Endangered	Species or species habitat may occur within area
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat known to occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Xerochrysum palustre Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hoplocephalus bungaroides Broad-headed Snake [1182]	Vulnerable	Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat known to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur

Name	Status	Type of Presence
Rhincodon typus Whale Shark [66680]	Vulnerable	within area Species or species habitat may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Ardenna grisea Sooty Shearwater [82651]		Breeding known to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Ardenna tenuirostris Short-tailed Shearwater [82652]		Breeding known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area

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Name	Threatened	Type of Presence
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat known to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known

Name	Threatened	Type of Presence
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		to occur within area Species or species habitat likely to occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Other Matters Protected by the EPBC Act		
Commonwealth Land		[Resource Information]
The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.		
Name		
Commonwealth Land - Australian National University Commonwealth Land - Australian Telecommunications Commission Commonwealth Land - Commonwealth Trading Bank of Australia		
Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area

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Name	Threatened	Type of Presence
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleishy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Puffinus griseus Sooty Shearwater [1024]		Breeding known to occur within area
Puffinus pacificus Wedge-tailed Shearwater [1027]		Breeding known to occur within area
Puffinus tenuirostris Short-tailed Shearwater [1029]		Breeding known to occur within area

Name	Threatened	Type of Presence
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable*	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Cosmocampus howensis Lord Howe Pipefish [66208]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area

Name	Threatened	Type of Presence
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Berardius arnuxii Arnoux's Beaked Whale [70]		Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area

Name	Status	Type of Presence
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon hectori Hector's Beaked Whale [76]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Belowla Island	NSW
Brush Island	NSW
Clyde River	NSW
Cullendulla Creek	NSW
Forestry Management Areas in Batemans Bay (FMZ2)	NSW
Meroo	NSW
Murramarang	NSW
South Coast Subregion of Southern Region	NSW
Tollgate Islands	NSW

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
Southern RFA	New South Wales

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur

Name	Status	Type of Presence
Canis lupus familiaris Domestic Dog [82654]		within area Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large- leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat may occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area
Nationally Important Wetlands		[Resource Information]
Name		State
Clyde River Estuary		NSW
Cormorant Beach		NSW
Cullendulla Creek and Embayment		NSW
Durras Lake		NSW
Meroo Lake Wetland Complex		NSW
Swan Lagoon		NSW
Termeil Lake Wetland Complex		NSW

Key Ecological Features (Marine)

[Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Upwelling East of Eden	South-east

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-35.715246 150.248826,-35.715246 150.248826,-35.519879 150.392335,-35.526586 150.425981,-35.72751 150.274232,-35.715246 150.248826

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Office of Environment and Heritage, New South Wales](#)
- [Department of Environment and Primary Industries, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment, Water and Natural Resources, South Australia](#)
- [Department of Land and Resource Management, Northern Territory](#)
- [Department of Environmental and Heritage Protection, Queensland](#)
- [Department of Parks and Wildlife, Western Australia](#)
- [Environment and Planning Directorate, ACT](#)
- [Birdlife Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- [Natural history museums of Australia](#)
- [Museum Victoria](#)
- [Australian Museum](#)
- [South Australian Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- [Australian Tropical Herbarium, Cairns](#)
- [eBird Australia](#)
- [Australian Government – Australian Antarctic Data Centre](#)
- [Museum and Art Gallery of the Northern Territory](#)
- [Australian Government National Environmental Science Program](#)
- [Australian Institute of Marine Science](#)
- [Reef Life Survey Australia](#)
- [American Museum of Natural History](#)
- [Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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Appendix J: Likelihood of occurrence evaluation for species and populations of conservation significance

An evaluation of the likelihood of occurrence was made for listed threatened and migratory species and populations identified as occurring, having occurred or likely to occur in the locality. Species or populations that are solely dependent on marine environments, such as cetaceans, fish and marine turtles, and seabirds that are dependent on marine environments and offshore islands such as shearwaters, albatross and petrels etc, have been omitted from the table due to lack of suitable habitat in the study area. This likelihood of occurrence evaluation was based on: database searches of NSW BioNet Wildlife Atlas and the EPBC Act’s Protected Matters Search Tool for listed matters for the locality; relevant studies; presence or absence of suitable habitat; the ecology of the species as detailed in references, particularly NSW OEH (2017c), Birdlife Australia (n.d.) and the Australian Government (2019b); features of the study area; results of the field surveys; professional judgement; and advice from local NPWS staff. Five terms for the likelihood of occurrence of listed species and populations are used in this report. The terms for likelihood of occurrence are:

- ‘yes’ = the matter of conservation significance was or has been observed in the study area or immediate surrounds
- ‘likely’ = there is a medium to high probability that the matter of conservation significance uses or occurs in the study area or immediate surrounds
- ‘potential’ = suitable habitat/plant community type for the matter of conservation significance occurs in the study area, but there is insufficient information to categorise the matter of conservation significance as likely or unlikely to occur
- ‘unlikely’ = there is a low to very low probability that the matter of conservation significance uses or occurs in the study area or immediate surrounds
- ‘no’ = the habitat/environment within the study area or immediate surrounds is unsuitable for the matter of conservation significance

Species	NSW BC Act	C’with EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Caladenia tessellata</i> Thick-lip Spider-orchid	E	V	The Thick-lip Spider Orchid has been recorded in the Sydney region, the Central Coast, Ulladulla, Kiama, inland near Queanbeyan and Braidwood, and along the east coast of Victoria. However, many of these populations are predicted to be extinct or have not had any recent recordings. It prefers grassy woodland on clay loam or sandy soils, although population inland at Braidwood is on stony soils. It has a single leaf which regrows each year with flowering between September and November (NSW Scientific Committee 2008).	No: No recent records in LGAs – last record for Ulladulla in 1998. Not recorded during field surveys. The study area is isolated from the previous record at Ulladulla.

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Species	NSW BC Act	C'with EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Correa baeuerlenii</i> Chef's Cap	V	V	Chef's Cap Correa is a shrub to 2.5 metres tall. It has been recorded between has been recorded between Nelligen (on Nelligen Creek and the Buckenbowra River) and Mimosa Rocks National Park. Occurs in riparian sites within forests of various eucalypts, including Silvertop Ash (<i>Eucalyptus sieberi</i>), Yellow Stringybark (<i>E. muelleriana</i>), Blue-leafed Stringybark (<i>E. agglomerata</i>) and Spotted Gum (<i>Corymbia maculata</i>), or she-oak woodland. It may also be found in near-coastal rocky sites. (OEH 2017c).	Unlikely: There are no records under NSW BioNet for the species. The field survey did not record the species. There is one record from 1884 for the species on Atlas of Living Australia near the study area/national park. Not preferred habitat.
<i>Cryptostylis hunteriana</i> Leafless Tongue Orchid	V	V	The Leafless Tongue Orchid is known, and predicted, to occur in a number of sites in south-eastern Australia, mainly near the coast or coastal ranges. Known populations in the Shoalhaven and Eurobodalla LGAs. This terrestrial orchid is known from swamp-heath and open forest on sandy soils in coastal districts. The larger populations typically occur in woodland dominated by Scribbly Gum (<i>Eucalyptus sclerophylla</i>), Silvertop Ash (<i>E. sieberi</i>), Red Bloodwood (<i>Corymbia gummifera</i>) and Black She-oak (<i>Allocasuarina littoralis</i>); where it appears to prefer open areas in the understory of this community and is often found in association with the Large Tongue Orchid (<i>C. subulata</i>) and the Tartan Tongue Orchid (<i>C. erecta</i>). The species flowers between November and February (OEH 2017c).	Unlikely: Known to occur in locality. However, limited marginal habitat in study area. Not recorded during targeted field surveys during known flowering period in suitable habitat.
<i>Galium australe</i> Tangled Bedstraw	V	V	Tangled Bedstraw is widespread in Victoria and Tasmania and is also found in South Australia, and Jervis Bay. Following a taxonomic revision, many recent records in NSW have been re-determined as other species. Tangled Bedstraw has been recorded historically in the Nowra (Colymea) and Narooma areas and is extant in Nadgee Nature Reserve, south of Eden. Records in the Sydney area are yet to be confirmed. Most flowering collections have been made in late spring to early autumn. In NSW and Jervis Bay, Tangled Bedstraw has been recorded in Turpentine forest and coastal Acacia shrubland. In other States the species is found in a range of near-coastal habitats, including sand dunes, sand spits, shrubland and woodland (OEH 2017c).	Unlikely: Only record from locality is a preserved specimen from 1911. Recent NSW records pre-determined as other species.

Species	NSW BC Act	C'with EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Genoplesium baueri</i> Bauer's Midge Orchid	E	E	Bauer's Midge Orchid is known from coastal areas from the Shoalhaven LGA to NSW Central Coast. Many populations have no recent records. It grows in shrubby woodland and open forest on shallow sandy soils. In the Shoalhaven, relatively large populations are known from Scribbly Gum, Red Bloodwood, Silvertop Ash and Black She-oak dominated communities (OEH 2017c). Flowering between February and March (Stephenson 2011).	Unlikely: No records from the locality. Limited marginal habitat in study area.
<i>Genoplesium vernale</i> East Lynne Midge Orchid	V	V	The East Lynne Midge Orchid grows in dry sclerophyll woodland and forest extending from near the coast to the coastal ranges. It prefers well-drained shallow soils, often occurring near the crests of ridges and on low rises where the ground cover is more open and sedge dominated rather than being shrubby. The species is currently known from only a narrow 12 km wide belt of predominantly dry sclerophyll forest from 17 km south of Batemans Bay to 24 km north of Ulladulla. The species generally flowers between early November and mid-December (OEH 2017c, NSW NPWS 2002).	Unlikely: Known to occur in the locality. Closest records to study area inland near the Princes Highway. Not recorded during field surveys, which coincided with general flowering season.
<i>Haloragis exalata</i> subsp. <i>exalata</i> Square Raspwort	V	V	Square Raspwort is a shrub that occurs in four widely scattered localities in eastern NSW including the Central Coast, the South Coast and the North Western Slopes. The species appears to require protected and shaded damp situations in riparian habitats. The recorded flowering season is from November to January (OEH 2017c).	No: Known to occur in locality with one record inland from Durras. Study area not preferred habitat. Not recorded during field surveys, which coincided with general flowering season.
<i>Melaleuca biconvexa</i> Biconvex Paperbark	V	V	Biconvex Paperbark is only found in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Biconvex Paperbark generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. Flowering occurs over just 3-4 weeks in September and October (OEH 2017c).	Unlikely: No records for locality. Study area does not traverse paperbark stands and areas of fringing swamp, such as Durras Lake. Not known for Batemans IBRA sub-region.
<i>Persicaria elatior</i> Tall Knotweed	V	V	Tall Knotweed is an erect herb to 90 cm tall. It has been recorded in south-eastern NSW, including around Batemans Bay, northern NSW and in Queensland. The species preferred habitat is damp places beside streams and lakes. It occasionally occurs in swamp forest or associated with disturbance (OEH 2017c).	No: One record from locality from preserved specimen in 1972. Lack of preferred habitat in study area. Not recorded during field surveys.

