Review of Environmental Factors

Shoalhaven River Entrance Opening

Shoalhaven City Council

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Acknowledgement *of Country*

Walawaani (welcome),

Shoalhaven City Council recognises the First Peoples of the Shoalhaven and their ongoing connection to culture and country. We acknowledge Aboriginal people as the Traditional Owners, Custodians and Lore Keepers of the world's oldest living culture and pay respects to their Elders past, present and emerging.

Walawaani njindiwan (safe journey to you all)

This acknowledgment includes Dhurga language. We recognise and understand that there are many diverse languages spoken within the Shoalhaven.

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1 INTRODUCTION

1.1 Background

The Shoalhaven River is a barrier river estuary located on the South Coast of NSW. The estuary is unique in that it has two distinct and separate ocean entrances. Due to the construction of Berry's canal, the main permanent ocean entrance is located at Crookhaven Heads, entrained by rock armoured training wall and the Crookhaven headland. The secondary entrance is located at Shoalhaven Heads and comprises a sand berm that intermittently opens and closes to the ocean.

The Shoalhaven River entrance at Shoalhaven Heads is only opened naturally by the occurrence of flood events, and is subsequently closed naturally after these events during more ambient conditions due to the interplay of river, tide, and coastal processes.

The Shoalhaven River entrance at Shoalhaven Heads is managed by Shoalhaven City Council (Council) in accordance with the *Shoalhaven River Entrance Management Plan for Flood Mitigation* (2006) (EMP). The primary objective of the EMP is to reduce the frequency and magnitude of nuisance flooding impacts on low lying areas around Shoalhaven Heads. The current approach to entrance management through the EMP is proactive maintenance of a dry notch at 2m AHD, and the reactive construction of a pilot channel through the entrance berm to release flood waters and reduce flood impacts in low lying foreshore areas around the estuary. The triggers for action are generally based on when estuarine water levels reach a specific 'trigger' level, or are forecast to reach these levels through relevant flood warning notifications.

A Review of Environmental Factors (REF) for the Shoalhaven River Dry-Notch was prepared in 2021. This previous REF includes an impact assessment of the existing dry-notch maintenance at the entrance and sand nourishment along River Road foreshore, but no assessment of the survey works at the entrance, the excavation of the pilot channel, or any berm management works.

Council is now updating the 2021 REF to include the above activities as well as:

- Expanding the area of the dry notch to cover the entire beach berm area, limited by vegetated areas including a buffer, between the river and the ocean. This would allow for entrance opening at the most efficient location, where the flood waters are naturally channelled and have least resistance, rather than having to redirect the natural flows toward the area of the current dry notch.
- Using the sand removed during dry-notch maintenance for sand nourishment along the foreshore of Shoalhaven Heads Beach from the entrance to the south, to the front of Shoalhaven Heads Surf Life Saving Club (SLSC) in the north in addition to the sand nourishment along the foreshore along River Road.

Figure 2-1 shows the location of the proposed works, and the proposed activities are described in Section 1.3.

1.2 Purpose of This Review of Environmental Factors

In light of legislative updates, mainly the *Coastal Management Act 2016*, and the development of the Lower Shoalhaven River Coastal Management Program (CMP) a review of the EMP is required. The Shoalhaven River entrance at Shoalhaven Heads is located on Crown land and entrance openings are only permitted as outlined in the Crown land licence, in line with the EMP. Therefore, an update of the EMP requires a renewal of the Crown land licence, and consequently an update of the REF.

Water Technology has been engaged to prepare the REF under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to assess any environmental impacts from the proposed works. Council has an obligation to consider all possible environmental impacts which may result from these works and

determine whether these impacts are likely to be significant or not. This will be achieved through the development of the REF. The REF is to be prepared in accordance with Clause 171 of the *Environmental Planning and Act Regulation 2021*.

The Shoalhaven River entrance is an environmentally sensitive area. Its network of intertidal wetlands is used by shorebirds for feeding and nesting, and the broader estuary provides important fish habitat. It also provides significant aesthetic and recreational values for residents and visitors.

This REF describes the proposed activity and legislative context, assesses potential environmental impacts and recommends the mitigation measures to satisfy Council's due diligence and statutory responsibilities. Information obtained through stakeholder consultation, including with the NSW National Parks and Wildlife Service (NPWS) and broader community, was considered in the preparation of this assessment.

1.3 Proposed Activities

The proposed activity comprises survey works, entrance management through dry notch maintenance and berm management, pilot channel excavation and reuse of sand for sand nourishment. All works will be undertaken in accordance with the *Shoalhaven River EMP (2025).*

All activities except sand nourishment are related to flood management and mitigation, and are either proactive (ongoing management) or reactive (triggered by flood warning) as described below. Some activities are also undertaken differently depending on the presence of nesting shorebirds. This is further detailed in Section 6.4 of this REF.

The proposed works will be undertaken by Council or their contractors. Entrance management at the Shoalhaven River entrance at Shoalhaven Heads for flood mitigation purposes is an established process within Council, with Council also responsible for a number of other entrances within the Shoalhaven Local Government Area (LGA).

1. Survey works (proactive)

Survey works to monitor the sand berm and dry notch height (m AHD) will be undertaken continuously throughout the year (when the entrance is closed) on a monthly basis or as needed. The data collected will inform the need for dry notch maintenance and berm height management. Survey work will be undertaken by surveyors walking along the beach surveying the berm and dry notch height using a RTK GPS. It may also be undertaken through the use of unmanned aerial vehicles (UAVs) such as drones.

2. Dry notch maintenance (proactive)

The dry notch maintenance works consist of scraping the "dry notch" area of the entrance berm to a target level using earth moving machinery (such as a CATD6/D7 size bulldozer or excavator and 2-3 6WD dump trucks). Under the EMP (current and updated), the dry notch will be excavated to a level of 2.0m AHD across a 50m minimum stretch of the entrance in a north-south direction, avoiding impact in vegetation as detailed in Section 2.1 of this REF. The east-west extent of the notch will be determined by the shape of the entrance berm and dune at the time. The western limit of excavation will be determined by the point where the natural sand level drops below 2.0m AHD. To avoid impacts from wave overwash, and impacts on nesting shorebirds, the eastern limit will be maintained as follows:

- During the months of March to October the dry notch will be mechanically excavated to 2.0m AHD to within approximately 10m west of the high point of the berm/dune.
- During the potential shorebirds breeding season (October to March) the dry notch will be mechanically excavated to 2.0m AHD to within approx. 20m west of the high point of the berm/dune, if it is deemed that this can be done without direct disturbance to nesting shorebirds.

The configuration is shown in Figure 1-1.

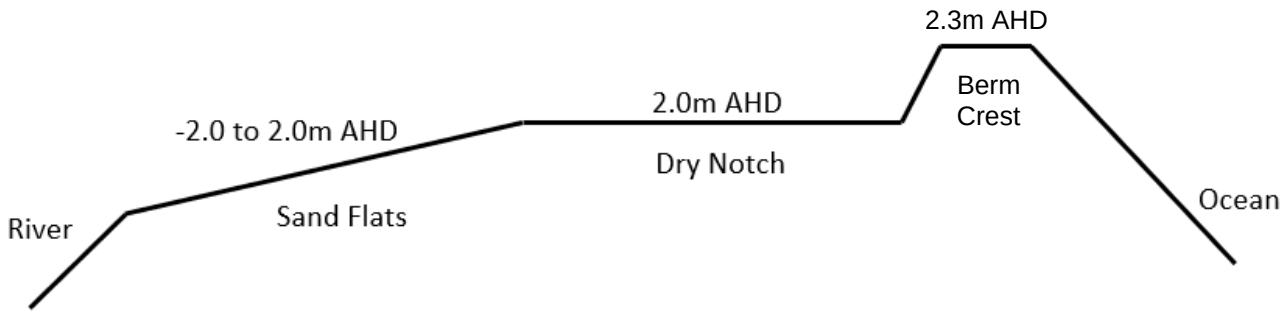

Figure 1-1 Proposed configuration of entrance berm works. Figure courtesy SCC 2021.

3. Berm height management (proactive/reactive)

Berm height management would be undertaken using earth moving machinery (the same as for the dry notch maintenance described above) to maintain the berm crest height at < 2.3m AHD for its total width (from the dry notch to where the level drops to 2.3m AHD on the ocean side). The need for berm height management will be based on surveys of berm height in Activity 1. Depending on the rate of vertical berm height growth, this activity may need to occur more frequently than the dry notch maintenance, and potentially also during shorebird nesting season if possible (only in areas 255m away from nesting shorebirds, or as determined by a future licence to harm). A licence to harm under the *National Parks and Wildlife Act 1974* (NPW Act) will be required if nesting threatened shorebirds need to be disturbed (e.g. nest relocated) to undertake the entrance opening

Berm lowering may also be undertaken as a reactive measure in a prognosed or occurring flood event, and can be done either as an alternative or in addition to pilot channel excavation.

4. Pilot channel excavation (reactive)

A pilot channel would be excavated in the event that any one of the following triggers are reached:

- A water level exceeding 3.0m AHD recorded at the Nowra River gauge (Wharf Road, BoM number: 68213)
- A water level exceeding 2.0m AHD at the Shoalhaven Heads River gauge (Hay Avenue, MHL ID: 215415)
- A forecast that either of the above trigger levels are expected to be reached based on the issue of a **Flood Warning** from the Bureau of Meteorology

The pilot channel excavation is undertaken with an excavator or a backhoe. The specific location of this channel will depend on the shape of the entrance berm at the time of the works, with the works to focus on low points in the berm as a result of natural processes as well as dry notch and berm management, to facilitate a more rapid entrance opening. Being reactive works (flood response), the pilot channel excavation may also impact on areas with native vegetation in situations where flood waters cannot be controlled. Where possible, the channel should be located a significant distance from the northern and southern vegetated dunes to avoid impacts from a meandering entrance.

5. Sand nourishment and sand storage

The sand excavated during Activities 2 and 3 (and where operationally achievable, Activity 4) would be beneficially reused for beach nourishment at pre-designated foreshore areas to help improve the resilience of those foreshore locations to coastal erosion. The two locations include:

- The Shoalhaven Heads beach – immediately north of the entrance berm, extending up to the SLSC.
- The estuary foreshore along River Road.

Excavated sand would be moved between the sites by truck. Up to 40 tonne trucks can access both the beach locations and the river foreshore to dump sand. There is an existing beach access, via River Road car park, for machinery to access the river entrance. Additionally machinery is able to access the estuary foreshore along River Road adjacent to the boat ramp and driving on the foreshore beach. This activity also covers the potential storage of sand for use at a later stage. The stockpile location is marked in Figure 2-1.

1.4 Project Justification and Options

The purpose of the proposal is for flood mitigation, enabling Council to facilitate expedient and swift mechanical intervention in the path of floodwaters, reducing potential impacts of nuisance flooding on the low lying foreshore areas at Shoalhaven Heads. The entrance management also aims to maintain responsible environmental management of the entrance berm and shorebird habitat, and the maintenance of natural coastal processes to the greatest extent possible. To reuse the excavated sand, sand nourishment activities would be undertaken to strengthen the resilience of the identified beaches and estuary foreshore, as previously discussed.

The Shoalhaven River entrance area is of high environmental significance. The scenic and recreational values of the area are very important to residents and visitors of the region. The river entrance at Shoalhaven Heads is one of the most important sites on the NSW coast for populations of migratory wading birds protected under international agreements. Additionally, threatened species of other shorebirds may nest at the site during nesting season (typically October to March). The lower estuary also contains State Significant Coastal Wetlands, mapped in the Resilience and Hazards State Environmental Planning Policy 2021 (RH SEPP).

Option 1 – Do Nothing

Doing nothing would entail allowing the entrance to open and close on a natural cycle. Consequently, the water levels within the estuary may reach higher levels than if the entrance is opened at a certain trigger level. If the entrance of the Shoalhaven River at Shoalhaven Heads were to remain closed during a flood, water levels could be significantly higher for longer in some parts of the river's floodplain. This would result in greater impacts on the Shoalhaven community, especially at the village of Shoalhaven Heads, in terms of inundation of houses and other property, cutting of access roads and possibly through increased injury or loss of life.

Option 2 – Continue with the Current Opening Regimes

By continuing the current river entrance opening regime as approved under the existing Crown land licence the flood levels within the estuary can be sufficiently managed. However, the dry notch area is small, restricting operational flexibility. By allowing a wider dry notch area, Council would have greater control to open the entrance in a more efficient location (where the water naturally flows) in a flood event.

Option 3 – Widen the Dry Notch Area and Implement Sand Nourishment (Preferred)

As described above, a wider dry notch area would allow Council to have greater operational flexibility, allowing for an efficient entrance opening during flooding, as the opening can be done in the location where the water naturally would break through. The optimal location for the dry notch may change depending on the current prevailing natural processes and can be difficult to predict. Sand nourishment would bring back sand to beach areas where natural processes erode it, while maintaining the sediment within the same sediment compartment. The sand nourishment would be beneficial both for the amenity and infrastructure in the proposed locations. Sand nourishment can currently be undertaken under separate approvals, however combining the approvals would facilitate the works and the sand could be directly transported to the nearby sites making operations more streamlined and cost-efficient.

1.5 Lower Shoalhaven River CMP

Coastal processes relating to entrance management have been assessed within the Lower Shoalhaven River CMP. The Stage 2 CMP report "Review of the Entrance Management Plan" (Rhelm, 2023) provides a detailed overview of the local coastal processes and entrance dynamics, past and current entrance management practices, as well as consideration of potential options for management of the entrance into the future.

The Stage 4 CMP Report (Rhelm, 2024a) details the management actions to be covered by the CMP. Management action CTF_20 relates to the entrance opening at Shoalhaven Heads and is detailed as follows:

CTF_20: Implement the Entrance Management Policy and undertake review

"Implement the Entrance Management Policy (EMP) in accordance with the associated Review of Environmental Factors (REF). Both being updated at the time of public exhibition of the CMP. Review and potential subsequent update to be undertaken as part of Lower Shoalhaven River Floodplain Risk Management Study and Plan (FRMSP), and Lower Shoalhaven River & St Georges Basin Flood Evacuation Capability Assessment & Triggers."

It is also noted that entrance management as a flood risk mitigation measure is supported by the CMP.

2 PROJECT LOCATION

2.1 Location

The Shoalhaven River entrance lies between the township of Shoalhaven Heads to the north-east and Comerong Island Nature Reserve (National Park estate) to the south, within Shoalhaven LGA. Shoalhaven Heads consists of developed urban residential properties with natural areas along the coastal foreshore connecting with Seven Mile Beach National Park to the North. Comerong Island also has a number of residential properties outside of the areas that are National Parks estate.

The subject site shown in Figure 2-1. This map depicts the proposed Activity Area for Activities 1-4, and the beach nourishment placement zones for Activity 5. The primary activity area for entrance berm works (Activities 1-4) is within the entrance berm area between the river estuary and the ocean, and is Crown Land owned by the NSW Government. The exact extent of the dry notch area is identified in the updated EMP.

A buffer area of 20m should be kept to all areas with native vegetation so as to not impact on root or natural spreading of the vegetation communities. Vegetation in this case constitutes areas with established populations of native flora with more than a few individual plants present.

The ‘subject site’ includes the area of potential direct impact on the community and the environment from the proposed activity. The ‘study area’ consists of the subject site for all activities including a 50m buffer to the subject site, where direct and indirect impacts on the community and the environment may occur.

Site access is via an existing beach track marked in yellow in the below figure. Access to the beach track is via a locked gate at the River Road car park. The sand would be stockpiled next to the parking lot as needed.

2.2 Land Ownership and Management

The sand nourishment would be undertaken on Lot 7005 DP1075719 and Lot 7004 DP94785, which are Crown Land managed by Council. The stockpile location, sand nourishment areas, beach track and dune area are zoned as RE1 – Public Recreation and W2 – Recreational Waterways under Shoalhaven LEP 2014 (see Figure 2-2).

The land on which the waterway and entrance lies is Crown land managed by the NSW Department of Planning Housing and Infrastructure (DPHI) (Figure 2-1). A Crown land licence will be required to undertake the works as discussed in Section 4.1.5.

The site is adjacent to National Parks estate and while approval for the works is not required, a licence to harm would be required as the works may impact on threatened shorebirds if the river entrance is opened during nesting season.

Referral to the Department of Primary Industries - Fisheries (DPIRD Fisheries) is also required as discussed in Sections 4.1.5 and 4.1.8, and it will be done as part of the Crown land licence process.

