

Transport  
for NSW

# Ettalong Channel Dredging 2023

Minor works review of  
environmental factors

July 2023



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## Acknowledgement of Country

Transport for NSW acknowledges Darkinjung people, the traditional custodians of the land on which the Ettalong Channel Dredging is proposed.

We pay our respects to their Elders past and present and celebrate the diversity of Aboriginal people and their ongoing cultures and connections to the lands and waters of NSW.

Many of the transport routes we use today – from rail lines, to roads, to water crossings – follow the traditional Songlines, trade routes and ceremonial paths in Country that our nation's First Peoples followed for tens of thousands of years.

Transport for NSW is committed to honouring Aboriginal peoples' cultural and spiritual connections to the land, waters and seas and their rich contribution to society.



## MW REF approval and authorisation

Approved by	Dave Hopper – Senior Programs Officer
Signed	<i>David Hopper</i>
Date	21/07/2023

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# 1. Introduction

The purpose of the Minor Works review of environmental factors (REF) is to describe the proposal, to document the likely impacts of the proposal on the environment, to detail mitigation measures to be implemented and to determine whether or not the proposal can proceed. For the purposes of this work Transport for NSW (Transport) is the proponent and determining authority under Division 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

The description of the proposed works and assessment of associated environmental impacts has been undertaken in the context of section 171 of the *Environmental Planning and Assessment Regulation 2021*, Guidelines for Division 5.1 Assessments (DPE, 2022), the *Biodiversity Conservation Act 2016 (NSW)* (BC Act), the *Fisheries Management Act 1994* (FM Act) and the *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)* (EPBC Act).

In doing so the REF helps to fulfil the requirements of section 5.5 of the EP&A Act including that Transport examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Public Spaces under Division 5.2 of the EP&A Act.
- The significance of any impact on threatened species as defined by the BC Act and/or FM Act, in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report
- The potential for the proposal to significantly impact a matter of national environmental significance, including nationally listed threatened biodiversity matters, or the environment of Commonwealth land. Where a significant impact is considered likely on nationally listed biodiversity matters, either the proposal must be reconsidered or a Project REF must be prepared.

## 2. The proposal

### 2.1 Description

#### 2.1.1 Proposal location details

Table 2-1: Proposal location details

Location details	
Title	Ettalong Channel Dredging
File number	
Road name and number	Not applicable. Ettalong Channel and entrance shoal
Local government area	Central Coast LGA
Transport for NSW region	Hunter

#### 2.1.2 Proposal location and description

Transport for NSW proposes to undertake maintenance dredging of the Ettalong entrance channel in several areas between Little Box Head and Wagstaffe Bar, placement of dredged sand on the Ettalong entrance shoals and the establishment of two small laydown areas (the proposal). The key locations of the proposal are shown in Figure 2-1.

The following terms are used throughout this REF:

- Dredging/dredge areas – refers to the areas to be dredged in the proposal. These include dredge areas 1, 3 and 5 (see Figure 2-1). These areas represent the direct footprint of where dredging will occur and will be subject to any direct impacts of dredging.
- Placement areas – refers to areas where material dredged from the dredged areas will be placed. These areas include Placement Envelopes A, B and C as outlined in Figure 2-1. Dredged material would be placed within these areas as required.
- Laydown area – refers to ancillary areas located adjacent to the Pretty Beach boat ramp and opposite 101 The Esplanade, Ettalong Beach (see Figure 2-1 and Appendix A)
- Proposal area – refers all areas subject to the proposal including dredge areas, placement areas, moorings and laydown areas (Figure 2-1).
- Campaign – refers to dredging works/event.

Key features of the proposal include:

#### Dredging

- Navigation maintenance dredging of Ettalong Channel in several locations between the entrance shoal adjacent to Little Box Head and Wagstaffe Bar adjacent to Wagstaffe Point to restore navigable depths for large vessels.
- The proposal would target three shoaling locations that are the priority to facilitate the safe navigation of large vessels and avoid environmentally sensitive areas. Dredging would occur at two sites located to the south of Half Tide Rocks and at one site to the north of Half tide Rocks. Dredging extents including batters for Areas 1, 3 and 4 as shown in Figure 2-1.
- Dredging of Areas 2 and 5 have not been included in this campaign due to environmental constraints and would be subject to a separate environmental assessment. Dredging specifications for Areas 1, 3 and 4 are as follows:

Table 2-2 Dredging specifications (based on March 2023 hydrographic survey)

Dredge Location	Design Bed Level between batters (m LAT)	Batter Slope	Footprint Area (m <sup>2</sup> )	In-situ Volume (m <sup>3</sup> )
Area 1	-2.5	1 in 4	19,800	9,900
Area 3	-2.5	1 in 4	6,100	3,340
Area 4	-2.5	1 in 4	20,200	15,890

- Dredging volumes will be limited to <30,000m<sup>3</sup> in any 12-month period.
- Dredging will be undertaken using either a cutter suction dredge or trailing suction hopper dredge.

### Sand Placement

Dredged material will be placed on the Ettalong Entrance shoals in designated areas as identified in Figure 2-1 and detailed below.

Table 2-3. Placement specifications

Placement Location	Maximum Placement Elevation (m LAT)	Batter Slope	Envelope Area (m <sup>2</sup> )	Allocated Volume (m <sup>3</sup> )*
Envelope A	-2.0	1 in 6	82,500	TBA
Envelope B	0.0	1 in 6	63,200	TBA
Envelope C	-0.5	1 in 6	103,900	TBA

\*The volume to be placed in each envelope would be determined by a pre-works hydrographic survey, prevailing conditions and contractor methodology/preference.

- Final placement elevations and volumes to be determined following pre-placement hydrographic survey.
- Maximum placement elevations are not to exceed surrounding geomorphic features (e.g. crest of surrounding sand bar, etc.).
- Placement allocations are to minimise potential impacts on surfing amenity and sand should be spread evenly to avoid unpredictable wave breaking or refraction in the vicinity of key surfing areas.
- It should be noted that sand placement in Envelope A is the most favoured option by Department of Planning and Environment – Environment and Heritage Group (DPE-EHG) due to the likely longevity of dredging (i.e. greater distance from the dredging area and reduced rate of infill) and beneficial transport of sand towards Ocean Beach.

Due to the dynamic nature of the Ettalong entrance channel and shoal there will be a need for dredging to occur on an ongoing basis to maintain a safe navigation depth for large vessels along the full length of the channel. The long-term dredging strategy (including sand placement) for this waterway will be the subject of a separate approval and will require additional detailed investigations, consideration of alternative options and stakeholder consultation. The scope of that work is likely to require an additional 1-2 years before approval can be secured. The current REF (i.e. this document) has been prepared to facilitate the 2023 campaign for dredging of urgent, high priority locations with low complexity, but also addresses the maintenance dredging of these locations that may be required within the next 2 years, prior to finalisation of the broader strategy. Maintenance dredging may be required if shoaling within the vicinity of the 2023 dredge areas inhibits safe navigation. Maintenance dredging campaigns would be limited to within the direct vicinity of the 2023 campaign dredge areas, would involve less than 30,000m<sup>3</sup> annually and other than volumes dredged would be undertaken using the methodology described below. Any works outside that described in this REF would be subject to further assessment.

The priority dredge locations identified for the 2023 campaign area are based on the March 2023 hydrographic survey and discussions with community stakeholders. Final design for both dredging and placement areas may vary somewhat in response to updated hydrographic surveys as undertaken. Any adjustments to either areas will be minor variations in the extents outlined in Figure 2-1, would not occur within any sensitive areas (i.e. seagrass, soft corals) and would be subject to all measures identified in this REF.

This proposal is intended to avoid areas of seagrass, soft coral and sites located upstream of the extents outlined in Figure 2-1 and also excludes the placement of any material directly onto Umina-Ocean Beach or Ettalong Beach. Any such works would be subject to further assessment and approval as discussed above.

The proposal is anticipated to involve the following work methodology:

### Preliminaries

- Hydrographic survey of both the dredging and shoal placement areas would be undertaken prior to commencement of dredging to confirm final dredging and placement areas and volumes.
- Notifications would be provided to relevant stakeholders prior to commencement of works.
- Appropriate navigational markers/aids would be installed at the dredge areas.
- A site laydown area may be established on the foreshore either opposite 101 The Esplanade, Ettalong Beach or within the Pretty Beach Boat Ramp car park depending on contractor requirements if required (See Section 2.1.4 and Figure 2-1).

### Dredging Works

Depending on conditions and contractor selection, plant availability and conditions, dredging may be undertaken using a cutter suction or trailing suction hopper dredge. Either or both of the following broad methods may be utilised for dredging and sand placement:

#### Ocean-going trailing suction hopper dredge (TSHD):

A small/shallow draft ocean-going TSHD could be utilised for the works. Such a vessel operates under its own propulsion and works by lowering a suction head to the desired working depth. Sand is fluidised at the dredge head by a combination of water jets and suction. Sand is entrained in water drawn in at the suction head up a pipe and into an onboard hopper. Excess water from the dredging process spills out of the hopper and is discharged during dredging at the dredge site and during transit to the placement site. Water quality within the hopper is visually monitored by the skipper on an ongoing basis. Once the hopper is filled to capacity, the TSHD manoeuvres to the placement area. Typically, the sand load is then released directly underneath the dredge as the hull is split, or hopper doors are opened. In some cases, sand in the hopper can be re-fluidised and pumped by pipeline, or 'rainbowed' to the discharge point. When releasing sand directly from the hopper, the water depth needs to be sufficient as to allow access for the fully laden dredge and to allow sand to exit the hopper. When pumping or rainbowing, placement can be onto shallower areas within close proximity to navigable areas, however this method is more expensive due to the need to pump the sand and is not being currently considered for the proposal.

- The TSHD would be mobilised to site by sea. As the vessel can operate relatively independently, there is no strict requirement for a works/laydown compound, although sites for this purpose, if required, are identified in this REF (refer Figure 2-1).
- A TSHD would require a mooring location in close proximity to the dredge areas. Two mooring locations have been identified and are shown in Figure 2-1. Mooring locations would be located a sufficient distance away from sensitive marine vegetation. The mooring would include a barge approximately 20m x 9m. The barge would be secured to the seabed by spuds. The dredge would moor to the barge between dredging. The barge would be removed at the completion of dredging works.
- Dredging of each identified dredge area would be undertaken until the target bed level and profile is reached. This would involve multiple passes over an area to progressively deepen and widen the dredge cut to design. Dredging is interrupted by the need to periodically unload the hopper, thus cycling between the dredging and deposition areas. The vessel would need to make numerous transits between the two areas.
- The times of dredging may be restricted to periods of high tide to allow the vessel to access shallower parts of the dredge area, and/or the dredge hopper may only be partially loaded in order to reduce laden vessel draft during cycles. This may reduce dredging production rates and increase the number of transit cycles required. The frequency and time taken for transits would be dependent on the TSHD employed for the work.
- Due to navigability requirements for a TSHD vessel, Placement Envelope A is preferred particularly during dredging of Area 1. In this case sand is to be progressively placed approximately parallel to the existing contours on the western side of the entrance shoal with the intention of mimicking the natural bed form rather than creating a series of 'ant hills' within this area. During placement, the full load of the dredge hopper is typically released within a matter of minutes, but is spread both by dispersion of the sand as it falls through the water column and potentially by vessel movement during the placement process (depending on vessel design).
- Placement within Envelope C may also be possible using a TSHD, however this would be subject to confirmation by hydrographic survey and is less favoured due to closer proximity, and potential for infilling of the dredge areas. Again, the intent would be to spread material as evenly as possible within the design placement area.

- Both dredging and placement activity is typically controlled by GPS guidance, informed by hydrographic survey and design information.
- The main dredge vessel would be serviced by outboard powered work boat(s) which may undertake functions such as crew transfers, hydrographic survey or environmental monitoring.

#### **Cutter-suction dredge**

The typical cutter-suction dredge utilised for this proposal would be shore-launched and requires the establishment of a temporary pipeline between the dredging and placement area(s). The positioning of the vessel during dredging is typically controlled by winches pulling against cables anchored on each side and/or spuds anchoring the stern of the vessel. The dredged area is gradually expanded as the dredge works from side to side across the cut face. Minor repositioning occurs with the aid of a work boat to move anchors. Apart from such movements, dredging within an area is relatively continuous as sand is constantly pumped to the deposition area.

- The dredge is transported by road to the launch site close to the proposal areas and typically lifted by crane into the water. This would occur at the Pretty Beach Boat Ramp.
- Lengths of pipe are delivered to the designated laydown area (Figure 2-1) and are assembled on-shore segment-by-segment as the pipe (suspended by floats) is towed out from the beach by a work boat. Once the required length has been achieved, the pipe is positioned between the intended placement area and the dredge and connected. The size of the pump located on the dredge and corresponding pipe diameter will be dependent on contractor and equipment availability however the pipeline is likely to be 150-250mm (6-10 inch) diameter.
- The pipeline would consist of a combination of floating sections (with floats within the vicinity of the dredge) and submerged sections (through navigation channels and high vessel traffic areas without floats). Pipeline routes would be subject prevailing conditions, contractor methodology and are to be best configured to minimise the area impacted.
- The pipeline would avoid areas of sensitive marine habitat and if close by (within 10m) to seagrass would be anchored to prevent movement and damage to seagrass. The discharge point of the pipe is fixed by anchors and is moved periodically to ensure the even spread of sand within the placement envelope.
- Pipelines would have appropriate navigational aids and warnings installed where required.
- Indicative placement locations are provided in Figure 2-1, with the most likely placement areas for this method being placement envelopes B and C. At these locations material would be placed in holes, swales, depressions as appropriate. Final placement locations would be determined by hydrographic survey prior to the commencement of works.
- The main dredge vessel would be serviced by outboard powered work boat(s) which would undertake functions such as pipeline and anchor handling, crew transfers, hydrographic survey or environmental monitoring.

#### **Disestablishment and rehabilitation**

Post-dredging and placement hydrographic surveys would be undertaken to confirm compliance with design, verify volumes of sand moved and confirm completion of the contracted works.

At the conclusion of each dredging campaign, all vessels, pipelines and other equipment would be removed from the proposal area in the same fashion as establishment. The laydown compound(s) will be returned to original condition and damage to road kerbs, paths or other infrastructure made good.

The proposal is expected to require the use of the following plant and equipment:

- Cutter Suction Dredge
- Ocean-going trailing suction hopper dredge
- Work barge
- Work boat/s
- Prime mover for delivery of equipment
- Slew or Franna crane for launching
- Safety fencing around the laydown area

- Pipe rack
- Storage container
- Pipes
- Navigation aids (as required)
- Small hand held equipment (as required)

Hours for the dredging operations and sand placement for the proposal are as follows:

- Monday to Friday 7 am – 6 pm
- Saturday 8 am – 1 pm
- No work on Sunday or public holidays

Works would be undertaken within standard working hours wherever possible. If works within standard working hours is not possible due to tidal conditions etc. noise impacts are to be minimised in accordance with the TfNSW Noise Estimator Tool including additional measures as applicable. Any works outside of standard working hours would be subject to approval from the relevant TfNSW representative.

TfNSW may alter the hours of operation to suit other requirements (e.g. dredging operations may cease on Saturdays or in other holiday periods to limit disruption to recreational users within the area).



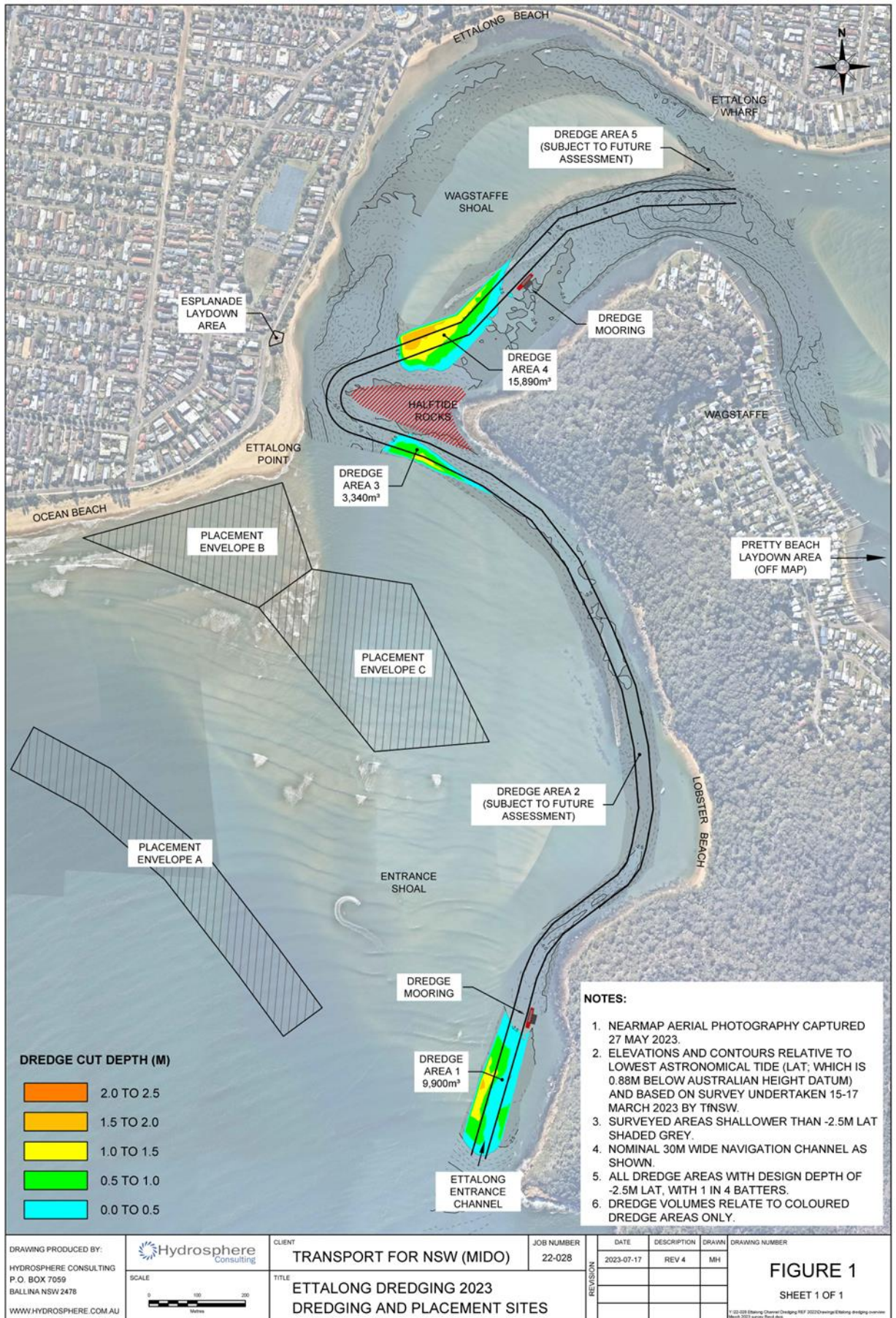


Figure 2-1 Key features of the proposal



### 2.1.3 Proposal objectives

Shoaling of Ettalong entrance channel is currently placing critical navigational constraints on larger vessels using the channel. Large vessels have run aground on shoals within the navigation channel. The Palm Beach ferry has previously needed to and may need to continue to cancel or restrict services to Ettalong Beach and Wagstaffe during low tide periods due to safety concerns. Such restrictions are causing severe disruptions to the Ettalong Beach and Wagstaffe communities.

The objectives of the proposal are:

- Restore the Ettalong Entrance Channel to a suitable navigable depth to improve safety and navigability of the channel as soon as possible.
- Beneficially reuse the dredged material in the most time and cost-efficient manner.

The proposal is intended to be undertaken as a priority to restore a safe navigational channel as soon as possible whilst Transport for NSW develop a dredging strategy for the long-term management of Ettalong entrance channel. Additionally, the placement of sand in the identified locations is expected to contribute to sand supply onto Ettalong Point/Ocean Beach and provide some buffering of beach erosion.

### 2.1.4 Ancillary facilities

A laydown site would be required to temporarily store small plant, machinery and materials for the proposal. Two sites have been identified depending on contractor requirements.

1. An unsealed carpark adjacent to the foreshore opposite 101 The Esplanade (Figure 2-1).
2. A section of sealed carpark adjacent to Pretty Beach boat ramp off Araluen Drive, Pretty Beach (Appendix A).

The Ettalong Beach site provides an area of approximately 300m<sup>2</sup> (up to 9 car spaces) and approximately 100m<sup>2</sup> (or three car parking spaces) at the Pretty Beach boat ramp site. A permit or approval would be required from Central Coast Council for the use of either site.

The lay down site would be restricted to the car park area at both locations. Suitable temporary fencing would be erected around the perimeter of the site. No clearing would be required. Public pedestrian access would be maintained to and along the foreshore at both locations. All site facilities and materials will be removed and the site restored to pre-works condition at the completion of each dredging campaign.