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Species	NSW BC Act	C'with EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Prasophyllum affine</i> Jervis Bay Leek Orchid	E	E	The Jervis Bay Leek Orchid is a ground orchid which produces a single onion-like leaf that can grow to 40 cm long. Flowers are produced on a cylindrical stalk that emerges from about two thirds of the way up the hollow leaf. Up to 35 flowers are clustered in a spike arranged along the top third of each flower stalk. It is currently known from three areas south-east of Nowra on South Coast. These are Kinghorne Point, Wowly Gully near the town of Callala Bay, and near the township of Vincentia. Flowering November – December.	Unlikely: No records for locality. Not recorded during field surveys, despite being known flowering season.
<i>Pterostylis gibbosa</i> Illawarra Greenhood	E	E	Known from a small number of populations in the Hunter region (Milbrodale), the Illawarra region (Albion Park and Yallah) and the Shoalhaven region (near Nowra). It is apparently extinct in western Sydney which is the area where it was first collected (1803). All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. In the Illawarra region, the species grows in woodland dominated by Forest Red Gum <i>Eucalyptus tereticornis</i> , Woollybutt <i>E. longifolia</i> and White Feather Honey-myrtle <i>Melaleuca decora</i> . Near Nowra, the species grows in an open forest of Spotted Gum <i>Corymbia maculata</i> , Forest Red Gum and Grey Ironbark <i>E. paniculata</i> . In the Hunter region, the species grows in open woodland dominated by Narrow-leaved Ironbark <i>E. crebra</i> , Forest Red Gum and Black Cypress Pine <i>Callitris endlicheri</i> . The Illawarra Greenhood is a deciduous orchid that is only visible above the ground between late summer and spring, and only when soil moisture levels can sustain its growth (OEH 2017c).	Unlikely: No records for locality. Study area not poorly drained soils.
<i>Rhodamnia rubescens</i> Scrub Turpentine	CE	-	Shrub or small tree to 25 m high. Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of <i>R. rubescens</i> typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m ASL. in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. (OEH 2017c).	Potential: Numerous records of the species in the national park (OEH BioNet search), and on the Atlas of Living Australia. Although very little of preferred habitat in subject site (rainforest and wet gullies), there is suitable habitat in the study area. Not recorded during field surveys.

Species	NSW BC Act	C'with EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Rhizanthella slateri</i> Eastern Underground Orchid	V	E	An orchid with a whitish, fleshy underground stem to 15 cm long and 15 mm diameter. The flowering heads mature below the soil surface or may extend to 2 cm above the ground. Each flower head has up to 30, tubular, purplish flowers. Occurs from south-east Queensland to south-east NSW. In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Habitat requirements are poorly understood, and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore, usually located only when the soil is disturbed. Flowers September to November.	Unlikely: No records for the locality. Not recorded during field surveys despite flowering season.
<i>Syzygium paniculatum</i> Magenta Lilly Pilly	E	V	The Magenta Lilly Pilly is a small to medium sized rainforest tree that grows to 8 m tall. Its distribution is restricted to a narrow coastal belt from Upper Lansdowne in the mid North Coast to Conjola State Forest on the south coast. South coast records are from grey soils over sandstone, generally restricted to remnant coastal littoral rainforest stands (OEH 2017c).	Unlikely: No records from the locality. Not recorded during field surveys.
<i>Thesium australe</i> Austral Toadflax	V	V	The Austral Toad-flax is a small herb up to 40 cm tall. It is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It occurs in grassland or grassy woodland and is often found in damp sites in association with Kangaroo Grass (<i>Themeda australis</i>) (OEH 2017c).	Unlikely: One record from the locality. Not recorded during field surveys. Limited preferred habitat in study area.
<i>Xerochrysum palustre</i> Swamp Everlasting	-	V	Found in Kosciuszko National Park and the eastern escarpment south of Badja. Also found in eastern Victoria. Grows in swamps and bogs which are often dominated by heaths. Also grows at the edges of bog margins on peaty soils with a cover of shrubs or grasses (OEH 2017c).	No: Not known from Sydney Basin IBRA Jervis subregion or South East Corner IBRA Batemans subregion.
Disclaimer: Data extracted from the Atlas of NSW Wildlife and the Australian Government's Protected Matters Search Tool is indicative and cannot be considered comprehensive.				
CE = Critically Endangered; E = Endangered; E2 = Endangered Population; V = Vulnerable; M = Migratory				

Likelihood of occurrence evaluation – fauna of conservation significance

Birds				
Species	NSW BC Act	C'with EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Actitis hypoleucos</i> Common Sandpiper	-	M	The Common Sandpiper breeds in Europe and Asia. In Australasia it visits New Guinea and Australia, mainly in the north and west. It is less often seen in New Zealand. In Australia, the Common Sandpiper is found in coastal or inland wetlands, both saline or fresh. It is found mainly on muddy edges or rocky shores. During the breeding season in the northern hemisphere, it prefers freshwater lakes and shallow rivers (Birdlife Australia n.d.).	Unlikely: Two records for edge of locality (one recent one more than 30 years old). No records for study area. The study area has a lack of preferred habitat of wetlands.
<i>Anthochaera phygia</i> Regent Honeyeater	CE	CE	The Regent Honeyeater is mainly associated with temperate woodlands and open forests of the inland slopes of south-east Australia. The woodlands and forests typically have significant numbers of mature trees, with high canopy cover and abundance of mistletoes. The Regent Honeyeater primarily feeds on nectar from box and ironbark eucalypts and occasionally from banksias and mistletoes. As such it is reliant on locally abundant nectar sources with different flowering times to provide reliable supply of nectar, and may undertake landscape scale migrations to the coast during non-breeding. Two of three known breeding sites are located in NSW at Capertee Valley and Bundarra-Barraba region. The species has occasionally been observed foraging on spotted gums in South Coast (OEH 2017c).	Potential: Three records from locality. Suitable habitat in study area.

Birds				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Apus pacificus</i> Fork-tailed Swift	-	M	The Fork-tailed Swift prefers a range of foraging habitats including riparian woodland, swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes. They are non-breeding visitors to all states and territories of Australia, arriving from its breeding grounds in Siberia around October, and departing in April. The species is thought to be highly mobile within Australia, moving across the country in search of food. They probably roost aerially.	Unlikely: A few records from locality. Lack of optimal foraging habitat in the study area.
<i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow	V	-	Dusky woodswallows are widespread in eastern, southern and south western Australia. Most breeding activity occurs on the western slopes of the Great Dividing Range. Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understory of eucalypt saplings, acacias and other shrubs, and ground cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland (OEH 2017c).	Potential: Records from the locality. Some low value generic potential habitat in the study area.
<i>Botaurus poiciloptilus</i> Australasian Bittern	E	E	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.). Occurs in both terrestrial and estuarine wetlands generally in areas of permanent water and dense vegetation. In areas with permanent water it may occur in flooded grassland, forest, woodland, rainforest and mangroves (OEH 2017c).	Unlikely: Known to occur within the locality although only one record. The study area has a lack of preferred habitat of freshwater wetlands and coastal swamps.

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Birds				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Calamanthus fuliginosus</i> Striated Fieldwren	E	-	The Striated Fieldwren is found in south-eastern NSW, into southern Victoria and the south-east of South Australia, and Tasmania. Most NSW records are from the far south coast (Nadgee NR and Ben Boyd NP) and in Morton NP (Little Forest, Tianjara Falls) with scattered records in between particularly in coastal habitats. The species prefers ground and understory vegetation, and can be found in swampy, coastal heathlands, tussocky grasslands, low shrubby vegetation and margins of swamps (OEH 2017c). Known to occur in the Batemans subregion in Coastal Headland Heathlands of Bracelet Honey-myrtle - Coast Tea-tree tall shrubland on headlands, South East Corner Bioregion.	Potential: Known to occur within the locality although only one record from 2001 and shown as near Depot Beach Camping Area which is not heathland. The study area has no swamps, a small area of heath at Snapper Point and patches of the plant community Bracelet Honey-myrtle - Coast Tea-tree tall shrubland on headlands.
<i>Calidris acuminata</i> Sharp-tailed Sandpiper	-	M	The Sharp-tailed Sandpiper spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Many inland records are of birds on passage. They are widespread in most coastal areas of NSW (Department of Environment 2019). The Sharp-tailed Sandpiper prefers the grassy edges of shallow inland freshwater wetlands. It is also found around sewage farms, flooded fields, mudflats, mangroves, rocky shores and beaches (Birdlife Australia n.d.).	Potential: Known to occur within locality, although few records. Suitable habitat (beaches) within study area.