Figure 2-1 Project location (approximate) and land ownership

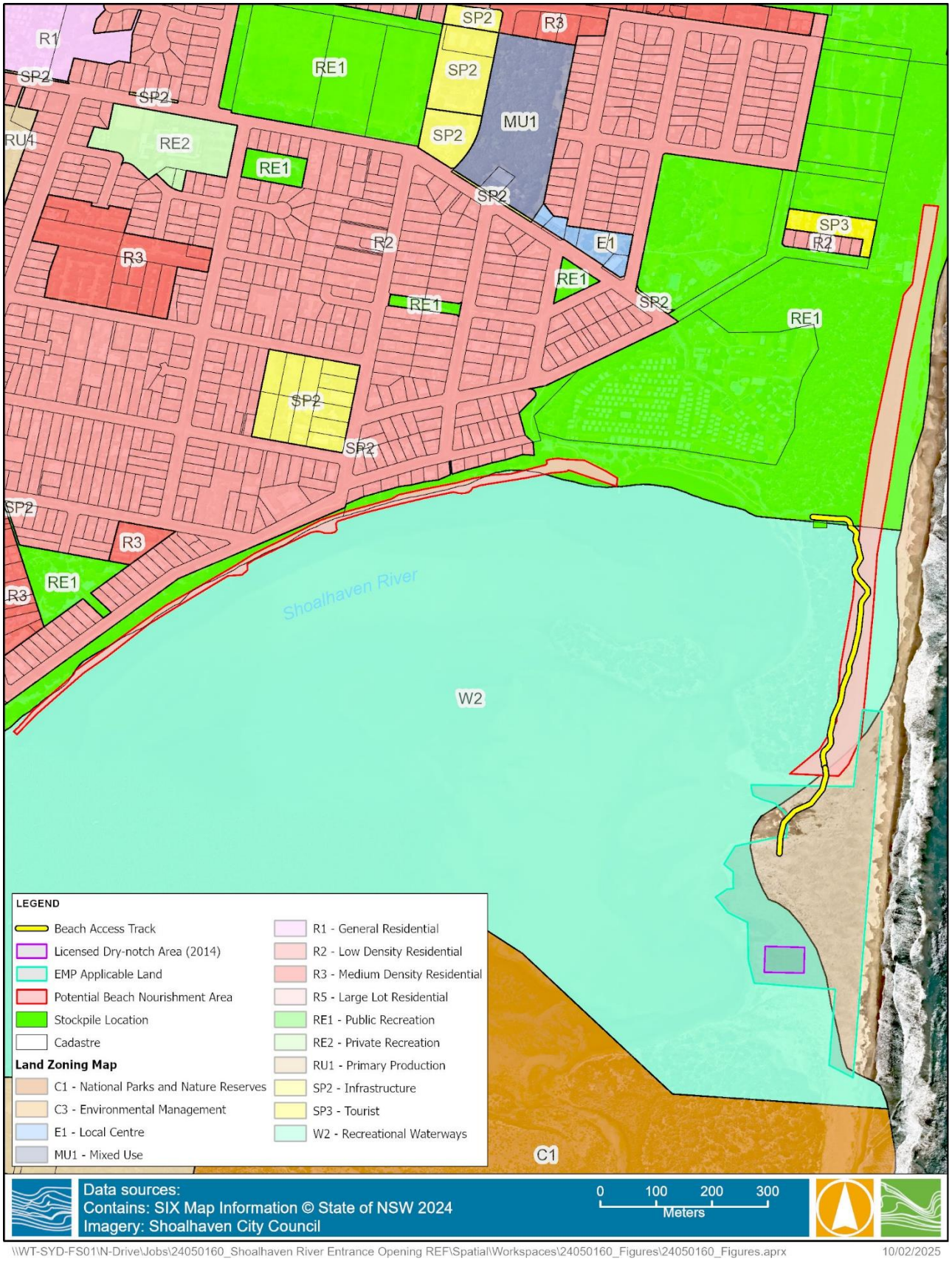

Figure 2-2 Land zoning

3 EXISTING ENVIRONMENT

3.1 Community values

The entrance area of the Shoalhaven River at Shoalhaven Heads has significant environmental, recreational and scenic values. The relatively natural coastal landscape with broad expanses of beach, sand dunes, ocean and river provide opportunities for appreciation by walkers, fishers, swimmers, boaters and other users of the area.

Community values include:

- Aesthetics – passive recreation undertaken to appreciate the aesthetic appeal;
- Cultural and spiritual values – water is particularly important for indigenous peoples;
- Aquatic ecosystems – respect for the health or integrity of the waterway's ecosystems; and
- Exercise and active recreation - activities including walking, swimming, surfing, boating, paddle boarding, kayaking, snorkelling, and fishing.

The estuary and river foreshore in the proposed sand nourishment location has recreational facilities in the form of boat ramps and a dog off-leash beach.

The Shoalhaven Heads Surf Life Saving Club is located north of the entrance. Part of the project purpose is to increase the resilience of the dune area in front of the surf club infrastructure through sand nourishment.

3.2 Landscape features

The Shoalhaven River enters the Tasman Sea at two locations: Shoalhaven Heads and Crookhaven Heads, and is a micro-tidal, wave dominated estuary system. The estuary is intermittently open and closed to the ocean at Shoalhaven Heads, whilst a permanent exchange with the ocean at Crookhaven Heads is maintained through a trained entrance (via Berry's Canal).

The dry notch area is the location of the highly dynamic entrance berm. When the entrance is closed, the dry notch area is a low-lying stretch of sand that forms a barrier between the ocean and the Shoalhaven River. However, during a flood event, the entrance opens through the dry notch area, and scours the sand away, forming a channel. This channel has been observed to remain open for several months to years, until the dominant coastal processes (waves, tides and littoral sediment transport) close it, and a wide sand berm is again formed.

Approximately 1km north of the Shoalhaven River entrance at Shoalhaven Heads is the Shoalhaven Heads Surf Life Saving Club. Sitting on the same stretch of beach as the entrance, the SLSC sits just behind the dune, and is at increasing risk of coastal erosion.

The River Road foreshore is located on the estuary side of Shoalhaven Heads, and has historically experienced significant erosion. The foreshore protects public and private assets, and in 2021 a sea wall was constructed to minimise future erosion. Subsequent nourishment projects using sand from Shoalhaven Heads beach have provided an additional erosion buffer and increased user and visual amenity.

3.3 Biodiversity

Background research and database searches undertaken for the REF include the Protected Matters Search Tool (*Environment Protection and Biodiversity Conservation Act 1999*), the BioNet Atlas of NSW Wildlife, BioNet Vegetation Classification, NSW Threatened Species Profiles, the NSW Biodiversity Values Map and Threshold Tool, and NSW SEED Map.

The Shoalhaven River estuary and entrance location on the dunes is mapped as containing Biodiversity Values (BV) under the *Biodiversity Conservation Act 2016* (BC Act, see Figure 3-1 and Section 4.1.7 for more details). Even if Council is not subject to the Biodiversity Offset Scheme (BOS), BV mapping still provides information about areas where biodiversity features need to be considered. In this case, the Shoalhaven River is mapped as having BV due to the presence of biodiversity features including Key Fish Habitat and estuarine vegetation as mapped by DPIRD Fisheries, as well as littoral wetlands, saltmarshes and other intertidal communities (Figure 3-1).

The Plant Community Types (PCTs) mapped adjacent to the sites include (Figure 3-2):

- PCT 3410 - Spinifex Strandline Grassland (sand dunes)
- PCT 3788 - Coastal Foredune Wattle Scrub (access track and stockpile)
- PCT 3638 - South Coast Sands Bangalay Forest (River Road foreshore)

PCT 3638 is associated with the threatened ecological communities Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions and Kurnell Dune Forest in the Sutherland Shire and City of Rockdale, both listed as Endangered under the BC Act.

A field survey was undertaken of the site to identify any flora species that may be impacted by the works. No flora species were present within the proposed dry notch area on the day of the survey. Previous surveys undertaken for the 2021 REF indicates the exotic species Sea-rocket (*Cakile maritima*) as present. Common flora species on site, outside the dry notch area, that could be directly impacted by the works include Spinifex (*Spinifex sericeus*), Coast Banksia (*Banksia integrifolia*), Coastal Wattle (*Acacia longifolia*), Swamp Oak (*Casuarina glauca), Lomandra* sp, and Coast Teatree (*Leptospermum laevigatum*).

A 20m buffer to areas with native vegetation is recommended for the dry notch maintenance and berm maintenance, avoiding any potential impacts to these vegetation communities. The use of the beach track and stockpiling locations will be in line with the current uses and no vegetation removal is proposed. Minor trimming or pruning may be required from time to time and will be undertaken in accordance with the relevant standards.

A BioNet Atlas search was also done to identify threatened species sighted within 10km of the site in the last 30 years. Based on the outcomes of this search as well as locations of species sightings mapping and consideration of potential habitat on site, a Likelihood of Occurrence table was prepared and is included in Appendix C. Threatened species sightings in close proximity to the site are shown in Figure 3-3.

In terms of the NSW coast, the Shoalhaven River estuary is a high priority site for shorebird conservation. More than 40 species of shorebirds have been observed in the Shoalhaven estuary (SCC, 2006). Some of the observed shorebirds are listed as threatened species and protected by NSW and Commonwealth legislation, and international agreements (mainly migratory species). Commonly recorded threatened species in the study area include the Little Tern (*Sternula albifrons*), Pied Oystercatcher (*Haematopus longirostris*), and Eastern Curlew (*Numenius madagascariensis*) (NSW Bionet, 2024). The entrance area at Shoalhaven Heads can be important for shorebirds as a beach nesting site, an intertidal feeding area and a high tide roost area.

The current Crown Land licence includes stipulations set by NSW National Parks and Wildlife Services (NPWS) regarding minimisation of disturbance to both threatened and migratory shorebird habitat during their breeding season by the use of buffer areas (50m from nesting site April-September and 255m in October-March). These stipulations are expected to be included in the renewed licence. A licence to harm threatened fauna, in case of flood events, has not been obtain at the time of writing this REF, meaning that the buffers need to be maintained at all times.

Furthermore, the EPBC Protected Matters Search Tool was used to identify any Matters of National Environmental Significance (MNES) within the area. The MNES report is included in Appendix D. MNES

recorded within 10km of the site include one Commonwealth marine area, seven threatened ecological communities, 111 threatened species and 76 migratory species.

Coastal wetlands occur south of the river entrance and throughout the Shoalhaven River estuary, providing important habitat for a large number of species. Seagrasses commonly occur throughout the estuary, with *Zostera* species dominating the aquatic parts of the subject site (Figure 3-4).

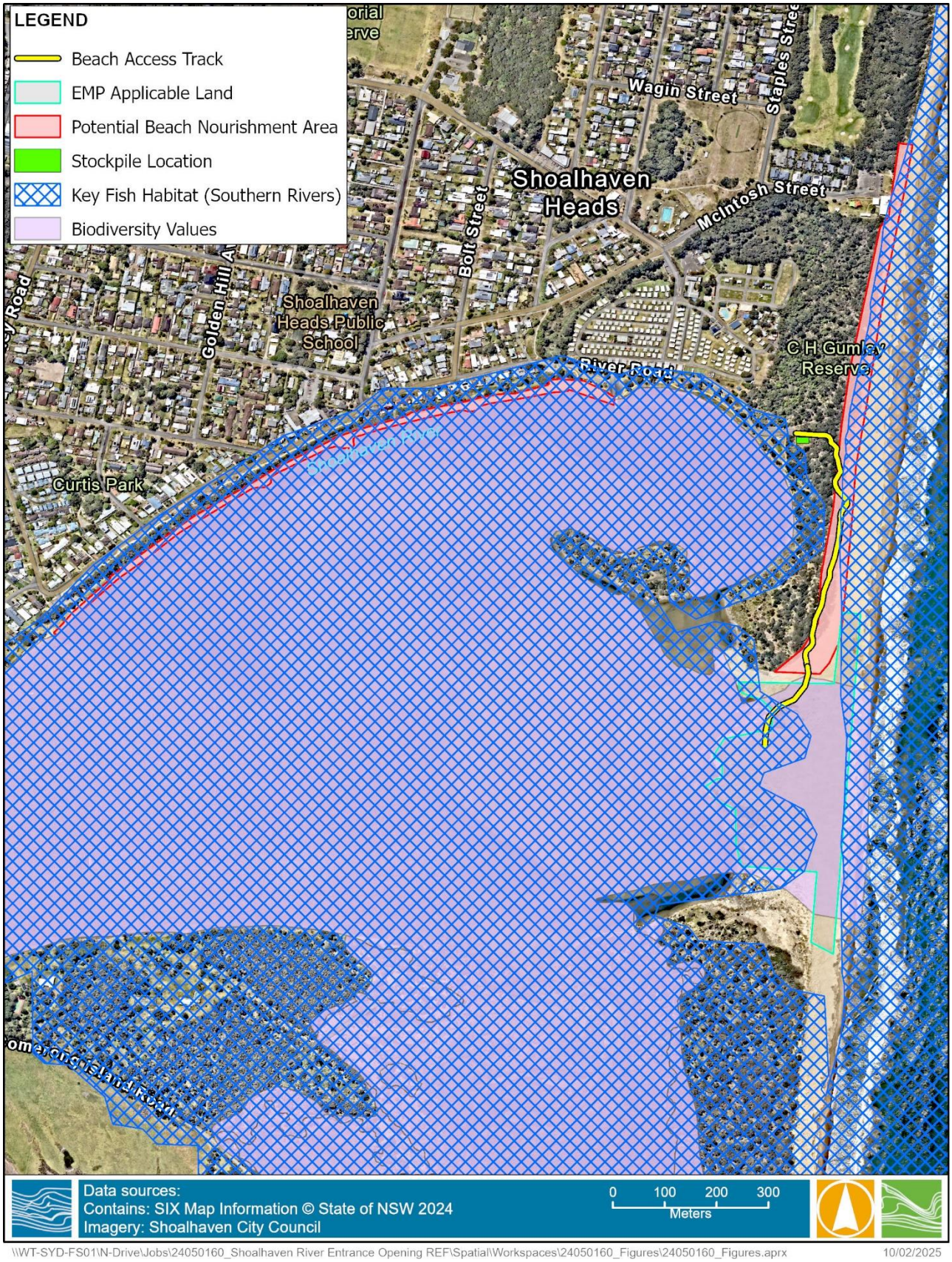

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Figure 3-1 Biodiversity Values and Key Fish Habitat

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Figure 3-2 Plant Community Types

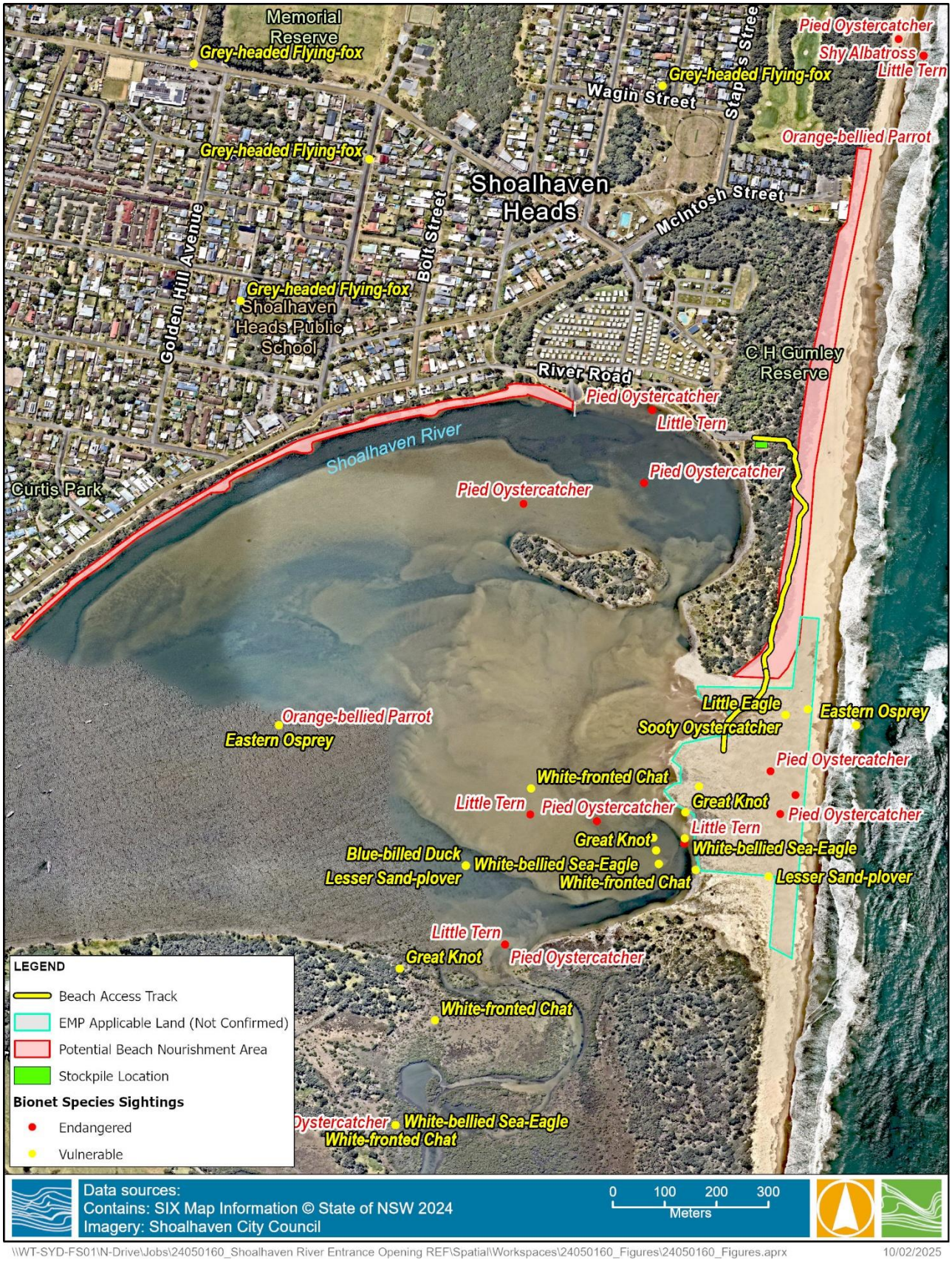

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Figure 3-3 Threatened species sightings

Figure 3-4 Marine vegetation (DPIRD Fisheries) and coastal wetlands (R&H SEPP)

3.4 Cultural heritage

An AHIMS search was conducted on 20 February 2025 and indicated that there is one recorded Aboriginal heritage site within proximity to the estuary in the vicinity of the subject site (Appendix B). Due to naturally dynamic nature of the entrance berm, it is considered likely that any other Aboriginal artefacts within the entrance area would have been discovered already. The proposed works will not significantly alter the natural regime as it is within the natural breakout range of the highly dynamic entrance, and therefore is highly unlikely to disturb any unknown artefacts. An unexpected finds protocol will be implemented as an environmental mitigation measure as part of a future environmental management plan for all construction/operation activities.

A search of the NSW State Heritage Inventory showed that here are no European state or local heritage listings within the subject site or in the nearby area.

4 LEGISLATIVE AND PLANNING CONTEXT

4.1 NSW Legislation

4.1.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Environmental Planning and Assessment Regulation* 2021 (EP&A Regulation) provide the framework for development and environmental assessment in NSW.

The proposed works are development without consent under clause 2.56 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* (TISEPP), as discussed further in Section 4.1.3 of this REF. Where works do not require development consent but require approval by a Government organisation under any legislation then they are defined as an activity under Part 5 of the EP&A Act. Division 5.1 and Section 5.7 of the EP&A Act requires any such Government body to determine whether or not the impacts of the activity are likely to be significant. A Review of Environmental Factors (REF) is used to document that determination.

This REF is intended to address Council's compliance with the EP&A Act including Division 5.1 Section 5.7, and the requirements of Clause 171 *Review of Environmental Factors* of the EP&A Regulation 2021.