Work boats would be launched and the dredge tendered from Pretty Beach boat ramp.

Table 2-4: Ancillary facilities

Ancillary facilities		
<p>Will the proposal require the use or installation of a compound site?</p> <p>A small laydown area would be required as described above. No dedicated compound site would be required for the proposal. The laydown area would be used for storage only and is unlikely to generate any significant noise or light spill.</p>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<p>Will the proposal require the use or installation of a stockpile site?</p> <p>No stockpile site will be required. All dredged material will be placed below water level <i>in situ</i>.</p>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
<p>Are any other ancillary facilities required (e.g., temporary plants, parking areas, access tracks)?</p> <p>The Pretty Beach boat ramp would be utilised for the launching of CSD dredge or work boats.</p>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

### 2.1.5 Proposed date of commencement

The 2023 dredging campaign is expected to occur during August-October 2023. Subsequent campaigns would occur as required over the next 2-3 years.

### 2.1.6 Estimated length of construction period

The 2023 dredging campaign is expected to take approximately 4-8 weeks, depending on weather, conditions and contractor plant. Subsequent campaigns are also expected to take approximately 4-8 weeks depending on volume to be dredged and equipment/plant used on those occasions.

## 2.2 Need and options

### 2.2.1 Options considered

The options considered for the proposal included:

- Option 1 – Do nothing
- Option 2 – Dredge all shoaling within Ettalong Channel
- Option 3 – Dredge priority areas within Ettalong Channel

#### Option 1

Option 1 is to do nothing. This option is not preferred as the proposal objectives would not be achieved. Delay of dredging until a long-term strategy can be developed would result in continued shoaling of the channel and continued disruptions of ferry services as well as potentially hazardous conditions for other vessels. Delay would also increase the likelihood that marine vegetation will establish within shoaled areas – further complicating the implementation of a future long-term strategy.

#### Option 2

This option would involve the dredging of all shoaling within the Ettalong Channel shallower than -2.5 m LAT including dredge areas 2 and 5 as identified in Figure 2-1. It is anticipated that the volume required to be dredged from these areas to significantly exceed 30,000 m<sup>3</sup>. Placement areas would include those identified on the shoal (Figure 2-1) however would also include placement on Ettalong Beach to address beach erosion. Whilst this is considered to be an attractive long-term option, this would require further detailed investigations and approvals including:

- Sediment investigation
- Aboriginal cultural heritage assessment
- European heritage assessment
- Further detailed aquatic habitat assessment
- Fisheries approval
- Environmental Protection Licence

The preparation of such assessments and acquisition of such approvals is expected to add a further 12-18 months to the project timeline and have a similar effect as Option 1 in the short-term. Due to the urgency of restoring safe navigable depths for the ferry this timeline is unfeasible. As such an option to target the shallowest most unsafe priority locations (Option 3) has been developed. The inclusion of the additional dredge areas and placement on Ettalong Beach would be considered in the broader strategy for the management of Ettalong entrance being developed by TfNSW.

#### Option 3

This option is described in detail in Section 2.1.

This option involves the dredging of up to 30,000 m<sup>3</sup> of sand from the three shallowest priority shoaling locations and placement of the material on the Ettalong entrance shoal. This would include an initial dredging campaign in 2023 and any additional maintenance campaigns over the next 2 years up to 30, 000 m<sup>3</sup>/annually as required.

This is the preferred option as it will restore safe navigable depths in the three shallow priority locations in a timely manner. This option also avoids areas of known sensitive aquatic habitat (soft corals, seagrass), cultural values (Ettalong Beach) and unknown sediment quality ensuring minimal environmental impact and straight forward approvals process. The placement of sand on the entrance shoal is expected to bolster sand supplies to Ocean Beach/Ettalong Beach (depending on placement

location) thereby contributing to buffer against beach erosion. This would ensure that a safe navigable depth is restored within the priority locations within Ettalong Channel as soon as possible whilst still achieving a beneficial reuse of the dredged material.

## 2.2.2 Justification for the proposal

Shoaling has occurred in multiple locations in Ettalong Channel causing severe restrictions on large vessel usage of the channel so much so that large vessels have run aground. As a result, large vessel usage of the channel has been reduced due to safety concerns. Ferry services to Ettalong Beach and Wagstaffe have been reduced as the safety risk of utilising the channel during low tide periods was deemed to be too high. Avoidance of low tide periods (i.e. only operating on high tides) is not possible as the ferry operates on a fixed daily schedule. The restricted ferry service has caused significant disruptions within the associated communities.

The proposal is required to restore safe navigational depths within Ettalong Channel. This is expected to restore confidence in large vessel operators of the channel resulting in the return of uninterrupted ferry services and other large vessel usage of the channel. This would have positive socio-economic outcomes associated with the return of the ferry including commuter confidence and tourism.

The placement of sand on the entrance shoal in the identified locations is expected to have positive benefits for sand supplies on Ocean Beach/Ettalong Beach. Both locations have a history of beach erosion and any additional sand supplied to these areas is considered to be a positive outcome.

The dredging and placement of sand at the areas identified would avoid areas of sensitive aquatic habitat and cultural value and any associated impacts. The proposal is expected to have minor and temporary impacts on water quality and recreational and vessel usage within the direct vicinity of the dredge and placement areas. Any impacts would be restricted to the period of dredging and placement and can be effectively managed with the measures identified in Section 5. The positive outcomes from the proposal are expected to outweigh the minor negative impacts associated with the proposal.

## 2.3 Statutory and planning framework

### 2.3.1 State Environmental Planning Policy (Transport and Infrastructure) 2021

The State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP (Transport and Infrastructure)) aims to facilitate the effective delivery of infrastructure across the state. Section 2.80(2a) of SEPP (Transport and Infrastructure) permits development for navigation and emergency response facilities to be carried out on any land or on unzoned land by or on behalf of a public authority without consent. In this section, a reference to “*development for the purpose of navigation facilities, wharf or boating facilities also includes a reference to dredging, or bed profile levelling, of existing navigation channels, if that dredging or levelling is carried out for safety reasons*”. It also includes reference to environmental management works if it is connection with such facilities. Environmental management works is defined as “*works for the purpose of avoiding, reducing, minimising or managing the environmental effects of development (including effects on water, soil, air, biodiversity, traffic or amenity), and...environmental protection works.*” The placement of dredged material is an essential and inseparable part of a dredging activity, i.e. dredging cannot occur without the placement of the dredged material in another location in some form. The selected locations and placement methodology of the dredged material would minimise the environmental effects of dredging (the development) by avoiding areas of sensitive marine vegetation, large tidal currents and areas of high vessel traffic. Further, the placement of the material in the identified locations would also contribute to the onshore sand supply of Ocean Beach/Ettalong Beach providing additional sand to areas of documented beach erosion. As such the placement of the dredged material is considered to be environmental management works as described in this SEPP.

As the proposal is for the purpose of navigation and emergency response facilities and environmental management works and is to be carried out by / on behalf of Transport for NSW, it can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979*. Development consent from council is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not require development consent or approval under State Environmental Planning Policy (Resilience and Hazards) 2021, State Environmental Planning Policy (Precincts – Eastern Harbour City) 2021, State Environmental Planning Policy (Precincts – Central River City) 2021, State Environmental Planning Policy (Precincts – Western Parkland City) 2021, State Environmental Planning Policy (Precincts – Regional) 2021 or State Environmental Planning Policy (Planning Systems) 2021.

## 2.3.2 Other relevant legislation and environmental planning instruments

### **Environment Planning and Assessment Act 1979 (EP&A Act)**

As TfNSW is the proponent, the proposal has been assessed as 'development permissible without consent' under Part 5 of the EP&A Act (Section 2.3.1). Accordingly, TfNSW must satisfy Sections 5.5 of the Act by examining, and considering to the fullest extent possible, all matters which are likely to affect the environment. This REF is intended to address TfNSW compliance with the EP&A Act including Sections 5.5.

### **Environment Planning and Assessment Regulation 2021**

Clause 171 of the regulation specifies numerous factors that the determining authority must take into account when considering the likely impact of an activity. These factors and how they have been considered are outlined in Section 4.1.

Under clause 171 of the regulation proponents are required to publish an REF for an activity with:

- a capital investment value of more than \$5 million or,
- an approval or permit for an activity that requires approval under:
  - FM Act sections 144, 200, 205 or 219, or
  - Heritage Act 1977 section 57, or
  - National Parks and Wildlife Act 1974 section 90 or
  - Protection of the Environment operations Act 1997 sections 47-49 or 122, or
- if the determining authority considers it to be in the public interest.

TfNSW considers it to be in the public interest for the REF to be published. The REF would be made available on the relevant project website.

### **Fisheries Management Act 1994**

Provides for the protection, conservation, and recovery of threatened species, populations and ecological communities of fish and marine vegetation and fish habitats, as well as promoting the development and sharing of fishery resources in NSW. The objectives of the FM Act are to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations, and in particular to:

- conserve fish stocks and key fish habitats;
- conserve threatened species, populations and ecological communities of fish and marine vegetation;
- promote ecologically sustainable development, including the conservation of biological diversity, consistently with these objectives;
- promote viable commercial fishing and aquaculture industries;
- promote quality recreational fishing opportunities;
- appropriately share fisheries resources among the users of those resources;
- provide social and economic benefits for the wider community of NSW; and
- recognise the spiritual, social and customary significance of fisheries resources to Aboriginal persons, and to protect and promote the continuation of Aboriginal cultural fishing.

To meet the primary objectives, Part 7 of the FM Act deals with the protection of aquatic habitats, with Part 7A addressing the conservation of threatened species. Part 7 commonly applies to dredging and reclamation works, protection of marine vegetation including mangroves and seagrass, protection of spawning of certain fish, and noxious fish and marine vegetation.

Under Section 199 written notification to the Minister for Agriculture is required. Any response from the Minister within 21 days must be taken into consideration.

Under Section 205 a permit to harm (cut, remove, damage, destroy, shade etc) marine vegetation (saltmarshes, mangroves, seagrass and seaweeds) is required if harm to marine vegetation is expected. A Section 205 permit is not currently required for the proposal given that impacts to marine vegetation are not anticipated.

No threatened species listed under the Act are expected to be impacted by the proposal (Section 3.7).

#### **Crown Lands Management Act 2016**

Crown land is land set aside on behalf of the community for a wide range of public purposes including environmental and heritage protection, recreation and sport, open space and government services. The *Crown Lands Management Act 2016* (CLM Act) governs the management of Crown land. A Crown land lease, licence, permit or right of way to occupy and/or use Crown land is required for certain works on Crown land. Where Transport for NSW is the manager of the Crown reserves impacted by the proposal, a lease or licence under the CLM Act is not required. Transport for NSW is not the reserve manager of the reserve where dredging and placement is proposed and therefore the proposal would require a Crown Lands licence under s2.18 of the CLM Act. TfNSW will obtain an appropriate licence from Crown Lands for the proposal prior to the commencement of works.

#### **Coastal Management Act 2016 (CM Act)**

The objects of this Act are to manage the coastal environment of New South Wales in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the State, and in particular—

- (a) to protect and enhance natural coastal processes and coastal environmental values including natural character, scenic value, biological diversity and ecosystem integrity and resilience, and
- (b) to support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety, and
- (c) to acknowledge Aboriginal peoples' spiritual, social, customary and economic use of the coastal zone, and
- (d) to recognise the coastal zone as a vital economic zone and to support sustainable coastal economies, and
- (e) to facilitate ecologically sustainable development in the coastal zone and promote sustainable land use planning decision-making, and
- (f) to mitigate current and future risks from coastal hazards, taking into account the effects of climate change, and
- (g) to recognise that the local and regional scale effects of coastal processes, and the inherently ambulatory and dynamic nature of the shoreline, may result in the loss of coastal land to the sea (including estuaries and other arms of the sea), and to manage coastal use and development accordingly, and
- (h) to promote integrated and co-ordinated coastal planning, management and reporting, and
- (i) to encourage and promote plans and strategies to improve the resilience of coastal assets to the impacts of an uncertain climate future including impacts of extreme storm events, and
- (j) to ensure co-ordination of the policies and activities of government and public authorities relating to the coastal zone and to facilitate the proper integration of their management activities, and
- (k) to support public participation in coastal management and planning and greater public awareness, education and understanding of coastal processes and management actions, and
- (l) to facilitate the identification of land in the coastal zone for acquisition by public or local authorities in order to promote the protection, enhancement, maintenance and restoration of the environment of the coastal zone, and
- (m) to support the objects of the Marine Estate Management Act 2014.

Part 3 of the CM Act applies to any public authority that exercises functions in connection with the coastal zone. Division 4 Clause 23 states that "*Public authorities (other than local councils) are to have regard to coastal management programs to the extent that those programs are relevant to the exercise of their functions.*"

The proposal is located within the coastal zone as defined by the CM Act. The proposal is consistent with the Act as it contributes to maintaining the coastal zone as a vital economic zone and by supporting a sustainable coastal economy by facilitating transport and tourism and by mitigating coastal hazards.

There are currently no Coastal Management Programs for the proposal area. However, the Ettalong entrance channel and Ocean Beach area is subject to two coastal zone management plans *Coastal Zone Management Plan for Brisbane Water Estuary* (Cardno, 2012) and *Gosford Beaches Coastal Zone Management Plan* (WorleyParsons, 2017).

An action within WorleyParsons (2017) is to *Investigate feasibility of beach nourishment to increase erosion buffer at Ettalong Point*. This action resulted in the *Umina-Ocean Beach Erosion Management Strategy Environmental Assessment* (Royal HaskoningDHV, 2022). This strategy identified the western margin of the entrance shoal as a potential placement location for dredged material for nourishment of Ocean Beach. Proposed placement envelope A is consistent with this recommendation. Cardno (2012) and WorleyParsons (2017) both identified Ettalong Beach as a preferred location for the placement of dredged material. This location would be considered in the broader long-term strategy for the management of the Ettalong entrance channel.

#### **Biodiversity Conservation Act 2016**

Part 7 of the *Biodiversity Conservation Act 2016* (BC Act) provides the environmental assessment requirements for activities assessed under Part 5 of the EP&A Act. If a significant impact is likely, a Species Impact Statement (SIS) or Biodiversity Development Assessment Report (BDAR) is required. Section 7.2(1)(a) and 7.3 describe the assessment requirements and thresholds for what is considered a significant impact. If a significant impact is considered likely, an SIS or BDAR is required.

Under the BC Act, an assessment of significance must be completed to determine the significance of potential impacts to threatened species, populations and/or communities or their habitat. A test of significance has been undertaken for the proposal on relevant species (Appendix E) which concluded that the action is not expected to have a significant impact on Fur-seals or the local population that occurs within Broken Bay. Potential impacts on other threatened species and communities are addressed in detail in Appendix E and summarised in Section 3.7. No significant impacts on aquatic species are expected. No impacts to terrestrial biodiversity are expected. As such, the preparation of a Species Impact Statement (SIS) based on the provisions of the BC Act and FM Act is not required for this proposal.

#### **Protection of the Environment Operations Act 1997**

The *Protection of the Environment Operations Act 1997* (POEO Act) is the key environmental protection and pollution statute. The POEO Act is administered by the EPA and establishes a licensing regime for waste, air, water and pollution.

Schedule 1 of the Act lists Scheduled activities of which require an Environmental Protection Licence (EPL). Part 1, Clause 19 lists extractive activities as a scheduled activity. Extractive activities include maintenance dredging of a navigation channel for vessels carried out by or on behalf of a public authority. Such an activity is considered to be a scheduled activity if it involves the extraction of more than 30,000 m<sup>3</sup> per year. The total volume of sediment dredged for this proposal within a single year would not exceed 30,000 m<sup>3</sup>, and therefore the proposal would not require an EPL.

#### **National Parks and Wildlife Act 1974**

The NPW Act regulates the control and management of all national parks, historic sites, nature reserves and Aboriginal areas. The main aim of the Act is to conserve the natural and cultural heritage of NSW.

The proposal was assessed as being unlikely to have an impact on Aboriginal cultural heritage (Appendix C).

Bouddi National Park is located adjacent and to the east of the dredge and placement areas. Consideration has been given to the National Parks and Wildlife Service *Developments adjacent to National Parks and Wildlife Service lands Guidelines for consent and planning authorities* in Table 2-5 below.

Table 2-5: Considerations for development adjacent to National Parks and Wildlife Service lands

Consideration	Comment
Erosion and sediment control	The proposal is not expected to generate any erosion or sediment runoff that would impact the adjacent Bouddi National Park.
Stormwater runoff	The proposal would not generate any stormwater runoff.
Wastewater	The proposal would not generate any wastewater.
Pests, weeds and edge effects	The proposal is not expected to introduce any pests, weeds or edge effects that would impact on Bouddi National Park.
Fire and the location of asset protection zones	The proposal would not have any impact on fire regimes, management or asset protection zones.
Boundary encroachments and access through NPWS land	The proposal would not encroach or require access through Bouddi National Park.
Visual, odour, noise, vibration, air quality and amenity impacts	The presence of the dredge may have a minor temporary impact on the visual amenity Of Bouddi National Park directly adjacent to active works. This impact would be restricted to the duration of the works 4-8 weeks. The area has been dredged previously and large vessels are common this waterway and therefore any impact would be insignificant.
Threats to ecological connectivity and groundwater-dependent ecosystems	The proposal is restricted to the waterway and is not expected to have any impact on ecological connectivity or groundwater-dependent ecosystems.
Cultural heritage	The proposal is unlikely to have an impact on Aboriginal cultural heritage or non-Aboriginal heritage.
Access to parks	The proposal would impact any access to parks.

#### Heritage Act 1977

Provides for the protection of conservation of buildings, works, maritime heritage (wrecks), archaeological relics and places of heritage value through their listing on various State and local registers. Makes it an offence to harm any non-Aboriginal heritage values without permission.

The proposal does not involve an item or place listed on the NSW State Heritage Register or the subject of an interim heritage order or listing and is therefore not a controlled activity. Approval of works on the site is therefore not required under Part 4 of the Heritage Act.

#### Marine Estate Management Act 2014

*The Marine Estate Management Act 2014* (MEM Act) provides a framework for the management of marine parks and aquatic reserves. The proposal is not located within a Marine Park or aquatic reserve and is not expected to impact a Marine Park or aquatic reserve (closest aquatic reserve is located over 4.5 km to the south at Barrenjoey Head).

#### Marine Safety Act 1998 and Marine Safety Regulation 2016

The objectives of the Act are as follows:

- to ensure the safe operation of vessels in ports and other waterways,
- to promote the responsible operation of vessels in those waters so as to protect the safety and amenity of other users of those waters and the amenity of occupiers of adjoining land,
- to provide an effective framework for the enforcement of marine legislation,
- to provide for the investigation of marine accidents and for appropriate action following any such investigation,
- to consolidate marine safety legislation.

The proposal is consistent with the objectives of the Act as it would restore safe navigable depths to the Ettalong entrance channel.

Under Section 18 of the *Marine Safety Act 1998*, the proposal is an aquatic activity as it would be undertaken on navigable waters and would temporarily restrict the availability of those waters for normal use by the public. As such, Section 97(1) of the Marine Safety Regulation 2016 would require the work to be subject to an approval issued by TfNSW (Maritime).

TfNSW (Maritime) have no objection to the proposal and have provided written approval of the proposal (Appendix D).



### **Central Coast Local Environment Plan 2022**

The dredge and placement areas are located in areas mapped as W2-Waterways in the Central Coast Local Environment Plan (LEP). The objectives of the W2 zone are as follows:

- To protect the ecological, scenic and recreation values of recreational waterways.
- To allow for water-based recreation and related uses.
- To provide for sustainable fishing industries and recreational fishing.
- To encourage the continuous public access to and along the foreshore and to reinforce the foreshore character and respect for existing environmental conditions.

The proposal is consistent with the zone objectives as it would improve navigation of and hence recreational use of Ettalong Channel. The proposal includes measures to minimise any impacts on the recreational use of the surf zone within the vicinity of the placement area.

The proposal is permitted without consent under the Transport and Infrastructure SEPP and therefore any consent requirements of the LEP do not apply.

### **State Environmental Planning Policy (Resilience and Hazards) 2021**

The *Coastal Management Act 2016* aims to manage the coastal environment of NSW in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the State. Chapter 2 of SEPP (Resilience and Hazards) gives effect to the objectives of the *Coastal Management Act 2016* from a land use planning perspective, by specifying how development proposals are to be assessed if they fall within the coastal zone.

The CM Act defines the coastal zone into four coastal management areas:

- Coastal Wetlands and Littoral Rainforest Area;
- Coastal Environment Area;
- Coastal Use Area; and
- Coastal Vulnerability Area.