Birds				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Calidris canutus</i> Red Knot	-	E, M	Red Knots are widespread around the Australian coast, less in the south and with few inland records. Small numbers visit Tasmania and off-shore islands. It is widespread but scattered in New Zealand. They breed in North America, Russia, Greenland and Spitsbergen. Red Knots are a non-breeding visitor to most continents. They gather in large flocks on the coast in sandy estuaries with tidal mudflats (Birdlife Australia n.d.).	Unlikely: Known to occur within the locality although only one record near Durras shown on BioNet and Atlas Of Living Australia.
<i>Calidris ferruginea</i> Curlew Sandpiper	E	CE	The Curlew Sandpiper is found around most of the Australian coastline, including all the NSW coast, and sometimes in freshwater wetlands in the Murray-Darling Basin. The species breeds in Siberia and migrates to Australia for the non-breeding period, arriving in Australia between August and November, and departing between March and mid-April. The species occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts.	Unlikely: Lack of preferred habitat. One record on Atlas of Living Australia south of study area near Batemans Bay from 1978.
<i>Calidris melanotos</i> Pectoral Sandpiper	-	M	A migratory wetland species, the Pectoral Sandpiper breeds both in Siberia and Alaska as well as the Canadian Arctic. It is a long distance migrant, with the bulk wintering in South America's Southern Cone. Some also winter in Australasia – including around coastline of most of most jurisdictions (Birdlife Australia n.d.).	Unlikely: No records for locality. The study area has a lack of preferred habitat of wetlands.

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Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo	V	-	<p>The Gang-gang Cockatoo prefers dense, tall, wet forests of mountains and gullies and alpine woodlands. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. The species range extends from southern Victoria to southern and central-eastern New South Wales.</p> <p>For nesting and roosting, old growth forest and woodlands are preferred, with nests located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts (OEH 2017c).</p>	Potential: Numerous records for the locality. May use study area as minor part of foraging range.
<i>Calyptorhynchus lathami</i> Glossy Black-Cockatoo	V	-	<p>The glossy black-cockatoo lives in dry sclerophyll forest and woodland containing <i>Allocasuarina</i> and <i>Casuarina</i>. In NSW, the species distribution is from the coast to the tablelands, extending further west to the Riverina and Pilliga Scrub. It prefers seeds from mature casuarinas trees, with the evidence of feeding obvious through chewed and cracked cones at the trees base. Its preferred regional forage species are <i>A. littoralis</i> and <i>A. Torulosa</i>. They occasionally eat seeds from eucalypts, angophoras, acacias and hakeas, as well as eating insect larvae. The species nests in the hollows of large, old eucalypt trees, with the typical nest site up to 30 metres above the ground. In NSW, breeding takes place from March to August. It requires sufficient extent of forage within home range to support breeding (OEH 2017c).</p>	Yes: Active feed tree observed during field surveys and many more preferred feed tree, <i>A. littoralis</i> , present in study area.

Birds				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Charadrius bicinctus</i> Double-banded Plover	-	M	The Double-banded Plover utilizes a range of habitats including littoral, estuarine, fresh or saline terrestrial wetlands, saltmarsh, grasslands and muddy, sandy, shingled or sometimes rocky beaches, bays and inlets, harbours and margins of fresh or saline terrestrial. The species has been observed on exposed reefs and rock platforms with shallow rock pools and also on coastal sand dunes. It usually builds nests in flat, open, slightly elevated areas on sand, shells, gravel or shingle (Department of the Environment 2019).	Potential: Although mainly a wetlands species, feeding, foraging or related behaviour has been observed within the locality. There is suitable habitat (beaches) in the study area.
<i>Climacteris picumnus victoriae</i> Brown Tree-creeper (eastern subspecies)	V	-	The Brown Tree-creeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges.	Unlikely: Lack of preferred habitat. One record from locality in 2000 – inland from coast.
<i>Cuculus optatus</i> Oriental Cuckoo	-	M	Non-breeding over-wintering nomadic bird foraging in forest on insects.	Potential: Generic habitat potential towards southern end of known range. One record immediately outside of locality however from 1992.
<i>Daphoenositta chrysoptera</i> Varied Sittella	V	-	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and <i>Acacia</i> woodland. The species feeds on arthropods removed from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy (OEH 2017c).	Potential: Numerous records for locality. Preferred habitat present.

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Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Dasyornis brachypterus</i> Eastern Bristlebird	E	E	This species habitat is characterised by dense, low vegetation including heath and open woodland with a heathy understory. Age of habitat since fires (fire-age) is of paramount importance to this species; Illawarra and southern populations reach maximum densities in habitat that has not been burnt for at least 15 years. There are three main populations: southern Queensland/northern NSW, Central - Barren Ground NR, Budderoo NR, Woronora Plateau, Jervis Bay NP, Booderee NP and Beecroft Peninsula and Southern - Nadgee NR and Croajingalong NP in the vicinity of the NSW/Victorian border (OEH 2017c).	Unlikely: Recorded for locality but on western side of highway and at southern extent of locality south of Batemans Bay. Very marginal and limited habitat.
<i>Esacus magnirostris</i> Beach Stone-curlew	CE	M	The Beach Stone-Curlew has been observed around the north coast of Australia and associated islands from near Onslow in Western Australia to the Manning River in New South Wales. The species has largely disappeared from the south-eastern part of its former range, and is now rarely recorded on ocean beaches in New South Wales. The Beach Stone-curlew is found exclusively along the coast, on a wide range of beaches, islands, reefs and in estuaries, and may often be seen at the edges of or near mangroves. They forage for crabs and other marine invertebrates in the intertidal zone of beaches and estuaries, on islands, flats, banks and spits of sand, mud, gravel or rock, and among mangroves. They breed above the littoral zone, at the backs of beaches, or on sandbanks and islands, among low vegetation of grass, scattered shrubs or low trees; also among open mangroves (Birdlife Australia n.d.).	Potential: Suitable habitat and one record from locality. However, range of species has contracted recently and rarely observed in southern NSW.

Birds				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Gallinago hardwickii</i> Latham's Snipe	-	M	Latham's Snipe is a non-breeding migrant to the south east of Australia including Tasmania, passing through the north and New Guinea on passage. Latham's Snipe breed in Japan and on the east Asian mainland. Latham's Snipe are seen in small groups or singly in freshwater wetlands on or near the coast, generally among dense cover. They are found in any vegetation around wetlands, in sedges, grasses, lignum, reeds and rushes and also in saltmarsh and creek edges on migration. They also use crops and pasture (Birdlife Australia n.d.).	No: A few records for locality. No records for study area. Species preferred habitat of freshwater wetlands absent in study area.
<i>Gallinago megala</i> Swinhoe's Snipe	-	M	Few definite records exist for Swinhoe's Snipe in Australia with most records for northern Australia. During the non-breeding season Swinhoe's Snipe occurs at the edges of freshwater or brackish wetlands, including swamps and freshwater streams (Department of the Environment 2019).	No: No records for locality. Species preferred habitat of wetlands absent in study area.
<i>Gallinago stenura</i> Pin-tailed Snipe	-	M	Most records for Pin-tailed Snipe records are for northern Australia and south-west. During non-breeding period the Pin-tailed Snipe occurs most often in or at the edges of shallow freshwater swamps, ponds and lakes with emergent, sparse to dense cover of grass/sedge or other vegetation. The species is also found in drier, more open wetlands such as claypans in more arid parts of species' range (Department of the Environment 2019).	No: No records for locality. Species preferred habitat of wetlands absent in study area.

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Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Glossopsitta pusilla</i> Little Lorikeet	V	-	The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat. The species forages primarily in the canopy of open <i>Eucalyptus</i> forest and woodland, as well as in other tree species. Riparian habitats are particularly used. Isolated flowering trees in open country also help sustain viable populations of the species. The species feeds mostly on nectar and pollen, occasionally on native fruits, and only rarely in orchards. It roosts in treetops, often distant from feeding areas. However, nests are closer to feeding areas, most typically in tree small hollows (3 cm) in the limb or trunk of smooth-barked Eucalypts, and usually high above the ground (2–15 m). Riparian trees often chosen as nest trees, including <i>Allocasuarina</i> . Nesting extends from May to September.	Potential: Suitable habitat and numerous records from locality.

Birds				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Grantiella picta</i> Painted Honeyeater	V	V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. It inhabits Boree/ Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A. harpophylla</i>) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus <i>Amyema</i> . Insects and nectar from mistletoe or eucalypts are occasionally eaten. Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches (OEH 2017c).	Unlikely: No records for the locality. Outside of range.
<i>Haematopus fuliginosus</i> Sooty Oystercatcher	V	-	Sooty Oystercatchers are found around the entire Australian coast, including offshore islands, being most common in Bass Strait. Small numbers of the species are evenly distributed along the NSW coast. Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. The species forages on exposed rock or coral at low tide for foods such as limpets and mussels. It breeds in spring and summer, almost exclusively on offshore islands, and occasionally on isolated promontories. The nest is a shallow scrape on the ground, or small mounds of pebbles, shells or seaweed when nesting among rocks (OEH 2017c).	Yes: Study area has preferred habitat. Observed during field surveys and multiple records for locality.

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Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Haematopus longirostris</i> Pied Oystercatcher	E	-	The Pied Oystercatcher is found in coastal areas throughout the Australian continent except for areas of unbroken sea cliffs such as the Great Australian Bight. The Pied Oystercatcher prefers mudflats, sandbanks and sandy ocean beaches and is less common along rocky or shingle coastlines. Although rarely recorded far from the coast, the Pied Oystercatcher may occasionally be found in estuarine mudflats and short pasture (Birdlife Australia n.d.).	Yes: Study area has preferred habitat. Multiple records for locality.
<i>Haliaeetus leucogaster</i> White-bellied Sea-eagle	V	-	The White-bellied Sea-eagle is found across Australia, in and near coastal areas, but can also be found inland along rivers and near wetlands. It depends on forest or woodlands with large trees to build their large stick nests up in the canopy, often with some exposed dead branches nearby to use as lookout posts. It feeds mainly on fish but also birds, mammals, turtles and carrion (OEH 2017c).	Yes: Study area has preferred habitat. Observed during field surveys and multiple records for locality.
<i>Hieraaetus morphnoides</i> Little Eagle	V	-	The Little Eagle is found in open forest, woodland, grassland and arid regions. It does not like dense forests. It nests in tall trees and builds stick nests (OEH 2017c).	Yes. Numerous records of species from locality. Suitable habitat although marginal and limited.
<i>Hirundapus caudacutus</i> White-throated Needle-tail	-	V/M	The White-throated Needle-tail is an aerial forager that has a range of habitats including the coast and ranges. It prefers woodland areas and roosts in dense foliage of canopy trees seeking out tree hollows in inclement weather (Marchant & Higgins 1993).	Potential: Known to occur in the locality. Suitable habitat is present in study area but is very limited and marginal.