Under the EP&A Act a determining authority means the public authority or authorities by or on whose behalf the activity is or is to be carried out, or any public authority whose approval is required in order to enable the activity to be carried out. The activity is carried out by Council and requires approval from NSW Department of Planning, Housing and Infrastructure (DPHI) - Crown Land (detailed in Section 4.1.5 of this REF). Therefore, both public authorities are determining authorities for the proposed works.

4.1.2 Coastal Management Act 2016

The *Coastal Management Act 2016* (CM Act) establishes the framework and sets forth the objectives for coastal management in New South Wales. The purpose of the CM Act is to manage the use and development of the coastal environment in an ecologically sustainable way, for the social, cultural and economic well-being of the people of New South Wales.

The CM Act defines the coastal zone, comprising four coastal management areas:

- Coastal wetlands and littoral rainforests;
- Coastal vulnerability area;
- Coastal environment area; and
- Coastal use area.

The CM Act establishes management objectives specific to each of these management areas, reflecting their different values to coastal communities.

The proposed works are located within the coastal use area and the coastal environment area. Therefore, the development controls for each of these areas apply to the site. A Draft Coastal Management Program (CMP) has been prepared for the Lower Shoalhaven River, with the current draft CMP including discussions regarding the management option and entrance opening of the Shoalhaven River at Shoalhaven Heads.

The National Parks area south of the site is mapped as coastal wetland under the CM Act (Figure 3-4). The proposed works are not to impact on the coastal wetland or the proximity area around it (100m buffer).

4.1.3 State Environmental Planning Policy (Transport & Infrastructure) 2021

The TISEPP aims to facilitate the delivery of infrastructure across NSW by identifying whether certain types of infrastructure require consent, can be carried out without consent or are exempt development.

As per Division 7, clause 2.56, development for the purpose of 'flood mitigation' may be carried out by or on behalf of a public authority without consent on any land. According to clause 2.165 (3) "*a reference in this section to development for the purpose of flood mitigation work includes a reference to development for any of the following purposes if the development is in connection with waterway or foreshore management activities*

(a) construction works,

(b) routine maintenance works,

(c) environmental management works".

The proposed works would be defined as 'routine maintenance works' under this section of the TISEPP. Therefore, all works can be undertaken on the land without consent. However, as explained in Section 4.1.1 of this REF they must be assessed under Part 5 of the EP&A Act.

4.1.4 State Environmental Planning Policy (Resilience and Hazards) 2021

State Environmental Planning Policy (Resilience and Hazards) 2021 (RH SEPP) streamlines coastal development assessment requirements, identifies development controls for consent authorities to apply to each coastal management area to achieve the objectives of the CM Act, and establishes the approval pathway for coastal protection works.

State-wide mapping that accompanies the RH SEPP is available for the coastal wetlands and littoral rainforest area, the coastal environment area, and the coastal use area. The mapping of the coastal vulnerability area for Shoalhaven City Council is still underway.

As per the RH SEPP the following areas of potential impacts must be considered for developments within the coastal environment area:

a. the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment;

b. coastal environmental values and natural coastal processes;

c. the water quality of the marine estate (within the meaning of the *Marine Estate Management Act 2014)*;

d. marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms;

e. existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability;

f. Aboriginal cultural heritage, practices and places; and

g. the use of the surf zone.

Areas of potential impacts to assess within the coastal use area as per the RH SEPP include:

h. existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability;

a. overshadowing, wind funnelling and the loss of views from public places to foreshores;

b. the visual amenity and scenic qualities of the coast, including coastal headlands;

c. Aboriginal cultural heritage, practices and places; and

d. cultural and built environment heritage.

The impacts on each of the above is included in the environmental impact assessment in Section 7.

4.1.5 Crown Land Management Act 2016

The *Crown Land Management Act 2016* (CLM Act) outlines the ownership, use, legislative requirements and management of Crown Land in NSW. The river entrance, sand stockpile and proposed sand nourishment areas are located on Crown Land, while the river itself is a Crown waterway. Some areas are managed by Council while others are managed by DPHI Crown Lands as detailed in Section 2.2 of this REF. As such the CLM Act applies. The CLM Act requires that occupation and use of Crown Land must be authorised under the act. The usual form of authorisation is a licence issued by DPHI Crown Lands.

Council must obtain a licence from DPHI Crown Land before undertaking the works. Referral to DPIRD Fisheries in accordance with Section 199 of the FM Act would be made by DPHI Crown Lands as part of the licence assessment process thereby replacing the need for Council to obtain a separate permit for dredging under the FM Act.

4.1.6 Water Management Act 2000

The *Water Management Act 2000* (WM Act) provides for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations. The WM Act defines principles of water management, sets out water licensing laws and environmental water provisions.

Section 91 (2) states that: *A controlled activity approval confers a right on its holder to carry out a specified controlled activity at a specified location in, on or under waterfront land*. In accordance with Clause 41 of the *Water Management (General) Regulation 2018,* this project is being carried out by or on behalf of Council and therefore exempt from requiring a Controlled Activity Approval in accordance with the Act.

Groundwater is not anticipated to be encountered during the maintenance of the dry notch and therefore additional licensing from Water NSW will not be required.

4.1.7 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) includes the Biodiversity Offsets Scheme (BOS) that governs how biodiversity offsets will be used to ensure they offset the loss due to development and deliver conservation outcomes. The Act and Regulations also govern the Biodiversity Assessment Method (BAM) as a scientific method that assesses biodiversity losses from impacts at development sites and gains from conserving land at stewardship sites.

Authorities, such as Council, seeking to undertake an activity under Part 5 of the EP&A Act can voluntarily opt-in to the BOS and BAM scheme, or alternatively can elect to undertake a Test of Significance (ToS) and proceed with a Part 5 approval. It will be required to:

- take serious and irreversible impacts into consideration; and
- determine if there are any additional and appropriate measures that will minimise the impact if the activity is to be carried out or approved.

Potential ecological impacts and mitigation measures are discussed in Section 7.4 of this REF. While Biodiversity Values were mapped on the site, it is concluded that the proposal is not likely to have a significant impact on any threatened species or threatened ecological communities, provided all mitigation measures are strictly adhered to. Therefore, any further assessments such as Tests of Significance, Species Impact

Statements or assessment of Significant Impact Criteria for EPBC listed threatened species are not required at this stage.

A licence to harm under the *National Parks and Wildlife Act 1974* (NPW Act) will be required if nesting threatened shorebirds need to be disturbed (e.g. nest relocated) to undertake the entrance opening. This is discussed further in Section 4.1.10 and Section 5 of this REF.

4.1.8 Fisheries Management Act 1994

The provisions of the *Fisheries Management Act 1994* (FM Act) relating to project development and approval processes operate similarly to the BC Act. The FM Act identifies key fish habitat, threatened aquatic species, populations and ecological communities and requires a test of significance.

The Shoalhaven River is mapped as Key Fish Habitat and any significant impacts on fish habitat may require further assessment. Significant impacts on threatened fish species would trigger the need for a Species Impact Statement for Part 4 and Part 5 projects. The potential ecological impacts on aquatic environments from the proposal are discussed in Section 7.4.2 of this REF report, and consultation with DPIRD Fisheries is discussed in Section 5 of this REF. It is concluded that the proposal is not likely to have a significant impact on any threatened aquatic species, marine vegetation or Key Fish Habitat.

A permit issued under Part 7 of the FM Act is required for dredging and reclamation activities. However, as per Section 200 of the FM Act a separate permit from fisheries will not be required as works proposed under this plan require authorisation under the *Crown Land Management Act 2016* and will be confined to the entrance area without any aquatic vegetation. Consultation with DPIRD Fisheries in accordance with Section 199 of the FM Act would be made by DPHI Crown Lands as part of the licence assessment process thereby replacing the need for Council to obtain a separate permit for dredging under the FM Act.

4.1.9 Heritage Act 1977

The *Heritage Act 1977* provides for the protection of non-Aboriginal heritage in NSW.

Items listed on the State Heritage Register, including archaeological heritage, require consent of the Heritage Council to undertake work or development which alters, moves, despoils or damages any part of the heritage item, place, precinct, land, its relics or any vegetation.

The potential heritage impacts of the proposal are discussed in Section 7.5 of this REF. It is concluded that the proposal is not likely to have a significant impact on any heritage features.

4.1.10 National Parks and Wildlife Act 1974

This Act provides, amongst other things, for the protection of Aboriginal heritage. All Aboriginal objects are protected under Section 90 of the *National Parks and Wildlife Act 1974* (NPW Act).

Under Section 90 of the NPW Act, an Aboriginal Heritage Impact Permit (AHIP) issued by Heritage NSW is required for works that may impact on or harm and Aboriginal object, site, land, activity or person. The Act requires that reasonable precautions and due diligence must be taken to avoid impacts on Aboriginal objects which includes:

- identifying whether there are, or likely to be any listed Aboriginal objects present in the area;
- determining whether the proposed activities are likely to harm Aboriginal objects (if present); and
- determining whether an Aboriginal Heritage Impact Permit (AHIP) is required.

If an AHIP is required, then consultation must be undertaken with Aboriginal stakeholder groups in accordance with the requirements in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010).

The potential Aboriginal heritage impacts of the proposal are discussed in Section 7.5.2 of this REF. It is concluded that the proposal is not likely to have a significant impact on any Aboriginal heritage and an AHIP is not required.

Impacts on shorebird habitat

NPWS has advised that a licence to harm will be required for any reactive flood mitigation works within the shorebird protection buffer areas.

4.1.11 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (PoEO Act) is the primary piece of legislation regulating pollution control and waste disposal in NSW and is administered by the Environment Protection Authority (EPA).

The proposed works will be carried out with appropriate mitigation measures in place so that air, water, and noise pollution will be minimal.

Scheduled activities (as defined in Schedule 1 of the Act) require an Environment Protection Licence (EPL), as does development which is proposed to be carried out which would enable scheduled activities to occur. The proposed works are not considered a scheduled activity and therefore do not require an EPL.

4.1.12 Local Government Act 1993

The *Local Government Act* 1993 (LG Act) provides the legal framework for local government and prescribes the responsibilities and powers of Councils.

Under Chapter 6 Part 2 of the LG Act, all public land is to be classified and categorised based upon its characteristics and intended use. Based upon the applicable land category, all community land is also to be managed under a plan of management in accordance with the core objectives of said land category.

The proposed works area is on Crown land and does not include any land owned by Council. However, Lot 7005 DP1075719 and Lot 7004 DP94785 are Council managed Crown Land. The Plans of Management under the LG Act do not apply to Crown Land.

4.1.13 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* (ALR Act) was enacted to return land to Aboriginal peoples through a process of lodging claims for certain Crown lands and the establishment of Aboriginal Land Councils.

This legislation would be relevant where an Aboriginal land claim has been made which affects submerged Crown Land or areas of Crown Land that may be proposed for processing, storage or use of dredged material. The *Commonwealth Native Title Act 1993* may also be relevant in this regard.

There have been no claims made under the ALR Act on the land where the works are proposed.

4.1.14 Shoalhaven Local Environmental Plan 2014

The *Shoalhaven Local Environmental Plan 2014* (SLEP) outlines the circumstances for when development consent is required for an activity. The provisions of TISEPP prevail over the SLEP and since the activity is permitted without consent under the TISEPP, development consent under the SLEP is not required.

4.2 Commonwealth Legislation

4.2.1 Environment Protection and Biodiversity Conservation Act 1999

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Commonwealth approval is required for certain actions. Actions which have, may have, or are likely to have a significant impact on Matters of National Environmental Significance (MNES). MNES include nationally threatened species or endangered ecological communities. Under the EPBC Act an assessment of the impact of a proposal on a MNES must be undertaken to determine whether there is likely to be a significant impact. If the assessment concludes there is a significant impact, then it will become a controlled action under the EPBC Act and the proposal must be referred to the Commonwealth. Approval from the relevant Federal Minister is also required for any actions that may have a significant impact on MNES, except in circumstances which are set out in the EPBC Act.

Approval from the Commonwealth is in addition to any approvals under NSW legislation.

The potential ecological impacts of the proposed works are discussed in Section 7.4 of this REF. It is concluded that the proposal is not likely to have a significant impact on any EPBC Act listed threatened species, populations or communities, provided the mitigation measures are adhered to, and does not require referral to the Commonwealth under the EPBC Act.

4.2.2 Native Title Act 1993

The *Native Title Act 1993* (NT Act) provides a national system for the recognition and protection of native title and for its co-existence with the national land management system. Works would occur in Crown managed waterway land, wherein the South Coast Native Title claim will apply.

It has been assumed that Native Title procedures will be undertaken by the DPHI during the process of granting a Crown lands licence.

Regardless, the ‘future act’ can be valid through Subdivision L – Low Impact Future Acts as the works do not extinguish native title and the excavation is undertaken for public health and safety. There are no procedural requirements.

5 CONSULTATION

Stakeholder consultation was undertaken as per Division 1 of the TISEPP. Consultation outcomes for agency consultations are outlined below.

5.1 Agency Consultations

Consultation letters were sent out by Water Technology to the following agencies:

- Heritage NSW; and
- Transport for NSW (TfNSW), both Roads and Maritime.

In their response, Heritage NSW noted that Shoalhaven Heads contains significant Aboriginal cultural values,. This site is located within proximity of the proposed sand nourishment site along River Road. Sand nourishment could either benefit or harm the Aboriginal cultural heritage, and would require detailed assessment were impacts to potentially occur.

An Aboriginal Due Diligence Assessment was proposed, inclusive of an AHIMS search and consideration of site cards for recorded sites, as well as consultation with the Aboriginal community. If potential harm to Aboriginal sites or objects may occur, an Aboriginal Cultural Heritage Assessment Report would need to be prepared, and a permit obtained prior to commencing the sand nourishment works.

Based on this, a basic AHIMS search was undertaken to review the location of the Aboriginal site (see Appendix B). A recommendation is made within this REF to avoid works within or in the close vicinity of any known Aboriginal sites. If the area of proposed sand nourishment is expanded beyond its current scope, a due diligence assessment for Aboriginal heritage needs to be undertaken and approval sought as relevant.

TfNSW made no objections to the proposal, however expressed their concerns that the sand used to nourish the foreshore along River Road would end up in the already narrow and shallow channel that operate adjacent to the foreshore. The Lower Shoalhaven River CMP (Rhelm, 2024a) action BOAT_37 recommends monitoring of the channel depth and dredging as needed, and would suitably mitigate any risks of sand buildup in the channel.

The response from Heritage NSW and TfNSW is included in Appendix A.

Due to licencing and approvals required from some agencies (NSW Crown Land, NPWS), consultation with the following public authorities has been undertaken by Council on an ongoing basis:

- NSW DPHI - Crown Land;
- NSW DPIRD Fisheries;
- NSW National Parks and Wildlife Services; and
- NSW DCCEEW Water.

As per Clause 2.15 (2), the NSW National Parks and Wildlife Services were notified of the works and provided a minimum of 21 days to respond to the proposal. The response is included in Appendix A.

5.2 Community Consultation

Council will put this REF on exhibition upon completion in accordance with regulations under the TISEPP.

6 ENVIRONMENTAL IMPACT ASSESSMENT

6.1 Topography, Geology and Soils

6.1.1 Soil landscapes

The sediment excavated as part of dry notch maintenance and pilot channel excavation is yellow-brown marine sand (ERNS, 2024), with a median grain size of 0.3 mm. The nourishment area is also yellow-brown marine sand, with a middle layer of dark-grey sand, and a deeper layer of silty clay. A more detailed discussion of sediment is provided in Section 6.2.2, however, the works will not adversely alter soil landscapes from their present condition.

6.1.2 Acid sulfate soils

The entrance berm primarily consists of marine sands. Acid sulfate soils are unlikely to be present in the entrance berm area where dry-notch works are planned. This is demonstrated through the acid soil type map presented in Figure 6-1. This indicates no risk of acid sulfate soil exposure for works not exceeding depths of 2.0m below the natural ground surface, or where works would result in a lowering of the water table more than 2.0m below the natural ground surface. Dry notch and pilot channel excavation depths will be within the levels created by natural entrance opening events and sand reworking.

Potential sand nourishment locations along River Road are classified as Class 3, which indicates that acid sulfate soils are likely to be found 1m below the natural ground surface. However, as there is no excavation planned in this area, only sand placement, there is a minimal risk. It should also be noted that no major issues regarding acid sulfate soils were identified during the excavation associated with the River Road seawall.

Field investigations by ENRS (2022) determined that there was very low or no acidity or indications of potential acid sulfate material in sediment samples along the River Road foreshore, and from sand just north of the dry notch area.

Therefore, the proposed works will not lead to the exposure of any acid sulfate soils.