Under the SEPP, works in an area identified as coastal wetlands or littoral rainforest require development consent. Further, works considered to be coastal protection works require development consent (with a few exceptions, including beach nourishment). The proposal is not located on land classed as coastal wetland or littoral rainforest or associated proximity areas and are not considered to be coastal protection works and therefore do not require consent under this SEPP.

The proposal is located on land mapped as Coastal Environment Area.

For projects within the Coastal Environment Area, TfNSW must consider whether the proposal is likely to cause an adverse impact on the following considerations within Table .



Table 2-6: Development considerations for land within the coastal environment area (s2.10, SEPP Resilience and Hazards 2021)

Consideration	
(a) the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,	The proposal would have some minor temporary impacts on water quality. The proposal would not cause an adverse impact on the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment (Section 3.2 and 3.7).
(b) coastal environmental values and natural coastal processes,	Due to the minor scale of dredging it is not expected to impact coastal processes. The strategic placement of the material is expected minimise any impacts that material placement could have on coastal processes (Section 2.1.2 and 3.1). The proposal is not expected to cause an adverse impact on 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), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1,	The proposal would have some minor temporary impacts on water quality however is not expected to have an adverse impact on water quality (Section 3.2). The proposal would not have any impacts on sensitive coastal lakes as none are located within the vicinity of the proposal.
(d) marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,	The proposal would avoid any impacts to native vegetation, undeveloped headlands and rock platforms. The proposal avoids all areas of known marine vegetation with only minimal indirect disturbances expected. The proposal may cause minor disturbance to marine fauna however is unlikely to have a significant impact on any fauna (Section 3.7).
(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,	The proposal would improve safe vessel access through Ettalong entrance channel. Laydown sites would maintain public to and along adjacent foreshore areas. No adverse impacts on 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 are expected.
(f) Aboriginal cultural heritage, practices and places,	No adverse impacts on Aboriginal cultural heritage, practices and places are expected (Section 3.5).
(g) the use of the surf zone.	The placement of the dredged material has the potential to impact the quality of the Box Head surf break. However, with the application of the identified placement specifications and measures any impact would be minimised with no significant adverse impact expected.

**Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) [Commonwealth]**

The Commonwealth EPBC Act protects matters of National Environmental Significance (NES), such as threatened species and ecological communities, migratory species (protected under international agreements), and National Heritage places (amongst others). Under the EPBC Act a referral is required to the Australian Government for proposed 'actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land'. These are considered in Section 3 and 4.2.

The assessment of the proposal's impact on matters of national environmental significance (MNES) and the environment of Commonwealth land found that there is unlikely to be a significant impact. Accordingly, the proposal has not been referred to the Australian Government Department of Agriculture, Water and Environment under the EPBC Act.

**Environment Protection (Sea Dumping Act) 1981 [Commonwealth]**

The Sea Dumping Act regulates the loading and dumping of waste at sea and the creation of artificial reefs in Australian waters.

Under section 10A of the Sea Dumping Act a permit is required for the dumping of controlled material (including dredged material) into Australian waters. Australian waters stretch from the low-water mark of the Australian shoreline out to 200 nautical miles. It does not include waters within the limits of a state or territory.

State limits are generally low water along the coastline together with bay closing lines and river closing lines. The Territorial Sea Baseline (TSB) typically represents the low water line and bay and river closing lines. State waters, or waters within the limits of a state or territory are landward of the TSB. Mapping of the TSB shows that the TSB is located offshore from the proposed placement areas (Figure 2-2). As such the proposed placement areas are located within the limits of the State and therefore a permit under the Sea Dumping Act is not required for this proposal.

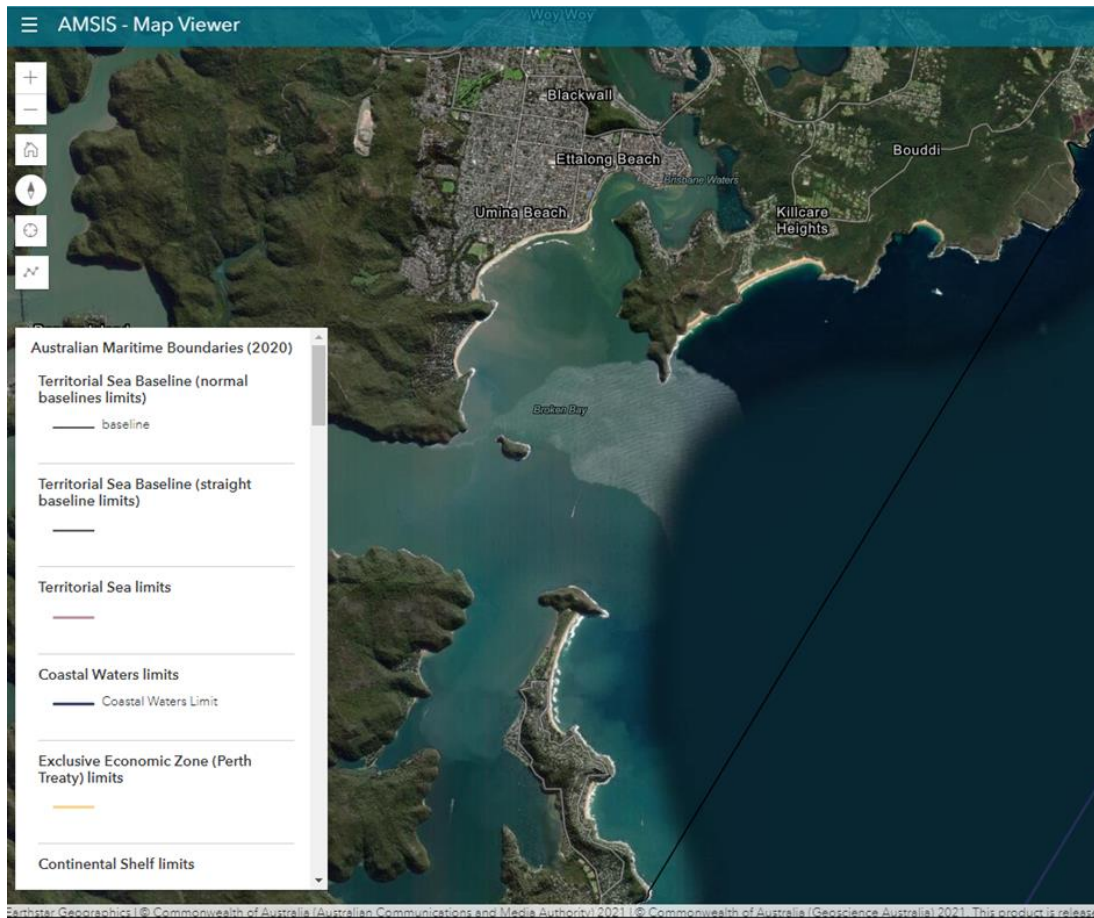


Figure 2-2: Locations of the Territorial Sea Baseline Source: AMSIS (<https://geoscience-au.maps.arcgis.com/apps/Styler/index.html?appid=151f79f8a50c4da6bfbfd13d59548e2db>)

### Native Title Act 1993 [Commonwealth]

The *Native Title Act 1993* provides a legal process for recognising the rights and interests of Aboriginal and Torres Strait Islander people in land and waters. No native title claims under the Native Title Act 1993 exist over the proposal site.

All Crown land is considered to be subject to native title rights unless native title is considered to be extinguished (i.e. through granting of freehold estate, mining leases etc.). Any activity that impacts on native title is considered to be a ‘future act’ (specific proposals to deal with land in a way that affects native title and interests) under the *Native Title Act 1993*. Future act activities require a notice to be forwarded to the native title claimants’ representative body for consultation and feedback. The proposal may trigger the requirement for a notice under the Native Title Act 1993, however legal advice has not been obtained. Any notice is to be prepared by the TfNSW legal team and sent to NTSCORP.

A letter was emailed to NTSCorp on 3<sup>rd</sup> February 2023 advising of the proposal and inviting comment. No response has been received to date.

## 2.4 Community and agency consultation

### 2.4.1 SEPP (Transport and Infrastructure) consultation

Part 2.2 of the SEPP (Transport and Infrastructure) contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. This is detailed below:

Table 2-7: Consultation required with Council

Is consultation with Council required under sections 2.10 - 2.12 and 2.14 of the SEPP (Transport and Infrastructure)?		
Are the works likely to have a substantial impact on the stormwater management services which are provided by council?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Are the works likely to generate traffic to an extent that will strain the capacity of the existing road system in a local government area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Will the works involve connection to a council owned sewerage system? If so, will this connection have a substantial impact on the capacity of the system?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Will the works involve connection to a council owned water supply system? If so, will this require the use of a substantial volume of water?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a minor or inconsequential disruption to pedestrian or vehicular flow? The lay down areas would be located in either an unsealed carpark opposite 101 The Esplanade, Ettalong Beach or at the Pretty Beach boat ramp. The area used is unlikely to cause more than a minor or inconsequential disruption to pedestrian or vehicular flow. Approval to use the sites would still be required from Central Coast Council.	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Will the works involve more than a minor or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Is there a local heritage item (that is not also a state heritage item) or a heritage conservation area in the study area for the works?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Is the proposal within the coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land? Note: See interactive map at <a href="http://Coastal%20management%20-%20(nsw.gov.au)">Coastal management - (nsw.gov.au)</a> . Note the coastal vulnerability area has not yet been mapped. Note: a certified coastal zone management plan is taken to be a certified coastal management program.	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Are the works located on flood liable land? If so, will the works change flooding patterns to more than a minor extent?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Table 2-8: Consultation with other public authorities

Is consultation with a public authority (other than Council) required under sections 2.13, 2.15 and 2.16 of the SEPP (Transport and Infrastructure)?		
Are the works located on flood liable land? (to any extent) If so, do the works comprise more than minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance? Note: Flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the <a href="http://Floodplain%20Development%20Manual%3A%20the%20management%20of%20flood%20liable%20land%20(nsw.gov.au)">Floodplain Development Manual: the management of flood liable land (nsw.gov.au)</a> .	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Are the works adjacent to a national park, nature reserve or other area reserved under the National Parks and Wildlife Act 1974, or on land acquired under that Act?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

A letter was sent to Department of Planning and Environment (DPE) – Environment, Energy and Science – Biodiversity Conservation in February 2023 (Appendix D) regarding proposed Ettalong entrance channel dredging inviting comment. No response to this letter has been received to date.		
Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Do the works include a fixed or floating structure in or over navigable waters? NSW Maritime is the relevant authority for approval of works on structures in, on or over the bed of any waters under the <i>Ports and Maritime Administration Act 1995</i> . NSW Maritime have advised they have no objections to the proposal via an approval letter (Appendix D).	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional facility or group home in bush fire prone land?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in clause 5.15 of Lockhart LEP 2012, Narrandera LEP 2013 and Urana LEP 2011).	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Are the works on land in a mine subsidence district within the meaning of the <i>Mine Subsidence Compensation Act 1961</i> ?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Table 2-9: Notification of council and occupiers of adjoining land

Do Council and occupiers of adjoining land need to be notified under section 2.110 of the SEPP (Transport and Infrastructure)?		
Does the proposal include a car park intended for the use by commuters using regular bus services?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Does the proposal include a bus depot?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Does the proposal include a permanent road maintenance depot or associated infrastructure, such as garages, sheds, tool houses, storage yards, training facilities and workers amenities?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

### 2.4.2 Other agency and community consultation

Consultation was undertaken via an emailed letter (example letter in Appendix D) in early 2023 to multiple agencies inviting comment on matters for consideration in the proposal REF, including:

- Central Coast Council
- Department of Planning and Environment (DPE) – Crown Lands
- Department of Primary Industry – Fisheries
- DPE - Environment, Energy and Science - Biodiversity Conservation
- Transport for NSW – Maritime (Boating Operations)

- NTSCorp

The only response received was from the above consultation was DPE – Crown Lands.

Other ongoing consultation to date includes:

- Discussions with DPI – Fisheries regarding dredging in Ettalong Channel.
- Discussions with DPE – Environment and Heritage Group regarding placement locations.
- Transport for NSW – Maritime – approval provided along with proposal conditions.

In addition, a stakeholder meeting was held in June 2023 to discuss the proposal which was attended by various TfNSW representatives and consultants and the following stakeholders:

- TfNSW – Waterways Operations (Maritime)
- DPE – Environment and Heritage Group
- Central Coast Council
- Peninsula Chamber of Commerce
- Wagstaffe to Killcare Community Association, Peninsula Waterway Community
- NRMA Ferries

All consultation is documented in Appendix D with key points from specific agency consultation summarised in Table 2-10.

Table 2-10: Summary of consultation

Agency - Date	Issue raised	Response
DPE - Crown Lands February 2023	The REF should include but not limited to the following:	
	Approval pathways, permits, licences and authorisations that may be required. A general Crown lands licence is required for the proposed dredging program and the REF will be used to assess the licence application, please refer to our website for information.	Proposal approvals, permits and licences are identified in Section 2.3.
	Provide the proposed dredging and sand relocation / nourishment locations.	Provided in Figure 2-1.
	How the proposed works are consistent with the Native Title Act 1993.	Addressed in Section 2.3.2
	Reference to any applicable Coastal Zone Management Plan or Coastal Management Program.	Addressed in Section 2.3.2
Transport for NSW – Maritime June 2023	Documentation of any consultation activities with other agencies.	Addressed in Section 2.4.2.
	Assessment of threatened species, populations or ecological communities or their habitats, within the meaning of the <i>Biodiversity Conservation Act 2016</i> or the <i>Fisheries Management Act 1994</i> .	Addressed in Section 3.7.
	They have no objection to the proposal subject to a number of conditions.	Conditions have been incorporated in the REF (Section 3.8)

DPI – Fisheries September 2022	Comments and conditions on placement of material on Ettalong Beach.	Placement on Ettalong Beach is no longer a part of this proposal as due to time constraints with required approvals it was not considered feasible. Placement on Ettalong Beach will be considered in the strategy for the long-term management of Ettalong entrance channel.
	The dredge channel should avoid seagrass. This includes the direct dredge footprint and the batter.	All dredge areas and pipelines would avoid areas of seagrass.
	Fisheries requests a copy of the final seagrass assessment and REF.	A copy of the REF including the aquatic ecology assessment would be provided to DPI – Fisheries for comment.
	Any potential harm to seagrass will require a Fisheries permit, regardless of the proponent.	The proposal would avoid all areas of seagrass. Seagrass is not expected to be impacted by the proposal and would not require a permit.
DPE – Environment and Heritage Group June 2023	Oyster leases are located in Brisbane Water and the Hawkesbury River, so the REF will need to consider the impacts of sedimentation on these aquaculture operations and consult with the oyster growers.	Water quality impacts are discussed in Section 3.2.
	Placement envelope A is our most favoured location for its longevity of dredging and beneficial transport of sand towards Ocean Beach.	Placement envelope A is the preferred placement location for the proposal.
	Regardless of the dredge method used, surfing amenity impacts should be minimised by avoiding placing sand in a concentrated zone.	Measures and specifications have been developed to minimise impacts on the surf break (Section 2.1 and 3.1).
	Placement Envelope B is less favourable to Envelope A due to the dynamic nature of sediment transport in this zone.	Envelope B has been included in the case that circumstances arise that make the use of envelope A unfavourable, unfeasible or impractical.
	Placement Envelope C is not favoured by the Department as it will be far more likely to mobilise, rework its way into the channel and potentially towards soft coral communities.	Envelope C has been included in the proposal in the case that circumstances arise that make the use of envelope A or B unfavourable, unfeasible or impractical.
	Please ensure that Fisheries are involved in the REF review to ensure protection of endangered soft coral communities that may be present in the area.	A copy of the REF would be provided to DPI – Fisheries.



### 3. Environmental assessment

This section provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposal. All aspects of the environmental potentially impacted upon by the proposal are considered. This includes consideration of the factors specified in section 171 of the Environmental Planning and Assessment Regulation 2021.

The matters of national environmental significance under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) are also considered in Section 4. Site-specific safeguards are provided to ameliorate the identified potential impacts.

#### 3.1 Soils and sediments

Table 3-1: Soils and sediments

Description of existing environmental and potential impacts		
<p>Are there any known occurrences of salinity or acid sulfate soils in the area?</p> <p>Bed sediments within Ettalong Channel are classified as having a high probability of acid sulfate soils (ASS)(ASS Risk Mapping and Class 1 in the Central Coast LEP 2022). In dredge areas 1 and 3, works would not remove bed material beyond the depth of previous dredging campaigns (-2.5m LAT). It is considered that this sediment will consist entirely of highly active marine sand that has been reworked into the channel from the entrance shoal. This material is not expected to be ASS or potential ASS (PASS). Dredge area 4, although likely to consist mainly of clean marine sands, is subject to a higher influence of estuarine processes and therefore sediments within this area, particularly deeper sediments, may contain fines which are associated with PASS. . A preliminary ASS investigation (SESL,2013) undertaken for a previous dredging project on Wagstaffe Shoal, nearby to dredge area 4, identified the material subject to the investigation as having nil ASS risk due to the lab analysis showing nil potential sulfidic activity.</p> <p>The oxidation of PASS can cause the production of acid and deoxygenation of water. Dredging using a trailing suction hopper dredge or cutter suction dredge and direct sub-surface placement of the dredged material significantly minimises the opportunities for oxidation. Sediments remain saturated during all stages of the process minimising access to oxygen. Further, due to the marine nature of the sediments they are expected to contain significant natural buffering capacity to neutralise the potential sulfuric acidity As such, any acidity generated from the oxidation of the sulfur during the dredging and placement process would be sufficiently neutralised by carbonates present in the material. Further, the seawater fraction of the dredged material as well as the receiving seawater at the placement site would provide further buffering capacity. Therefore, no impacts to water quality arising from acid sulfate/potential acid sulfate soils are expected from the proposal.</p>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<p>Does the proposal involve the disturbance of large areas (e.g., &gt;2ha) for earthworks?</p> <p>The proposal would be restricted to dredging and placement of dredged material. No earthwork is required for the laydown site. All dredging and placement would occur below water level with no exposed areas of excavation.</p>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
<p>Does the site have constraints for erosion and sedimentation controls such as steep gradients or narrow corridors?</p> <p>The proposal would be restricted to dredging and placement of dredged material below water level with the exception of a small laydown area in an existing carpark area. No steep gradients or narrow corridors are present at the laydown area.</p> <p>Slumping of dredge batters may occur if batters are too steep. Slumping may impact surrounding habitats and accelerate sedimentation within the navigation channel. To minimise the risk of slumping occurring all dredge cut batters are to be no steeper than 1(V) in 4(H).</p>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
<p>Are there any sensitive receiving environments that are located in or nearby the likely proposal area or that would likely receive stormwater discharge from the proposal?</p>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

<p>Sensitive receiving environments include (but are not limited to) wetlands, state forests, national parks, nature reserves, rainforests, drinking water catchments).</p> <p>The proposal would not generate any stormwater. However there are sensitive receiving marine environments that would potentially be impacted by the proposal, most notably seagrasses and soft corals. It is proposed that buffer areas be established to prevent direct disturbance of seagrass by the dredging works, and that water quality monitoring be undertaken to prevent non-direct impacts such turbidity resulting in smothering of any marine vegetation. The safeguards proposed in Section 5 will minimise any potential impacts.</p>		
<p>Is there any evidence within or nearby the likely footprint of potential contamination?</p> <p>Sediment within the Ettalong Channel above the design dredge level of -2.5 m LAT in dredge areas 1 and 3 is a result of continual infilling by clean marine sand originating from the ebb tide delta. The infill sediment within the channel is not expected to be contaminated as the sand has originated from the ebb tide delta and been transported within the highly active littoral zone of Broken Bay and Ettalong Channel area. Marine sand within the active delta shoals has not been subject to impacts from anthropogenic activities and is not expected to be contaminated.</p> <p>Dredge area 4, although likely to consist mainly of clean marine sands, is subject to a higher influence of estuarine processes and therefore sediments within this area, particularly deeper sediments, may contain fines. Contamination within estuarine sediments is typically associated with any fines. Contamination is not typically associated with the sandy fraction unless there is a nearby source of contamination (i.e. slipway). Although there is the potential for fines to occur within dredge area 4 (in particular the deeper sediments) contamination is not expected to be present for the following reasons:</p> <ul style="list-style-type: none"> <li>• No nearby recorded contaminated sites.</li> <li>• No nearby contamination sources (i.e. slipway, stormwater outlet).</li> <li>• No contamination recorded in previous sediment sampling within the Ettalong Beach - Wagstaffe Shoal area (SESL,2013; Lawson and Treloar,2006)</li> <li>• Dominance of marine processes.</li> </ul>	<p>Yes <input type="checkbox"/></p>	<p>No <input checked="" type="checkbox"/></p>
<p>Is the likely proposal footprint in or nearby highly sloping landform?</p>	<p>Yes <input type="checkbox"/></p>	<p>No <input checked="" type="checkbox"/></p>
<p>Is the proposal likely to result in more than 2.5ha (area) of exposed soil?</p> <p>All dredging and dredged material placement will occur below water level.</p>	<p>Yes <input type="checkbox"/></p>	<p>No <input checked="" type="checkbox"/></p>
<p>Sediment processes within the Ettalong Entrance Channel area are complex and highly dynamic being driven by oceanic and estuarine processes. Sediment processes in the area have been well studied and are presented in a concept sediment transport model in Figure . Sediment movements within the vicinity of the entrance shoal can be summarised from WRL (2021) as follows:</p> <ul style="list-style-type: none"> <li>• Sand on the eastern flank of the shoal migrates in a general east-south-east direction toward the entrance channel and Lobster Beach/Little Box Head. Some sand is deposited on the outer shoal and some is worked upstream towards Half Tide Rocks.</li> <li>• The northern extent of the eastern flank migrates north and episodically moves through the channel onto the Wagstaffe Shoal.</li> <li>• Sand in the central northern area of the shoal moves onto and off Ettalong Point as well as around Ettalong Point to the north and under certain conditions back towards Ocean Beach. This is a particularly dynamic area of the shoal.</li> <li>• Sand on the western perimeter of the shoal migrates in a north west direction onto Ocean Beach.</li> <li>• The dominant sediment transport pathway on Ocean Beach is alongshore transport towards the east around Ettalong Point and onto Ettalong Beach.</li> </ul> <p>Sand placed in placement envelope A is expected to migrate in a north-westerly direction and eventually into the nearshore zone of Ocean Beach, contributing to the bolstering of sand supply to Ocean Beach. Sand placed in placement envelope B is expected to contribute to sand supply on Ettalong Point. Additional sand here may help buffer against the formation of a nearshore channel or shoal blow out. It may also migrate to the west onto Ocean Beach or in a northerly direction onto Ettalong beach, depending on prevailing conditions. Sand placed in placement envelope C is expected to migrate into the eastern and southern areas of the shoal.</p> <p>Sand placed in envelopes A and B are located a significant distance from the Ettalong Channel and is not expected to directly migrate back into the entrance channel. Sand in envelope C, which is still located approximately 200 m from the entrance would likely migrate back into the channel over time. To minimise the likelihood of sand moving back into the</p>		



entrance channel, envelope A is the preferred placement location. If circumstances arise that make the use of envelope A unfavourable, unfeasible or impractical, envelopes B and C would be used, subject to the preparation of a Dredged Material Placement Management Plan.