Birds				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Ixobrychus flavicollis</i> Black Bittern	V	-	The Black Bittern has a wide distribution, from southern NSW north to Cape York and along the north coast to the Kimberley region. The species also occurs in the south-west of Western Australia. In NSW, records of the species are scattered along the east coast, with individuals rarely being recorded south of Sydney or inland. It inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. The species feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds (OEH 2017c).	Unlikely: Known to occur within locality. However, study area not optimal habitat. Prefers rainforest creeklines.

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Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Lathamus discolor</i> Swift Parrot	E	CE	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. The species migrates to the Australian south-east mainland between February and October and inhabits areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Their preferred feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Forest Red Gum <i>E. tereticornis</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . They also use lerp infested trees including Inland Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> , Blackbutt <i>E. pilularis</i> , and Yellow Box <i>E. melliodora</i> (OEH 2017c).	Potential: Suitable habitat in study area and recorded within locality.

Birds				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Limosa lapponica</i> Bar-tailed Godwit	-	M	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas (Marchant & Higgins 1993; Department of the Environment 2019).	Unlikely: Known to occur in locality but unlikely to occur in study areas as preferred habitat is wetlands.
<i>Lophoictinia isura</i> Square-tailed Kite	V	-	The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses (OEH 2017c).	Potential: Suitable habitat in study area. No BioNet records but numerous Atlas of Living Australia records for locality.

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Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Monarcha melanopsis</i> Black-faced Monarch	-	M	The Black-faced Monarch is found along the coast of eastern Australia, becoming less common further south. The Black-faced Monarch is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating. The Black-faced Monarch forages for insects among foliage, or catches flying insects on the wing. The species builds a cup nest of casuarina needles, bark, roots, moss and spider web in the fork of a tree, about 3 m to 6 m above the ground (Birdlife Australia n.d.).	Potential: Known to occur in locality. Potential for seasonal foraging over study area.
<i>Monarcha trivirgatus</i> Spectacled Monarch	-	M	The Spectacled Monarch is found in coastal north-eastern and eastern Australia, including coastal islands, from Cape York, Queensland to Port Stephens, New South Wales. It is much less common in the south. It is also found in Papua New Guinea, the Moluccas and Timor. The Spectacled Monarch prefers thick understory in rainforests, wet gullies and waterside vegetation, as well as mangroves. It is insectivorous, foraging mostly below the canopy in foliage and on tree trunks or vines. The species builds a small cup nest of fine bark, plant fibres, moss and spider web in a tree fork or in hanging vines, 1 m - 6 m above the ground, often near water (Birdlife Australia n.d.).	Unlikely: Although known to occur in locality, lack of preferred habitat.

Birds				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Myiagra cyanoleuca</i> Satin Flycatcher	-	M	The Satin Flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. It is also found in New Guinea. It is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. The species is an insectivorous aerial forager, often active from perches in mid- to upper canopy (Birdlife Australia n.d.).	Potential: Known to occur in locality. Potential for seasonal foraging over study area.
<i>Neophema chrysogaster</i> Orange-bellied Parrot	CE	CE	The Orange-bellied Parrot breeds in the south-west of Tasmania and migrates in autumn to spend the winter on the mainland coast of south-eastern South Australia and southern Victoria. There are occasional reports from NSW, with the most recent records from Shellharbour and Maroubra in May 2003. Typical winter habitat is saltmarsh and strandline/foredune vegetation communities either on coastlines or coastal lagoons. Spits and islands are favoured. The species can be found foraging in weedy areas associated with these coastal habitats or even in totally modified landscapes. On the mainland, the Orange-bellied Parrot spends winter mostly within 3 km of the coast in sheltered coastal habitats including bays, lagoons, estuaries, coastal dunes and saltmarshes. The species also inhabits small islands and peninsulas. Birds forage in low samphire herbland or taller coastal shrubland.	Unlikely: No records for locality. Lack of preferred habitat.

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Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Ninox connivens</i> Barking Owl	V	-	The Barking Owl is found throughout continental Australia except for the central arid regions. Although common in parts of northern Australia, the species has declined greatly in southern Australia and now occurs in a wide but sparse distribution in NSW. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests. It inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile riparian soils. They roost in shaded portions of tree canopies, including tall mid-story trees with dense foliage such as <i>Acacia</i> and <i>Casuarina</i> species. During nesting season, the male perches in a nearby tree overlooking the hollow entrance (OEH 2017c).	Potential: Suitable habitat in study area. Recorded for locality.
<i>Ninox strenua</i> Powerful Owl	V	-	Powerful Owls are associated with a wide range of wet and dry forest types with a high density of prey, such as arboreal mammals, large birds and flying foxes. Large trees with hollows at least 0.5m deep are required for shelter and breeding. Very large territory (500-5000ha).	Potential: Generic foraging habitat and potential roosting habitat in limited areas e.g. behind Snake Bay. Study area could overlap with multiple pairs/territories. Multiple records for locality.

Birds				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Numenius madagascariensis</i> Eastern Curlew	-	CE, M	The Eastern Curlew is widespread in coastal regions in the north-east and south of Australia, including Tasmania, and scattered in other coastal areas. It is rarely seen inland. The species is found on intertidal mudflats and sandflats, often with beds of seagrass, on sheltered coasts, especially estuaries, mangrove swamps, bays, harbours and lagoons. The Eastern Curlew eats mainly small crabs and molluscs. The species breeds in the northern hemisphere (Birdlife Australia n.d.).	Unlikely: Known to occur in locality but unlikely to occur in study area as preferred habitat is wetlands.
<i>Numenius minutus</i> Little Curlew, Little Whimbrel	-	M	The Little Curlew is widespread in the north of Australia and scattered elsewhere. It is an irregular visitor to New Zealand and Tasmania. It breeds in Siberia and is seen on passage through Mongolia, China, Japan, Indonesia and New Guinea. Little Curlews may gather in large flocks on coastal and inland grasslands and black soil plains in northern Australia, near swamps and flooded areas. They also feed on playing fields, paddocks and urban lawns (Birdlife Australia n.d.).	Unlikely: Known to occur in locality but unlikely to occur in study area as preferred habitat is wetlands.
<i>Numenius phaeopus</i> Whimbrel	-	M	Whimbrels are common across northern Australia and uncommon to rare further south. They breed in central Siberia to Iceland. They are found mainly on the coast, on tidal and estuarine mudflats, especially near mangroves. They are sometimes found on beaches and rocky shores. The species feed on intertidal mudflats by day and night, on worms, crustaceans and occasionally fish and nestling birds. They breed in the Arctic Circle (Birdlife Australia n.d.).	Unlikely: Known to occur in locality but unlikely to occur in study area as preferred habitat is wetlands.

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Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Onychoprion fuscata</i> Sooty Tern	V	-	The Sooty Tern is found over tropical and sub-tropical seas and on associated islands and cays around Northern Australia. In NSW only known to breed at Lord Howe Island. Occasionally seen along coastal NSW, especially after cyclones. Large flocks can be seen soaring, skimming and dipping but seldom plunging in off shore waters. Breeds in large colonies in sand or coral scrapes on offshore islands and cays including Lord Howe and Norfolk Islands (OEH 2017c).	Potential: No BioNet records but known to occur in locality, and numerous records on Atlas of Living Australia. May be seen along coast in study area on rare occasions.
<i>Pachycephala olivacea</i> Olive Whistler	V	-	The Olive Whistler inhabits the wet forests on the ranges of the east coast. It has a disjunct distribution in NSW chiefly occupying the beech forests around Barrington Tops and the MacPherson Ranges in the north and wet forests from Illawarra south to Victoria. In the south it is found inland to the Snowy Mountains and the Brindabella Range. It mostly inhabits wet forests above about 500m. During the winter months they may move to lower altitudes. It forages in trees and shrubs and on the ground, feeding on berries and insects, and makes nests of twigs and grass in low forks of shrubs (OEH 2017c).	Unlikely: Numerous records for locality. Lack of suitable habitat in study area – as more inland.