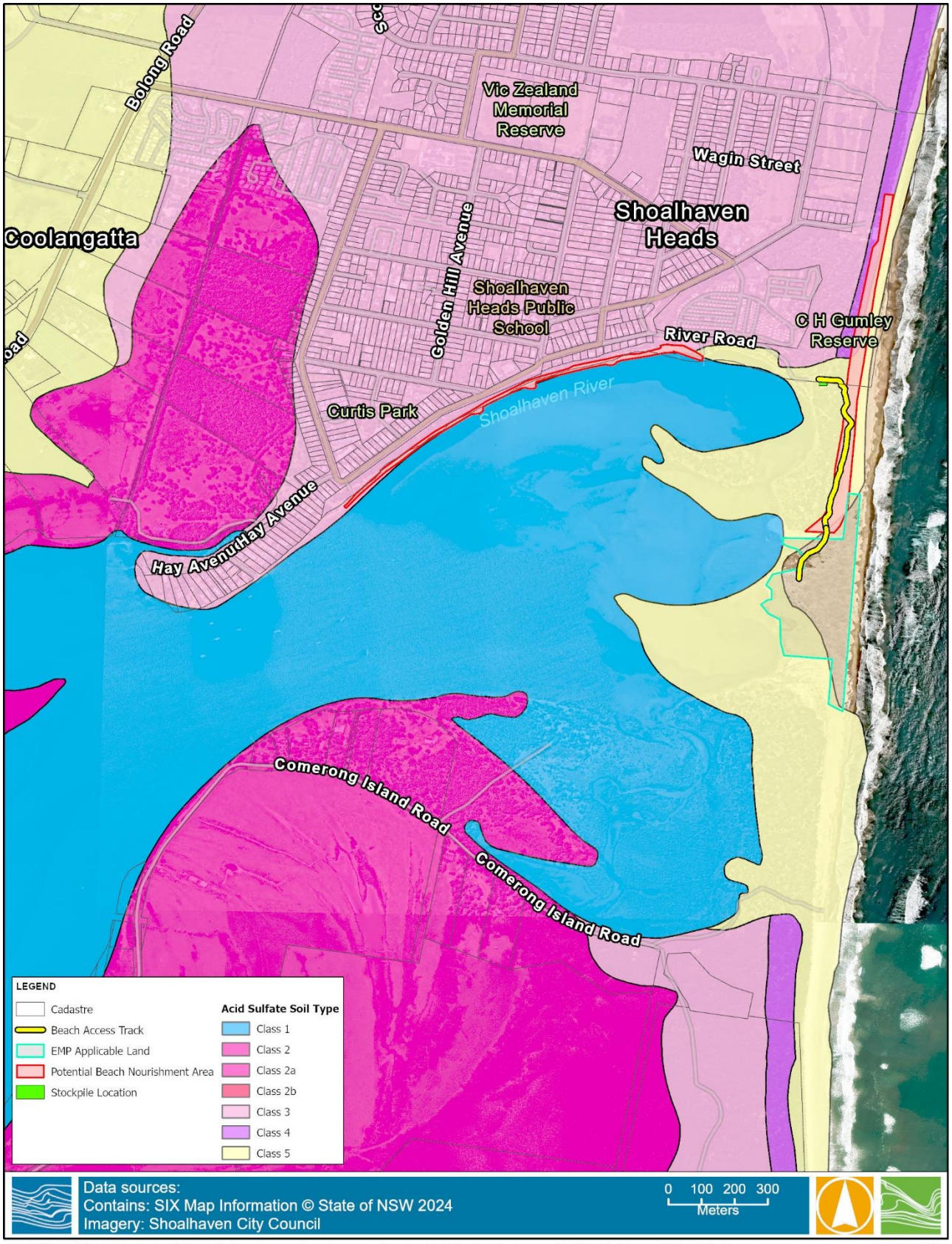

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Figure 6-1 Acid Sulfate Soils

6.1.3 Contaminated soils

Due to the highly dynamic nature of the entrance berm, the sediment in the dry notch area and pilot channel excavation is highly unlikely to be contaminated. Soils were assessed in 2024 for sand adjacent to the dry notch area (approximately 150m to the north) and along River Road. Contaminants of potential concern were not in exceedance of the assessment criteria in accordance with the National Assessment Guidelines for Dredging (ERNS, 2024). As a result, no evaluation or characterisation of the bioavailability or ecotoxicity of sediments was required for the Lower Shoalhaven River Pre-Dredge Feasibility Study (Advisian, 2024), which indicates that the excavation of dry notch sand and sand nourishment will not involve any contaminated soils.

6.1.4 Overall assessment

This section details the impacts on topography, geology and soils from the various activities.

1 Survey Work

Conducting surveys on the entrance berm will not impact the topography, geology and soils due to non-invasive survey techniques. The activities are limited to surface-level measurements, which have minimal disturbance to the natural environment.

2 Dry notch maintenance

The historical analysis of the dry notch levels across the dry notch area indicates that scraping of the dry notch to 2m AHD is expected to be infrequent and irregular. Analysis revealed that 66% of all surveys between 2009 and 2024 indicated that no excavation was necessary to maintain a 2.0m AHD notch level within the desired area. Volumes to be excavated are likely to be within the range of 950m^3 to 3,400m^3 (Water Technology, 2024).

The dry notch works are directly in an erosion-prone area, and are designed to induce temporary erosion (scouring) of the Shoalhaven Entrance channel to reduce flood impacts. However, the works will not result in adverse impacts to the estuary.

The area of works may be >2ha. This area is highly dynamic, and is frequently but irregularly open to the ocean. The excavation works will occur within the natural bounds of the estuary opening and closing regime, resulting in no impacts beyond those naturally occurring. Acid sulfate soils are unlikely to be present in the entrance berm area where dry-notch works are planned, indicating no risk of acid sulfate soil exposure. Dry notch excavation depths will be within the levels created by natural entrance opening events and sand reworking.

3 Berm Height Management

Proactive berm lowering (lowering the crest to > 2.3mAHD) will have minimal impact upon the topography, geology and soils. Berm lowering as a reactive measure will only occur when the trigger levels are expected to be reached based on a flood warning. Therefore, it is anticipated that the berm will be overtopped naturally if left long enough, and would be scoured out, thereby lowering the berm will not be directly interfering with natural processes.

The sand excavated will be placed within the same sediment compartment (discussed further in Section 6.2.1.3), and therefore will not be lost to the system.

4 Pilot Channel Excavation

As stated in Section 6.2.1.1, opening of the entrance is a naturally occurring phenomenon. Therefore, excavating a pilot channel prior to a flood event will not hinder the natural berm topography. Mechanically opening it will also not adversely affect long-term topography or soil landscapes.

5 Sand nourishment

The sand nourishment areas along the open coast are in frequently disturbed locations; both areas have been nourished in 2023, and are within the dynamic nearshore coastal zone.

Sensitive receiving environments are within the immediate vicinity of the sand nourishment areas, with seagrass located adjacent to the River Road foreshore. During the site inspection seagrass was visible just below the water surface along River Road foreshore (not at low tide). There is a risk of sand being placed very close to or even on top of seagrasses at low tide. Impacts to seagrasses will be mitigated by implementing a 5m buffer from any visible seagrass meadows, and ensuring all sediment is placed above the mean high water mark (MHWM). This will minimise the loss of sediment into the sensitive seagrass area.

6.2 Coastal processes

The Shoalhaven River enters the Tasman Sea at two locations: Shoalhaven Heads and Crookhaven Heads, and is a micro-tidal, wave dominated estuary system. The estuary is intermittently open and closed to the ocean at Shoalhaven Heads, whilst a permanent exchange with the ocean at Crookhaven Heads is maintained through a trained entrance. This section explores the various coastal processes that interact in the Shoalhaven Heads area (Section 6.2.1), and how they will be impacted through the REF activities (Section 6.2.2).

Complementary to this REF, is a historical analysis of the Shoalhaven River entrance at Shoalhaven Heads berm (Water Technology, 2024). This technical document provides a detailed analysis of entrance dynamics, including historical berm height and positioning, and gives insight into the typical extent of the berm and the expected volume of sand to be removed during proactive dry notch maintenance. The following section is largely based on the detailed investigations presented in that study (Water Technology, 2024).

6.2.1 Overview

6.2.1.1 Entrance Opening Regime

The Shoalhaven River entrance at Shoalhaven Heads is highly dynamic, and therefore undergoes significant fluctuations in sand berm width and height, with occasional openings to the ocean. During a closed entrance condition, the berm is typically extremely flat, particularly through the middle sections (Figure 6-2). Towards the southern extent, vegetation is observed, with minor sand undulations.

Figure 6-2 Entrance Closed Condition – 28/11/2023 (Source: SCC)

During high rainfall (flood) conditions, the Shoalhaven River water levels increase in height, and riverine waters gradually migrate across the Shoalhaven Entrance berm. However, this does not always result in an entrance breakout. For example, Figure 6-3 demonstrates the Shoalhaven River water level increasing over the berm, then slowly receding as river levels drop.

Figure 6-3 Entrance during November 2023 Heavy Rain Period (Source: SCC)

Once the Shoalhaven River entrance berm has been breached, the Shoalhaven River can directly flow out to the ocean (Figure 6-4). When the river is no longer in flood, the river and ocean water levels are at equilibrium. This means that the tidal, ocean and river processes interact, with ocean waves able to propagate through the entrance (Figure 6-5). This results in the transport of marine sands inshore, and the gradual build-up of the berm until it reaches above the high tide level, and naturally closes.

Figure 6-4 Open entrance - October 2022

Figure 6-5 Open entrance – October 2023

Shallow open entrance conditions can prevail for multiple months after an opening, with extremely flat berm elevations, for example as shown in Figure 6-6.

Figure 6-6 Shallow entrance conditions (Source: SCC)

The historical analysis revealed that sand levels, and thereby volumes, across the sand berm are highly variable. This can be represented through an assessment of the “saddle point”, which is the lowest section of the along-shore sand berm crest. This parameter is important as it indicates the location and water level at which the berm would naturally commence a breakout. The saddle point elevation across all Council entrance surveys (taken during ‘closed’ berm states) is presented in Figure 6-7, which demonstrates the natural variation in the saddle point over time (Water Technology, 2024).

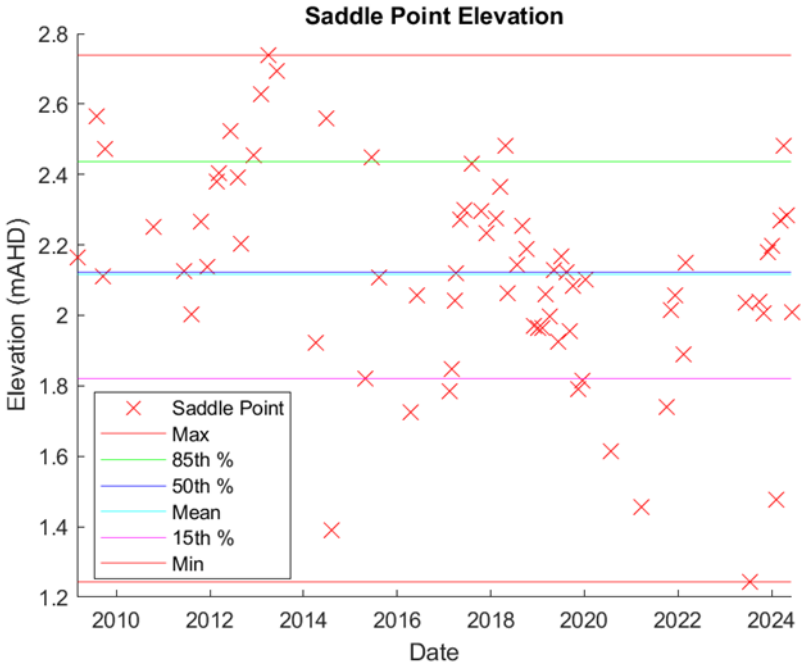

Figure 6-7 Saddle point elevation per survey

The statistical variation of the saddle point elevation is presented in Table 6-1. This shows that the dry notch excavation level of 2.0m AHD and the berm height management level of 2.3m AHD are well within the natural statistical variability of berm height across the activity area.

Table 6-1 Statistical variation of the saddle point and dry notch excavation volume

Statistical Berm Parameter	Elevation of saddle point (mAHD)
Maximum	2.7
85th Percentile	2.4
50th Percentile	2.1
Mean	2.1
15th Percentile	1.8
Minimum	1.2

6.2.1.2 Water Levels and storm events

Water levels at Shoalhaven Heads, irrespective of whether the entrance is open or closed, are predominantly governed by astronomical tides. If the entrance is closed, tides propagate through Crookhaven Heads and Berry's Canal with a lag of approximately two hours. Tides are semi-diurnal, with tidal panes measured at River Road Boat Ramp (Shoalhaven Heads) presented in Table 6-2.

Table 6-2 Annual Average Tidal Planes at Shoalhaven Heads, from data spanning 2001 to 2020 (Manly Hydraulics Laboratory, 2025)

Tidal Plane	Water Level (mAHD)
HAT	0.9
HHWSS	0.81
MHWS	0.49
MHWN	0.36
MSL	0.10
MLWN	-0.17
MLWS	-0.30
ISLW	-0.52
LAT	-0.46

Elevated water levels can also arise from catchment flooding and coastal storm events. Catchment flooding can cause significant inundation of Shoalhaven Heads, particularly along River Road. If it is severe enough, it can result in a natural breakout of the entrance opening.

When the entrance is open, the estuary area inside Shoalhaven Heads (i.e. River Road foreshore) is exposed to wave action and onshore winds, leading to increased erosion potential along River Road and re-working of the flood tide delta (Stantec, 2024). This is displayed through the sediment transport assessment that investigated potential erosion and accretion along River Road. The assessment revealed that a 100-year Average Recurrence Interval (ARI) ocean storm event would result in significant re-working of sand shoals inside the estuary entrance, where some sand shoals would be eroded and other areas accrete (see Figure 6-8) (Stantec, 2024).

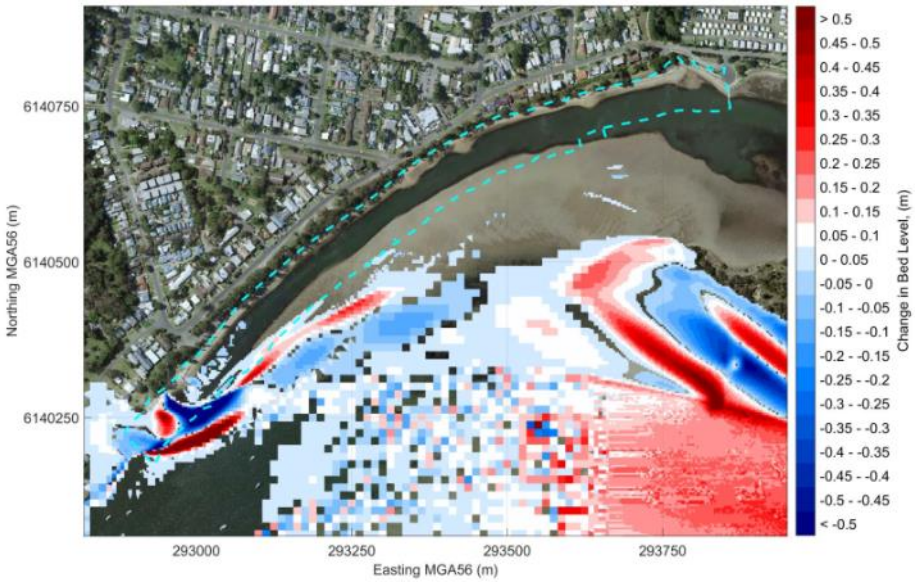

Figure 6-8 Predicted cumulative change in bed level in a 100-year ARI ocean wave event, post 100-year ARI flood event (Stantec, 2024)

6.2.1.3 Coastal Sediment Compartments

Sediment compartments are subdivisions of the coast that share a common sediment resource, and are separated by major obstacles such as headlands, or major changes in orientation of the coast. The compartment may be open, leaky or closed at either or both boundaries and the sediment budget may be positive, stable or negative. Shoalhaven Heads is located within the Illawarra Primary sediment compartment, and the Shoalhaven River secondary sediment compartment, as defined in the CM Act (see Figure 6-9). The Shoalhaven River secondary compartment extends from Black Head in the north to Beecroft Head in the south and includes the entirety of the Shoalhaven River up to the tidal extent (CM Act 2016).

Any sand that is excavated at the dry notch area and placed at either of the two nourishment locations will therefore stay within the same sediment compartment. This will result in no net loss of sand from the active morphological system.

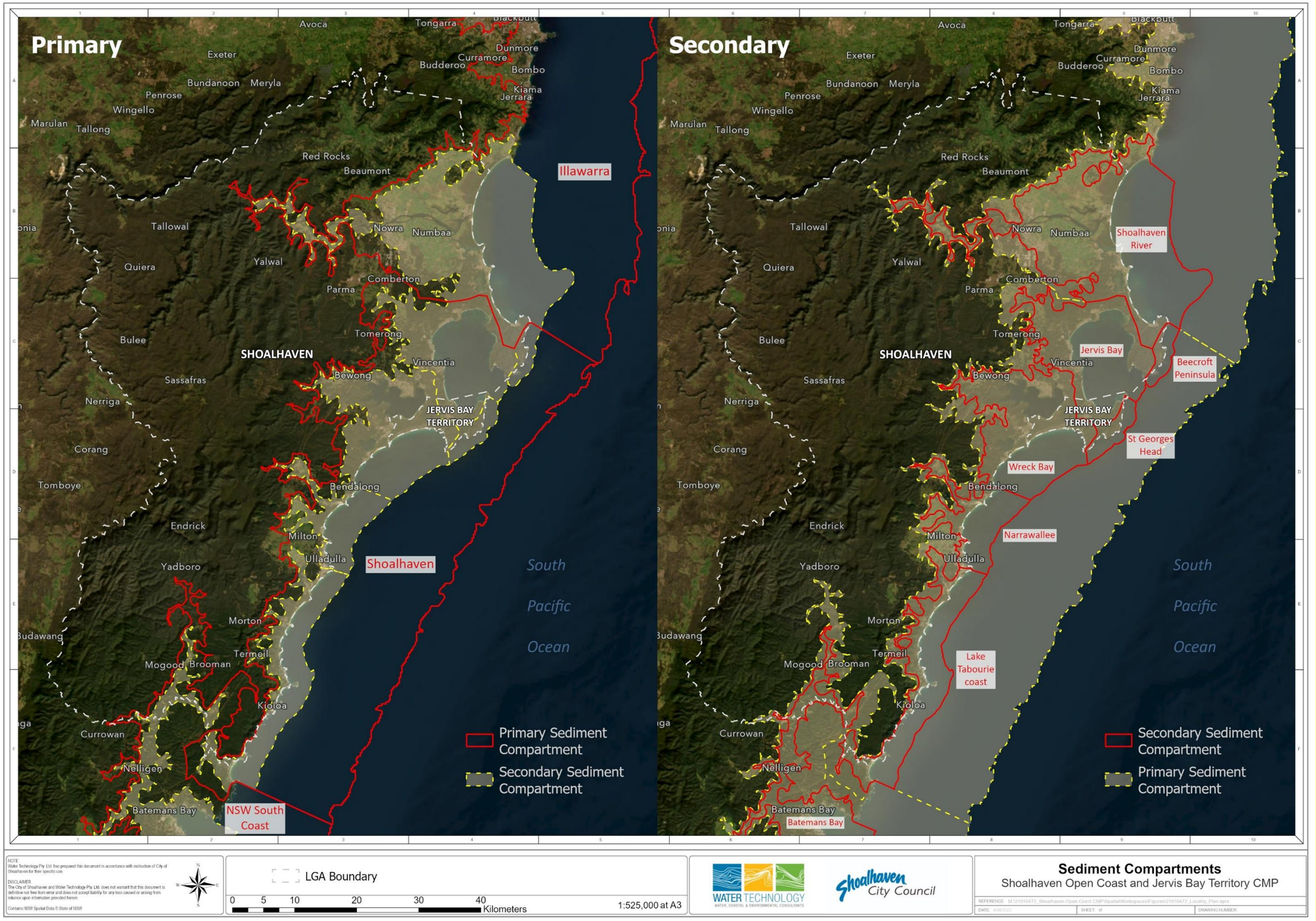

Figure 6-9 Shoalhaven Heads sediment compartments

6.2.2 Coastal Process Impact Assessment

This section details the impacts to coastal processes from the various activities.