The placement of sand in a nearshore coastal environment has the potential to influence nearshore wave behaviour. In particular sand placed in envelope A has the potential influence the Box Head surf break by potentially creating 'close out' sections of the wave if the sand is placed too shallow and/or too close to the break. A number of safeguards have been identified below to minimise impacts on the surf break. With the implementation of these safeguards, the placement of sand in envelope A is not expected to negatively impact the surf break. Depending on prevailing shoal conditions, the placement of sand here may positively impact the break.

Modification of the bed form through sand placement, particularly for envelope A, has the potential to change wave refraction and lead to unintended wave focussing. This has the potential to change the morphological characteristics of inshore areas and could, for example, cause the formation of new channels, bars or beach erosion. It is important that the safeguards identified below are implemented to minimise the influence of sand placement on wave behaviour and associated impacts. With the implementation of these safeguards wave related impacts are expected to be minor.



Figure 3-1: Ocean Beach - Ettalong Beach conceptual sediment transport model. Source: WRL, 2021.

**Safeguards**

Safeguards to be implemented are:

- S1. Dredge cut batters are to be no steeper than 1(V) in 4(H).

- S2. A Dredged Material Placement Plan would be developed prior to works. The plan is to include the following:
  - A hydrographic survey of the target envelope area and immediate surrounds is to be undertaken prior to the preparation of the plan.
  - Identification of target placement areas and specification.
  - Include consultation with Department Planning and Environment – Environment and Heritage Group and Umina Boardriders to ensure minimal impacts on coastal processes and surf break.
  - Review of elevations and batter slopes and other placement specifications based on survey and consultation.
- S3. Material would be used to fill in holes and depressions and placed in an even and consistent manner across the placement envelopes to create a relatively uniform surface with no significant holes, high points or steep slopes.
- S4. Maximum placement elevations are not to exceed surrounding geomorphic features (e.g. crest of surrounding sand bar, etc.).
- S5. Placement allocations are to minimise potential impacts on surfing amenity and sand should be spread evenly to avoid unpredictable wave breaking or refraction in the vicinity of key surfing areas.
- S6. Batters for sand placement are to be no steeper than 1(V) in 6(H).
- S7. Envelope A would be filled to a maximum elevation of -2.0 m LAT.
- S8. Envelope B would be filled to a maximum of 0 m LAT.
- S9. Envelope C would be filled to a maximum of -0.5 m LAT.
- S10. Potential or actual acid sulphate soils would be managed in accordance with the Roads and Maritime Services Guidelines for the Management of Acid Sulphate Materials 2005.
- S11. No sediments or soils would be stockpiled at the laydown areas.

### 3.2 Waterways and water quality

Table 3-2: Waterways and water quality

Description of existing environmental and potential impacts		
Is the proposal located within, adjacent to or near a waterway? Dredging is located within the Ettalong Entrance channel which is located at the entrance to Brisbane Water in Broken Bay. The placement locations are located on the Ettalong entrance shoal offshore from Ocean Beach/Ettalong Point in Broken Bay.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Is the location known to flood or be prone to water logging? All works will be undertaken on the estuary and seabed below mean high water mark.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Is the proposal located within or immediately adjacent to the area managed by WaterNSW covered by chapter 8 of State Environmental Planning Policy (Biodiversity and Conservation) 2021 (SEPP (Biodiversity and Conservation))? Note: See map here - <a href="#">Sydney drinking water catchment map</a> .	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Would the proposal be undertaken on a bridge or ferry? The proposal would occur within the Ettalong entrance channel which is utilised by the Palm Beach ferry. The proposal would facilitate a safe navigation channel for the ferry. There may be some minor vessel restrictions, including the ferry, during dredging. However, any impact would be very minor and temporary. Any such temporary impacts would be far outweighed by the positive impact of returning a safe navigation depth to the channel (See Section 3.8).	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Is the proposal likely to require the extraction of water from a local water course (not mains)?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
<p>Dredging and dredged material placement has the potential to generate turbid water. The generation of turbidity at dredge areas 1 and 3 is expected to be minimal due to the dredging of clean marine sands. Clean marine sands typically contain little to no turbidity generating fines. Further, given the strong tidal flows and coastal processes any suspended sediments are expected to dissipate quickly. There will be some localised disturbance of sand within the direct vicinity of dredging however this will quickly settle out.</p> <p>Dredge area 4, although likely to consist mainly of clean marine sands, is subject to a higher influence of estuarine processes and therefore sediments within this area, particularly deeper sediments, may contain some fines. Due to the potential presence of fines there is also the potential for the generation of turbidity at this site. If fines are encountered turbidity would also be generated during placement and discharge of excess water from the dredge. Safeguards have been provided below to minimise impacts on water quality. With the implementation of these safeguards impacts to water quality are expected to be localised and temporary.</p> <p>The use of silt curtains is considered to be an unpractical and ineffective water quality measure for this proposal due to strong currents and swell that occurs within the proposal area. Further, the use of a trailing suction hopper dredge requires regular movements by a large vessel which would make the use of a silt curtain unfeasible.</p> <p>Working in around around waterways carries the inherent risk of accidental minor fuel and oil spills into a waterway. This risk can be effectively managed by the measures identified below. Visual monitoring would also consider signs for spillage of fuel/oil and emergency spill response kits would be used to contain any spills. In addition, a bund would be in place in any areas used to hold fuel and oil within the contractor's laydown area to prevent spills affecting adjacent foreshore and marine habitats.</p>		

**Safeguards**

Safeguards to be implemented are:

- WQ1. All efforts would be made to minimise the occurrence and extent of the sediment plumes throughout the course of the works.
- WQ2. A Water Quality Management Plan is to be prepared and is to include at least the following monitoring:
  - The dredge operator is to continually visually monitor the characteristics of the sand being dredged and placed. If material not consistent with 'clean marine sands' is encountered, dredging in that location is to cease and an appropriate course of action is to be developed in consultation with the TfNSW Project Manager.
  - During dredging of dredge areas 1 and 3, the dredge operator is to continually monitor, through visual observation of the dredge and placement areas to ensure that no visual impacts to water quality are occurring further than 50m from the disturbance areas.
  - During dredging of dredge area 4, formal turbidity monitoring using a calibrated WQ meter or other calibrated device (e.g. turbidity tube) is to be undertaken at the dredge and placement areas in addition to the visual observation described above. Turbidity monitoring is to be undertaken within 50 metres up-current (to determine ambient conditions) and 50 metres down-current of the dredge and discharge area.
  - Turbidity monitoring is to be undertaken 3-hourly during operations.
  - Turbidity at the down-current monitoring sites should not exceed 25NTU above ambient.
  - If turbidity exceedances occur, the TfNSW Project Manager is to be notified and appropriate course of action to be developed in conjunction. Action may include modification of dredge area, abandonment of dredge area, more detailed monitoring to evaluate risks or other additional controls.
  - Regardless of the sediment source location, if placement envelope B is used for sand disposal, formal turbidity monitoring of the site is to occur as outlined above.
  - Visual monitoring is to include inspections for fish kills or odd fish behaviour.
- WQ3. Vessels (including barges) are only to be used at suitable tides when no less than 600mm clearance is available between the underside of the vessel and the bed of the waterway.

- WQ4. Refuelling of plant and equipment and storage of hazardous materials on barges is to occur within a double-bunded area.
- WQ5. An emergency spill kit is to be kept on all vessels at all times and maintained throughout the construction work. The spill kit must be appropriately sized for the volume of substances on the vessel.
- WQ6. Spill kits for construction barges must be specific for working within the marine environment.
- WQ7. All workers will be advised of the location of the spill kit and trained in its use.
- WQ8. If an incident (e.g. spill) occurs, the Roads and Maritime Services Environmental Incident Classification and Reporting Procedure is to be followed and the Roads and Maritime Services Contract Manager notified as soon as practicable.
- WQ9. In the event of a maritime spill, the incident emergency plan would be implemented in accordance with Sydney Ports Corporation’s response to shipping incidents and emergencies outlined in the ‘NSW State Waters Marine Oil and Chemical Spill Contingency Plan’ (Maritime, 2012).
- WQ10. Emergency contacts will be kept in an easily accessible location on vehicles, vessels, plant and site office. All workers will be advised of these contact details and procedures.
- WQ11. Vehicles, vessels and plant must be properly maintained and regularly inspected for fluid leaks.
- WQ12. No vehicle or vessel wash-down or re-fuelling would occur on-site.
- WQ13. Appropriate site and project inductions/training detailing potential water quality impacts and relevant construction measures and spill and emergency response procedures to be used.
- WQ14. All fuels, chemicals and liquids are to be stored in an impervious bunded area a minimum of 50 metres away from:
  - Rivers, creeks or any areas of concentrated water flow.
  - Flooded or poorly drained areas.
  - Slopes above 10%.

### 3.3 Noise and vibration

Table 3-3: Noise and vibration

Description of existing environmental and potential impacts		
Are there any residential properties or other noise sensitive areas near the location of the proposal that may be affected by the work (i.e., church, school, hospital)? During construction?  The nearest sensitive noise receptors to the proposed dredge areas are residential residences at Wagstaffe and Ettalong Beach (approx. 400 metres from the closest dredge areas). Residences are located approximately 24m from both the laydown areas.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
During operation? The navigation channel will be subject to normal use following works.	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Is the proposal going to be undertaken only during standard working hours? Standard working hours <ul style="list-style-type: none"> <li>• Monday-Friday: 7:00am to 6.00pm</li> <li>• Saturday: 8.00am to 1.00pm</li> <li>• Sunday and Public Holidays: no work</li> </ul> It is anticipated that the majority of works would be undertaken during standard working hours. However, there would also be occasions where out of hours works would need to be undertaken to take advantage of optimum high tide. This would be required to improve the efficiency of the project as lower tides restrict access for a TSHD.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>



<p>Out of hours work may need to occur on any days during the expected works period depending on tides. After hours works would be limited to the operation of the dredge and work boat.</p>																						
<p>Is any explosive blasting required for the proposal?</p>	<p>Yes <input type="checkbox"/></p>	<p>No <input checked="" type="checkbox"/></p>																				
<p>Would construction noise or vibration from the proposal affect sensitive receivers?</p> <p>The most nuisance sound emissions will emanate from the operation of the dredge during the work period. The nearest sensitive noise receptors to the dredge area are residential residences at Wagstaffe and Ettalong Beach (approx. 400 metres from the dredge area) and residences approximately 24m from the laydown areas. Relevant background and noise management levels (NML) as outlined in the TfNSW Construction Noise Estimator Tool are provided below. Residences are considered to be best represented by the R2 noise area category. The background noise environment is likely to be typical of an inner suburban area, with local traffic, watercraft noise, commercial noise and to a small extent, ocean noise.</p> <p>Previous noise assessments indicate that noise levels emitted from dredge vessels are within the vicinity of 110dBA. Using the Transport for NSW Noise Estimator Tool (Appendix B) the estimated predicted noise level at the nearest residential receptor during dredging operations as 47 dB(A) during standard construction hours, which is less than the NML (55 dB(A)) and the OOHW day NML (50 dB(A)). However, noise levels at the nearest residential receptor are expected to exceed the NML during OOHW Period 1 by 2 dB(A) and OOHW Period 2 by 7 dB(A).</p> <table border="1"> <thead> <tr> <th></th> <th>Background noise level (dB(A))</th> <th>Noise management level (dB(A))</th> <th>Level above NML (dB(A))</th> </tr> </thead> <tbody> <tr> <td>Standard hours</td> <td>45</td> <td>55</td> <td>0</td> </tr> <tr> <td>Day (OOHW) Sat out of hours and Sunday</td> <td>-</td> <td>50</td> <td>0</td> </tr> <tr> <td>OOHW Period 1 6pm-10pm</td> <td>40</td> <td>45</td> <td>2</td> </tr> <tr> <td>OOHW Period 2 10pm-7am</td> <td>35</td> <td>40</td> <td>7</td> </tr> </tbody> </table> <p>The results indicate that works during standard hours would not result in any increase in noise levels above NMLs at surrounding receivers. It is only proposed to undertake works during standard working hours (without further assessment). No additional mitigation measures would be required in addition to those provided below for works within standard construction hours.</p> <p>In addition, it is noted that the residential area at Wagstaffe is located behind a large ridge line which is likely to attenuate incoming noise. Further, the noise of a dredge is similar to other large vessels that frequent the entrance area and therefore not dissimilar to noises typically experienced in the area.</p> <p>Noise emitted from the laydown would be limited to the delivery and removal of pipelines, plant and storage and therefore any noise impacts will be minor and temporary. If the boat ramp is used for the launch and retrieval of the crane and work boats some minor localised noise impacts may occur. Any noise generated would be consistent with the typical noise of the location (cars, truck, trailers, boats etc.) and be intermittent. The laydown area on The Esplanade may be used for the assembly of pipelines which would be noise generating works. Such works would be limited to standard work hours and occur intermittently.</p>		Background noise level (dB(A))	Noise management level (dB(A))	Level above NML (dB(A))	Standard hours	45	55	0	Day (OOHW) Sat out of hours and Sunday	-	50	0	OOHW Period 1 6pm-10pm	40	45	2	OOHW Period 2 10pm-7am	35	40	7	<p>Yes <input type="checkbox"/></p>	<p>No <input checked="" type="checkbox"/></p>
	Background noise level (dB(A))	Noise management level (dB(A))	Level above NML (dB(A))																			
Standard hours	45	55	0																			
Day (OOHW) Sat out of hours and Sunday	-	50	0																			
OOHW Period 1 6pm-10pm	40	45	2																			
OOHW Period 2 10pm-7am	35	40	7																			
<p>Would operation of the proposal alter the noise environment for sensitive receivers? This might include, but not be limited to, altering the line or level of an existing carriageway, changing traffic flow, adding extra lanes, increasing traffic volume, increasing the number of heavy vehicles, removing obstacles that provide shielding including changing the angle of view of the traffic, changing the type of pavement, increasing traffic speeds by more than 10km/hour or installing audio-tactile line markings.</p>	<p>Yes <input type="checkbox"/></p>	<p>No <input checked="" type="checkbox"/></p>																				
<p>Would the proposal result in vibration being experienced by any surrounding properties or infrastructure during operation?</p>	<p>Yes <input type="checkbox"/></p>	<p>No <input checked="" type="checkbox"/></p>																				

It is also unlikely that any vibration from the proposal would be an issue with residential receivers as there are no activities associated with the proposal that would create vibration.

There are no other noise issues or impacts of the proposal in construction and operation.

**Safeguards**

Safeguards to be implemented are:

- N1. Construction vehicles and equipment will be suitably serviced prior to works and appropriately maintained during construction activities.
- N2. Plant that is not being used will be turned off.
- N3. Works are to be undertaken within standard working hours wherever possible. If works within standard working hours is not possible due to tidal conditions etc. noise impacts are to be minimised in accordance with the TfNSW Noise Estimator Tool including additional measures as applicable. Any works outside of standard working hours would be subject to approval from the relevant TfNSW representative.
- N4. The community must be notified of all work outside standard hours which have the potential to impact noise sensitive receivers. Notification zones must be determined using the TfNSW Noise Estimator Tool. Notification requirements must comply with the RMS Construction Noise and Vibration Guideline.
- N5. Loading and unloading of materials/deliveries is to occur as far away as possible from sensitive receivers.
- N6. Dedicated loading/unloading areas are to be shielded if close to sensitive receivers.
- N7. The laydown area is to be located away from sensitive receivers where practical.

**3.4 Air quality**

Table 3-4: Air quality

Description of existing environmental and potential impacts		
Is the proposal likely to result in large areas (>2ha) of exposed soils? All dredging and dredged material placement would occur below water level.	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Are there any dust-sensitive receivers located within the vicinity of the proposal during the construction period?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Is there likely to be an emission to air during construction? Emissions generated from dredge and work boats will emit particulate matter and gaseous emissions. With appropriate maintenance and operation of the machinery, it is not anticipated that air quality would be negatively impacted during the works. All work areas are open air.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Limited plant and machinery would be required for the proposal. No other air quality issues or impacts of the proposal in construction and operation are anticipated.		

**Safeguards**

Safeguards to be implemented are:

- AQ1. If plant or machinery begin to emit excessive emissions they would be turned off until the issue is rectified.

### 3.5 Aboriginal heritage

Table 3-5: Aboriginal heritage

Description of existing environmental and potential impacts		
Would the proposal involve disturbance in any area that has not been subject to previous ground disturbances?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Has an online Aboriginal Heritage Information Management System (AHIMS) search been completed?  An extensive AHIMS search of the dredging areas, placement areas and laydown areas was undertaken. No Aboriginal sites, objects or place were located within the footprint of the proposal. AHIMS results are included in Appendix C.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Is there potential for the proposal to impact on any items of Aboriginal heritage?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Would the proposal involve the removal of mature native trees?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Is the proposal consistent with the requirements of the legacy <i>Roads and Maritime Procedure for Aboriginal cultural heritage consultation and investigation</i> (PACHCI)?  A PACHCI Stage 1 assessment checklist was completed and sent to the relevant Aboriginal Community and Heritage Partner for assessment on 21/06/2023 who assessed that the proposal is unlikely to have an impact on Aboriginal cultural heritage (Appendix C).	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Although no Aboriginal sites or objects are located within the footprint of the proposal there are a significant number of sites/objects located nearby to the proposal, particularly along the foreshore of the Lobster Beach-Half Tide Rocks area. Staff undertaking work must be aware of all Aboriginal sites within the vicinity of the proposal area to ensure these sites are not impacted.		

#### Safeguards

Safeguards to be implemented are:

- ACH1. If any potential Aboriginal objects (including skeletal remains) are discovered during the course of the proposal, all works in the vicinity of the find must cease. Steps in the Transport for NSW *Standard Management Procedure: Unexpected Heritage Items* must be followed.
- ACH2. If the scope of the proposal changes the relevant Aboriginal Community and Heritage Partner and Environmental
- ACH3. Due to the large number of Aboriginal sites and/or objects within the vicinity of the proposal area, including middens, this area is regarded as highly sensitive. Staff undertaking work must be aware of all Aboriginal sites within the vicinity of the proposal area to ensure these sites are not impacted.