Birds				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<p><i>Pachyptila turtur subantarctica</i> Fairy Prion (southern)</p>	-	V	<p>The Fairy Prion (southern) breeds on Macquarie Island and a number of other subantarctic islands outside of Australia. There are 80 to 250 breeding pairs in Australia and a global population of 80 000. In Australia, breeding is recorded on two rock stacks off Macquarie Island and on the nearby Bishop and Clerk Island. The population may have been larger prior to the arrival of black rats on Macquarie Island. The subspecies digs burrows among rocks or low vegetation in which to nest. Burrows may be dug below mat forming herbs. Feeds by plucking food from the ocean surface. Some individuals may migrate towards New Zealand and southern Australia in winter (Department of the Environment 2019).</p>	<p>Unlikely: Although known to occur in locality they only breed in Macquarie Island and subantarctic islands. They may use ocean adjacent to study area for foraging.</p>
<p><i>Pandion cristatus</i> Eastern Osprey</p>	V	-	<p>The Eastern Osprey is found in many coastal and lake areas of the world. In Australia, it is found on the north and east coast from Broome to the south coast of New South Wales. They are found on the coast and in terrestrial wetlands of tropical and temperate Australia and off-shore islands, occasionally ranging inland along rivers, though mainly in the north of the country. They mainly feed on medium sized fish. They nest on cliff, or large dead trees or other tall structures such as radio mast. The nests are constructed of sticks and driftwood (Birdlife Australia n.d.).</p>	<p>Unlikely: Recorded for locality. However, the species feed on the wing from the ocean. No nests recorded during survey.</p>

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Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Petroica boodang</i> Scarlet Robin	V	-	The Scarlet Robin is found in south-eastern and south-western Australia, as well as on Norfolk Island. The species prefers open forests and woodlands in Australia, while it prefers rainforest habitats on Norfolk Island. During winter, it will visit more open habitats such as grasslands. It feeds mainly on insects and forages on or near the ground. It will sit on a perch and fly down to catch prey (Birdlife Australia n.d.).	Potential: Recorded for locality although more likely to occur in the hinterland, the species may use the study area for foraging.
<i>Petroica phoenicea</i> Flame Robin	V	-	The Flame Robin is endemic to south eastern Australia, and ranges from near the Queensland border to south east South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands (OEH 2017c).	Potential: Numerous records on Atlas of Living Australia. No BioNet records. More likely to occur in the hinterland, the species may use the study area for foraging.
<i>Pezoporus wallicus wallicus</i> Eastern Ground Parrot	V	-	The Ground Parrot is found in scattered populations along the east coast of Australia, from south-east coastal Queensland and in pockets in north-east and southern New South Wales, through to coastal areas of Gippsland in Victoria and the islands of the Bass Strait to its stronghold in Tasmania. The species lives mainly in heathland, sedgeland or on button-grass plains (Birdlife Australia n.d.).	Unlikely: Two records in northern part of locality, including one 20 year old record near/at Murramarang Aboriginal Area. Very minimal suitable habitat for species in study area.

Birds				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Rhipidura rufifrons</i> Rufous Fantail	-	M	The Rufous Fantail is a summer breeding migrant to southeastern Australia (Morcombe 2004). The Rufous Fantail is found in rainforest, dense wet eucalypt and monsoon forests, paperbark and mangrove swamps and riverside vegetation (Morcombe 2004). Open country and drier open forest may be used by the Rufous Fantail during migration (Morcombe 2004). It is insectivorous, seeking its prey from the middle and lower levels of the canopy.	Potential: Multiple records for locality. May seasonally forage over study area.
<i>Rostratula australis</i> Australian Painted-snipe	E	E	The Australian Painted Snipe is restricted to Australia. Most records are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. In NSW many records are from the Murray-Darling Basin. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter (OEH 2017c).	No: No records for locality. Lack of suitable habitat. Not known from Sydney Basin IBRA Jarvis subregion or South East Corner IBRA Batemans subregion.

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Birds				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Sternula albifrons</i> Little Tern	E	-	Migrating from eastern Asia, the Little Tern is found on the north, east and south-east Australian coasts, from Shark Bay in Western Australia to the Gulf of St Vincent in South Australia. It is almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records). They nest in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands. The nest is a scrape in the sand, which may be lined with shell grit, seaweed or small pebbles. Often seen feeding in flocks, foraging for small fish, crustaceans, insects, worms and molluscs by plunging in the shallow water of channels and estuaries, and in the surf on beaches, or skipping over the water surface with a swallow-like flight (OEH 2017c).	Potential: Limited suitable and preferred habitat in study area with only minimal dunes/sandy beaches, although records in proximity for locality.
<i>Sternula nereis</i> Fairy Tern	-	V	The Fairy Tern is found on isolated sandy inlets and along the coast from Dampier Archipelago, Western Australia, southward to Tasmania and Victoria, and is only vagrant to the east coast. It is most common in Western Australia and rare in New South Wales, Northern Territory and Queensland. It is also found in New Zealand and New Caledonia. The Fairy Tern is found on coastal beaches, inshore and offshore islands, sheltered inlets, sewage farms, harbours, estuaries and lagoons. It favours both fresh and saline wetlands and near-coastal terrestrial wetlands, including lakes and salt-ponds (Birdlife Australia n.d.).	Unlikely: No records for locality. Feed on water and nest on sandy beaches. No suitable habitat in study area.

Birds				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Thinornis rubricollis</i> Hooded Plover	CE	V	The Hooded Plover is endemic to southern Australia. Presently the Hooded Plover occurs in NSW north to Sussex Inlet. Occasionally, individual birds are sighted slightly further north to the Shoalhaven River and Comerong Beach and one bird was sighted at Lake Illawarra in March 2001. In south-eastern Australia Hooded Plovers prefer sandy ocean beaches, especially those that are broad and flat, with a wide wave-wash zone for feeding, much beachcast seaweed, and backed by sparsely vegetated sand-dunes for shelter and nesting. Hooded Plovers forage in sand at all levels of the zone of wave-wash during low and mid-tide or among seaweed at high-tide, and occasionally in dune blowouts after rain (OEH 2017c).	Yes: Known to occur in study area and multiple records for locality. Suitable habitat in study area. Known monitoring site south of Pretty Beach.
<i>Tringa nebularia</i> Common Greenshank		M	The Common Greenshank breeds in the Palaearctic regions and is widespread in Africa, Coastal Asia, the Indian subcontinent, the Philippines and southern New Guinea. They are common throughout Australia in the summer. Common Greenshanks are found both on the coast and inland, in estuaries and mudflats, mangrove swamps and lagoons, and in billabongs, swamps, sewage farms and flooded crops (Birdlife Australia n.d.).	Unlikely: Known to occur in locality but unlikely to occur in study area as preferred habitat is wetlands.

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Birds				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Tyto novaehollandiae</i> Masked Owl	V	-	The Masked Owl is associated with forest with sparse, open, understory, typically dry sclerophyll forest and woodland and especially the ecotone between wet and dry forest, and non-forest habitat. It is known to utilise forest margins and isolated stands of trees within agricultural land and heavily disturbed forest where its prey of small and medium sized mammals can be readily obtained.	Potential: Generic potential foraging habitat in study area. Numerous records for locality.
<i>Tyto tenebricosa</i> Sooty Owl	V	-	Sooty Owls are associated with tall wet old growth forest on fertile soil with a dense understory and emergent tall Eucalyptus species. Pairs roost in the daytime amongst dense vegetation, in tree hollows and sometimes in caves. The Sooty Owl is typically associated with an abundant and diverse supply of prey items and a selection of large tree hollows.	Potential: Generic potential foraging habitat in study area. Multiple records for locality.
Disclaimer: Data extracted from the Atlas of NSW Wildlife and the Australian Government's Protected Matters Search Tool are indicative and cannot be considered comprehensive.				
CE = Critically Endangered; E = Endangered; E2 = Endangered Population; V = Vulnerable; M = Migratory				

Reptiles and amphibians				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Heleioporus australiacus</i> Giant Burrowing Frog	V	V	The Giant Burrowing Frog is distributed in south eastern NSW and Victoria, and appears to exist as two distinct populations: a northern population largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water (OEH 2017c).	Unlikely: No records for locality. Study area outside of the two known populations. Lack of suitable breeding habitat in study area.
<i>Hoplocephalus bungaroides</i> Broad-headed Snake	E	V	The Broad-headed Snake is largely confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 km of Sydney. Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in crevices or hollows in large trees within 500m of escarpments in summer (OEH 201c7).	Unlikely: BioNet and Atlas of Living Australia have no records from coastline for locality. No suitable habitat e.g. cliff edges, in study area.
<i>Litoria aurea</i> Green and Golden Bell Frog	E	V	This species has been observed utilising a variety of natural and man-made waterbodies (Pyke & White 1996) such as coastal swamps, marshes, dune swales, lagoons, lakes, other estuary wetlands, riverine floodplain wetlands and billabongs, stormwater detention basins, farm dams, bunded areas, drains, ditches and any other structure capable of storing water (OEH 2017c). Fast flowing streams are not utilised for breeding purposes by this species. Preferable habitat for this species includes attributes such as shallow, still or slow flowing, permanent and/or widely fluctuating water bodies that are unpolluted and without heavy shading (OEH 2017). Large permanent swamps and ponds exhibiting well-established fringing vegetation (especially <i>Typha</i> sp. and <i>Eleocharis</i> sp.) adjacent to open grassland areas for foraging are preferable (Ehmann 1997; Robinson 1994). Ponds that are typically inhabited tend to be free from predatory fish such as Mosquito Fish (<i>Gambusia holbrooki</i>) (OEH 2017c).	Unlikely: Study area not preferred habitat and not connected to known or significant potential habitat. One record for Murramarang National Park, but not within study area.

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Reptiles and amphibians				
Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Mixophyes balbus</i> Stuttering Frog	E	V	Stuttering Frogs occur along the east coast of Australia from southern Queensland to north-eastern Victoria. Considered to have disappeared from Victoria and to have undergone considerable range contraction in NSW, particularly in south-east NSW. It is the only <i>Mixophyes</i> species that occurs in south-east NSW and in recent surveys it has only been recorded at three locations south of Sydney. The Dorrigo region, in north-east NSW, appears to be a stronghold for this species. Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Breed in streams during summer after heavy rain (OEH 2017c).	Unlikely: No records for locality. Lack of suitable habitat in study area.
Disclaimer: Data extracted from the Atlas of NSW Wildlife and the Australian Government's Protected Matters Search Tool is indicative and cannot be considered comprehensive.				
CE = Critically Endangered; E = Endangered; E2 = Endangered Population; V = Vulnerable; M = Migratory				

Mammals				
Fauna Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Arctocephalus pusillus doriferus</i> Australian Fur-Seal	V	-	Found along rocky platforms and islands of south-eastern Australia. Reported to have bred at Seal Rocks, near Port Stephens and Montague Island in southern NSW. Haul outs are observed at isolated places along the NSW coast. Prefers rocky parts of islands with flat, open terrain (OEH 2017c). The species forages in oceanic waters of the continental shelf and generally does not dive deeper than 150 m (Department of the Environment 2019).	Potential: Known breeding site south at Montague Island. Numerous records for locality. Suitable habitat of rocky platforms in study area which may be used as haul out sites.