1 Survey Work

Conducting surveys on the entrance berm will not impact coastal processes due to non-invasive survey techniques. The activities are limited to surface-level measurements, which do not alter coastal processes, including sediment dynamics, and have minimal disturbance to the natural environment.

2 Dry notch maintenance

The historical analysis of the dry notch levels across the dry notch area indicates that scraping of the dry notch to 2m AHD is expected to be infrequent and irregular. Analysis revealed that 66% of all surveys between 2009 and 2024 indicated that no excavation was necessary to maintain a 2.0m AHD notch level within the desired area. Volumes to be excavated are likely to be within the range of 950 to 3,400 m^3 (Water Technology, 2024).

Additionally, the dry notch excavation level of 2.0m AHD is within the natural variability of the berm, as per the technical analysis (Water Technology, 2024).

Therefore, maintaining the dry notch to 2.0m AHD will have limited impact on coastal processes due to being within the natural variability of the entrance dynamics, and will not adversely affect the estuary behaviour or function.

3 Berm Height Management

Lowering the berm (when the crest is > 2.3m AHD) will have minimal impact upon coastal processes, as berm lowering will occur in two instances, firstly when the trigger levels are expected to be reached based on a flood warning. Therefore, it is anticipated that the berm will be overtopped naturally if left long enough, and would be scoured out, thereby the works will not hinder natural coastal processes. Additionally, the berm height management level of > 2.3m m AHD is within the natural variability of the berm, as per the technical analysis (Water Technology, 2024).

The sand excavated will be placed within the same sediment compartment (discussed further in Section 6.2.1.3), and therefore will not be lost to the system overall. Minimal short-term impacts to the coastal processes and sediment dynamics will be felt, as this small volume of sand will not travel to the offshore sand reserve during the entrance breakout. However, these impacts will not be long term, with all sand remaining in the same sediment compartment.

4 Pilot Channel Excavation

As stated in Section 6.2.1.1, opening of the entrance is a naturally occurring phenomenon. Therefore, excavating a pilot channel prior to a flood event will not hinder the natural estuary opening frequency, magnitude or extent. Mechanically opening it will also not adversely affect long-term estuary behaviour or other coastal processes.

The pilot channel should be excavated in a location of significant distance from both the northern and southern vegetated dune extents to mitigate the impacts of a meandering entrance. The lowest point on the berm where the estuary would naturally break out may be used as the pilot channel position, however, is not explicitly required.

5 Sand nourishment

Sand obtained from the entrance berm will be used for sand nourishment either along River Road or in front of Shoalhaven Heads SLSC. For both locations, sand should be placed above the MHWM. This will provide increased protection to assets in a large coastal or flood event and will minimise the loss of sediment during

natural tidal cycles and nearshore sediment transport regimes. It will also increase the recreational amenity and usability of the foreshore and SLSC by the community.

Sediment Compatibility:

Prior field investigations have described the sediment as largely yellow to light brown sand, with minor shell and shell grit for sediment from both Shoalhaven Heads Beach and from the River Road foreshore (ERNS, 2024). For Shoalhaven Heads beach (sample taken from approximately 100 m north of the dry notch area), sediment was brown/yellow sand with low plasticity down to a depth of 1m below surface. For River Road foreshore, sediment cores indicated that sand is of similar consistency, type, colour and grainsize as the beach sediment. Sand was typically a brown/yellow colour down to 0.35m – 1.1m depending on location along River Road. Below this yellow sand layer, colour altered to a dark grey sand from 0.3m - 1m depth. Several sediment cores also reached a silty clay layer between 0.7 – 1.1 m depth (ERNS, 2024). Sediment size is between 0.33mm and 0.35mm (ERNS, 2024).

The primary analytical assessment did not identify contaminants of potential concern in exceedance of the assessment criteria in accordance with the National Assessment Guidelines for Dredging (ERNS, 2024). As a result, no evaluation or characterisation of the bioavailability or ecotoxicity of sediments was required for the Lower Shoalhaven River Pre-Dredge Feasibility Study (Advisian, 2024), which indicates that the excavation of dry notch sand and sand nourishment will not result in adverse environmental issues.

The results of the sediment analysis (ERNS, 2024) were corroborated by visual inspection on 04/06/2024. Photographs of sediment samples are provided below from the dry notch area (see Figure 6-10) and the River Road foreshore (see Figure 6-11), further west of the section that was nourished in 2023. This shows that the dry notch sediment is therefore highly compatible with sediment at River Road and in front of Shoalhaven Heads SLSC, with visual amenity maintained and physical compatibility.

Figure 6-10 Shoalhaven Heads Beach sediment

Figure 6-11 River Road sediment

Prior nourishment:

Sand from Shoalhaven Heads Beach (adjacent to the dry notch area) has previously been used for beach nourishment at both River Road foreshore and in front of Shoalhaven Heads SLSC. In 2023, 570 m of the River Road foreshore was nourished with approximately 3,300m^3 of sand. This sand has remained stable and in situ (as per the site inspection on 04/06/2024), indicating it is suitable for nourishment.

The dune in front of Shoalhaven Heads SLSC has been nourished with sand sourced adjacent to the dry notch numerous times in the last five years, with no adverse impacts.

Impact:

The use of dry notch sand at either of the two locations will have a positive impact by mitigating beach and foreshore erosion. As sand from Shoalhaven Heads has already been used in beach nourishment, the placement of dry notch sand will not have a negative impact from present day conditions. The use of sediment within the same sediment compartment results in minimal impact on coastal processes, as the sediment is not lost from the system.

6.3 Water Quality and Hydrology

6.3.1 Flooding

The Shoalhaven River entrance at Shoalhaven Heads intermittently opens and closes to the sea due to estuarine, coastal and flood processes, and is only opened naturally by the occurrence of floods. The Shoalhaven River also has a permanently open entrance to the ocean via Berry's Canal and the water level within the estuary is therefore subject to tidal fluctuations.

Under certain conditions, the extent, duration and depth of flooding at Shoalhaven Heads can be related to the entrance opening condition, with a closed condition resulting in increased flood risk in minor flood events. Dry notch maintenance and pilot channel excavation is one of the strategies of the Shoalhaven River EMP to effectively manage and minimise this flood risk for low lying properties within the Shoalhaven River catchment. Therefore, these works will positively impact flood behaviour and flood duration, and will not adversely affect flood risk.

However, it should be noted that an artificial entrance opening during a large flood event will not mitigate flood effects, providing no benefit or reduction in flood levels.

A pilot channel would be excavated in a flood event when trigger levels of 3.0m AHD at Nowra bridge or 2.0m AHD at the Shoalhaven Heads gauge are reached or forecasted to be reached through the issue of a flood warning from the Bureau of Meteorology (BoM). In the long-term, flood behaviour will not be altered through entrance management works, and no change to the entrance opening frequency, trigger or regime are proposed. The pilot channel excavation will only assist the natural break out of the entrance; it will not alter the long-term flooding frequency or magnitude.

6.3.2 Surface Water

The surface water in the immediate vicinity of the entrance (on the estuary side) has been monitored by Council from 1992-present. Site E-275 (boat ramp opposite tourist park) is located slightly offshore of the River Road nourishment area.

The surface water ranges from brackish (0.5-30 ppt) to salt water (>30 ppt), depending on entrance and meteorological conditions, as represented in Figure 6-12.

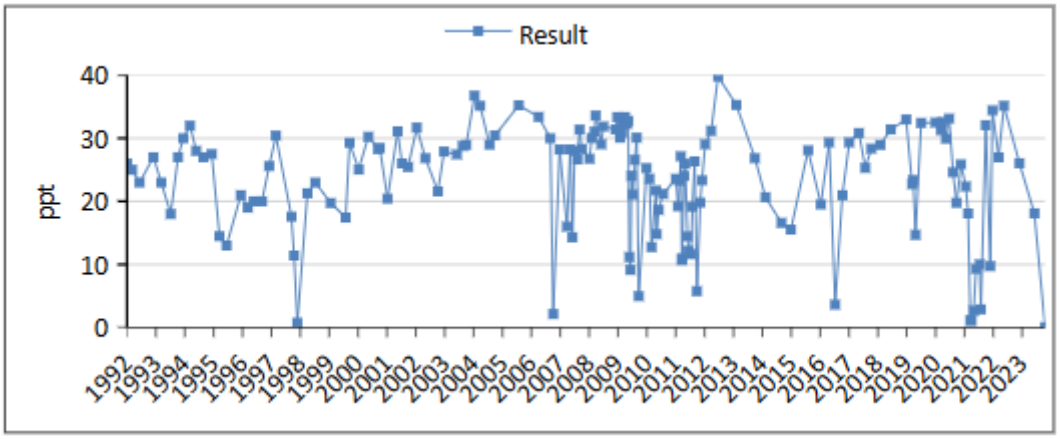

Figure 6-12 Salinity at E-275 (SCC, Aqua Data)

Surface water will be impacted by pilot channel excavation and resultant entrance openings. The entrance opening may cause a local and temporary increase in tidal exchange with the ocean. However, entrance opening are a frequent and natural process, with the trigger levels within the natural breakout range. The pilot channel excavation will not result in surface water impacts outside of what is naturally occurring, as shown in Figure 6-12.

6.3.3 Groundwater

Groundwater will not be impacted by dry notch or pilot channel excavation or sand nourishment activities. The excavation will typically not be greater than 1m in depth, and will not reach groundwater or aquifers. The sand nourishment only involves placing sediment on top of existing foreshore areas, and does not require excavation below surface level. Therefore, there will be no adverse impacts to groundwater.

6.3.4 Sensitive receiving environments

Large seagrass beds (primarily *Zostera capricornii*) occur immediately adjacent to the River Road foreshore area. Impacts to seagrass will be minimised by ensuring a minimum 5m buffer zone from sand nourishment activities, and only nourishing areas above MHWM. This will minimise burial of seagrass from the additional sand or increases in turbidity.

6.3.5 Water Quality and Hydrology Impact Assessment

1 Survey works

The survey works will not impact water quality or hydrology.

2 Dry notch maintenance

The dry notch maintenance will not impact water quality or hydrology, as this will occur above 2.0 mAHD.

3 Berm height management

See section 2 dry notch maintenance above.

Berm lowering as a response to a flood warning (reactive) would have similar impacts as described in section 4 Pilot channel excavation below.

4 Pilot channel excavation

The pilot channel excavation will occur as a reactive measure in a pending flood event, and will be excavated in the location of the “saddle point” of the berm. In that regard, there are limited options for where the channel is excavated. Therefore, hydrology will be impacted through the establishment of an open entrance. However, this is a natural process and would occur given enough time. The entrance opening will influence both hydrology and water quality, allowing direct tidal exchange.

Therefore, excavating a pilot channel prior to a flood event will not hinder the natural estuary hydrology or water quality.

Additionally, the proposed works will be located within 40m of a waterway. Therefore, the NSW DCCEEW - Water will be notified and specific controls will be adhered to, in order to mitigate any potential negative impacts.

The area is flood prone, and the works are designed to mitigate the effects of flooding and reduce risk. The works will not exacerbate flood risk, and therefore have a positive impact.

5 Sand nourishment

Sand nourishment may have a temporary impact on water quality through briefly increasing turbidity. However, this will be mitigated through only placing sand above the MHWM, avoiding placement of sand directly in the water.

Hydrology will also be impacted by sand nourishment through the relocation of sand, potentially altering beach width and height at the nourishment locations. However, this is anticipated to be a small impact, with prior sand nourishment campaigns not resulting in adverse impacts.

6.4 Biodiversity

6.4.1 Impacts on Threatened Shorebirds

Impacts on shorebirds is a determining factor for some of the activities assessed in this REF. Birds that nest only on beaches can easily be subject to disturbance, severely reducing their breeding success. Additionally, intertidal feeding grounds are important for migratory birds, as well as local wading birds, because the availability of an adequate food supply is likely to be a critical factor for their survival. Furthermore, if the birds are disturbed when attempting to rest at roost sites, such as the Shoalhaven River entrance, it is energy-consuming and is likely to have a deleterious effect on survival rates.

Potential impacts to threatened shorebirds from the proposed activities can be:

- Direct: disruption during nesting season or when using the habitat potentially causing abandonment of nest, destruction of nest, or death of hatched chicks, juveniles or even adult birds.
- Indirect: deterrence from using the area as a nesting site.

The current Crown land licence stipulates the following buffers to any nesting sites are to be maintained at all times:

- April-September: 50m from any individual migratory shorebirds using habitat, including all plant, personnel and equipment
- October-March: 255m from any nesting shorebirds, including all plant, personnel and equipment.

If a bird is discovered within the relevant buffer from the works or ancillary activities, the works must halt and NPWS be contacted for instruction or to give clearance.

A licence to harm threatened fauna, in case of flood events, had not been obtained at the time of writing, meaning that the buffers need to be maintained at all times. This licence can be obtained following issue of a Crown Land licence for the EMP and becomes a condition of the Crown Land licence.

For the purpose of this assessment and varying impacts on the shorebirds over the nesting season, the activities have been split into A: non-nesting season, and B: nesting season as per Table 6-3 below.

Table 6-3 Activities division into shorebird nesting and non-nesting season

	Survey works	Dry notch maintenance	Berm height management	Pilot channel excavation	Sand nourishment
Non-nesting season (April-September)	1A	2A	3A	4A	5*
Nesting season (October-March)	1B	2B	3B	4B	5*

*Sand nourishment is not proposed within shorebird nesting areas and will not be affected thereby.

1 Survey works

1A & 1B: The survey works may impose temporary disturbance on the shorebirds using habitat or nesting if survey work is undertaken in their presence. Depending on the size of the nesting area, Council may need to collect limited data within the nesting site to ensure it has sufficient data to support the entrance opening decision making process. The duration would be for a few minutes and survey points could be chosen to avoid active nesting sites. The survey should always occur on foot so as to lower the impact and with the intention to spot any potential nests in time to avoid accidental impact. A suitably qualified shorebird expert can attend and supervise the survey and provide advice and exclusion zones.

Alternatively, survey during nesting season could be undertaken using UAV (drones) in order to avoid any potential impacts.

2 Dry notch maintenance

2A: In line with NPWS response to consultation regarding shorebird habitat protection, dry notch maintenance carried out in line with the Crown Land licence buffer areas (50m from any bird outside nesting season) will suitably minimise impacts on shorebirds. Dry notch maintenance should be scheduled for August or September to remove any buildup prior to the commencement of the shorebird nesting season.

Sand removal work, including dry notch maintenance, should avoid all vegetated areas (not including individual plants) to minimise disturbance of shorebird nesting habitat. This includes dune grasses, shrubs and other foreshore vegetation. A buffer of 20m around the vegetation should also be left untouched by the sand removal works to not disturb the edge of the vegetation, causing it to retreat and impacting on available habitat for fauna, including shorebirds.

2B: Dry notch maintenance carried out in line with the Crown land licence buffer areas (255m from fence boundary) will suitably minimise impacts on shorebirds. In consultation with NPWS it has been deemed prudent to maintain the 255m buffer from the temporary fence erected to protect shorebirds during nesting season rather than from any nest itself. The 255m buffer should also be kept to any nest outside the fenced off area.

A buffer zone of 20m should be maintained around the foreshore vegetation as per 2A.

3 Berm height management

3A: As per 2A above. For reactive berm height management within 50m of nesting shorebirds, a threatened species licence will be required.

3B: As per 2B above. For reactive berm height management within 255m of nesting shorebirds, a threatened species licence will be required.

4 Pilot channel excavation

4A: As per 3A above.

4B: As per 3B above.

5 Sand nourishment

5: No impacts on threatened shorebirds are proposed from this activity as the nesting area does not coincide with the sand nourishment areas. If threatened shorebird species were using the habitat or nesting in the sand nourishment areas, the conditions within the Crown land licence including the buffer would apply.

6.4.1.1 Tests of Significance

No Tests of Significance (ToS) under the BC Act or assessments under the EPBC Act were deemed necessary as any potential impacts to threatened shorebirds will be suitably mitigated by implementing the buffer zoned recommended by NPWS. If the buffers cannot be maintained (i.e. flood works need to be undertaken within 255m of nests), a licence to harm from NPWS would be required prior to undertaking the works.

No other additional threatened entities are deemed to be at increased risk of impact from the works.

6.4.2 Impact on Terrestrial Flora and Fauna

The terrestrial flora and fauna on the site and within the estuary may be impacted by the proposed works both directly and indirectly. Direct impacts on flora include removal of vegetation in connection to the sand removal, trimming and pruning of vegetation for access, compression of roots and whole plants from trucks travelling over them, and smothering of vegetation by sand from the sand nourishment covering them, either in the nourishment or stockpiling locations.

The vegetation within the dry notch area itself is limited to the occasional occurrence of the exotic species Sea-rocket. Impacts on native vegetation at the northern and southern ends of the dry notch area should be avoided, and a 20m buffer without disturbance should be kept to the vegetation.

The impacts on flora results in the loss of habitat for fauna, which can impact the lifecycles of local fauna species. If vegetation removal is minimised, the impacts on fauna habitat will also largely be minimised. However, the sand also functions as habitat mainly for invertebrates and smaller organisms, which e.g. shorebirds then feed on.