### 3.6 Non-Aboriginal heritage

Table 3-6: Non-Aboriginal heritage

Description of existing environmental and potential impacts		
Have online heritage database searches been completed?  <ul style="list-style-type: none"> <li>• Transport (including legacy Roads and Maritime) section 170 register.</li> <li>• NSW Heritage database.</li> <li>• Commonwealth Heritage List, established under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act).</li> <li>• Australian Heritage Places Inventory.</li> <li>• Local Environmental Plan(s) heritage items.</li> </ul> Searches of the following were undertaken:	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

<ul style="list-style-type: none"> <li>• Transport (including legacy Roads and Maritime) section 170 register.</li> <li>• State Heritage Inventory</li> <li>• Australian Heritage Database</li> <li>• Central Coast Local Environmental Plan 2022– Heritage (Online Mapping)</li> <li>• Australasian Underwater Cultural Heritage Database</li> </ul>		
Are there any items of non-Aboriginal heritage or heritage conservation areas listed on relevant heritage databases/registers that are located within the vicinity of the proposal?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Is the proposal likely to impact trees that form part of a heritage listing or have other heritage value?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Is the proposal likely to occur in or near features that indicate potential archaeological remains?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

**Safeguards**

Safeguards to be implemented are:

- H1. If unexpected heritage items are uncovered during the works, all works must cease in the vicinity of the material/find and the steps in the Roads and Maritime Services Standard Management Procedure: Unexpected Heritage Items must be followed. Roads and Maritime Services Senior Environment Specialist - Heritage must be contacted immediately.

**3.7 Biodiversity**

Table 3-7: Biodiversity

Description of existing environmental and potential impacts		
<p>Have relevant database searches been carried out?</p> <p>An aquatic ecological assessment (AEA) was prepared by H20 (2023) for the proposal (Appendix E). The assessment identifies and considers impacts of the proposal on aquatic/marine habitat, key fish habitat, estuarine macrophytes and fauna species. This includes migratory and threatened species, seagrass and macroalgae, marine birds, shorebirds and waders, marine mammals and reptiles, fish, sharks, rays and marine invertebrates.</p> <p>H20 (2023) undertook the following database searches for the proposal.</p> <p>Relevant databases were searched during March 2022, applying a ~10 km radius around the Study Area to identify threatened biodiversity, migratory species and MNES that may potentially occur at the locality. Some more current sightings data may be available for some species; however, this additional data is unlikely to include fish, sharks, rays or marine invertebrates that have potential to be impacted by this proposal.</p> <p>The Study Area referred to within the AEA, and this section of the REF, is the collective area within the dredge areas and placement areas. The following databases and information sources were searched:</p> <ul style="list-style-type: none"> <li>• Bionet, Atlas of NSW Wildlife (last 20 years).</li> <li>• NSW DPI Fisheries Threatened Species Lists (NSW DPI 2023a) (a search for estuarine/marine species was conducted in June 2023).</li> <li>• Fisheries NSW Spatial Data Portal – Mapping of Estuarine Macrophytes, Aquaculture, Marine Protected Areas, Key Fish Habitats and Coastal Management SEPP layers (NSW DPI 2023b).</li> <li>• EPBC Act Protected Matters Report tool.</li> <li>• Atlas of Living Australia (fish, sharks and rays only).</li> <li>• Various recent aerial image captures.</li> </ul>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<p>Did the database searches identify any endangered ecological communities, threatened flora and/or threatened or protected fauna, or migratory species in or within the vicinity of the proposed works? Both Commonwealth and State listed matters must be considered.</p>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>



<p>Searches of the Bionet database identified sightings data for 47 items listings under the BC Act within a ~10 km radius of the Study Area). These included:</p> <ul style="list-style-type: none"> <li>• 20 Threatened marine birds and/or shorebirds,</li> <li>• 4 Threatened marine mammals; and</li> <li>• 3 Threatened marine reptiles.</li> </ul> <p>Review of Threatened Species Listings under the FM Act that may occur in the Study Area or wider locality (catchment or adjacent waters) identified the following listings relevant to this study:</p> <ul style="list-style-type: none"> <li>• 4 Threatened sharks and rays,</li> <li>• 3 Threatened fish; and</li> <li>• 1 Invertebrate.</li> </ul> <p>The EPBC Protected Matters Report Search identified the following MNES relevant to this study (i.e. marine/estuarine species or those that use marine/estuarine habitat) within ~10 km radius of the Project Area (Appendix 2):</p> <ul style="list-style-type: none"> <li>• 50 Listed Threatened species,</li> <li>• 70 Listed Migratory species; and</li> <li>• 8 Threatened Ecological Communities (TEC).</li> </ul> <p>In addition to the above, the EPBC Protected Matters Report Search identified 91 protected marine species that include certain species of fish, along with some marine birds, reptiles and mammals. A total of 2 marine mammals were identified as part of protected listings for cetaceans (Appendix 2).</p> <p>Of the Commonwealth listed Threatened and/or Migratory species and communities, the following were identified for consideration as part of this assessment:</p> <ul style="list-style-type: none"> <li>• 37 Marine birds and shorebirds,</li> <li>• 2 Marine mammals,</li> <li>• 5 Marine turtles,</li> <li>• 6 Fish.</li> </ul> <p>In total 71 marine birds (including shorebirds and waders), 11 marine mammals, 5 marine reptiles, 9 sharks and rays, 6 fish, 1 invertebrate and 1 TEC which are considered threatened and/or migratory species were identified to require a review of habitat and potential of occurrence. A summary of all threatened and migratory species considered as part of the AEA, along with consideration of their likelihood of occurrence within the Study Area and potential to be impacted, is provided in Appendix E of this REF.</p>		
<p>Does the proposal involve pruning, trimming or removal of any tree/s?</p>	<p>Yes <input type="checkbox"/></p>	<p>No <input checked="" type="checkbox"/></p>
<p>Is the proposal likely to impact nationally listed threatened species, ecological communities or migratory species?</p> <p>Below comments are extracted from H20 (2023).</p> <p><b>Surveys</b></p> <p>Site investigations included survey and visual inspection of representative areas of the seabed during May 2022. This included area inside and within 25 m of each of the preliminary dredge and placement areas. These included surveys of benthic habitat to identify and map any seagrasses or other sensitive communities e.g. macroalgae and soft corals. Visual observations to verify the seabed habitat were made using a combination of towed camera transects and spot observations using a bathyscope, drop camera or, in the cases of shallow areas and during periods of clear water, observation from the side of the boat.</p> <p>A pre-works clearance survey of potential habitat for seagrass and soft corals establishment inside and within 25 m of each of the current identified dredge and sand placement areas were conducted in July 2023.</p> <p><b>Posidonia australis</b></p> <p>Surveys of the Study Area found the seagrass <i>Posidonia australis</i>, considered an Endangered Population under the FM Act and an Endangered Ecological Community under the EPBC Act, to occur well outside and to the east of Dredging Area 4 (refer to Figure 3-2). The proposed dredging activities are expected to be confined to a distance of 80 m or more from the nearest <i>P. australis</i> stand (based on mapping completed in 2022). Further, pre-dredging surveys conducted in July 2023 did not find any seagrass, including <i>P. australis</i> within the study area. This is also likely to provide a sufficient buffer from any localised and short-term reductions in water quality and increased sedimentation. Any required dredge pipelines area also likely to be positioned to adequately avoid nearby seagrasses, which do not occur within potential routes between the dredge and disposal</p>	<p>Yes <input type="checkbox"/></p>	<p>No <input checked="" type="checkbox"/></p>

areas. Given the avoidance of these seagrass areas, the proposed dredging activities are not expected to have any direct impact on *P. australis* seagrass beds, which are located well outside the Study Area. Further assessment through a 7-Part test as well as the Significant Impact Criteria is not required.

**Cauliflower Soft Coral**

During the Site Survey a search of the Dredging Area and surrounding seabed areas was undertaken for the Endangered Cauliflower Soft Coral (*Dendronephthya australis*), which has previously been recorded near to Lobster Beach approximately 185 m to the southeast of Dredge Area 3 (H2O Consulting Group 2019). A map showing previous occurrences of *D. australis* is provided in Appendix E of this REF. However, the Cauliflower Soft Coral was not found to occur at this or any other location in the Study Area during site surveys in 2022. Thus, it is possible that significant flooding events and prolonged periods of freshwater flows within the Hawkesbury River that discharges into Broken Bay between 2019 and 2022 may have impacted on this species and the local population that occurs in the locality. The current dredging proposal has also been designed to avoid the areas that this species has been previously recorded within. Thus, based on the absence of this species in the wider locality, which was surveyed in 2022 and detection during the pre-dredging surveys in July 2023, it has been assumed to have a low likelihood to currently occur within the Study Area. Further assessment through a 7-Part test as well as the Significant Impact Criteria is not required.

**Threatened marine birds, shorebirds and waders**

Marine birds regularly use the aerial and subtidal estuarine habitats associated with the Study Areas to forage, while shorebirds and wader may at times use aerial habitats to travel between foraging, resting and roosting habitats. The proposal is confined to subtidal areas and therefore not expected to result in any direct impacts to shorebirds or waders.

A wide diversity of marine birds that forage along the NSW coastline are likely to also forage in habitat within the Study Area at times. These species are typically birds of flight that forage aerially over large areas of water along the coastline and at sea. The potential for detrimental impacts to the water quality from the proposed dredging operations is considered to be generally minor in spatial extent considering the vast areas of coastal waters these species utilise for foraging. Any potential impacts are also likely to be very short-term, given the tidal exchange of the area and the clean marine sand substrate, allowing the substrate to settle and disperse quickly. Given the above, it is highly unlikely that any disturbance to aerial foraging for these species would be of ecological significance, thus further assessment is not required.

**Threatened marine mammals**

It is unlikely that larger marine mammals such as cetaceans (whales) would enter the shallow, narrow channels. Use of channel waters by any smaller marine mammals, such as dolphins and fur-seals, is likely to occur on occasions as part of transient movements in and out of Brisbane Waters for opportunistic feeding or for refuge. Given these species forage over very large areas including those within the channel, and particularly coastal waters outside the channel entrance, when considered against the relatively small extent of the Study Areas the potential for ecologically significant impacts on these species as a result of the proposed maintenance dredging works is minimal.

The proposed maintenance dredging may have potential to impact on some areas of foraging and refuge habitat for threatened fur-seal species (listed as vulnerable under the BC Act and Marine under EPBC Act) that may occasionally occur in the Study Area or adjacent waters A Five-Part Test was conducted to consider these potential impacts and concluded that the proposed action is not expected to have a significant impact on Fur-seals or the local population that occurs within Broken Bay.

**Threatened marine reptiles**

Seagrass habitat provides foraging habitat for some marine turtles, particularly the Green Turtle (*Chelonia mydas*). No seagrass loss or seagrass habitat modification as a result of the proposed works is expected to occur. No seagrass loss or seagrass habitat modification as a result of the proposed works is expected to occur. Dredging is proposed to avoid areas of previously mapped established seagrasses and adhere to 5 m buffer zones around any remaining seagrasses that occur within the Study Area in the Ettalong Channel. While these species may visit the area at times, they typically forage over very large areas of coastline and the lack of seagrasses within the Study Area renders the habitat of minimal significance to marine turtles. Any small-scale habitat changes confined to the Study Area during or following dredging works are considered to be of minimal ecological significance to foraging prospects for species of marine turtles.

<p>The proposed maintenance dredging works are not expected to generate any ecologically significant levels of underwater noise that has potential for detrimental physiological or behavioural responses by marine turtles should they be present in the vicinity.</p> <p>The works are also not considered likely to result in any short-term or sustained increases in vessel movements that could potentially pose an increased risk of vessel strike for any marine turtles that may transiently occur in the Study Area during dredging operations. In general, impacts from the maintenance dredging on threatened and migratory marine turtles that may occur in the Study Area during dredging activities are considered very minimal.</p> <p><b>Threatened fish and sharks</b></p> <p>The Vulnerable Great White Shark is also likely to utilise waters within the Ettalong Channel to travel between habitats within the Brisbane Water Estuary and Broken Bay and the associated adjacent coastal waters. However, any occurrence in the Study Area, is most likely part of transient movements, while any disturbance to prey availability from these works is considered to be of minimal ecological significance to this species.</p> <p>The Critically Endangered Grey Nurse Shark is known to be common around headlands and reefs in nearby coastal waters, especially in depth of 10m or more and where large drop-offs and deep gutters occur amongst the reef structure. Use of habitat inside Broken Bay by Grey Nurse Sharks is considered rare and the predominately shallow sandy shoals are unlikely to be of ecological significance to primarily reef dwelling species (NSW DPI 2013).</p> <p>Cryptic species such as protected Syngnathid fishes are likely to utilise habitat associated with the seagrasses in the vicinity of dredging areas. This may potentially include the Endangered White's Seahorse (<i>Hippocampus whitei</i>), which is known to occur within Brisbane Water. Loss of seagrass habitat, or reduction in seagrass habitat quality also may impact on future residency in the locality by this species. The natural habitat of White's Seahorse includes seagrass beds, with a preference for <i>P. australis</i> in some estuaries (NSW DPI 2019), so the potential for its use of seagrass habitat in those areas is high. Given the <i>P. australis</i> and other seagrass beds that are present in Brisbane Water, as well as any previously mapped soft coral, are not within any proposed dredging areas and not expected to be directly or indirectly impacted, the proposed dredging works are not expected to impact on either habitat for the White's Seahorse directly.</p> <p>The Vulnerable Black Rockcod (<i>Epinephelus daemeli</i>) may occur in the locality, however use of habitat is typically confined to deep drop-offs and ledges associated with headlands and coastal waters (NSW DPI 2012). The occurrence of the species in the Study Area is considered to be rare and, while the significance of habitat (shallow areas of shoaling clean marine sands) to be disturbed during these dredging works is considered to be of minimal ecological significance to this species.</p>		
<p>Would the proposal require the removal of any other vegetation?</p>	<p>Yes <input type="checkbox"/></p>	<p>No <input checked="" type="checkbox"/></p>
<p>Would the proposal require the removal of any tree hollows?</p>	<p>Yes <input type="checkbox"/></p>	<p>No <input checked="" type="checkbox"/></p>
<p>Are there any known areas of outstanding biodiversity value or areas mapped as 'littoral rainforest' or 'coastal wetland' under chapter 2 of SEPP (Resilience and Hazards) in or within the vicinity of the proposed work?</p>	<p>Yes <input type="checkbox"/></p>	<p>No <input checked="" type="checkbox"/></p>
<p>Would the proposal provide any additional barriers to the movement of wildlife?</p>	<p>Yes <input type="checkbox"/></p>	<p>No <input checked="" type="checkbox"/></p>
<p>Would the proposal disturb any natural waterways or aquatic habitat?</p> <p>Bed disturbance would be limited to within the dredging and placement areas. The total dredge area would cover approximately 46,000m<sup>2</sup> and the total placement area is unlikely to exceed 100,000 m<sup>2</sup> in one dredging campaign. Dredge cut depths range from &lt;0.5m to 2.5m. The disturbance within the dredge areas is not considered to be significant as it is maintenance dredging, restoring areas of the channel to previous depths. Disturbances within the placement area would be restricted to the placement of dredged material. Any disturbance from the</p>	<p>Yes <input checked="" type="checkbox"/></p>	<p>No <input type="checkbox"/></p>

<p>placement of the material would be temporary as the material would be quickly reworked into and through the active shoal area.</p> <p>Habitat to be disturbed is limited to the soft sediment habitat within the dredge and placement areas. Removal of soft sediment from within the Dredging Area will result in the loss of infaunal community assemblages inhabiting the volume of sediment that will be removed. These assemblages are likely to consist of various polychaetes, gastropods and bivalves. The extent and magnitude of any disturbance to or loss of infauna as a result of the proposed dredging is not expected to occur at any ecologically relevant scale. Infauna occupying surface sediments may also be smothered during the Sand Placement, as a result some animals may perish where they can escape or migrate away from the sediment that is placed. Given the sediment volumes proposed to be moved and the very active sand movements that occur on the Ettalong Shoal, the magnitude of any smothering processes is likely also be of minimal ecological significance.</p> <p>The proposal will avoid all areas of seagrass, macroalgae, soft coral and rocky habitat.</p>		
<p>Would the proposal impact (directly or indirectly) any potential microbat roosting or breeding habitat such as on bridges and culverts?</p>	<p>Yes <input type="checkbox"/></p>	<p>No <input checked="" type="checkbox"/></p>

**Safeguards**

Safeguards to be implemented are:

- B1. There is to be no disturbance or damage to threatened species or areas of outstanding value.
- B2. Works are not to harm threatened fauna (including where they inhabit bridges or other structures e.g. timber fence posts or maritime piles).
- B3. If unexpected threatened fauna or flora species are discovered, stop work immediately and follow the Roads and Maritime Services Unexpected Threatened Species Find Procedure in the Roads and Maritime Services Biodiversity Guidelines 2011 – Guide 1 (Pre-clearing process).
- B4. Seagrass maps are to be prepared for incorporation into the project CEMP or equivalent that identify seagrass boundaries (or any other sensitive habitats) and required buffers and would require updating after 12 months.
- B5. The CEMP or equivalent document should include information to assist in identifying the threatened *P. australis* seagrass community and Endangered Cauliflower Soft Coral that occurs or may occur within the locality.
- B6. All vessels and the site compound are to have on hand appropriate spill kits and bins for disposal of all rubbish and debris. This should include adequate hydrocarbon booms.
- B7. Local NPWS officers are to be contacted regarding recent use of the shoreline between Little Box Point and Half Tide Rocks by Fur-seals.
- B8. No works, including vessel launching, beaching, or any operation, or laying of pipes are to occur within 10 m of any seagrasses.
- B9. If any Cauliflower Soft Corals are seen during within 10m of any works, works must stop immediately and a marine ecologist should be notified. The marine ecologist and project team must consult with DPI Fisheries to assess appropriate management actions as above.
- B10. No mooring or beaching of vessels within any seagrass areas or any other marine vegetation.
- B11. The NSW NPWS Guidelines for approach distance to Seals must be adhered to at all times. Should this not be possible the project ecologist and NPWS must be notified immediately.
- B12. No dredge pipes are to be placed over seagrasses or rocky intertidal or subtidal areas.
- B13. All equipment to be brought to the Project Area must be thoroughly cleaned and free of substrate to avoid introduction of species such as *C. taxifolia*. Given the potential for *C. taxifolia* in nearby areas, equipment should be also thoroughly cleaned following the completion of the project to prevent spread of the species to other areas.

- B14. If *C. taxifolia* is found within the Study Area, it should be avoided and not disturbed to minimise further spread to other areas of the Study Area. If dredging vessels or equipment are found to have caught *C. taxifolia* during works, they should be thoroughly cleaned with fresh water, with all biota safely disposed of on land.
- B15. Environmental controls such as sediment and erosion controls, and if necessary, the position of dredge pipes, should be inspected weekly by a TfNSW Environmental Scientist or an independent environmental consultant.
- B16. No dredging of additional areas is to occur without further consideration of aquatic ecological impacts.
- B17. Hydrocarbon-based products would be stored in the storage container in the laydown area only.