Mammals				
Fauna Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Cercartetus nanus</i> Eastern Pygmy Possum	V	-	<p>The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes. It is found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. The species feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. It also feeds on insects throughout the year; this feed source may be more important in habitats where flowers are less abundant such as wet forests.</p> <p>The Eastern Pygmy Possum shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (<i>Pseudocheirus peregrinus</i>) dreys or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks (OEH 2017c).</p>	Yes: A few records on edge of locality area, however study area has suitable habitat and NPWS advice of one released near north end of North Durras Beach/south-western end of Depot Headland.
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	V	V	<p>Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes.</p>	Unlikely: No known records from locality. Few records in region.
<i>Dasyurus maculatus</i> Spotted-tailed Quoll	V	E	<p>The Spotted-tailed Quoll inhabits a range of forest communities including wet and dry sclerophyll forests, coastal heathlands and rainforests, more frequently recorded near the ecotones of closed and open forest. This species requires habitat features such as maternal den sites, an abundance of food (birds and small mammals) and large areas of relatively intact vegetation to forage in. Maternal den sites are logs with cryptic entrances; rock outcrops; windrows; and burrows. Home ranges measured in hundreds to thousands of hectares.</p>	Potential: Suitable habitat within study area. Numerous records for locality.

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Mammals				
Fauna Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Isoodon obesulus</i> Southern Brown Bandicoot	E	E	This species is associated with heath, coastal scrub, heathy forests, shrubland and woodland on well drained (often sandy) soils. This species is thought to display a preference for newly regenerating heathland and other areas prone to fire. Nocturnal and sleeping by day in well-concealed nests of shredded vegetation often mixed with dirt under grass-trees, dense Blackberry and rabbit burrows. Omnivorous, feeding on fungi, fern shoots, plant roots, insects, worms and spiders. Solitary with non-overlapping home ranges 5-20ha for males, with females in smaller ranges about 2-3ha. Breed year round often following heavy rain (OEH 2017c).	Unlikely: Lack of preferred habitat in study area. One record for locality.
<i>Phoniscus papuensis</i> Golden –tipped Bat	V	-	The Golden-tipped Bat is distributed along the east coast of Australia in scattered locations from Cape York Peninsula in Queensland to south of Eden in southern NSW. It also occurs in New Guinea. It is found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m. Also recorded in tall open forest, <i>Casuarina</i> -dominated riparian forest and coastal <i>Melaleuca</i> forests. They will fly up to two kilometres from roosts to forage in rainforest and sclerophyll forest on mid- and upper-slopes. Their roosts are mainly in rainforest gullies on small first- and second-order streams in usually abandoned hanging Yellow-throated Scrubwren and Brown Gerygone nests modified with an access hole on the underside. Bats may also roost under thick moss on tree trunks, in tree hollows, dense foliage and epiphytes (OEH 2017c).	Unlikely: Study areas not optimal habitat. A few records for locality. Prefers rainforest creeklines.
<i>Miniopterus schreibersii oceanensis</i> Eastern Bent-wing Bat	V	-	Associated with a range of habitats such as rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland. It forages above and below the tree canopy on small insects. Will utilise caves, old mines, and stormwater channels, under bridges and occasionally buildings for shelter.	Likely: Preferred habitat in study area. Numerous records for locality.
<i>Mormopterus norfolkensis</i> Eastern Freetail Bat	V	-	Specific habitat requirements of this species are poorly known. Has been recorded in habitats ranging from rainforest to dry sclerophyll and woodland, with most recorded in the latter. Roosts in small colonies in tree hollows and under loose bark; has been found under house eaves, in roofs and metal caps on telegraph poles. Probably forages above forest or woodland canopy, and in clearings adjacent to forest. Most records are of single individuals, and are likely to occur at low densities over its range.	Likely: No BioNet records however, small number of ATLAS of Living Australia records for locality. Preferred habitat in study area.

Mammals				
Fauna Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Myotis macropus</i> Southern Myotis	V	-	This species will occupy most habitat types such as mangroves, paperbark swamps, riverine monsoon forest, rainforest, wet and dry sclerophyll forest, open woodland and River Red Gum woodland, as long as they are close to water. The bat forages over streams and pools catching insects and small fish by raking their feet across the water surface. When roosting it is most commonly associated with caves, however, this species has been observed to roost in tree hollows, amongst vegetation, under bridges, in mines, tunnels and stormwater drains. The species apparently has specific roost requirements, and only a small percentage of available caves, mines, tunnels and culverts are used.	Unlikely: Lack of suitable habitat in study area e.g. no large freshwater water bodies. A few records for locality.
<i>Petauroides volans</i> Greater Glider	EP	V	The greater glider is restricted to eucalypt forests and woodlands of eastern Australia. Its diet is mostly eucalypt leaves and occasional flowers and is found in highest abundance in taller, montane, moist eucalypt forests, with relatively old trees and abundant hollows. The distribution may be patchy even in suitable habitat. Forests with a diversity of eucalypt species, due to seasonal variation, are its preferred community. There is an Endangered Population of Greater Glider in the Eurobodalla LGA extending south from Moyura (OEH 2019).	Potential: There is suitable habitat for the species in the study area. A BioNet search resulted in numerous records of the species for the locality. A number of these are mapped as Eurobodalla Greater Glider Endangered Population. However, official OEH advice is that the Endangered Population is south of the Moruya River, with the river acting as a barrier to dispersal, isolating the population from other occurrences of the species. A search of the Atlas of Living Australia records found numerous records in the locality. Adopting a precautionary approach, the assessment concludes that the species may potentially occur and will assess the species as Vulnerable under the EPBC Act, and as part of the Endangered Population in the Eurobodalla LGA under NSW BC Act.

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Mammals				
Fauna Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Petaurus australis</i> Yellow-bellied Glider	V	-	The Yellow-bellied Glider is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. It occurs in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. The species feeds mainly on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein, and extract sap by incising (or biting into) the trunks and branches of favoured food trees, often leaving a distinctive 'V'-shaped scar. They live in small family groups of two - six individuals and are nocturnal, with their dens in hollows of large trees. They are very mobile and occupy large home ranges between 20 and 85 ha to encompass dispersed and seasonally variable food resources (OEH 2017c).	Potential: Many records for locality. Suitable habitat in study area. No incisions observed during field surveys.
<i>Petaurus norfolcensis</i> Squirrel Glider	V	-	The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. The species inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understory in coastal areas. It prefers mixed species stands with a shrub or Acacia mid-story. They live in family groups of a single adult male one or more adult females and offspring and require abundant tree hollows for refuge and nest sites. The diet varies seasonally and consists of <i>Acacia</i> gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein (OEH 2017c).	Potential: Numerous records from locality. These records are from 1980 – 2002 from Davey's research. Marginal habitat in study area with minimal forest/woodland with heath understory.
<i>Petrogale penicillata</i> Brush-tailed Rock-wallaby	E	V	The range of the Brush-tailed Rock-wallaby extends from south-east Queensland to the Grampians in western Victoria, roughly following the line of the Great Dividing Range. However the distribution of the species across its original range has declined significantly in the west and south and has become more fragmented. In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north (OEH 2017c)	No: No records from locality and no suitable habitat in study area.

Mammals				
Fauna Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Phascogale tapoatafa</i> Brush-tailed Phascogale	V	-	The Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide. It prefers dry sclerophyll open forest with sparse ground cover of herbs, grasses, shrubs or leaf litter. They also inhabit heath, swamps, rainforest and wet sclerophyll forest. The species forages in rough barked trees of 25 cm DBH or greater, feeding mainly on arthropods but will also eat other invertebrates, nectar and sometimes small vertebrates. The females have exclusive territories of approximately 20 - 40 ha, while males have overlapping territories often greater than 100 ha. They nest and shelter in tree hollows with entrances 2.5 - 4 cm wide and use many different hollows over a short time span (OEH 2017c).	Potential: A few records for locality. Suitable habitat in study area.
<i>Phascolarctos cinereus</i> Koala	V	V	The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. It was briefly historically abundant in the 1890s in the Bega District on the south coast of NSW, although not elsewhere, but it now occurs in sparse and possibly disjunct populations. Koalas are also known from several sites on the southern tablelands. They inhabit eucalypt woodlands and forests, feeding on foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Their home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size. (OEH 2017). In the South East Corner Bioregion the Koala is known to be associated with a range of vegetation formations and classes, including <i>Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills, northern South East Corner</i> and <i>Lilly Pilly - Coachwood warm temperate rainforest on moist sheltered slopes and gullies, Sydney Basin Bioregion and South East Corner Bioregion</i> . South coast populations preferred feed trees include <i>Eucalyptus punctata</i> , <i>E. robusta</i> , <i>E. microcorys</i> , <i>E. sclerophylla</i> and <i>E. tereticornis</i> .	Potential: A few records for locality. One feed tree species, <i>E. tereticornis</i> , is present in some parts of study area but not extensively. <i>Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills</i> , and <i>Lilly Pilly - Coachwood warm temperate rainforest on moist sheltered slopes and gullies</i> which occur in the study area are known Koala vegetation communities.