Direct impacts on fauna include injury and death as a result of the proposed works, e.g. through vehicle strikes or incidents involving plant. Indirect impacts include disturbance and disruption to fauna lifecycles (feeding, breeding, nesting areas etc). No threatened fauna species except the shorebirds as detailed above are expected to be impacted by the works. In case an animal is present in the work location at the time of the works, the animal should not be harmed, and disturbance should be avoided by keeping some distance to it until the animal moves. The shorebird buffer zones do not apply to other fauna.

Indirect impacts to flora are mainly related to changes in water levels following entrance opening, which can have impacts on estuarine wetlands, saltmarshes and mangroves if undertaken on a frequent basis. No changes to the opening frequency or trigger levels are anticipated at this stage, and therefore there are no

anticipated additional impacts on wetlands. When the entrance is open, it does not alter the tidal regime across the wetlands, and the area is still inundated during high tides and is drained during low tides.

1 Survey works

The survey works are temporary in nature and cause minimal disruption to the local flora and fauna. Any direct interaction with fauna species and unnecessary disturbance of vegetated areas is to be avoided, resulting in minimal impacts.

2 Dry notch maintenance

Any plants or animals present within the dry notch area during the dry notch maintenance would risk being directly impacted by the works. Native vegetation should be avoided to the degree possible, and a buffer of 20m should be kept to the established dune and foreshore vegetation at the northern and southern ends of the site. The plant operators and other personnel present during the dry notch maintenance should keep an eye out for any fauna present on site, though the chance of animals staying on the site during plant operations are low.

3 Berm height management

See section 2 dry notch maintenance above.

The berm is anticipated to have a very low occurrence of any flora species due to its highly changeable nature.

Berm lowering as a response to a flood warming (reactive) would have similar impacts as described in 4 Pilot channel excavation below.

4 Pilot channel excavation

The pilot channel excavation will occur as a reactive measure in a flood event, and will be excavated in the location of the “saddle point” of the berm. In that regard, there are limited options for where the channel is excavated. If there are a range of options, the one with the lowest impact on beach vegetation should be opted for.

The impacts on fauna are expected to be similar of those described in 2 Dry notch maintenance above.

5 Sand nourishment

Sand nourishment and storage has a larger impact area than the flood mitigation activities above. The access track, stockpile location, and nourishment areas are the main areas of impact, with potential impacts such as vegetation trimming or removal, soil/sand compaction from traffic and suffocation of vegetation.

The vegetation around the beach access track is maintained by Council on an ongoing basis, and no changes are proposed.

Soil and sand compaction occurs in the areas where trucks drive, causing vegetation loss. Therefore, trucks should stay on tracks where applicable and minimise time offroad, unless in non-vegetated areas such as on the beach sand.

The stockpile should be maintained with as small a footprint as possible to minimise suffocation of vegetation, and in areas free of vegetation in the designated location. Similarly, the sand nourishment should occur on the beach areas only, in locations with minimal or no vegetation. Particular care should be taken to not push sand into the vegetated areas at the upper edge of the beach on the foreshore along River Road.

6.4.3 Aquatic Biodiversity

Any potential impacts on aquatic biodiversity would be limited to the impacts on seagrasses and their associated fauna communities. Mangroves, saltmarshes and coastal wetlands within the area are not within the immediate work areas, and indirect impacts would be negligible.

The seagrass meadows within Shoalhaven River estuary are already subject to water level fluctuations through tidal regimes and river entrance openings and are used to temporary air exposure. Therefore, the impacts of flood mitigation measures are not anticipated to affect the seagrass communities significantly.

The sand nourishment, however, is not a natural process and may have impacts on the seagrasses as detailed below.

1 Survey works

No impact on aquatic biodiversity is expected form the survey works.

2 Dry notch maintenance

No impact on aquatic biodiversity is expected form the dry notch maintenance.

3 Berm height management

No impact on aquatic biodiversity is expected form the berm height management.

Berm lowering as a response to a flood warming (reactive) would have similar impacts as described in 4 Pilot channel excavation below.

4 Pilot channel excavation

The excavation of a pilot channel is expected to lead to the river entrance opening, consequently causing a drop in water levels in the estuary. This could temporarily expose seagrasses to air, however this is a regular and natural occurrence within the trigger levels within the natural breakout range as described above, and is not expected to affect the seagrass meadows.

No change to the current opening regime is proposed.

5 Sand nourishment

Sand placed on the Shoalhaven River foreshore along River Road at Shoalhaven Heads has the potential to wash out into the channel and suffocate seagrasses. Careful management of the sand placement will be required to avoid negative impacts. The sand should be placed above the MHWM on the site, and should at all times be placed at least 5m from any visible seagrass meadows.

6.5 Heritage

6.5.1 Local, state and national heritage

The proposed works are not expected to have any impacts on local or state heritage items or areas. No heritage items or area are mapped in close vicinity of the works.

6.5.2 Aboriginal heritage

Activity 1-4 are not expected to have a significant impact on Aboriginal heritage features. The works involves moving large volumes of sand, however due to the changeable nature of the beach dunes and the dry notch area, any remnants of Aboriginal artefacts or sites are likely to have been shifted over time.

5 Sand nourishment

One registered Aboriginal site, , is located within proximity to the proposed work location for the sand nourishment along River Road. To avoid any impact to Aboriginal heritage, the sand nourishment should not be undertaken in the location of this site and any other known Aboriginal sites close to the works. A 50m buffer should be kept to these sites at all times.

If any Aboriginal heritage items or sites were at risk of being impacted, an Aboriginal Due Diligence Assessment should be undertaken as well as consultation with the Aboriginal community. If potential harm to Aboriginal sites or objects may occur, an Aboriginal Cultural Heritage Assessment Report would need to be prepared, and a permit obtained prior to commencing the sand nourishment works.

6.6 Noise and Vibration

Activity 1 Survey works

This is unlikely to have any impact on the noise and vibration in the area.

Activities 2-3 Dry notch maintenance and berm height management

All activities include the use of large machinery and plant in areas of public recreation, near known shore bird habitat, and in a location without any major noise interference. Noise from the works can carry across the beach and negatively impact on anyone using the beach at the time of the proposed works, however this will be temporary and short in duration, limited to a few times per year for a few of days at a time.

Negative impact could also occur on any fauna, including shore birds, using the site at the time of the works. Potential impacts on nesting birds will be suitably mitigated by maintaining the buffer area discussed in section 6.4.1 of this report. Any non-nesting birds and other fauna are expected to move away from the plant for the temporary duration of the works, therefore avoiding significant impact.

The proactive (maintenance) work will be undertaken during standard working hours (Monday-Friday 7am to 6pm, Saturday 7am to 1pm).

Activity 4 Pilot channel excavation

In the case of a flood event, any members of the public present on the beach should be asked to leave the beachfront at the entrance and keep a safe distance from the pilot channel excavations for their own safety. Therefore, no significant noise impact on the general public are expected at this point.

The reactive work (flood mitigation) can be undertaken at any time of the day. The site is not located close to any residential dwellings or businesses and nighttime works would not have a significant noise impact on the surrounding area.

Activity 5 Sand nourishment

This activity will be undertaken on the dunes and beach in the vicinity of the surf club and around the foreshore along River Road. Trucks moving sand to the beach and dunes can have minor noise impacts on anyone using the beach or the surf club. Noise from trucks moving sand to the foreshore will have minor noise impact on the local residents along River Road as well as the holiday park at the eastern end closer to the sand stockpile location.

Neither of these noise impacts are expected to be significant as they are temporary and for a short duration.

6.7 Air Quality

Impacts on air quality may arise from all activities due to exhaust fumes from vehicles, plant and other motorised equipment. Significant impact can be avoided by not leaving vehicles idling or otherwise used unnecessarily

Minor dust formation from the sand removal may be possible, however there are no sensitive receivers in the nearby area that could be affected by this. Any nesting shore birds would be suitably protected by maintaining the buffer distance discussed in Section 6.4.1.

6.8 Waste and Hazardous Materials

No waste or hazardous materials are expected to be generated as a result of this proposal.

The sand removed from the site will be reused within the same local area and no significant impact is expected as detailed in Section 6.2.

6.9 Traffic and Access

1 Survey works

No impact on traffic and access is expected form the survey works. The survey works are expected to be carried out as per the current arrangements and cause no hindrance to access on the site.

2 Dry notch maintenance

The dry notch maintenance works could potentially extend across the entire area of the entrance as marked in Figure 2-1 (exact location to be assessed on a case by case scenario). While the works are unlikely to be ongoing across the entire area, some information signage should be erected, and access restrictions will need to be imposed for the safety of the public.

Signage to inform/warn pedestrians about the ongoing works should be placed at the nearby pedestrian entry points to the beach from the surf club, to south as far as Comerong Island Nature Reserve if needed. This is to protect the public from accessing the work areas and prevent personal harm.

Trucks moving sand are expected to present the biggest danger to pedestrians. It would be impractical to fence off the entire beach area to exclude any pedestrians or beach users so signage and surveillance will be sufficient. However, the beach track and stockpiling location should be closed off due to restricted visibility and closeness to the holiday park and other facilities. Council/contractor staff will need to be available to monitor these locations for any pedestrians, and truck drivers will need to remain vigilant to any pedestrians in the area.

Access to walk along the beach should be maintained for the duration of the works where possible.

No impacts on parking are expected at this stage. If truck movements extent into the parking at the eastern end of River Road, the, this should be closed. No public vehicles are allowed on the beach and therefore vehicle collisions should not be a potential risk to consider.

3 Berm height management

The impacts from berm height management are expected to be the same as for dry notch maintenance described above.

4 Pilot channel excavation

Pilot channel excavation impacts will be limited to the area immediately surrounding the channel itself. The beach track stockpiling location will not used for the pilot channel excavation as the sand would be washed away by the flow of water. Impacts within the work area itself is similar to that described for Activity 2.

Pilot channel excavation can occur at any time of day or night (as governed by Council's operational procedures). While there are likely to be no recreational beach users around at night, the visibility would be lower, hence care should be taken and sufficient lighting used to ensure no one is harmed. A quick surveillance check of the area should also be conducted to ensure the location is free of members of the public and ensure anyone needing to traverse to/from Comerong Island Nature Reserve is advised.

5 Sand nourishment

The sand nourishment will impact on public roads in Shoalhaven Heads. A short section of River Road will be used for accessing the foreshore of Shoalhaven River and no other roads should be impacted. The River Road has a separate walking and bicycle track. Traffic management along River Road may be required from time to time and will be determined by operational procedures. The condition of the section of road used for sand transport should be assessed and maintained at a sufficient standard for safe and easy truck access.

The parking at the eastern end of River Road should be closed while sand is being moved from the stockpile along River Road.

The foreshore itself is very narrow and should be closed for the duration of the sand nourishment works.

Access to the beach location of the nourishment works would be along the beach front.

The beach/dunes would also be impacted by the plant and machinery movements as described in Activity 2 above.

6.10 Visual Amenity

All of the proposed works will be undertaken in areas of high scenic value and high recreational use. The works will temporarily affect the public amenity negatively, however the works occur rarely and last for a short duration. No significant negative impact on the visual or aesthetic values are expected from the works.

Sand nourishment has the potential to positively impact the scenic value as the intention is to replenish the sand on the beach and foreshore and slowing the erosion of the beachfront.

6.11 Socio-economic

The public amenity and socio-economic value will be improved by the works as they are expected to mitigate against flooding impacts. The sand nourishment will also contribute to the maintenance of the current foreshore and beach areas, provide recreation opportunities to the general public, and strengthen the foreshore against coastal hazards.

Public access to certain areas of the beach, River Road foreshore and surrounding access areas will be limited while machinery/plant and trucks are operating in those areas. Access to walk along the beach should be maintained as all times as far as practical. River Road foreshore should be closed to public access while trucks and machinery are replenishing the sand.

No impact is expected on local businesses. If sand nourishment occurs in close proximity to the surf club the club's activities may be impacted. The surf club should be notified ahead of any sand nourishment works that may impact on their activities.

7 ASSESSMENT OF ENVIRONMENTAL FACTORS

Section 171 of the EP&A Regulation lists the environmental factors to be investigated when consideration is being given to the likely impact of an activity on the environment under Part 5 of the EP&A Act. An assessment of the proposed activity against these environmental factors has been undertaken (Table 7-1).

Table 7-1 Assessment of section 171 (EP&A Regulation) environmental factors

In accordance with Section 171(2) of the EP&A Regulation, Council has considered the following environmental factors:	Assessment of impact	Reason
a. the environmental impact on the community	Negligible/Positive	The subject site is located within Crown land and is frequently used by the public for social and recreational activities. Minimal negative impact is expected while the works are undertaken. Positive impact is expected from the flood mitigation and from the sand nourishment. Chapter 6 provides a full assessment of potential impacts on community.
b. the transformation of the locality	Negligible	The subject site is an open-coast beach and will remain as such, maintaining the range of current beneficial uses. Thus, there will be no transformation of the locality in response to the proposed activity.
c. the environmental impact on the ecosystems of the locality	Negligible/Negative	The ecosystems in the locality range from aquatic, intertidal and terrestrial. Impacts to flora and fauna can result from all aspects of the works. Impacts on threatened shorebirds may occur if the entrance needs to be opened during shorebird nesting season. A licence to harm for emergency works is required from NPWS for such circumstances. In consideration of this, analysis indicates the impact on these ecosystems is considered negligible given the assessments carried out and with the implementation of mitigative controls/ Refer to Section 6.4 for further information on this analysis.

In accordance with Section 171(2) of the EP&A Regulation, Council has considered the following environmental factors:	Assessment of impact	Reason
d. reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality	Negligible/Negative	There would be minimal impact on the aesthetic, recreational, scientific or other environmental qualities or value of the locality as per above and as detailed in Chapter 6. During the works there will be impacts from machinery and plant (noise, access restrictions etc.), but it is expected to be very infrequently and for short periods of time (may extend over a single work day).
e. the effects on any locality, place or building that has – f. aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance, or g. other special value for present or future generations?	Negligible	The proposed activities should avoid any identified sites by maintaining a 50m buffer to avoid any potential impacts to it. The subject site has no significant aesthetic, architectural, cultural, historical, scientific or social values likely to be impacted on by this activity. The site is highly disturbed due to its location at the river entrance.
h. the impact on the habitat of protected animals, within the meaning of the *Biodiversity Conservation Act 2016*	Negligible/Negative	Impacts on habitat will be limited to removal of some dune vegetation, vegetation trimming, and potential minor sedimentation of seagrasses. None of these habitat impacts are expected to affect threatened species. Threatened shorebird habitat will likely be impacted by the dry notch maintenance and associated berm lowering and reshaping of the dunes. This work will be undertaken outside nesting areas and not within nesting season. If emergency works (planned entrance opening) is undertaken during shorebird nesting season a licence to harm from NPWS is required to relocate any bird nests. Other habitat of protected species that occur in the Shoalhaven LGA, will not be significantly impacted on by the proposed activity. Refer to Section 6.4 for details.

In accordance with Section 171(2) of the EP&A Regulation, Council has considered the following environmental factors:	Assessment of impact	Reason
i. the endangering of a species of animal, plant or other form of life, whether living on land, in water or in the air?	Negligible/Negative	The impact on threatened flora and fauna that have been recorded within the locality has been considered in association with the proposed activity. The entrance where the main impact will occur contains limited animal, plant, or other form of life habitat. The main risk lies within the disturbance of threatened shorebirds nesting during emergency works. This would be mitigated through a licence to harm from NPWS for when impact cannot be avoided. Until the licence is obtained, the buffer areas will need to be maintained at all times. Other impacts can be suitable managed through the mitigation measures recommended in Chapter 8. Refer to Section 6.4 for details.
j. long term effects on the environment	Negligible	The site is already subject to major influences from natural processes and the river entry is generally heavily disturbed by water flows and sand movements. The proposal is not expected to alter these processes in a significant way.
k. degradation of the quality of the environment	Negligible.	No degradation of the quality of the environment is expected. The proposed activity is unlikely to disturb the soil surface within the subject site beyond that which occurs in response to natural events and other recreational uses. Sand movement within the area occurs naturally, with this proposal aiming to control some of that movement for asset protection and emergency works. No detrimental impact to flora and fauna is expected, with the potential exception of shorebirds. Long-term or long-lasting impact on aquatic ecosystems through the input of sediments or nutrients into the ecosystem is unlikely. The proposed activity is unlikely to introduce weeds or pests to the area or contaminate the substrate within the subject site. The mitigation measures in Chapter 8 will minimise any potential impacts.

In accordance with Section 171(2) of the EP&A Regulation, Council has considered the following environmental factors:	Assessment of impact	Reason
l. risk to the safety of the environment	Positive	The proposed activity would decrease the levels of risks to the safety of the environment that may occur in response to flooding or coastal hazard. No significant negative safety risks are associated with the works.
m. reduction in the range of beneficial uses of the environment	Positive	The subject site has a variety of beach and ocean related recreational values. In general, the beneficial uses of the area will not be impacted. However, sand nourishment would improve the useability by mitigating the foreshore and dune erosion.
n. pollution of the environment	Negligible	The proposed activity is not expected to result in pollution of the environment. It is unlikely that the activity (with the implementation of mitigation) would result in water, noise, or air pollution, spillages, dust, odours, vibration or radiation. The proposed activity is not expected to result in the oxidation of acid sulfate soils and subsequent leaching back into the waterways.
o. environmental problems associated with the disposal of waste	Negligible	The proposed activity would not result in the generation of trackable waste, hazardous waste, liquid waste, or restricted solid waste as described in the PoEO Act. Sand excavated would be beneficially reused in the local area.
p. increased demands on resources (natural or otherwise) which are, or are likely to become, in short supply	Negligible	No natural or other resources that are, or are likely to become, in short supply will have increasing demands in response to the proposed activity.
q. the cumulative environmental effect with other existing or likely future activities	Negligible	All of the activities under the proposal are already being undertaken and therefore no change is expected in that regard. The site is also not subject to any other activities except public recreational use. Due to the site being Crown land, and permission for land use being required, it is considered less likely that any future activities would occur on the site, and any cumulative impacts will therefore be negligible.