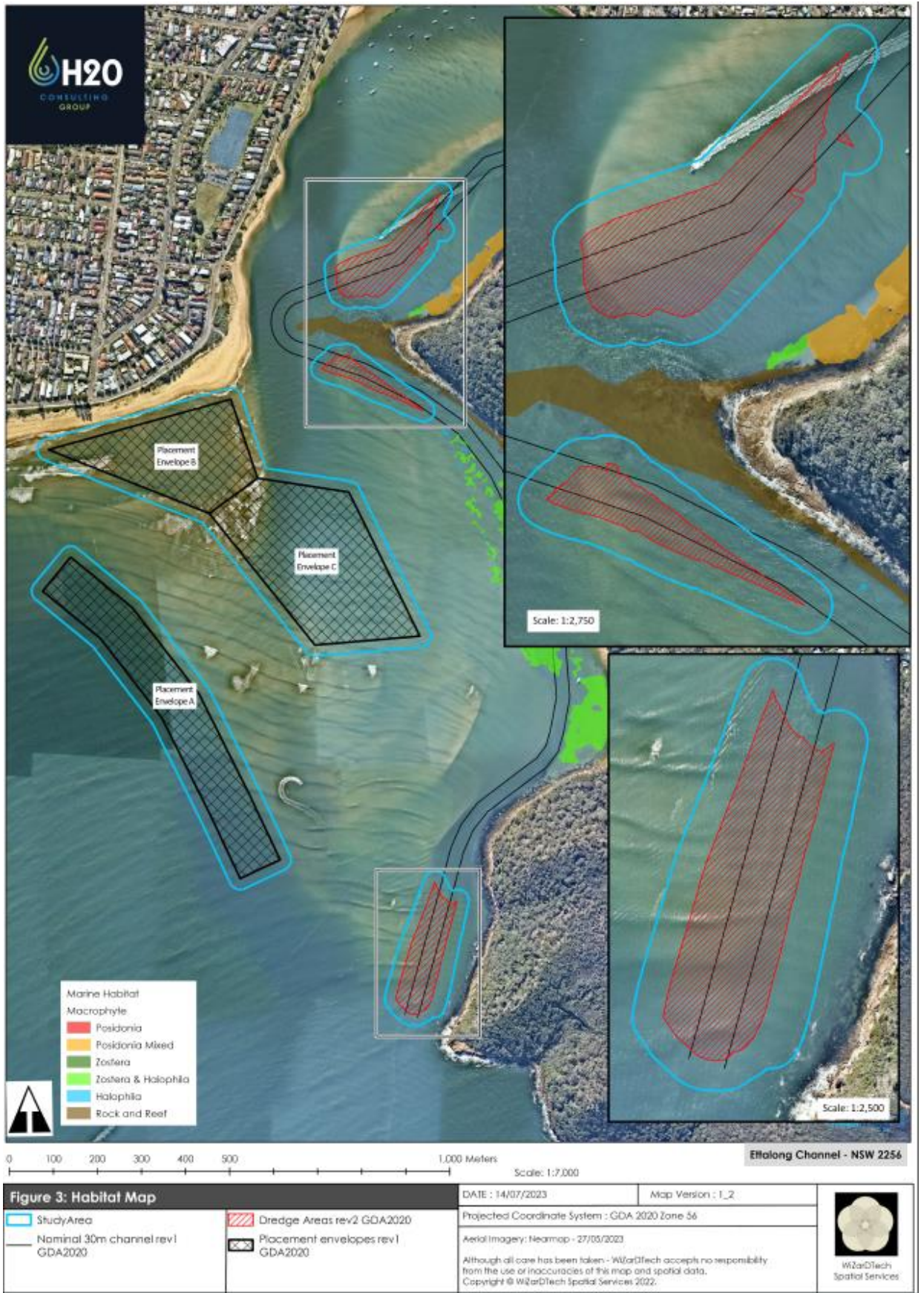


Figure 3-2 Habitat map showing aquatic habitat near to the Study Area

### 3.8 Traffic and transport

Table 3-8: Traffic and transport

Description of existing environmental and potential impacts		
Is the proposal likely to result in detours or disruptions to traffic flow (vehicular, cycle and pedestrian) or access during construction?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
The laydown area will restrict vehicular parking within the parking area whilst in place. The car park is an unsealed informal parking area used beach goers. Any impact will be temporary with no ongoing impacts. Pedestrian access from The Esplanade to the foreshore will be maintained.		
Is the proposal likely to result in detours or disruptions to traffic flow (vehicular, cycle and pedestrian) or access during operation?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Is the proposal likely to affect any other transport nodes or transport infrastructure (e.g., bus stops, bus routes) in the surrounding area? Or result in detours or disruptions to traffic flow (vehicular, cycle and pedestrian) or access during operation?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
<p>Currently ferry services and other large vessels utilising Ettalong entrance channel are severely restricted by the shoaling within the channel. Ferry services have at times been cancelled due to safety concerns around the shallowness of the shoaling. The proposal would remove the priority shoaling areas restoring navigable depths to the channel. This would have a positive impact on the ferry services and large vessel utilisation of the channel.</p> <p>The dredge, whilst in operation, and moored between dredging and pipelines (if required) would result in localised restrictions on vessel traffic. However, any impact would be minor and localised and the benefits of shoal removal on overall navigation and vessel traffic far outweigh these impacts. Impacts on vessel traffic during dredging would be minimised by the identified safeguards below.</p>		

#### Safeguards

Safeguards to be implemented are:

- T1. The footprint of the laydown area is to be minimised where possible.
- T2. Pedestrian access to be maintained through to the foreshore at the laydown area.
- T3. A permit is to be sought from Central Coast Council for the use of the laydown area/s as required.
- T4. Where possible, current vessel movements are to be maintained during works. Any disturbance is to be minimised as much as practicable.
- T5. A Vessel Traffic Management Plan (VTMP) is to be prepared prior to the commencement of works in consultation with the local Boating Safety Officer and implemented.
- T6. In accordance with the VTMP appropriate navigation markers, warnings, lighting and signage would be installed to demarcate dredge and placement areas, locations of pipeline and dredge.
- T7. All work vessels must comply with the Marine Safety (Domestic Commercial Vessel) National Law Act 2012, the Marine Safety Act 1998, and all relevant subordinate legislation.
- T8. All work vessels must exhibit lights and shapes in accordance with International Regulations for Preventing Collisions at Sea 1972.
- T9. Prior to commencement of any work, the development and implementation of Vessel Traffic Management Plan (VTMP) must be undertaken by the contractor in consultation with the local Boating Safety Officer.
- T10. All pipes and associated equipment which will restrict or vary existing navigation conditions must be clearly marked, including the use of lights at night, to reduce the risk to vessel navigation and safety. Appropriate markings shall be identified within the VMP.



- T11. It is the contractor’s responsibility to supply, install, maintain, and remove all navigation aids that are required by the VTMP over the duration of the works, which may include:
  - Navigation channel lateral marks
  - Channel blocked/closed signals
  - Navigation marks or signage required by NSW Maritime to ensure the safe and efficient operation of the navigation channel or channels through or around the works and temporary removal, relocation, or covering of any existing contradictory or superfluous signs, buoyage or navigation marks.
  - The dredge Master shall maintain a radio listening watch on VHF channel 16 at all times.
  - Any marine pollution resulting from a work vessel must be reported to TfNSW by phoning 13 12 36, along with notifying the Senior Boating Safety Office.
  - Notification shall be provided to NSW Maritime if the proposal duration is to extend.
  - All items including vessel, plant, machinery and auxiliary equipment must be removed from NSW State Waters on completion of the works unless they otherwise hold an appropriate licence.

### 3.9 Socio-economic

Table 3-9: Socio-economic

Description of existing environmental and potential impacts		
<p>Is the proposal likely to impact on local business?</p> <p>Currently shoaling within Ettalong entrance channel is severely restricting ferry services and large vessel movements to Ettalong and Wagstaffe. A reduction in ferry services leads to a reduction in tourists which impacts local businesses. The reduction in ferry services also restricts commuters which would also impact business. The proposal will restore navigable depths to the entrance channel facilitating the return of ferry services and large vessel movements and subsequently have a positive impact on local business.</p>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<p>Is the proposal likely to require any property acquisition?</p>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
<p>Is the proposal likely to alter any access for properties (either temporarily or permanently)?</p>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
<p>Is the proposal likely to alter any on-street parking arrangements (either temporarily or permanently)?</p> <p>Either of laydown sites would require the temporary use of car park space. Public parking within the footprint of the laydown area would not be available during works. At The Esplanade the laydown area is approximately 300m<sup>2</sup> and approximately 100m<sup>2</sup> (or 3 car park spaces). Use of the laydown area would be restricted to the period of works (4-8 weeks). As such, any impact on parking is expected to be minor and temporary.</p>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
<p>Is the proposal likely to change pedestrian movements or pedestrian access (either temporarily or permanently)?</p> <p>Pedestrian access to the foreshore will be maintained at the laydown site.</p>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
<p>Is the proposal likely to impact on any items or places of social value to the community (either temporarily or permanently)?</p>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
<p>Is the proposal likely to reduce or change visibility of any businesses, farms, tourist attractions or the like (either temporarily or permanently)?</p>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
<p>Is the proposal likely to impact trees planted by a community group, Landcare group or by council or a tree that is a memorial or part of a memorial group e.g., has a plaque?</p>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Is the proposal likely to impact trees that form part of a streetscape, an avenue or roadside planting?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
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**Safeguards**

Safeguards to be implemented are:

- C1. Notification is to be given to affected community members prior to the works taking place. The notification is to include:
  - Details of the proposal
  - The duration of works and working hours
  - Any changed traffic or access arrangements
  - How to lodge a complaint or obtain more information
  - Contact name and details.
- C2. Notification should be a minimum of 7 calendar days prior to the start of works.
- C3. All complaints are to be recorded on a complaints register and attended to promptly.

### 3.10 Landscape character and visual amenity

Table 3-10: Landscape character and visual amenity

Description of existing environmental and potential impacts		
Is the proposed work over or near an important physical or cultural element or landscape? (For example, heritage items and areas, distinctive or historic built form, National Parks, conservation areas, scenic highways etc.)?  The proposal would be in The Ettalong Entrance Channel which is in a location of high visual amenity and scenic value	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Would the proposal obstruct or intrude upon the character or views of a valued landscape or urban area? For example, locally significant topography, a rural landscape or a park, a river, lake or the ocean or a historic or distinctive townscape or landmark?  The presence of a dredge and associated plant machinery on a highly scenic waterway may detract from the amenity of the location. Further the presence of a laydown area at either site would detract from the visual amenity of the foreshore at either location. The laydown area may also disrupt views of the waterway from nearby residences. However, any impact is expected to be temporary being restricted to the period of works only (4-8 weeks per campaign).	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Would the proposal require the removal of mature trees or stands of vegetation, either native or introduced?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Would the proposal result in large areas of shotcrete visible from the road or adjacent properties?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Would the proposal involve new noise walls or visible changes to existing noise walls?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Would the proposal involve the removal or reuse of large areas of road corridor, landscape, either verges or medians?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Would the proposal involve substantial changes to the appearance of a bridge (including piers, girders, abutments and parapets) that are visible from the road or residential areas?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
If involving lighting, would the proposal create unwanted light spillage on residential properties at night (in construction or operation)?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

The dredge, pipelines and associated signage may have lighting systems for navigation and safety purposes. Light spill from such systems is expected to be minimal and no impact on residential properties is anticipated.		
Would any new structures or features to be constructed, result in over shadowing to adjoining properties or areas?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
<p>Although the presence of a dredge and equipment may temporarily detract from the amenity of the area during works, the Ettalong entrance channel is a busy waterway where vessel use is high and dredging has occurred on an off for years. As such any temporary impact on amenity is unlikely to be of concern to the community.</p> <p>The laydown areas would detract from the visual amenity of the foreshore at either location however any impact would be temporary being restricted to the period of works only (4-8 weeks per campaign).</p>		

**Safeguards**

Safeguards to be implemented are:

- V1. Works to be carried out in accordance with Roads and Maritime EIA-N04 Guideline for Landscape Character and visual impact assessment.
- V2. Laydown area is to be kept clean, tidy and rubbish free at all times.
- V3. All site materials, plant, machinery and storage is to be removed from the laydown site and waterway at the end of each campaign.

**3.11 Waste**

Table 3-11: Waste

Description of existing environmental and potential impacts		
Is the proposal likely to generate >200 tonnes of waste material (contaminated and /or non-contaminated material)? All dredged material will be beneficially reused by placing on the entrance shoal to bolster sand supplies to Ocean beach/Ettalong Point.	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Is the proposal likely to require a licence from EPA? The threshold for an Environmental Protection Licence for extractive activities is the extraction of 30,000m <sup>3</sup> annually. The 2023 campaign and any subsequent campaign will involve the dredging of less than 30,000 m <sup>3</sup> annually.	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Is the proposal likely to require the removal of asbestos?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
The proposal is not expected to generate any significant waste as all dredged material will be beneficially reused on the entrance shoal. Construction personnel would generate personal waste which would be disposed of appropriately. The dredge and work boats may generate onboard wastewater which would be disposed of at a site approved to receive wastewater.		

**Safeguards**

Safeguards to be implemented are:

- W1. The volume of material to be dredged would be less than 30,000m<sup>3</sup> (threshold for EPL).
- W2. All construction personnel waste would be disposed of appropriately.
- W3. Vessel wastewater would not to be discharged into the environment. Wastewater would be disposed of at a site approved to receive vessel wastewater.

## 4. Consideration of State and Commonwealth environmental factors

### 4.1 Environmental Planning and Assessment Regulation 2021 factors

The following factors, listed in section 171(2) of the Environmental Planning and Assessment Regulation 2021, have been considered to assess the likely impacts of the proposal on the natural and built environment. This consideration is required to comply with sections 5.5 and 5.7 of the EP&A Act.

Table 4-1: Consideration of section 171 of the EP&A Regulation factors

Environmental factor	Impact
<p>a) Any environmental impact on a community?</p> <p>The proposal may cause minor disturbance to the community such as restrictions on navigation and minor loss of amenity however potential impacts would be minimised by the measures identified in this REF. The proposal would have long term positive environmental impact on the community as waterway users, including the ferry and commuter, would benefit from safer navigation conditions.</p>	Short-term negative, long-term positive
<p>b) Any transformation of a locality?</p> <p>The proposal would not transform a locality as the dredging is maintenance dredging of a navigation channel that has been previously dredged.</p>	Nil
<p>c) Any environmental impact on the ecosystems of a locality?</p> <p>The proposal would have localised, minor and short-term negative impacts on water quality via short term increase in turbidity. These impacts would be minimised and managed by the measures outlined in this REF.</p>	Minor short-term negative
<p>d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?</p> <p>The proposal would have a minor temporary impact on the aesthetic, recreational and environmental quality of the dredge and placement areas. These impacts are associated with the presence of the dredge and restrictions on vessel movements and impacts on water quality due to turbidity generation. However, these impacts can be adequately managed through the measures identified in this REF.</p> <p>The proposal would result in a long term positive impact on the recreational value of the waterway by restoring safe navigation within the entrance channel.</p>	Short-term negative, long-term positive
<p>e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?</p> <p>There would be no impact on any items or place of significance.</p>	Nil
<p>f) Any impact on habitat of any protected animals (within the meaning of the <i>Biodiversity Conservation Act 2016</i>)?</p> <p>The proposal would not have any impact on the habitat of any protected animals due to the limited scope of works for the proposed activities and the implementation of the safeguards given in Section 3 of this REF.</p>	Nil
<p>g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?</p> <p>The proposal would not endanger any species of animal, plant or other form of life, whether living on land, in water or in the air due to the limited scope of works for the proposed activities and the implementation of the safeguards given in Section 3 of this REF.</p>	Nil

Environmental factor	Impact
<p>h) Any long-term effects on the environment? The proposal would have positive long-term effects on the environment due to improved safety of the Ettalong entrance channel. There are no anticipated negative long-term effects on the environment from the maintenance works due to the limited scope of these works and the implementation of the safeguards given in Section 3 of this REF.</p>	Positive
<p>i) Any degradation of the quality of the environment? The proposal would potentially degrade the quality of the environment in the short-term, however the potential impacts would be minimised with the implementation of the safeguards given in Section 3 of this REF.</p>	Short-term negative
<p>j) Any risk to the safety of the environment? The proposal would have minimal risk to the safety of the environment due to the limited scope of works for the maintenance activities covered in this REF, and the potential impacts would be minimised with the implementation of the safeguards given in Section 3 in this REF.</p>	Minimal
<p>k) Any reduction in the range of beneficial uses of the environment? The proposal would cause a minor restriction the use of Ettalong entrance channel due to dredging. This would be a minor reduction limited to the short period of works. In the long term the proposal would improve the range of uses of channel by restoring safe navigation depths.</p>	Short-term negative, long-term positive
<p>l) Any pollution of the environment? The proposal would potentially cause pollution of the environment, however the potential impacts would be minimised with the implementation of the safeguards given in Section 3 of this REF.</p>	Minimal
<p>m) Any environmental problems associated with the disposal of waste? No environmental problems are anticipated for the disposal of waste as no waste is likely to be produced by the proposal. All dredged material will be reused by placement on the entrance shoal for bolstering of sand supplies to Ocean Beach</p>	Nil
<p>n) Any increased demands on resources, natural or otherwise which are, or are likely to become, in short supply? The proposal would not require the use of resources, which are, or are likely to become, in short supply.</p>	Nil
<p>o) Any cumulative environmental effect with other existing or likely future activities? The proposal is unlikely to have any cumulative environmental affect with existing or likely future activities. This proposal avoids areas of sensitive marine habitat and is expected to only have minor temporary impacts on water quality that can be effectively managed with measures identified in this REF.</p>	Nil
<p>p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The placement of material on the entrance shoal has the potential to impact coastal processes such as wave behaviour. However, this risk is minimised by the measures identified in this REF and as such the proposal is not expected have any significant impact on coastal processes.</p>	Minimal
<p>q) Any impact on applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1? The proposal does not have any impact on strategic planning matters under Division 3.1 of the Act.</p>	Nil
<p>r) Any impact on other relevant environmental factors?</p>	Nil

Environmental factor	Impact
In considering the potential impacts of this proposal all relevant environmental factors have been considered, refer to Chapter 3 of this REF.	

## 4.2 Matters of National Environmental Significance

Table 4-2: Matters of national environmental significance

Environmental factor	Impact
a) Any impact on a World Heritage property? No world heritage properties are located within the vicinity to the proposal.	Nil
b) Any impact on a National Heritage place? No National Heritage places are located within the vicinity of the proposal	Nil
c) Any impact on a wetland of international importance (often called 'Ramsar' wetlands)? No wetlands of international importance are located within the vicinity of the proposal.	Nil
d) Any impact on nationally threatened species, ecological communities or migratory species? The aquatic habitat assessment concluded that the proposal is unlikely have a significant impact on any nationally threatened species, ecological communities or migratory species	Nil
e) Any impact on a Commonwealth marine area? There are no commonwealth marine areas within the vicinity of the proposal	Nil
f) Does the proposal involve a nuclear action (including uranium mining)? The proposal does not involve a nuclear action.	Nil
Additionally, any impact (direct or indirect) on the environment of Commonwealth land? No direct or indirect impacts on the environment of Commonwealth land are expected	Nil



## 5. Summary of safeguards and environmental management measures

This section provides a summary of the site-specific environmental safeguards and management measures identified in described in chapters 3 and 4 of this REF. These safeguards will be implemented to reduce potential environmental impacts throughout construction and operation. A framework for managing the potential impacts is provided with reference to environmental management plans and relevant Transport QA specifications. Any potential licence and/or approval requirements required prior to construction are also listed.

Table 5-1: Summary of site-specific safeguards for proposed work

Factor	Safeguard
Soil	<ul style="list-style-type: none"> <li>• S1. Dredge cut batters are to be no steeper than 1(V) in 4(H).</li> <li>• S2. A Dredged Material Placement Plan would be developed prior to works. The plan is to include the following: <ul style="list-style-type: none"> <li>– A hydrographic survey of the target envelope area and immediate surrounds is to be undertaken prior to the preparation of the plan.</li> <li>– Identification of target placement areas and specification.</li> <li>– Include consultation with Department Planning and Environment – Environment and Heritage Group and Umina Boardriders to ensure minimal impacts on coastal processes and surf break.</li> <li>– Review of elevations and batter slopes and other placement specifications based on survey and consultation.</li> </ul> </li> <li>• S3. Material would be used to fill in holes and depressions and placed in an even and consistent manner across the placement envelopes to create a relatively uniform surface with no significant holes, high points or steep slopes.</li> <li>• S4. Maximum placement elevations are not to exceed surrounding geomorphic features (e.g. crest of surrounding sand bar, etc.).</li> <li>• S5. Placement allocations are to minimise potential impacts on surfing amenity and sand should be spread evenly to avoid unpredictable wave breaking or refraction in the vicinity of key surfing areas.</li> <li>• S6. Batters for sand placement are to be no steeper than 1(V) in 6(H).</li> <li>• S7. Envelope A would be filled to a maximum elevation of -2.0 m LAT.</li> <li>• S8. Envelope B would be filled to a maximum of 0 m LAT.</li> <li>• S9. Envelope C would be filled to a maximum of -0.5 m LAT.</li> <li>• S10. Potential or actual acid sulphate soils would be managed in accordance with the Roads and Maritime Services Guidelines for the Management of Acid Sulphate Materials 2005.</li> <li>• S11. No sediments or soils would be stockpiled at the laydown areas.</li> </ul>
Waterways and water quality	<ul style="list-style-type: none"> <li>• WQ1. All efforts would be made to minimise the occurrence and extent of the sediment plumes throughout the course of the works.</li> <li>• WQ2. A Water Quality Management Plan is to be prepared and is to include at least the following monitoring: <ul style="list-style-type: none"> <li>– The dredge operator is to continually visually monitor the characteristics of the sand being dredged and placed. If material not consistent with ‘clean marine sands’ is encountered, dredging in that location is to cease and an appropriate course of action is to be developed in consultation with the TfNSW Project Manager.</li> <li>– During dredging of dredge areas 1 and 3, the dredge operator is to continually monitor, through visual observation of the dredge and placement areas to ensure that no visual impacts to water quality are occurring further than 50m from the disturbance areas.</li> <li>– During dredging of dredge area 4, formal turbidity monitoring using a calibrated WQ meter or other calibrated device (e.g. turbidity tube) is to be undertaken at the dredge and placement areas in addition to the visual observation described above. Turbidity monitoring is to be undertaken within 50 metres up-current (to determine ambient conditions) and 50 metres down-current of the dredge and discharge area.</li> <li>– Turbidity monitoring is to be undertaken 3-hourly during operations.</li> <li>– Turbidity at the down-current monitoring sites should not exceed 25NTU above ambient.</li> <li>– If turbidity exceedances occur, the TfNSW Project Manager is to be notified and appropriate course of action to developed in conjunction. Action may include modification of dredge area,</li> </ul> </li> </ul>