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Mammals				
Fauna Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<p><i>Potorous tridactylus tridactylus</i> Long-nosed Potoroo (SE mainland)</p>	V	V	<p>The long-nosed potoroo is found on the south-eastern coast of Australia, from Queensland to eastern Victoria and Tasmania, including some of the Bass Strait islands. There are geographically isolated populations in western Victoria. In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range, with an annual rainfall exceeding 760 mm. They inhabit coastal heaths and dry and wet sclerophyll forests. Dense understory with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. Underground-fruited fungi are a large component of the diet, but they also eat roots, tubers, insects and their larvae and other soft-bodied animals in the soil. They dig small holes in the ground in a similar way to bandicoots. They are mainly nocturnal (OEH 2017c).</p>	<p>Potential: Suitable habitat in study area. Not recorded from locality.</p>
<p><i>Pseudomys novaehollandiae</i> New Holland Mouse</p>	-	V	<p>The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Known to inhabit open heathlands, woodlands and forests with a heathland understory and vegetated sand dunes. Distribution is patchy in time and space, with peaks in abundance during early to mid stages of vegetation succession typically induced by fire (OEH 2017c).</p>	<p>Unlikely: No records from locality. Lack of preferred habitat in study area.</p>
<p><i>Pteropus poliocephalus</i> Grey-headed Flying-fox</p>	V	V	<p>Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. The Grey-headed Flying-fox inhabits a wide range of habitats including rainforest, mangroves, and paperbark forests. Camps are often located in gullies, typically close to water, in vegetation with a dense canopy. In times of natural resource shortages, they may be found in unusual locations. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Their roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. They feed on the nectar and pollen of native trees, in particular <i>Eucalyptus</i>, <i>Melaleuca</i> and <i>Banksia</i>, and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops (OEH 2017c).</p>	<p>Potential: Numerous records for locality, however seasonal foraging habitat only. Not recorded during field surveys.</p>

Mammals				
Fauna Species	NSW BC Act	C'wlth EPBC Act	Distribution and habitat associations	Likelihood of Occurrence
<i>Scoteanax rueppellii</i> Greater Broad-nosed Bat	V	-	The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. It utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Usually roosts in tree hollows, foraging for beetles and other large, slow-flying insects, and sometimes other bat species, after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m (OEH 2017c).	Potential: A few records for locality. Suitable habitat in study area.
<i>Sminthopsis leucopus</i> White-footed Dunnart	V	-	The White-footed Dunnart occurs in Tasmania and along the Victorian and southern NSW coast. The Shoalhaven area is the species' northern-most limit. It has not been recorded west of the coastal escarpment with the western-most record being from Coolangubra State Forest, approximately 10 km south-east of Bombala. It is found in a range of different habitats across its distribution, including coastal dune vegetation, coastal forest, tussock grassland and sedgeland, heathland, woodland and forest. In NSW, the species seems to favour vegetation communities with an open understory structure (contrasting with populations in Victoria which apparently prefer dense shrub and ground layers). It is patchily distributed across these habitats and, where present, typically occurs at low densities. It is an opportunistic carnivore that feeds on a variety of ground-dwelling invertebrates and, occasionally, small lizards. They shelter in bark nests in hollows under standing or fallen timber, burrows in the ground, piles of logging debris, in the 'skirts' of grass-trees <i>Xanthorrhoea</i> spp. and cycads <i>Macrozamia</i> spp. and in rock crevices (OEH 2017c).	Potential: A few records for locality. Occurs in broad range of habitat including those in the study area.
Disclaimer: Data extracted from the Atlas of NSW Wildlife/Bio Net and the Australian Government's Protected Matters Search Tool is indicative and cannot be considered comprehensive.				
CE = Critically Endangered; E = Endangered; E2 = Endangered Population; EP = Endangered Population; V = Vulnerable; M = Migratory				

Appendix K: Likelihood of occurrence evaluation for ecological communities of conservation significance

An evaluation of the likelihood of occurrence was made for listed threatened ecological communities (TECs) identified as occurring, having occurred or likely to occur in the locality. This evaluation was based on: database searches of NSW BioNet Wildlife Atlas and the Protected Matters Search Tool for EPBC Act listed matters for the locality; Forest Ecosystem Validation Mapping (NGH 2002); presence or absence of suitable habitat; features of the study area; results of the field surveys; professional judgement; literature (Australian Government 2019a, 2019b); and advice from local NPWS staff. Five terms for the likelihood of occurrence of listed communities are used in this report. The terms for likelihood of occurrence are:

- ‘yes’ = the matter of conservation significance was or has been observed in the study area or immediate surrounds
- ‘likely’ = there is a medium to high probability that the matter of conservation significance uses or occurs in the study area or immediate surrounds
- ‘potential’ = suitable habitat/plant community type for the matter of conservation significance occurs in the study area, but there is insufficient information to categorise the matter of conservation significance as likely or unlikely to occur
- ‘unlikely’ = there is a low to very low probability that the matter of conservation significance uses or occurs in the study area or immediate surrounds
- ‘no’ = the habitat/environment within the study area or immediate surrounds is unsuitable for the matter of conservation significance

Ecological community of conservation significance	Considerations related to study area	Likelihood of occurrence
Bangalay Sand Forest of the Sydney Basin and South East Corner Bioregions (NSW TEC)	<ul style="list-style-type: none"> • study area is within a few kms from the sea as in NSW TEC • study area altitude < 100 m meets NSW TEC • presence of indicator species in the study area 	Yes
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (NSW TEC) Subtropical and Temperate Coastal Saltmarsh (C'wlth TEC)	<ul style="list-style-type: none"> • study area is not on and immediately above marine and estuarine tidal flats • study area includes areas of intertidal zone on shores of estuaries and lagoons e.g. shoreline alignment (Alignment A) near Maloneys Beach • lack of indicator species in study area 	Unlikely
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (NSW TEC)	<ul style="list-style-type: none"> • study area not periodically or semi-permanently inundated by freshwater, or has no wetlands that have saline influence 	No

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Ecological community of conservation significance	Considerations related to study area	Likelihood of occurrence
<p>Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion (NSW TEC)</p> <p>Illawarra and South Coast Lowland Forest and Woodland Ecological Community (C'wlth TEC)</p>	<ul style="list-style-type: none"> the NSW version of this community does not occur in Eurobodalla or southern Shoalhaven C'wlth version does occur in LGAs, in the Jervis, Ettrema and Illawarra subregions of the Sydney Basin Bioregion and the Bateman subregion of the South East Corner Bioregion. not recorded during field surveys 	<p>No</p>
<p>Illawarra Subtropical Rainforest in the Sydney Basin Bioregion (NSW TEC)</p> <p>Illawarra-Shoalhaven Subtropical Rainforest of the Sydney Basin Bioregion (C'wlth)</p>	<ul style="list-style-type: none"> study area outside of geographical occurrence 	<p>No</p>
<p>Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (NSW TEC)</p> <p>Littoral Rainforest and Coastal Vine Thickets of Eastern Australia (C'wlth TEC)</p>	<ul style="list-style-type: none"> canopy and shrub layer made up of rainforest species/closed canopy north of Bega and close to ocean; study area subject to marine environment/climatic influences evidence of low fire occurrence scattered remnants in study area 	<p>Likely</p>
<p>Lowland Grassy Woodland in the South East Corner Bioregion (NSW and C'wlth TEC)</p>	<ul style="list-style-type: none"> occurs in LGA – Eurobodalla predominantly south of Clyde River catchment – main occurrences west of Batemans Bay, around Moruya, in the Araluen valley, in the Cobargo - Bega – Candelo area, the Towamba Valley and near Tanja occurs in rainshadow areas some common canopy species present in study area <i>Eucalyptus globoidea</i> and <i>E. tereticornis</i>-species components of ecotone transitional areas between higher Spotted Gum complex and lower areas not observed during field surveys - 	<p>No</p>
<p>Milton Ulladulla Subtropical Rainforest in the Sydney Basin Bioregion (NSW TEC)</p> <p>Illawarra-Shoalhaven Subtropical Rainforest of the Sydney Basin Bioregion (C'wlth)</p>	<ul style="list-style-type: none"> study area outside of boundaries of community geology of study area not Milton Monzonite for C'wlth characteristics, see above under Illawarra-Shoalhaven description 	<p>No</p>
<p>River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (NSW TEC)</p> <p>River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (C'wlth)</p>	<ul style="list-style-type: none"> study area not on river flats or river terraces in the central to upper parts of coastal floodplain 	<p>No</p>

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Ecological community of conservation significance	Considerations related to study area	Likelihood of occurrence
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (NSW TEC) Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community (C'wlth TEC)	<ul style="list-style-type: none"> • in relevant geographic area • sandy loam soils present • areas near beach east of Maloneys Beach potential and behind next beach east, may be subject to waterlogging/inundation 	Potential
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (NSW TEC)	<ul style="list-style-type: none"> • no areas in study area have characteristic species • BioMetric mapping has TEC occurring in study area 	Potential
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions (NSW TEC)	<ul style="list-style-type: none"> • study area does not have native grasslands on headlands 	No

NSW TEC = NSW Threatened Ecological Community listed under the *Biodiversity Conservation Act 2016*; C'wlth TEC = Commonwealth Threatened Ecological Community as listed under the *Environment Protection and Biodiversity Conservation Act 1999*.

Appendix L: Occurrence of other heritage items and places

The occurrence of other heritage items and places within, or immediately adjacent to, the study area was based on: results from searches of Australian Heritage Database, the NSW State Heritage Inventory, the NSW Historic Heritage Information Management System (HHIMS) and the NSW Maritime Heritage Database; advice from NPWS staff; field survey observations; and GIS mapping of items/places against the proposed activity study area.