In accordance with Section 171(2) of the EP&A Regulation, Council has considered the following environmental factors:	Assessment of impact	Reason
r. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions	Positive/Neutral	The main purpose of the proposed activity is to mitigate flooding within the estuary as per the EMP, and the estuary forms part of the coastal zone. Positive impacts on coastal hazards are therefore anticipated. Sand nourishment is carried out to mitigate the effects of coastal erosion, and will therefore also have a general positive impact on the coastal zone. The coastal processes themselves will not be impacted by the works.
s. Applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1	Negligible	The proposed activity is consistent with *Shoalhaven 2040 Our Strategic Land-use Planning Statement* (Shoalhaven City Council, 2020) and the Illawarra Shoalhaven Regional Plan 2041 (NSW DPE, 2021)
t. other relevant environmental factors	Negligible	There are no other relevant environmental factors pertaining to the proposed activity.

Note – the 'locality' in this context is as per the EP&A Regulation and refers to the subject site and study area within this REF.

8 MITIGATION MEASURES

The following mitigation measures should be implemented to minimise any potential environmental impacts resulting from the work for Activities 1-5. These mitigation measures (and others) will be embedded into an Environmental Management Plan for all activities described in this REF.

Table 8-1 General mitigation measures

Mitigation measures: General
Adhere to the framework and procedures in the *Lower Shoalhaven River EMP (2025)* to minimise risk to life, private property and assets due to flooding.
The exact location of the dry notch, berm lowering and pilot channel excavations will be specific to each entrance opening due to the dynamic nature and changes in topography. This REF looked at the impacts of the entirety of potential locations, however when undertaking works, each locality will be selected based on site conditions. Further detail will be provided within the *Lower Shoalhaven River EMP (2025)*.
Works within the mapped waterway and undesignated Crown Land require a Short-term Crown Licence. All works shall be undertaken in accordance with the conditions of the Crown Licence. No works are permitted without a Crown Licence, nor in contradiction of the Licence conditions, including the licenced area.
Dry notch maintenance and proactive berm lowering should occur from April through to September, outside the shorebird nesting season, as far as possible. Consultation with NPWS is required for all works at any time of the year. Dry notch maintenance and berm lowering should be scheduled for August or early September on an annual basis.
Notification of proposed works and timing shall be provided to NPWS and other relevant stakeholders ahead of works with sufficient warning, in line with the *Lower Shoalhaven River EMP (2025)* and the conditions within the Crown Land licence.

Table 8-2 Water quality and hydrology mitigation measures

Mitigation measures: Water Quality and Hydrology
Machinery will not be re-fuelled on site and no major equipment maintenance works shall be undertaken on-site.
The contractor shall keep an emergency marine spill kit on-site at all times with procedures to contain and collect any leakage or spillage of fuels, oils and greases from plant and equipment.
The proposed works are located within 40m of the Shoalhaven River. NSW DCCEEW Water should be notified about the works and may provide specific controls to be adhered to.
Sand for nourishment purposes will only be deposited above the Mean High Water Mark to avoid negative impacts on water quality and aquatic flora and fauna, such as seagrass meadows.

Table 8-3 Biodiversity mitigation measures

Mitigation measures: Biodiversity
Apply for a licence/permit to harm from DCCEEW for when works are likely to negatively impact threatened fauna (e.g. migratory shorebirds). Without the licence, the 255m (from the temporary fence or a nest if it is located outside the fence) and 50m (from any bird) buffers need to be maintained also in flood events unless the nesting bird can be relocated by a suitably qualified person. Council is to abide by the conditions imposed in the licence/permit to harm to mitigate impacts on threatened and migratory shorebirds.

Mitigation measures: Biodiversity
Council is to establish exclusion zones and buffer areas in consultation with NPWS.
A suitably qualified shorebird expert can attend and supervise the survey works and provide advice and exclusion zones.
A Council environmental officer or other suitably qualified person shall undertake preclearance surveys for fauna presence prior to works commencing each day and prior to machinery access and egress from site.
If any protected fauna are detected in the vicinity of the works or machinery access/egress, works and/or machinery movement will stop immediately and not resume until the animal(s) has vacated the site of its own accord. In the event that a nest or nesting birds are detected, works will cease and mitigation measures will be adapted in consultation with the NPWS Shorebird Recovery Coordinator, to minimise risk of disturbance to the birds and ensure their protection. A licence to harm will supersede the mitigation measure in relation to shorebird. The licence may not apply to other threatened fauna.
No clearing of native vegetation is to occur as part of the works. A buffer of 20m should be kept to native vegetation at the northern and southern ends of the site.
A minimum 5m buffer zone from sand nourishment activities should be kept from all visible seagrass meadows. Only areas above Mean High Water Mark should be nourished.
Particular care should be taken to not push sand into the vegetated areas at the upper edge of the beach on the foreshore along River Road.
Access along the beach track will be maintained in line with current procedures. Trimming and pruning for access may occur, however the track should not be widened or trees removed unless at risk of falling over.
Confine vehicle movements to existing tracks and unvegetated areas, and avoid movement on undisturbed areas. Avoid storing or parking equipment and materials on native vegetation and groundcover.
Excavated sand shall only be deposited in the designated stockpile or directly in the proposed sand nourishment locations, and avoid impact on vegetation. Sand shall not be dumped in vegetated areas. The stockpile should be kept as small as possible to avoid smothering the surrounding vegetation.
If any damage occurs to vegetation outside of the boundaries of the site as a result of the implementation of the proactive aspects of the proposal, the Project Manager will be notified and will establish strategies for mitigation of impacts as well as vegetation restoration.
Minimise disturbance of fauna habitat.
The works are to be undertaken in a manner that ensures no harm to threatened fauna or flora occurs.
Communication with NPWS staff, is to be established to minimise impacts from entrance management works on the local shorebird community.
As part of the induction process, Council is to provide all site personnel with information on the biodiversity values of the study area, including shorebird buffer areas and no-go areas.
In the event that any wildlife be significantly disturbed or injured during works, Council's Environmental Officers are to be contacted, or if unavailable, Wildlife Rescue – South Coast should be contacted, to rescue and relocate the animal(s).
Work equipment should be washed prior to entering and leaving site to ensure weed material and diseases are not transported and spread.

Table 8-4 Heritage mitigation measures

Mitigation measures: Heritage
To avoid any impact to Aboriginal heritage, the sand nourishment should not be undertaken in the location of any known Aboriginal sites close to the works and a 50m buffer should be kept to these sites at all times.
All contractors / Council staff employed in the project shall be made aware of the presence of this Aboriginal site and the implications for the works.
If, during the proposed works, any Aboriginal objects or evidence of Aboriginal occupation are uncovered, all work must cease in the vicinity of the suspected Aboriginal objects or evidence of occupation, and further advice should be sought from a qualified and experienced archaeologist, in accordance with the unexpected finds protocol.
Monitoring of the dunes shall occur to document any indirect impact the opening may have on recorded and unrecorded Aboriginal heritage sites (e.g. additional scouring).

Table 8-5 Noise and vibration mitigation measures

Mitigation measures: Noise and Vibration
Works should be carried out during daylight to minimise impacts on fauna and residents. Reactive works during a flood event may occur at any time of day, however, should not involve any sand nourishment along River Road.
Plant operators are to operate equipment in a manner that does not generate unnecessary noise, such as by avoiding excessive revving and minimising impacts with solid objects where possible.
Machines/equipment are to be turned off when not in use, or throttle-down to a minimum.
Noise complaints and impacts are to be monitored and to be passed onto the Council Work Supervisor

Table 8-6 Air quality mitigation measures

Mitigation measures: Air quality
Vehicles and equipment are to be maintained in good working order and regularly serviced to minimise exhaust fumes.
Do not leave vehicles idling unnecessarily.

Table 8-7 Traffic and access mitigation measures

Mitigation measures: Traffic and Access
Current traffic movements and property access are to be maintained during the works. Any disturbance is to be minimised to prevent unnecessary local traffic delays.
Machinery shall access the site via the gated end of River Rd and along an existing vehicle access track through the dune system
Signage will be used to advise pedestrians of the worksite, and to discourage public entry into the site and to ensure pedestrians do not enter areas where machines are operating. Appropriate measures would be implemented to direct people around the work site.
After dark, the visibility would be lower, hence care should be taken and sufficient lighting used to ensure no one is harmed. A quick surveillance check over the area should also be conducted to ensure the location is free of members of the public and ensure anyone needing to traverse to/from Comerong Island Nature Reserve is advised of the works.
Comply with Council requirements regarding traffic control, access and road/pedestrian access.

Mitigation measures: Traffic and Access
All work vehicles and machinery when not in actual use for the proposed activity will be stored off road.
Operators to drive to conditions.
Council should coordinate with Transport for NSW-Maritime in the publication of a Marine Notice for vessel operators. This notice will alert people to hazardous conditions on NSW waterways and warn vessel operators of dangerous changed circumstances, or potential hazards.
The parking at the eastern end of River Road should be closed if trucks are accessing the site for access to the sand stockpile.

Table 8-8 Visual amenity mitigation measures

Mitigation measures: Visual amenity
Contain the works to the minimum area required at any one time.
Complaints and impacts are to be monitored and to be passed on to Council.

Table 8-9 Socio-economic mitigation measures

Mitigation measures: Socio-economic
Carry out community and stakeholder consultation before works start.
All personnel will exercise courtesy in dealing with the community.

9 DETERMINATION AND RECOMMENDATIONS

An environmental impact assessment has been undertaken for the proposed activities associated with the Shoalhaven River entrance opening. The assessment has been undertaken under Part 5 of the EP&A Act, and in relation to the factors outlined within Section 171 of the EP&A Regulation. Mitigation measures have been provided to suitably mitigate any potential negative environmental impacts.

The findings of this assessment indicate that none of the anticipated environmental impacts will be significant, provided that the methodology for the works remains as described within this REF, and the mitigation measures outlined herein are adhered to.

Impacts on threatened/migratory shorebirds protected under the BC Act and EPBC Act may occur if sufficient care is not taken, however through consultation with NPWS, and as stipulated in the conditions of the Crown land permit, sufficient buffer areas have been accounted for to minimise the risk of harming shorebirds.

This REF will expire after five (5) years from determination and shall require revision and amendment as appropriate, along with a review of the EMP and application for a new licence.

Shoalhaven City Council has considered the potential environmental effects of the proposed activity and the effectiveness and feasibility of measures for reducing or preventing detrimental effects. It is determined:

1. The proposed safeguards identified in the report (Section 8) shall be maintained/adopted and implemented.
2. It is unlikely that there will be any significant environmental impact from the proposed activity and an Environmental Impact Statement is not required for the proposed activity.
3. The proposed activity is not likely to significantly affect threatened species or ecological communities, or their habitats for the purposes of the NSW BC Act, and entry into the Biodiversity Offset Scheme or preparation of a Species Impact Statement is not required.
4. The proposed activity is not a ‘controlled action’ for the purposes of the Commonwealth EPBC Act and referral to the Commonwealth Environment Minister is not required.

_____

Shane Pickering

Acting Manager, Environmental Services

Shoalhaven City Council Date:

10 REFERENCES

Crown Land (2021). Crown Land licence number RN 630902 for Shoalhaven City Council.

ERNS (2024). Particle Size Distribution Investigation Shoalhaven Heads – River Road Nourishment

Ecoplanning (2023). Assessment of Endangered Ecological Communities in Coastal Hazard Areas.

Rhelm (2023). Coastal Management Program for Lower Shoalhaven River, Review of the Entrance Management Plan

Rhelm (2024a). Lower Shoalhaven River Coastal Management Program Draft CMP.

Rhelm (2024b). Memo (draft): Lower Shoalhaven River Entrance Management Policy Trigger Level Review.

Shoalhaven City Council (2006). Shoalhaven River Entrance Management Plan for Flood Mitigation.

Shoalhaven City Council (2008). Shoalhaven River Estuary Management Plan.

Shoalhaven City Council (2021). Review Of Environmental Factors (REF) Shoalhaven River Dry-Notch.

Shoalhaven City Council (2022). Statement of Environmental Effects, River Road Foreshore Management – Coastal Protection Works.

Shoalhaven City Council (2023). Review of the Entrance Management Plan (2023) - Council Comments (internal draft document).

Smith, P. (1991). The Biology and Management of Waders (suborder Charadrii) in NSW.

Stantec (2022). Flora and Fauna Assessment, Lower Shoalhaven Dredging Project.

Stantec (2024). Coastal Processes Modelling Shoalhaven Heads Shoreline Nourishment.

Water Technology (2025). Memorandum – Historical Analysis of Berm Height

Note

This report contains sensitive information relating to location of Aboriginal Cultural Heritage sites. To protect this sensitive information, Council has removed this information.

Appendix A and Appendix B of this report has been removed from this report to protect culturally sensitive information that has been presented in the original report.

If you have any questions on how Council manages sensitive information, please contact Council on 1300 293 111.

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

APPENDIX C
LIKELIHOOD OF OCCURRENCE TABLE

Table 10-1 Likelihood criteria

Likelihood Criteria	
Recorded	The species was observed in the study area during the current survey.
High	It is highly likely that a species inhabits the study area and is dependent on identified suitable habitat (i.e.. for breeding or important life cycle periods such as winter flowering resources), has been recorded recently in the locality (10km) and is known or likely to maintain resident populations in the study area. Also includes species known or likely to visit the study area during regular seasonal movements or migration.
Moderate	Potential habitat is present in the study area. Species unlikely to maintain sedentary populations, however, may seasonally use resources within the study area opportunistically or during migration. The species is unlikely to be dependent (i.e.. for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area, or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded.
Low	It is unlikely that the species inhabits the study area and has not been recorded recently in the locality (10km). It may be an occasional visitor, but habitat similar to the study area is widely distributed in the local area, meaning that the species is not dependent (i.e.. for breeding or important life cycle periods such as winter flowering resources) on available habitat. Specific habitat is not present in the study area, or the species are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded.
None	Suitable habitat is absent from the study area.

Table 10-2 Likelihood of occurrence for flora and fauna

Family	Scientific Name	Common Name	NSW status	Comm. status	Records	Description	Likelihood
Fauna							
Hylidae	*Litoria aurea*	Green and Golden Bell Frog	E1,P	V	31	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet.	Moderate
Cheloniidae	*Caretta caretta*	Loggerhead Turtle	E1,P	E	2	Loggerhead Turtles are ocean-dwellers, foraging in deeper water for fish, jellyfish and bottom-dwelling animals. The female comes ashore to lay her eggs in a hole dug on the beach in tropical regions during the warmer months.	Low

Family	Scientific Name	Common Name	NSW status	Comm. status	Records	Description	Likelihood
Cheloniidae	*Chelonia mydas*	Green Turtle	V,P	V	1	Ocean-dwelling species spending most of its life at sea. Carnivorous when young but as adults they feed only on marine plant material. Eggs laid in holes dug in beaches throughout their range. Scattered nesting records along the NSW coast.	Low
Cheloniidae	*Eretmochelys imbricata*	Hawksbill Turtle	P	V	1	Hawksbill Turtles spend their first five to ten years drifting on ocean currents. During this pelagic (ocean-going) phase, they are often found in association with rafts of Sargassum (a floating marine plant that is also carried by currents).	Low
Varanidae	*Varanus rosenbergi*	Rosenberg's Goanna	V,P		1	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat.	Low
Procellariidae	*Ardenna grisea*	Sooty Shearwater	P	J	1	The Sooty Shearwater is found in the southern hemisphere during summer, where the species breeds around New Zealand, southern Australia and southern South America. In Australia, the Sooty Shearwater breeds on islands off NSW and Tasmania.	Low
Procellariidae	*Ardenna pacifica*	Wedge-tailed Shearwater	P	J	5	The Wedge-tailed Shearwater is a pelagic, marine bird known from tropical and subtropical waters. The species has been recorded in offshore waters of eastern Victoria and southern NSW, mostly over continental slope with sea-surface temperatures of 13.9–24.4 °C	Low
Procellariidae	*Ardenna tenuirostris*	Short-tailed Shearwater	P	C,J,K	2	Usually shearwaters only visit land to breed, including the NSW coast. They establish colonies on remote islands, capes or coastal mountains.	Low
Ardeidae	*Botaurus poiciloptilus*	Australasian Bittern	E1,P	E	10	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleocharis* spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails.	Moderate
Ardeidae	*Ixobrychus flavicollis*	Black Bittern	V,P		1	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night.	Low

Family	Scientific Name	Common Name	NSW status	Comm. status	Records	Description	Likelihood
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V,P		9	Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'.	Moderate, recorded nearby
Accipitridae	^^*Pandion cristatus*	Eastern Osprey	V,P,3		5	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	Moderate, recorded nearby
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew	E1,P		1	Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch.	Low
Burhinidae	*Esacus magnirostris*	Beach Stone-curlew	E4A,P		9	Beach Stone-curlews are 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 in the intertidal zone of beaches and estuaries, on islands, flats, banks and spits of sand, mud, gravel or rock, and among mangroves. Beach Stone-curlews 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.	High, recorded nearby
Haematopodidae	*Haematopus fuliginosus*	Sooty Oystercatcher	V,P		9	Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels.	Moderate, recorded nearby
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher	E1,P		47	Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. The chisel-like bill is used to pry open or break into shells of oysters and other shellfish. Nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones.	High, recorded nearby