	<p>abandonment of dredge area, more detailed monitoring to evaluate risks or other additional controls.</p> <ul style="list-style-type: none"> <li>– Regardless of the sediment source location, if placement envelope B is used for sand disposal, formal turbidity monitoring of the site is to occur as outlined above.</li> <li>– Visual monitoring is to include inspections for fish kills or odd fish behaviour.</li> </ul> <ul style="list-style-type: none"> <li>• WQ3. Vessels (including barges) are only to be used at suitable tides when no less than 600mm clearance is available between the underside of the vessel and the bed of the waterway.</li> <li>• WQ4. Refuelling of plant and equipment and storage of hazardous materials on barges is to occur within a double-bunded area.</li> <li>• WQ5. An emergency spill kit is to be kept on all vessels at all times and maintained throughout the construction work. The spill kit must be appropriately sized for the volume of substances on the vessel.</li> <li>• WQ6. Spill kits for construction barges must be specific for working within the marine environment.</li> <li>• WQ7. All workers will be advised of the location of the spill kit and trained in its use.</li> <li>• WQ8. If an incident (e.g. spill) occurs, the Roads and Maritime Services Environmental Incident Classification and Reporting Procedure is to be followed and the Roads and Maritime Services Contract Manager notified as soon as practicable.</li> <li>• WQ9. In the event of a maritime spill, the incident emergency plan would be implemented in accordance with Sydney Ports Corporation’s response to shipping incidents and emergencies outlined in the ‘NSW State Waters Marine Oil and Chemical Spill Contingency Plan’ (Maritime, 2012).</li> <li>• WQ10. Emergency contacts will be kept in an easily accessible location on vehicles, vessels, plant and site office. All workers will be advised of these contact details and procedures.</li> <li>• WQ11. Vehicles, vessels and plant must be properly maintained and regularly inspected for fluid leaks.</li> <li>• WQ12. No vehicle or vessel wash-down or re-fuelling would occur on-site.</li> <li>• WQ13. Appropriate site and project inductions/training detailing potential water quality impacts and relevant construction measures and spill and emergency response procedures to be used.</li> <li>• WQ14. All fuels, chemicals and liquids are to be stored in an impervious bunded area a minimum of 50 metres away from: <ul style="list-style-type: none"> <li>– Rivers, creeks or any areas of concentrated water flow.</li> <li>– Flooded or poorly drained areas.</li> <li>– Slopes above 10%.</li> </ul> </li> </ul>
Noise and vibration	<ul style="list-style-type: none"> <li>• N1. Construction vehicles and equipment will be suitably serviced prior to works and appropriately maintained during construction activities.</li> <li>• N2. Plant that is not being used will be turned off.</li> <li>• N3. Works are to be undertaken within standard working hours wherever possible. If works within standard working hours is not possible due to tidal conditions etc. noise impacts are to be minimised in accordance with the TfNSW Noise Estimator Tool including additional measures as applicable. Any works outside of standard working hours would be subject to approval from the relevant TfNSW representative.</li> <li>• N4. The community must be notified of all work outside standard hours which have the potential to impact noise sensitive receivers. Notification zones must be determined using the TfNSW Noise Estimator Tool. Notification requirements must comply with the RMS Construction Noise and Vibration Guideline.</li> <li>• N5. Loading and unloading of materials/deliveries is to occur as far away as possible from sensitive receivers.</li> <li>• N6. Dedicated loading/unloading areas are to be shielded if close to sensitive receivers.</li> <li>• N7. The laydown area is to be located away from sensitive receivers where practical.</li> </ul>
Air quality	<p>AQ1. If plant or machinery begin to emit excessive emissions they would be turned off until the issue is rectified.</p>
Non-Aboriginal heritage	<ul style="list-style-type: none"> <li>• H1. If unexpected heritage items are uncovered during the works, all works must cease in the vicinity of the material/find and the steps in the Roads and Maritime Services Standard Management Procedure: Unexpected Heritage Items must be followed. Roads and Maritime Services Senior Environment Specialist - Heritage must be contacted immediately.</li> </ul>
Aboriginal heritage	<ul style="list-style-type: none"> <li>• ACH1. If any potential Aboriginal objects (including skeletal remains) are discovered during the course of the proposal, all works in the vicinity of the find must cease. Steps in the Transport for NSW <i>Standard Management Procedure: Unexpected Heritage Items</i> must be followed.</li> </ul>

	<ul style="list-style-type: none"> <li>• ACH2. If the scope of the proposal changes the relevant Aboriginal Community and Heritage Partner and Environmental</li> <li>• ACH3. Due to the large number of Aboriginal sites and/or objects within the vicinity of the proposal area, including middens, this area is regarded as highly sensitive. Staff undertaking work must be aware of all Aboriginal sites within the vicinity of the proposal area to ensure these sites are not impacted.</li> </ul>
Biodiversity	<ul style="list-style-type: none"> <li>• B1. There is to be no disturbance or damage to threatened species or areas of outstanding value.</li> <li>• B2. Works are not to harm threatened fauna (including where they inhabit bridges or other structures e.g. timber fence posts or maritime piles).</li> <li>• B3. If unexpected threatened fauna or flora species are discovered, stop work immediately and follow the Roads and Maritime Services Unexpected Threatened Species Find Procedure in the Roads and Maritime Services Biodiversity Guidelines 2011 – Guide 1 (Pre-clearing process).</li> <li>• B4. Seagrass maps are to be prepared for incorporation into the project CEMP or equivalent that identify seagrass boundaries (or any other sensitive habitats) and required buffers and would require updating after 12 months.</li> <li>• B5. The CEMP or equivalent document should include information to assist in identifying the threatened <i>P. australis</i> seagrass community and Endangered Cauliflower Soft Coral that occurs or may occur within the locality.</li> <li>• B6. All vessels and the site compound are to have on hand appropriate spill kits and bins for disposal of all rubbish and debris. This should include adequate hydrocarbon booms.</li> <li>• B7. Local NPWS officers are to be contacted regarding recent use of the shoreline between Little Box Point and Half Tide Rocks by Fur-seals.</li> <li>• B8. No works, including vessel launching, beaching, or any operation, or laying of pipes are to occur within 10 m of any seagrasses.</li> <li>• B9. If any Cauliflower Soft Corals are seen during within 10m of any works, works must stop immediately and a marine ecologist should be notified. The marine ecologist and project team must consult with DPI Fisheries to assess appropriate management actions as above.</li> <li>• B10. No mooring or beaching of vessels within any seagrass areas or any other marine vegetation.</li> <li>• B11. The NSW NPWS Guidelines for approach distance to Seals must be adhered to at all times. Should this not be possible the project ecologist and NPWS must be notified immediately.</li> <li>• B12. No dredge pipes are to be placed over seagrasses or rocky intertidal or subtidal areas.</li> <li>• B13. All equipment to be brought to the Project Area must be thoroughly cleaned and free of substrate to avoid introduction of species such as <i>C. taxifolia</i>. Given the potential for <i>C. taxifolia</i> in nearby areas, equipment should be also thoroughly cleaned following the completion of the project to prevent spread of the species to other areas.</li> <li>• B14. If <i>C. taxifolia</i> is found within the Study Area, it should be avoided and not disturbed to minimise further spread to other areas of the Study Area. If dredging vessels or equipment are found to have caught <i>C. taxifolia</i> during works, they should be thoroughly cleaned with fresh water, with all biota safely disposed of on land.</li> <li>• B15. Environmental controls such as sediment and erosion controls, and if necessary, the position of dredge pipes, should be inspected weekly by a TfNSW Environmental Scientist or an independent environmental consultant.</li> <li>• B16. No dredging of additional areas is to occur without further consideration of aquatic ecological impacts.</li> <li>• B17. Hydrocarbon-based products would be stored in the storage container in the laydown area only.</li> </ul>
Traffic and transport	<ul style="list-style-type: none"> <li>• T1. The footprint of the laydown area is to be minimised where possible.</li> <li>• T2. Pedestrian access to be maintained through to the foreshore at the laydown area.</li> <li>• T3. A permit is to be sought from Central Coast Council for the use of the laydown area/s as required.</li> <li>• T4. Where possible, current vessel movements are to be maintained during works. Any disturbance is to be minimised as much as practicable.</li> <li>• T5. A Vessel Traffic Management Plan (VTMP) is to be prepared prior to the commencement of works in consultation with the local Boating Safety Officer and implemented.</li> <li>• T6. In accordance with the VTMP appropriate navigation markers, warnings, lighting and signage would be installed to demarcate dredge and placement areas, locations of pipeline and dredge.</li> <li>• T7. All work vessels must comply with the Marine Safety (Domestic Commercial Vessel) National Law Act 2012, the Marine Safety Act 1998, and all relevant subordinate legislation.</li> <li>• T8. All work vessels must exhibit lights and shapes in accordance with International Regulations for Preventing Collisions at Sea 1972.</li> <li>• T9. Prior to commencement of any work, the development and implementation of Vessel Traffic Management Plan (VTMP) must be undertaken by the contractor in consultation with the local Boating Safety Officer.</li> </ul>

	<ul style="list-style-type: none"> <li>• T10. All pipes and associated equipment which will restrict or vary existing navigation conditions must be clearly marked, including the use of lights at night, to reduce the risk to vessel navigation and safety. Appropriate markings shall be identified within the VMP.</li> <li>• T11. It is the contractor's responsibility to supply, install, maintain, and remove all navigation aids that are required by the VTMP over the duration of the works, which may include:             <ul style="list-style-type: none"> <li>– Navigation channel lateral marks</li> <li>– Channel blocked/closed signals</li> <li>– Navigation marks or signage required by NSW Maritime to ensure the safe and efficient operation of the navigation channel or channels through or around the works and temporary removal, relocation, or covering of any existing contradictory or superfluous signs, buoyage or navigation marks.</li> <li>– The dredge Master shall maintain a radio listening watch on VHF channel 16 at all times.</li> <li>– Any marine pollution resulting from a work vessel must be reported to TfNSW by phoning 13 12 36, along with notifying the Senior Boating Safety Office.</li> <li>– Notification shall be provided to NSW Maritime if the proposal duration is to extend.</li> <li>– All items including vessel, plant, machinery and auxiliary equipment must be removed from NSW State Waters on completion of the works unless they otherwise hold an appropriate licence.</li> </ul> </li> </ul>
Socio-economic	<ul style="list-style-type: none"> <li>• C1. Notification is to be given to affected community members prior to the works taking place. The notification is to include:             <ul style="list-style-type: none"> <li>– Details of the proposal</li> <li>– The duration of works and working hours</li> <li>– Any changed traffic or access arrangements</li> <li>– How to lodge a complaint or obtain more information</li> <li>– Contact name and details.</li> </ul> </li> <li>• C2. Notification should be a minimum of 7 calendar days prior to the start of works.</li> <li>• C3. All complaints are to be recorded on a complaints register and attended to promptly.</li> </ul>
Landscape character and visual amenity	<ul style="list-style-type: none"> <li>• V1. Works to be carried out in accordance with Roads and Maritime EIA-N04 Guideline for Landscape Character and visual impact assessment.</li> <li>• V2. Laydown area is to be kept clean, tidy and rubbish free at all times.</li> <li>• V3. All site materials, plant, machinery and storage is to be removed from the laydown site and waterway at the end of each campaign.</li> </ul>
Waste	<ul style="list-style-type: none"> <li>• W1. The volume of material to be dredged would be less than 30,000m<sup>3</sup> (threshold for EPL).</li> <li>• W2. All construction personnel waste would be disposed of appropriately.</li> <li>• W3. Vessel wastewater would not to be discharged into the environment. Wastewater would be disposed of at a site approved to receive vessel wastewater.</li> </ul>

## 5.1 Licensing and approvals

Table 5-2: Summary of licensing and approvals required

Instrument	Requirement	Timing
<i>Fisheries Management Act 1994</i> (s199)	Notification to the Minister for Primary Industries prior to any dredging or reclamation works.	A minimum of 28 days prior to the start of the proposal.
<i>Crown Land Management Act 2016</i> (Division 3.4, 5.5 and 5.6)	Lease or licence to occupy areas of Crown land.	Prior to start of the proposal.
Local Government Act 1993	Permit to use Council managed land for laydown areas	Prior to start of the proposal.

Instrument	Requirement	Timing
Marine Safety Act 1998 (S.18)	The proposal is an aquatic activity and therefore requires approval from TfNSW (Maritime)	Approval has been received and is included in Appendix D

## 6. References

Cardno 2012, Coastal Zone Management Plan for Brisbane Water Estuary. Prepared for Gosford City Council

H2O Consulting Group [H2O] 2023, Aquatic Ecological Assessment Ettalong Emergency Works. Prepared for TfNSW. In preparation.

NSW DPI 2023a, Threatened Species Lists. NSW Department of Primary Industries.  
<https://www.dpi.nsw.gov.au/fishing/species-protection/what-current>, Accessed June 2023.

NSW DPI 2023b, Fisheries Spatial Data Portal. NSW DPI website. Link: Fisheries Spatial Data Portal (nsw.gov.au). Accessed June 2023.

Royal Haskoning DHV 2022, Umina-Ocean Beach Erosion Management Strategy Environmental Assessment

SESL 2013, Acid Sulphate Soil Preliminary Investigation and Preliminary contamination Assessment for Ettalong Shoal Ettalong NSW 2257. Prepared for Gosford City Council

WorleyParsons 2017, Gosford Beaches Coastal Zone Management Plan

WRL 2021, Umina-Ocean Beach Sediment Dynamics and Coastal Processes Investigation. Prepared for Central Coast Council



## 7. Certification, review and decision

### 7.1 Certification

This minor works REF provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses, to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the proposal.

**Prepared by:**

Signature



Name: Uriah Makings  
Position: Environmental Scientist  
Company name: Hydrosphere Consulting  
Date: 19/07/2023

**Minor Works REF reviewed by:**

Signature



Name: Mick Howland  
Position: Managing Director  
Company name: Hydrosphere Consulting  
Date: 19/07/2023

## 7.2 Environment staff review

The Minor Works REF has been reviewed and considered against the requirements of sections 5.5 and 5.7 of the EP&A Act.

In considering the proposal this assessment has examined and taken into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of that activity as addressed in the Minor Works REF and associated information. This assessment is considered to be in accordance with the factors required to be considered under section 171 of the Environmental Planning and Assessment Regulation 2021.

The proposal described in the Minor Works REF will have some environmental impacts which can be ameliorated satisfactorily. Having regard to the safeguard and management measures proposed, this assessment has considered that these impacts are unlikely to be significant and therefore an approval for the proposal does not need to be sought under Division 5.2 of the EP&A Act.

The assessment has considered the potential impacts of the activity on areas of outstanding value and on threatened species, ecological communities or their habitats for both terrestrial and aquatic species as defined by the *Biodiversity Conservation Act 2016* and the *Fisheries Management Act 1994*.

The proposal described in the Minor Works REF will not affect areas of outstanding value. The activity described in the Minor Works REF will not significantly affect threatened species ecological communities or their habitats. Therefore, a species impact statement is not required.

The assessment has also addressed the potential impacts on the activity on matters of national environmental significance and any impacts on the environment of Commonwealth land and concluded that there will be no significant impacts. Therefore, there is no need for a referral to be made to the Australian Government Department of Agriculture, Water and the Environment for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the *Environment Protection and Biodiversity Conservation Act 1999*.

The Minor Works REF is considered to meet all relevant requirements.

### 7.3 Environment staff recommendation

It is recommended that the proposal to undertaken maintenance dredging at Ettalong NSW as described in this Minor Works REF proceed subject to the implementation of all safeguards identified in the Minor Works REF and compliance with all other relevant statutory approvals, licences, permits and authorisations.

The Minor Works REF has examined and taken into account to the fullest extent possible all matters likely to affect the environment by reason of the activity and established that the activity is not likely to significantly affect the environment or threatened species, ecological communities or their habitats.

The Minor Works REF has concluded that there will be no significant impacts on matters of national environmental significance or any impacts on the environment of Commonwealth land.

The Minor Works REF determination will remain current for five years until July 2028 at which time it shall lapse if works have not been physically commenced.

**Recommended by:**

Signature



Name: Renae Martin  
Position: Environment and Sustainability Manager  
Date: 21/07/2023

**Noted by:**

Signature



Name: Dave Hopper  
Position: Senior Office Programs  
Date: 21/07/2023

## 7.4 Determination

In accordance with the above recommendation, I certify that I have reviewed and endorsed the contents of this Minor Works REF, and to the best of my knowledge, it is in accordance with the EP&A Act, the EP&A Regulation and the Guidelines approved under Section 170 of the EP&A Regulation, and the information is neither false nor misleading.

I determine that Transport for NSW may:

- proceed with the activity

Signature 

Name: Simon Walter  
Position: Senior Manager Maritime Infrastructure Programs  
Date: 21/07/2023

## 7.5 EP&A Regulation publication requirement

Table 7-1: EP&A Regulation publication requirement

Requirement		
Does this Minor Works REF need to be published under section 171(4) of the EP&A Regulation?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

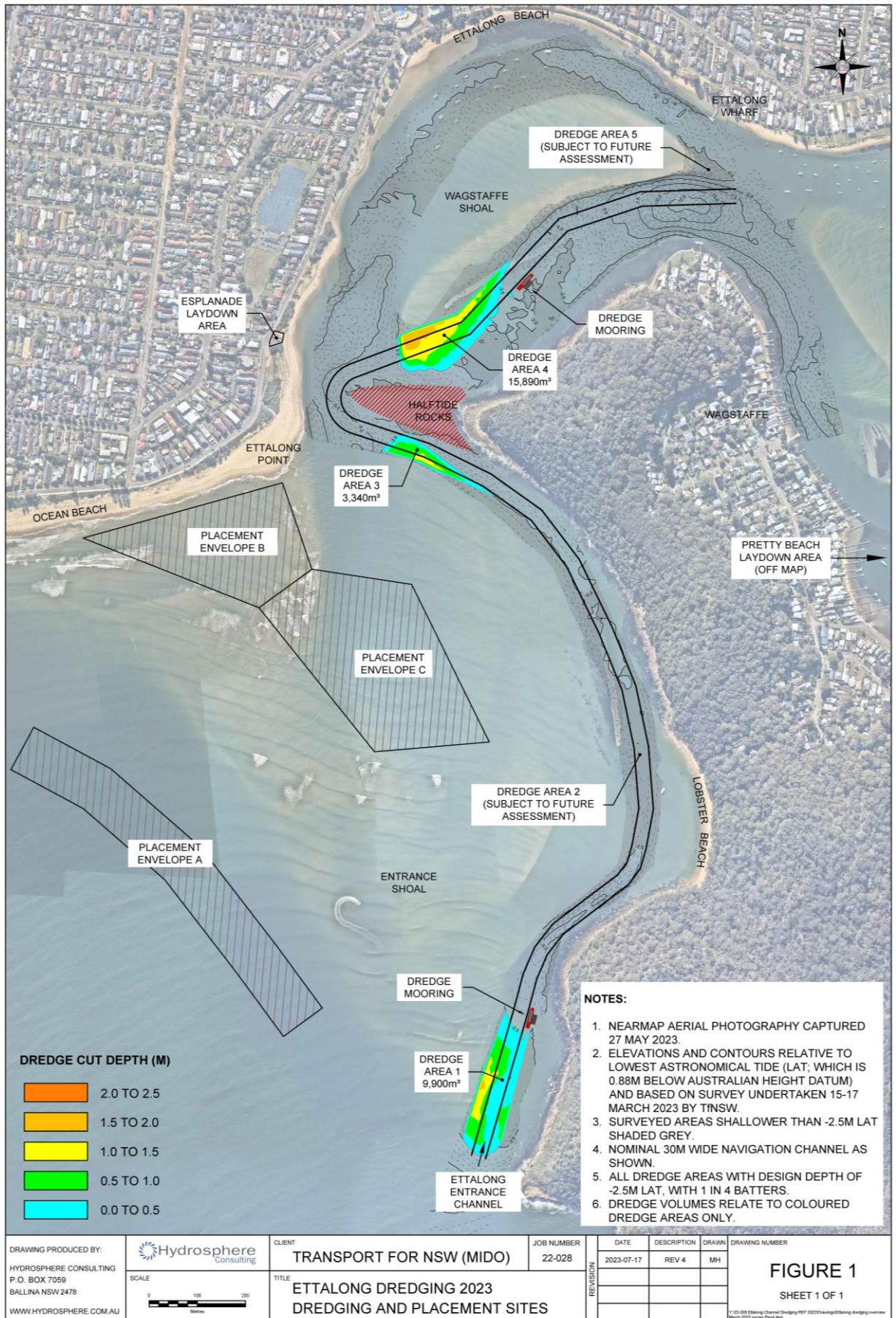
## 8. Definitions

Table 8-1: Definitions

Term	Definition
ASS	Acid sulfate soil
CSD	Cutter suction dredge
dB	Decibel
LAT	Lowest Astronomical tide
Laydown area	Storage area
Navigation channel	Deeper channel used by watercraft for navigation
Shoal	Submerged sandbank
Spud	Vertical steel shafts used to secure barges/work platforms to the seabed.
TSHD	Trailing suction hopper dredge