The terms for occurrence are:

- ‘yes’ = the heritage item or place occurs within, or immediately adjacent to, the study area
- ‘likely’ = there is a medium to high probability that the heritage item or place occurs within, or immediately adjacent to, the study area
- ‘potential’ = the heritage item or place records and mapping suggests that it may be within or in the immediate surrounds of the study area however, there is insufficient information to make a definitive determination; or the proposed activity may have indirect impacts on the item or place
- ‘unlikely’ = there is a low to very low probability that the heritage item or place is within, or immediately adjacent to, the study area; and that there is a low to very low probability that the proposed activity will impact the heritage item or place
- ‘no’ = the heritage item or place is not within, or immediately adjacent to, the study area; and there is no to negligible probability that the proposed activity will impact the heritage item or place

Item/place name		Listing status	Listing summary/Statement of significance	Likelihood of occurrence
Huts and Gravel Pit (Item No. 1276. Item type: Complex)		Potential s.170	Site of four (possibly more) fisherman’s huts built with bark walls and iron roofs; and a former DMR gravel pit. Date of construction of huts is unknown. They were demolished c. 1981 (bark is said to have come from a nearby sawmill; location unknown). Date of gravel pit is unknown.	Potential: Some of complex near or within study area/proposed activity. See elements below.
Site of Former Huts (Item No. 3066. Item type: Element)	Potential: Element may be near or within study area/proposed activity. Not recorded during field surveys.			
Gravel Pit; Honeysuckle Bay (Item No. 3067. Item type: Element)	No: Element not within or near study area.			
Hut Remains (Item No. 1277. Item type: Complex)		Potential s.170	Two sites with hut remains; first was probably a fisherman’s hut, located on the headland, slab construction with footings, concrete steps (possibly more than one building); second site is on Flat Rock Island Track , construction is of concrete slab, bush poles with wire.	No: Complex is not near study area/proposed activity isn’t the existing track staying out here.
Former Hut(s) (Item No. 3068. Item type: Element)	No: Element not within or near study area.			
Hut Remains (Item No. 3069. Item type: Element)	No: Element not within or near study area.			

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Durras Historic Sites (Item No. 1278. Item type: Complex)		Potential s.170	<p>Site of "Eaglehawk" on Wasp Head. Weatherboard house and garage. Remains of South Durras sawmill; includes boiler and wharf remains. Some remains of Durras Village in cleared area. Wasp Head monument is a small brass plate. Eaglehawk was the sawmill managers house. It was later occupied by Dr. McKenzie of Canberra. It was demolished in 1982. The lease for Durras village was resumed when the park was established. The monument commemorates 'the ashes spread here' [?].</p> <p>Clearing; boiler on rocks below; remains of wharf. Mill owned by McMillan. Operated 1900 to 1930. Logs cut to about 8 mile radius and hauled to mill by bullocks or horse teams. Logs also loaded onto a stern wheeled punt from cutting sites around lake. Taken to ramp near present boat launching ramp, off loaded by stem winch and onto trollies via wooden railway to mill.</p>	<p>Potential: Some of complex near or within study area/proposed activity. See elements below.</p>	
Eaglehawk House Site Wasp Head (Item No. 3070. Item type: Element)	<p>Potential: Close to or within study area. New section to track for descent to Mill Beach.</p>				
South Durras Sawmill (Item No. 3071. Item type: Element)	<p>No: Not within or near study area.</p>				
Durras Village (Item No. 3072. Item type: Element)	<p>No: Not within or near study area.</p>				
Wasp Head Monument (Item No. 3073. Item type: Element)	<p>No information available.</p>				
Pebbly Beach (Item No. 1281. Item type: Complex)		Listed s. 170	<p>Pebbly Beach is listed for State social significance as a special natural place valued by the Moruya and Batemans Bay communities, and also by holiday-makers from Canberra and Sydney, especially for its flora and fauna values and its scenic qualities. There is a strong degree of community attachment arising from long use of the areas as a place for recreation and holiday-making (particularly sightseeing, picnicking, holidaying, bush walking, whale watching, water activities). It is also valued for its historical associations with the early timber industry of the area for the connections it represents between the past and present. The proximity of Durras Mountain and its scenic, landmark and recreational values, may also enhance the significance of the place to a wide community of visitors and recreational users, though this would need to be confirmed by further research.</p> <p>Possible remains of town; school, sawmill etc. There was a number of leaseholds and fibro cabins which have been removed. Mooring rings on rocks. Inholdings containing about 12 intact cottages and the physical evidence of two further cottages. Possible well; ring of rocks at ground level; filled in by NPWS, depression only.</p>	<p>Yes: Some of complex is within or immediately adjacent to the study area, and the proposed activity may result in increased visitation to the site and hence increased demand for accommodation and facilities.</p>	
Pebbly Beach Town Site (Item No. 3082. Item type: Element)	<p>Yes: The proposed activity includes some revegetation work on old tracks near the cabins to mitigate erosion issues and improve visitor amenity.</p>				
Pebbly Beach Mooring Rings (Item No. 3083. Item type: Element)	<p>Likely: The mooring rings are within or immediately adjacent to the study area and it is likely there will be indirect impacts by the proposed activity on the moorings.</p>				
Ocean View; Pebbly Beach Cabins (Item No. 3084. Item type: Element)	<p>Likely: The cabins are within or immediately adjacent to the study area and there may be increased visitation to the site and hence increased demand for accommodation and facilities. As part of a separate project, minor upgrades are</p>				

	Pebble Beach Well (Item No. 3085. Item type: Element)			planned consistent with the listing and the site character. Unlikely: The well site is not within or immediately adjacent to the study area and it is unlikely there will be indirect impacts by the proposed activity on this item.
Depot Beach Cabins (Item No. 1282. Item type: Complex)		Listed s.170	Depot Beach draws its name from its use as sawlog store or depot, for milling operations at Pebbly Beach. Development of the site in the 1950s for weekend cabins reflected the increase in mobility offered by the motor vehicle and the search for new recreational opportunities by city dwellers. Representative at local and regional level of cabins erected in the 1950s. 6 weekender cabins exist of original 12 that were built on Lands Department lease.	Potential: Although not within or immediately adjacent to the study area and no works planned for Depot Beach Cabins, there may be increased visitation to the site and hence increased demand for accommodation and facilities.
	Cabin 01; Depot Beach (Item No. 3086. Item type: Element)			Potential: As above.
North Durras Bottle Dump (Item No. 3075. Item type: Element)		Potential s.170	Tennis court eroded into lake and has exposed bottle dump; bottles now spread by tide; mainly beer and cordial bottles. Probably dates before 1950's; most bottles cleaned up by NPWS c. 1983, occasionally bottles still appear.	No: Not within or near study area.
Water Supply (Item No. 3076. Item type: Element)		Potential s.170	Fenced pool (10 x 10 [measurement unit not defined in original]). Originally water supply for village.	No: Not within or near study area.
Depot Beach Mooring (Item No. 3077. Item type: Element)		Potential s.170	Iron mooring rings in rock (two) known. More than thirty cm in diameter. No details for mooring. Depot Beach was a major depot for sleepers around 1900 with revival in the timber industry. Beach area deserted and later resettled in the 1930's.	Likely: The study area includes the rock platforms at Depot Beach where the mooring rings are.
Depot Beach Tramway (Item No. 3078. Item type: Element)		Potential s.170	Location of start of the tramway; cutting remains, it runs north for about one km, but disappears near the new road system. No details for tramway. Depot Beach was a major depot for sleepers around 1900 with revival in the timber industry. Beach area deserted and later resettled in the 1930's.	No: The study area includes the rock platforms at Depot Beach, not near the tramway cutting.
Depot Beach Toilet Block (Item No. 3079. Item type: Element)		Potential s.170	Two concrete slabs. Removed by NPWS 1980.	No: The study area is not in the area of the old toilet block. Proposed activity is on beach and rock platforms in this area.
Depot Beach & Littoral Rainforest (Item No. 8441. Item type: Element)		Potential s.170	No detail provided with listing.	No: The study area is not near the littoral rainforest. Proposed activity is on beach and rock platforms in this area.

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Richmond Beach Littoral Rainforest (Item No. 8456. Item type: Element)	Potential s.170	No detail provided with listing.	No: Study area is not near the littoral rainforest at Richmond Beach. Proposed activity is on beach and rock platforms in this area.
Oaky Beach Littoral Rainforest (Item No. 8491. Item type: Element)	Potential s.170		No: Study area is not near the littoral rainforest at Oaky Beach. Proposed activity is on beach.
Wasp Head (Item No. 8480. Item type: Element)	Potential s.170	No detail provided with listing.	Potential: Refer to Wasp Head listing above.
McMillan's Sawmill, Wharf and Skids (Eurobodalla LEP)	Listed Eurobodalla LEP	Foreshore adjoining and on, Banyandah Street, at southern end of Mill Beach	No: Not within or near study area. Refer to South Durras Sawmill listing above.
Myrtle Beach-Wasp Head Geological Site (Myrtle Beach - Wasp Head coastal area)	Listed Eurobodalla LEP	Approximately 20 hectares of land between Mill Beach and Myrtle Beach, comprising rock platforms and adjacent coastal cliffs to the low water mark.	No information available on listing.
Pebbly Beach Sawmill Complex, including Sawmill remnants, Town and school site	Listed Shoalhaven LEP	No detail provided with listing. See s. 170 listing detail above.	Yes: The proposed activity includes some revegetation work on old tracks near the cabins to mitigate erosion issues and improve visitor amenity.
Wasp Head Saw Mill Boiler	Listed MHR	At Wasp Head, a boiler from the former saw mill is evident on the NW side of Wasp Head above the high tide mark.	No information available on listing.
Wasp Head Saw Mill Tramway Spikes	Listed MHR	Site of the former tramway descends down a track cut through the side of the cliff and extended out on a raised tramway seaward over the rock platform. The remains of the former tramway are evident by paired iron spikes 2m apart which have been drilled into the rock platform (indicating the location of paired former tramway piers located every 3 m) and extending to the rock platform face and then turning extending out to seaward. The spikes extend over and area of approx. 27m x 2m.	No information available on listing.
<i>Dureenbee</i> shipwreck	Listed MHR	The small fishing trawler <i>Dureenbee</i> was attacked by twelve shells from Japanese submarine <i>I-175's</i> 4.7-inch deck gun and its two 13-millimeter machine guns off Moruya on 3 August 1942. The damage led to the 223-ton steamer being abandoned and wrecking ashore at Bateman's Bay, a total loss. Three of the crew were killed and three injured. The <i>Dureenbee</i> foundered ashore at the north head of Batemans Bay. The 35.6 metre iron screw steamer was built at the Government Dockyard at Newcastle in 1919.	No: Not within or near study area.

s. 170 = section 170 of the *Heritage Act 1977* (NSW); LEP = Local Environmental Plan; MHR = Maritime Heritage Register