Family	Scientific Name	Common Name	NSW status	Comm. status	Records	Description	Likelihood
Charadriidae	*Charadrius leschenaultii*	Greater Sand-plover	V,P	V,C,J,K	1	Almost entirely restricted to coastal areas in NSW, occurring mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks. Roosts during high tide on sandy beaches and rocky shores; begin foraging activity on wet ground at low tide, usually away from the edge of the water; individuals may forage and roost with other waders.	Moderate, recorded nearby
Charadriidae	*Charadrius mongolus*	Lesser Sand-plover	V,P	E,C,J,K	2	Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms. Highly gregarious, frequently seen in flocks exceeding 100 individuals; also often seen foraging and roosting with other wader species.	Moderate, recorded nearby
Charadriidae	*Pluvialis fulva*	Pacific Golden Plover	P	C,J,K	11	In non-breeding grounds in Australia this species usually inhabits coastal habitats, though it occasionally occurs around inland wetlands. They are less often recorded in terrestrial habitats, usually wetlands. On its breeding grounds it occurs in tundra.	Moderate
Charadriidae	*Thinornis cucullatus cucullatus*	Eastern Hooded Dotterel	E4A	V	1	Its natural habitats are freshwater lakes, freshwater marshes, coastal saline lagoons, and sandy beaches. Heavy populations are found on beaches with seaweed and dunes. Hooded Plovers nest on the beach or dunes in spring and summer.	Moderate, recorded nearby
Scolopacidae	*Arenaria interpres*	Ruddy Turnstone	P	C,J,K	5	Ruddy Turnstone is mainly found on coastal regions with exposed rock coast lines or coral reefs. Ruddy Turnstone mainly forages between lower supralittoral and lower littoral zones of foreshores, from strand-line to wave-zone. Roosting occurs on beaches, above the tideline, among rocks, shells, beachcast seaweed or other debris.	Moderate
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	P	C,J,K	5	The Sharp-tailed Sandpiper spends the non-breeding season in Australia. Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	Moderate
Scolopacidae	*Calidris canutus*	Red Knot	P	E,C,J,K	4	In NSW the Red Knot mainly occurs in small numbers on intertidal mudflats, estuaries, bays, inlets, lagoons, harbours and sandflats and sandy beaches of sheltered coasts. It usually forages near the water's edge, with feeding activity regulated by the tide as birds closely follow the tide-edge.	Moderate, recorded nearby
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	E1,P	CE,C,J,K	1	It generally occupies littoral and estuarine habitats, and in NSW is mainly found in intertidal mudflats of sheltered coasts. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores.	Moderate, recorded nearby

Family	Scientific Name	Common Name	NSW status	Comm. status	Records	Description	Likelihood
Scolopacidae	*Calidris ruficollis*	Red-necked Stint	P	C,J,K	14	In Australasia, the Red-necked Stint is mostly found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores. Roosting habitats include sheltered beaches, spits, banks or islets, of sand, mud, coral or shingle, sometimes in saltmarsh or other vegetation.	Moderate
Scolopacidae	*Calidris tenuirostris*	Great Knot	V,P	V,C,J,K	5	Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons. Migrates to Australia from late August to early September, and return north in March and April.	Moderate, recorded nearby
Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit	P	C,J,K	30	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 usually roosts on sandy beaches, sandbars, spits and also in near-coastal saltmarsh.	Moderate
Scolopacidae	*Limosa lapponica baueri*	Bar-tailed Godwit (baueri)	P	V	2	It is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. Less frequently it occurs in salt lakes and brackish wetlands, sandy ocean beaches and rock platforms. In NSW its high tide roost areas on sandy beaches, sandbars, spits and near-coastal saltmarsh are frequently shared with other shorebirds.	Moderate, recorded nearby
Scolopacidae	*Numenius madagascariensis*	Eastern Curlew	P	CE,C,J,K	28	It generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves.	High, recorded nearby
Scolopacidae	*Numenius phaeopus*	Whimbrel	P	C,J,K	3	The Whimbrel is a regular migrant to Australia and New Zealand, with a primarily coastal distribution in intertidal mudflats of sheltered coasts. The Whimbrel generally forages on intertidal mudflats, along the muddy banks of estuaries and in coastal lagoons, either in open unvegetated areas or among mangroves. It is one of a small group of shorebird species that regularly roost in mangroves and other structures flooded at high tide.	Low
Scolopacidae	*Tringa brevipes*	Grey-tailed Tattler	P	C,J,K	3	he Grey-tailed Tattler is often found on sheltered coasts with reefs and rock platforms or with intertidal mudflats. IT occurs less frequently on the NSW South Coast.	Low
Scolopacidae	*Xenus cinereus*	Terek Sandpiper	V,P	V,C,J,K	3	In Australia, has been recorded on coastal mudflats, lagoons, creeks and estuaries. Favours mudbanks and sandbanks located near mangroves. Generally roosts communally amongst mangroves or dead trees, often with related wader species.	Moderate, recorded nearby

Family	Scientific Name	Common Name	NSW status	Comm. status	Records	Description	Likelihood
Stercorariidae	*Stercorarius parasiticus*	Arctic Jaeger	P	C,J,K	1	Arctic Jaeger is a migratory bird that breeds in the Northern hemisphere and wintering in the tropics and southern ocean. It is largely pelagic and only shores to breed.	Low
Laridae	*Gelochelidon nilotica*	Gull-billed Tern	P	C	3	The gull-billed tern breeds in colonies on lakes, marshes and coasts in the northern hemisphere after which it disperses globally.	Low
Laridae	*Hydroprogne caspia*	Caspian Tern	P	J	9	The Caspian Tern is mostly found in sheltered coastal embayments (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are preferred.	Low
Laridae	*Sterna hirundo*	Common Tern	P	C,J,K	7	The species is a non-breeding migrant to Australia, where it is mainly found along the eastern coast, where they are widespread and common from south-eastern Queensland to eastern Victoria, though less often recorded south of Port Hacking in NSW.	Moderate
Laridae	*Sternula albifrons*	Little Tern	E1,P	C,J,K	65	Almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers. Nests in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands.	High
Laridae	*Thalasseus bergii*	Crested Tern	P	J	20	The greater crested tern occurs in tropical and warm temperate coastal parts of the Old World from South Africa around the Indian Ocean to the Pacific and Australia. The nests are located on lowlying sandy, rocky, or coral islands, sometimes amongst stunted shrubs, often without any shelter at all.	Moderate
Cacatuidae	^^*Callocephalon fimbriatum*	Gang-gang Cockatoo	E1,P,3	E	1	In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts.	Low
Cacatuidae	^*Calyptorhynchus lathami lathami*	South-eastern Glossy Black-Cockatoo	V,P,2	V	7	Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods. Dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May.	Moderate
Strigidae	^^*Ninox strenua*	Powerful Owl	V,P,3		5	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. It requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation.	Low

Family	Scientific Name	Common Name	NSW status	Comm. status	Records	Description	Likelihood
Tytonidae	^^*Tyto novaehollandiae*	Masked Owl	V,P,3		1	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides.	Low
Meliphagidae	*Epthianura albifrons*	White-fronted Chat	V,P		6	Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. Have been observed breeding from late July through to early March, with 'open-cup' nests built in low vegetation.	Moderate, recorded nearby
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	V,P		1	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Low
Artamidae	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V,P		1	Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey and ground-cover of grasses or sedges.	Low
Petroicidae	*Petroica boodang*	Scarlet Robin	V,P		1	The Scarlet Robin lives in dry eucalypt forests and woodlands. It breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees.	Low
Phascolarctidae	*Phascolarctos cinereus*	Koala	E1,P	E	2	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	Low
Pseudocheiridae	*Petauroides volans*	Southern Greater Glider	E1,P	E	73	The greater glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species.	Moderate
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	V,P	V	40	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	Moderate
Otariidae	*Arctocephalus forsteri*	New Zealand Fur-seal	V,P		1	Prefers rocky parts of islands with jumbled terrain and boulders. Feeds principally on cephalopods and fish, but also seabirds and occasionally penguins.	Low
Otariidae	*Arctocephalus pusillus doriferus*	Australian Fur-seal	V,P		2	Prefers rocky parts of islands with flat, open terrain. They occupy flatter areas than do New Zealand Fur-seals where they occur together.	Low

WATER TECHNOLOGY
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APPENDIX D
PROTECTED MATTERS SEARCH

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. Please see the caveat for interpretation of information provided here.

Report created: 18-Jun-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment 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 (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	7
Listed Threatened Species:	111
Listed Migratory Species:	76

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 https://www.dcceew.gov.au/parks-heritage/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 Lands:	11
Commonwealth Heritage Places:	None
Listed Marine Species:	102
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	5
Regional Forest Agreements:	1
Nationally Important Wetlands:	3
EPBC Act Referrals:	9
Key Ecological Features (Marine):	None
Biologically Important Areas:	10
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

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 a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name	Buffer Status
Commonwealth Marine Areas (EPBC Act)	In buffer area only

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.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area	In feature area
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	Community likely to occur within area	In feature area
Illawarra and south coast lowland forest and woodland ecological community	Critically Endangered	Community likely to occur within area	In feature area
Illawarra-Shoalhaven Subtropical Rainforest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area	In feature area
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area	In buffer area only
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area	In feature area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris tenuirostris Great Knot [862]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat known to occur within area	In feature area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat may occur within area	In feature area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area	In feature area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area	In feature area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Endangered	Species or species habitat known to occur within area	In feature area
Limosa limosa Black-tailed Godwit [845]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In feature area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area	In feature area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area	In feature area
Pycnoptilus floccosus Pilotbird [525]	Vulnerable	Species or species habitat known to occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area	In feature area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour may occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Thinornis cucullatus cucullatus Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area	In feature area
FISH			
Epinephelus daemelii Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area	In feature area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area	In feature area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat known to occur within area	In feature area
Seriolella brama Blue Warehou [69374]	Conservation Dependent	Species or species habitat known to occur within area	In feature area
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat known to occur within area	In feature area
FROG			
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area	In feature area
Litoria watsoni Southern Heath Frog, Watson's Tree Frog [91509]	Endangered	Species or species habitat may occur within area	In buffer area only
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat may occur within area	In buffer area only
MAMMAL			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat known to occur within area	In feature 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	In feature area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In feature area
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat likely to occur within area	In feature area
Notamacropus parma Parma Wallaby [89289]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Petauroides volans Greater Glider (southern and central) [254]	Endangered	Species or species habitat known to occur within area	In feature area
Petaurus australis australis Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat known to occur within area	In feature area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
Potorous tridactylus trisulcatus Long-nosed Potoroo (southern mainland) [86367]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
PLANT			
Acacia bynoeana Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Calochilus pulchellus Pretty Beard Orchid, Pretty Beard-orchid [84677]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Corunastylis vernalis listed as Genoplesium vernale East Lynne Midge-orchid [78699]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area	In feature area
Daphnandra johnsonii Illawarra Socketwood [67186]	Endangered	Species or species habitat known to occur within area	In buffer area only
Genoplesium baueri Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528]	Endangered	Species or species habitat known to occur within area	In feature area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Irenepharsus trypherus Delicate Cress, Illawarra Irene [14664]	Endangered	Species or species habitat may occur within area	In buffer area only
Melaleuca biconvexa Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area	In feature area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area	In feature area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat known to occur within area	In feature area
Pomaderris brunnea Rufous Pomaderris, Brown Pomaderris [16845]	Vulnerable	Species or species habitat known to occur within area	In feature area
Prasophyllum affine Jervis Bay Leek Orchid, Culburra Leek-orchid, Kinghorn Point Leek-orchid [2210]	Endangered	Species or species habitat known to occur within area	In feature area
Prostanthera densa Villous Mintbush [12233]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat known to occur within area	In feature area
Pterostylis vernalis Halbury Rustyhood [84711]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area	In feature area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhodomyrtus psidioides Native Guava [19162]	Critically Endangered	Species or species habitat may occur within area	In feature area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat known to occur within area	In feature area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Xerochrysum palustre Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Zieria granulata Hill Zieria, Hilly Zieria, Illawarra Zieria [17147]	Endangered	Species or species habitat likely to occur within area	In buffer area only
REPTILE			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Hoplocephalus bungaroides Broad-headed Snake [1182]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Natator depressus			
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
SHARK			
Carcharias taurus (east coast population)			
Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Carcharodon carcharias			
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Galeorhinus galeus			
School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area	In feature area
Rhincodon typus			
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Anous stolidus			
Common Noddy [825]		Species or species habitat likely to occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna carneipes			
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Ardenna grisea			
Sooty Shearwater [82651]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Calonectris leucomelas			
Streaked Shearwater [1077]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In feature area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche carteri			
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta			
Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche eremita			
Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour may occur within area	In feature area
Thalassarche impavida			
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche melanophris			
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche salvini			
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Migratory Marine Species			
Balaenoptera edeni			
Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
Balaenoptera musculus			
Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
Caperea marginata			
Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In feature area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Dugong dugon Dugong [28]		Species or species habitat may occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In feature area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area	In feature area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat may occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area	In feature area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Terrestrial Species			
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Calidris alba Sanderling [875]		Foraging, feeding or related behaviour known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area	In feature area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area	In feature area
Calidris tenuirostris Great Knot [862]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Foraging, feeding or related behaviour known to occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area	In feature area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Limicola falcinellus Broad-billed Sandpiper [842]		Foraging, feeding or related behaviour known to occur within area	In feature area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Limosa limosa Black-tailed Godwit [845]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area	In feature area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area	In feature area
Tringa brevipes Grey-tailed Tattler [851]		Foraging, feeding or related behaviour known to occur within area	In feature area
Tringa glareola Wood Sandpiper [829]		Foraging, feeding or related behaviour known to occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area	In feature area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [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.

Commonwealth Land Name	State	Buffer Status
Communications, Information Technology and the Arts - Telstra Corporation Limited		

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - Australian Telecommunications Commission [11853]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12009]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12008]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [11887]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12010]	NSW	In feature area
Commonwealth Land - Telstra Corporation Limited [12007]	NSW	In buffer area only
Defence		
Defence - PARACHUTE DROPPING ZONE (PARACHUTE TRAINING SCHOOL) ; NOWRA - PTS [10067]	NSW	In buffer area only
Defence - Defence Housing Authority		
Commonwealth Land - Defence Housing Authority [15968]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [11852]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [12346]	NSW	In buffer area only
Commonwealth Land - Defence Housing Authority [15967]	NSW	In buffer area only

Listed Marine Species

[Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Anous stolidus			
Common Noddy [825]		Species or species habitat likely to occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna carneipes as Puffinus carneipes			
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Calidris alba Sanderling [875]		Foraging, feeding or related behaviour known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris tenuirostris Great Knot [862]	Vulnerable	Foraging, feeding or related behaviour known to occur within area overfly marine area	In feature area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area	In feature area
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Charadrius ruficapillus Red-capped Plover [881]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In feature area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In feature area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea antipodensis gibsoni as Diomedea gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In feature area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Limicola falcinellus Broad-billed Sandpiper [842]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In feature area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Limosa limosa Black-tailed Godwit [845]	Endangered	Foraging, feeding or related behaviour known to occur within area overfly marine area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In feature area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area	In feature area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area	In feature area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In feature area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area	In feature area
Pterodroma cervicalis White-necked Petrel [59642]		Species or species habitat may occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Stercorarius antarcticus as Catharacta skua Brown Skua [85039]		Species or species habitat may occur within area	In buffer area only
Sterna striata White-fronted Tern [799]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Breeding known to occur within area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat may occur within area overfly marine area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche bulleri platei as Thalassarche sp. nov.			
Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche carteri			
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta			
Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche eremita			
Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour may occur within area	In feature area
Thalassarche impavida			
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche melanophris			
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche salvini			
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Thinornis cucullatus as Thinornis rubricollis			
Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area	In feature area
Thinornis cucullatus cucullatus as Thinornis rubricollis rubricollis			
Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa brevipes as Heteroscelus brevipes Grey-tailed Tattler [851]		Foraging, feeding or related behaviour known to occur within area	In feature area
Tringa glareola Wood Sandpiper [829]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In feature area
Fish			
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area	In feature area
Cosmocampus howensis Lord Howe Pipefish [66208]		Species or species habitat may occur within area	In feature area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In feature area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area	In feature area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In feature area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area	In feature area
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area	In feature area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area	In feature area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In feature area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area	In feature area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In feature area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area	In feature area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area	In feature area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In feature area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In feature area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area	In feature area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In feature area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area	In feature area
Mammal			
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area	In feature area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area	In feature area
Dugong dugon Dugong [28]		Species or species habitat may occur within area	In feature area
Reptile			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area

Whales and Other Cetaceans [Resource Information]

Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area	In feature area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In feature area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In feature area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In feature area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In feature area

Current Scientific Name	Status	Type of Presence	Buffer Status
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area	In feature area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In feature area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In feature area

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State	Buffer Status
Brundee Swamp	Nature Reserve	NSW	In buffer area only
Comerong Island	Nature Reserve	NSW	In feature area
Jervis Bay	National Park	NSW	In buffer area only
Saltwater Swamp	Nature Reserve	NSW	In buffer area only
Seven Mile Beach	National Park	NSW	In buffer area only

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State	Buffer Status
Southern RFA	New South Wales	In feature area

Nationally Important Wetlands [Resource Information]

Wetland Name	State	Buffer Status
Coomonderry Swamp	NSW	In buffer area only
Shoalhaven/Crookhaven Estuary	NSW	In feature area
Wollumboola Lake	NSW	In buffer area only

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Bulk Storage Dam	2022/9157		Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
MARA Team Testing - Release 38 - Smoke Test -05 April 2024 - To Be Deleted	2024/09849		Post-Approval	In buffer area only
MARA Team Testing - Release 39 - 29 April 2024 - To Be Deleted	2024/09866		Approval	In buffer area only
West Culburra Residential Subdivision	2023/09524		Assessment	In buffer area only
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Referral decision				
Beecroft Weapons Range Visitors Centre	2004/1322	Referral Decision	Completed	In buffer area only
Breeding program for Grey Nurse Sharks	2007/3245	Referral Decision	Completed	In feature area

Biologically Important Areas [Resource Information]

Scientific Name	Behaviour	Presence	Buffer Status
Dolphins			
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Breeding	Likely to occur	In feature area
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Breeding	Known to occur	In buffer area only
Seabirds			
Ardenna carneipes Flesh-footed Shearwater [82404]	Foraging	Known to occur	In buffer area only
Ardenna pacifica Wedge-tailed Shearwater [84292]	Foraging	Likely to occur	In buffer area only
Ardenna tenuirostris Short-tailed Shearwater [82652]	Foraging	Likely to occur	In feature area

Scientific Name	Behaviour	Presence	Buffer Status
Diomedea exulans antipodensis Antipodean Albatross [82269]	Foraging	Known to occur	In buffer area only
Pelagodroma marina White-faced Storm-petrel [1016]	Breeding	Known to occur	In feature area
Procellaria parkinsoni Black Petrel [1048]	Foraging	Likely to occur	In buffer area only
Sharks			
Carcharias taurus Grey Nurse Shark [64469]	Foraging	Known to occur	In feature area
Whales			
Megaptera novaeangliae Humpback Whale [38]	Foraging	Known to occur	In feature area

Bioregional Assessments [Resource Information]

SubRegion	BioRegion	Website	Buffer Status
Sydney	Sydney Basin	BA website	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and 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

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

Where little information is available for a 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 detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

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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