## Appendix A: Proposal Drawings





DRAWING PRODUCED BY: HYDROSPHERE CONSULTING P.O. BOX 7059 BALLINA NSW 2478 WWW.HYDROSPHERE.COM.AU		CLIENT	TRANSPORT FOR NSW (MIDO)	JOB NUMBER	22-028	DATE	2023-07-17	DESCRIPTION	REV 4	DRAWN	MH	DRAWING NUMBER	<b>FIGURE 1</b> SHEET 1 OF 1
		TITLE	ETTALONG DREDGING 2023 DREDGING AND PLACEMENT SITES		REVISION								



Figure 2: Aerial view of laydown sites

## Appendix B: TfNSW Noise Estimator Tool Results



Transport for  
NSW **Noise Estimator (Individual Plant)**

Please input information into yellow cells  
Please pick from drop-down list in orange cells

Project name	Ettalong dredging
Scenario name	Single dredge
Receiver address	NA
Select area ground type	Water
Select type of background noise level input	Representative Noise Environment

Noise area category		Representative Noise Environment	User Input
RBL or LA90 Background level (dB(A))		R2	
	Day	45	
	Evening	40	
	Night	35	
LAeq(15minute) Noise management level (dB(A))			
	Day (OOHW)	55	
	Evening	45	
	Night	40	

Is all plant at the same representative distance to the receiver? Y/N	Y
Representative distance (m)	400 All at Representative Distance

**Steps:**

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban).
5. Select the type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available).
  - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environment' provides examples to help select the noise area category.
  - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Is all plant at the same representative distance to the receiver? Select Y or N (cell C24):
  - (a) where Y is selected - enter the representative distance in cell C25.
  - (b) where N is selected - go to step #7.
7. For the scenario (e.g. shallow excavation), select plant from the drop-down list in cells A28 to A47 (e.g. dump trucks + excavator):
  - (a) enter quantity for each selected plant in cells D28 to D47.
  - (b) where N is selected from step #6 - enter the distance to receiver for each individual plant in cells E28 to E47.
  - (c) is there line of sight to receiver? select from drop down list in cells F28 to F47. Solid barrier can be in the form of road cutting, solid concrete capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise management level (see rows 57 to 62).
9. Identify and implement standard mitigation measures where feasible and reasonable. Include any shielding implemented as part of the standard 'is there line of sight to receiver' drop-down list.
10. Identify and implement feasible and reasonable additional mitigation measures (see rows 63 to 65).
11. Document a summary report detailing:
  - (a) project description (including location, duration, hours of work, construction methodology, plant, potentially impacted receivers, etc.).
  - (b) background noise levels.
  - (c) noise management levels.
  - (d) predicted noise levels for each time period.
  - (e) sleep disturbance affected distance for night works.
  - (f) mitigation measures.

Type/ model plant (See Sources sheet)	SWL LAeq (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Grader	110	85	1	400	Yes	0	0	400	47
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88
					Yes	0	0		-88

<b>Total SPL LAeq(15minute) (dB(A))</b>		<b>47</b>						
		<b>Non-residential receivers</b>						
	<b>Residential receiver</b>	<b>Classroom at schools and other educational institutions</b>	<b>Hospital wards and operating theatres</b>	<b>Place of worship</b>	<b>Active recreation</b>	<b>Passive recreation</b>	<b>Industrial premise</b>	<b>Offices, retail outlets</b>
Noise Management Level (dB(A))	Standard hours	65	65	65	65	60	75	70
	Day (OOHW)	50	65	65	65	60	75	70
	OOHW Period 1	45	65	65	65	60	75	70
	OOHW Period 2	40	65	65	65	60	75	70
Level above background (dB(A))	Standard hours	2						
	Day (OOHW)	2						
	OOHW Period 1	7						
	OOHW Period 2	12						
Level above NML (dB(A))	Standard hours							
	Day (OOHW)							
	OOHW Period 1	7						
	OOHW Period 2	12						
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-
	OOHW Period 1	-	-	-	-	-	-	-
	OOHW Period 2	V, N, R2, DR	-	-	-	-	-	-

Minor works review of environmental factors

## Appendix C: AHIMS Search Results and PACHCI Assessment

Hydrosphere Consulting

Date: 19 June 2023

P O Box 7059

Ballina New South Wales 2478

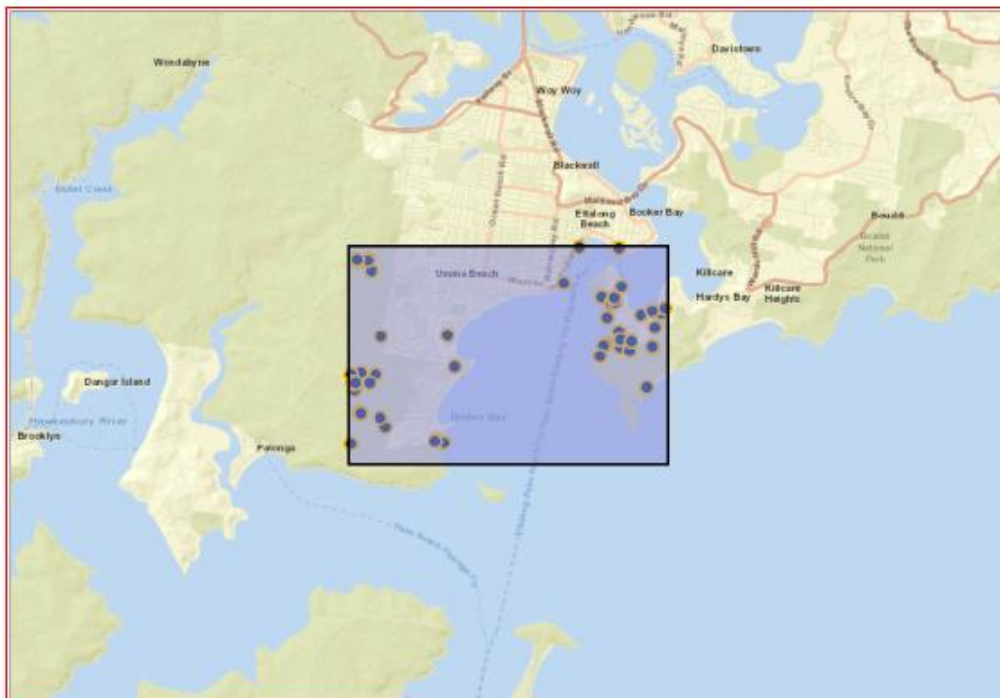
Attention: Uriah Makings

Email: [uriah.makings@hydrosphere.com.au](mailto:uriah.makings@hydrosphere.com.au)

Dear Sir or Madam:

**AHIMS Web Service search for the following area at Lat. Long From : -33.5521, 151.2904 - Lat. Long To : -33.5163, 151.3522, conducted by Uriah Makings on 19 June 2023.**

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

<b>59</b>	<b>Aboriginal sites are recorded in or near the above location.</b>
<b>0</b>	<b>Aboriginal places have been declared in or near the above location. *</b>



Transport  
for NSW

07/07/2023

David Hooper  
Principal Manager Dredging  
Maritime Infrastructure Delivery Office  
Transport for NSW

Dear David,

**Preliminary assessment results for *Ettalong Channel Dredging* based on Stage 1 of the *Procedure for Aboriginal cultural heritage consultation and investigation (the procedure)*.**

The project, as described in the Stage 1 assessment, was assessed as being unlikely to have an impact on Aboriginal cultural heritage.

The assessment is based on the following due diligence considerations:

- The project is unlikely to harm known Aboriginal objects or places.
- The cultural heritage potential of the project area appears to be reduced due to past disturbance.

Your project may proceed in accordance with the environmental impact assessment process, as relevant, and all other relevant approvals.

If the scope of your project changes, including placement envelopes A, B and C you must contact me and your regional environmental staff to reassess any potential impacts on Aboriginal cultural heritage.

If any potential Aboriginal objects (including skeletal remains) are discovered during the course of the project, all works in the vicinity of the find must cease. Follow the steps outlined in the Transport for NSW's *Unexpected Archaeological Finds Procedure*.

Safeguard- Due to the large number of Aboriginal sites and/or objects in the study area, including middens, this area is regarded as highly sensitive. Staff undertaking work must be aware of all Aboriginal sites within the project area to ensure these sites are not impacted.

For further assistance in this matter do not hesitate to contact me.

Yours sincerely

A handwritten signature in black ink, appearing to read "merredy".

Merredy Quinn- Bates  
Aboriginal Cultural Heritage Officer

---

Transport for NSW  
Level 5, 6 Stewart Ave, Newcastle West 2302 NSW | Locked Bag 2030, Newcastle West, 2302 NSW  
M 0447 283 690 | E merredy.quinn-bates@transport.nsw.gov.au

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## Appendix D: Consultation Responses

## Department of Planning and Environment

Our ref: DOC23/027141

Matthew Chambers

Infrastructure Programs Officer

Transport for NSW

[Matthew.chambers@transport.nsw.gov.au](mailto:Matthew.chambers@transport.nsw.gov.au)

13 February 2023

---

**Subject:** Ettalong Channel Dredging

Dear Mr Chambers

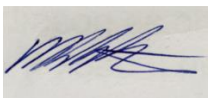
I refer to your request seeking comments on matters to be addressed in the review of environmental factors (REF) for dredging in Ettalong Channel dated 2 February 2023.

The REF should include, but not be limited to the following:

- Approval pathways, permits, licences and authorisations that may be required. A general Crown lands licence is required for the proposed dredging program and the REF will be used to assess the licence application, please refer to our [website](#) for information.
- Provide the proposed dredging and sand relocation / nourishment locations.
- How the proposed works are consistent with the *Native Title Act 1993*.
- Reference to any applicable Coastal Zone Management Plan or Coastal Management Program.
- Documentation of any consultation activities with other agencies.
- Assessment of threatened species, populations or ecological communities or their habitats, within the meaning of the *Biodiversity Conservation Act 2016* or the *Fisheries Management Act 1994*.

If you require further information, please contact Kylie Butler A/Senior Project Officer at [kylie.butler@crowland.nsw.gov.au](mailto:kylie.butler@crowland.nsw.gov.au).

Yours sincerely,



Malcolm Robertson

A/Manager Coastal Unit

Land & Asset Management, Crown Lands

## Uriah Makings

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**From:** Sarah Conacher <sarah.conacher@dpi.nsw.gov.au>  
**Sent:** Friday, 9 September 2022 3:59 PM  
**To:** Uriah Makings  
**Subject:** RE: Ettalong Channel Dredging

Hi Uriah,

It was nice catching up on the phone this afternoon regarding the Ettalong Channel dredging proposal. As discussed:

1. Fisheries has no objection, in principal, to the nourishment of Ettalong Beach with some of the dredge sediments from the Ettalong Channel. This is based on the assumption that the channel dredge sediments are clean marine sand of similar composition to the existing sediments on Ettalong Beach.
2. The volume of dredge sediment that will fit on Ettalong Beach is to be determined by Hydrosphere Consulting, based on the following:
  - a. A 2m buffer must be maintained between the seagrass and any deposited sediments;
  - b. There must be no tracking of vehicles or machinery over seagrass;
  - c. There must be no storage of sediments, equipment, materials, bunds or piping over seagrass;
  - d. There must be no direct impacts to seagrass during the dredging and nourishment operations; and
  - e. The final profile (gradient) of the nourished beach should be designed to avoid slumping and rapid erosion of sediments that could smother seagrass beds.
3. The dredge channel should avoid seagrass. This includes the direct dredge footprint and the batter.
4. Fisheries requests a copy of the seagrass assessment prepared by H2O Consulting.
5. Fisheries requests to review the REF prior to giving final advice in relation to the proposal.

If Transport is the proponent, no Fisheries permit is required for the dredging and beach nourishment. If Council is the proponent, a Fisheries permit will be required for dredging and beach nourishment. Any potential harm to seagrass will require a Fisheries permit, regardless of the proponent.

Also, I need to flag that there are oyster leases in Brisbane Water and the Hawkesbury River, so the REF will need to consider the impacts of sedimentation on these aquaculture operations and consult with the oyster growers.

Kind regards,  
Sarah

**Sarah Conacher** | A/Senior Fisheries Manager – Coastal Systems Unit  
NSW Department of Primary Industries | Fisheries  
12 Shirley Rd, Wollstonecraft NSW  
ALL MAIL TO: DPI Fisheries, Attn: R. Philps, 1243 Bruxner Hwy, Wollongbar NSW 2477  
T: 02 8437 4981 | M: 0419 314 437 | E: [sarah.conacher@dpi.nsw.gov.au](mailto:sarah.conacher@dpi.nsw.gov.au)

Simon Walter  
Acting Senior Manager Maritime Infrastructure Programs  
Maritime Infrastructure Delivery Office

Via email: [Simon.Walter@transport.nsw.gov.au](mailto:Simon.Walter@transport.nsw.gov.au)

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**Re: Ettalong Channel Dredging**  
**Statutory Consultation - Invitation to Comment**

27 June 2023

Dear Simon,

Thank you for your email dated 27 June, 2023 requesting NSW Maritime provide comment on the proposed Ettalong Channel dredging campaign to commence in August 2023 for a period of approximately 4-8 weeks to remove approximately 30 000 cubic metres of material.

In accordance with *Marine Safety Act 1998* and *Marine Safety Regulation 2016* ("the regulation"), NSW Maritime is the responsible licensing official for aquatic activities ("activity") in or on any navigable waters, and that restrict the availability of those waters for normal use by the public. As such, a licence or written approval to conduct an activity shall be required by a person unless otherwise excluded by the regulation. Further, NSW Maritime is the relevant authority for approval of works on structures in, on or over the bed of any waters under the *Ports and Maritime Administration Act 1995*.

In consideration of the information contained within your letter of request, Transport for NSW Maritime has no objections to the commencement of the proposed activity and provides this letter as written approval subject to the following conditions:

1. All work vessels must comply with the *Marine Safety (Domestic Commercial Vessel) National Law Act 2012*, the *Marine Safety Act 1998*, and all relevant subordinate legislation.
2. All work vessels must exhibit lights and shapes in accordance with the *International Regulations for Preventing Collisions at Sea 1972* {COLREGs}.
3. Prior to the commencement of any work, the development and implementation of a Vessel Traffic Management Plan (VTMP) must be undertaken by the contractor in consultation with the local Boating Safety Officer.
4. All pipes and associated equipment which will restrict or vary existing navigation conditions must be clearly marked, including the use of lights at night, to reduce the risk to vessel navigation and safety. Appropriate markings shall be identified within the VTMP.
5. It is the contractor's responsibility to supply, install, maintain, and remove all navigation aids that are required by the VTMP over the duration of the works, which may include:
  - a) Navigation channel lateral marks,
  - b) Channel blocked/closed signals,
  - c) Navigation marks or signage required by NSW Maritime to ensure the safe and

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efficient operation of the navigation channel or channels through or around the works, and

- d) Temporary removal, relocation, or covering of any existing contradictory or superfluous signs, buoyage, or navigation marks.

6. The dredge Master shall maintain a radio listening watch on VHF channel 16 at all times.
7. Any marine pollution resulting from a work vessel must be reported to Transport for NSW by phoning 13 12 36, along with notifying the Senior Boating Safety Officer.
8. Notification shall be provided to NSW Maritime if the proposed works duration will likely extend beyond the above mentioned date.
9. All item(s) including vessel, plant, machinery, and auxiliary equipment must be removed from NSW State waters on completion of the works unless they otherwise hold an appropriate licence.

Prior to the commencement of the works, NSW Maritime may:

1. Publish a Marine or Gazette Notice to provide safety advice to vessel operators.
2. Request Marine Rescue NSW announce a Securite navigation safety message.

For on-water matters and VTMP contractor support, please contact Senior Boating Safety Officer:

- Senior Boating Safety Officer Craig Anderson on 0427 417 033, or
- Boating Safety Officer Mark Raward on 0418 460 294

Information may also be supplied via email to [mohawkes@transport.nsw.gov.au](mailto:mohawkes@transport.nsw.gov.au)

If you have any further questions, please contact me on 0417 603 458

Sincerely,



Drew Jones  
Manager Waterways Operations Hawkesbury  
River Broken Bay  
NSW Maritime

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## Uriah Makings

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**Subject:** FW: Ettalong Entrance Channel Dredging - Proposed placement areas

**From:** Chris Drummond <chris.drummond@environment.nsw.gov.au>

**Sent:** Monday, June 26, 2023 11:56 AM

**To:** Dave Hopper <Dave.Hopper@transport.nsw.gov.au>; Uriah Makings <uriah@hydrosphere.com.au>; Neil Kelleher <Neil.Kelleher@environment.nsw.gov.au>

**Cc:** Mick Howland <mick@hydrosphere.com.au>

**Subject:** RE: Ettalong Entrance Channel Dredging - Proposed placement areas

Hi Dave and Uriah,

Neil and I have worked together to come up with the following comments on the proposed placement areas.

- Placement envelop A is our most favoured location for its longevity of dredging and beneficial transport of sand towards Ocean Beach
- Regardless of the dredge method used, surfing amenity impacts should be minimised by avoiding placing sand in a concentrated zone.
- Placement Envelop B is less favourable to Envelop A due to the dynamic nature of sediment transport in this zone.
- Placement Envelop C is not favoured by the Department as it will be far more likely to mobilise, rework its way into the channel and potentially towards soft coral communities
- Please ensure that Fisheries are involved in the REF review to ensure protection of endangered soft coral communities that may be present in the area

Note that these are preliminary comments only given the limited time available.

Thanks

**Chris Drummond**

**Senior Coast and Estuaries Officer**, Hunter Central Coast Branch

Environment and Heritage Group | Department of Planning and Environment

T 02 4320 4201 | M 0466 416 685

E [chris.drummond@environment.nsw.gov.au](mailto:chris.drummond@environment.nsw.gov.au)

Level 2, 32 Mann Street, Gosford NSW 2250

[www.dpie.nsw.gov.au](http://www.dpie.nsw.gov.au)



*The Department of Planning and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.*

15 June 2023  
 1.00pm to 2.30pm  
 Ocean Beach Side  
 Surf Club

# Minutes

## Ettalong Dredging Project

<b>Chair</b>	Simon Walter, TfNSW Senior Project Manger
<b>Attendees</b>	<p>Dave Hopper, TfNSW, Principal Manager Dredging</p> <p>Crystal Lenane, TfNSW CSE Officer (online)</p> <p>Jesse Porter, TfNSW Manager of Operations Waterways</p> <p>Drew Jones, TfNSW, Manager of Operations Waterways</p> <p>Clare Naylor, TfNSW, Snr Environment &amp; Sustainability Officer</p> <p>Ken Saxby, TfNSW Community and Place</p> <p>Tiffany, TfNSW, Senior Manager Community &amp; Customer Engagement</p> <p>Chris Drummond, Environment and Heritage Group</p> <p>Neil Kelleher, Environment and Heritage Group</p> <p>Ben Fullagar,, Central Coast Council</p> <p>Warren Brown, Central Coast Council</p> <p>Mick Howland, Hydrosphere Consulting (online)</p> <p>Uriah Makings, Hydrosphere Consulting (online)</p> <p>Mathew Wales, Peninsula Chamber of Commerce</p> <p>Mike Walls, Wagstaffe to Killcare Community Association, Peninsula Waterway Community</p> <p>David Cummings, H2 Consulting, Aquatic Surveys</p> <p>Nathan Sanderson, NRMA Ferries, operations officer</p>
<b>Apologies</b>	N/A
<b>Items</b>	
<b>Item 1: Project update</b>	<p>Transport for NSW provided update on dredging program</p> <ul style="list-style-type: none"> <li>• We are looking at a number of approval pathways to expedite the dredging of the channel as soon as possible.</li> <li>• We are unable to use the dredging approvals we had in the previous dredging campaign.</li> <li>• We are working on a two stage approach                         <ul style="list-style-type: none"> <li>– Stage 1 – minor works REF to complete dredging this year</li> <li>– Stage 2 – more comprehensive REF for a longer term approval for when funding becomes available.</li> </ul> </li> <li>• Satellite timelapse image was played to demonstrate the dynamics</li> </ul>



- 
- At this stage dredging planned for October. This is with an accelerated program.
  - Originally looking at dredging 2 main areas, however feedback from ferry operators indicated that other areas need addressing. Project team to review priority dredging areas.

---

**Item 2:  
Ferry Operator Feedback**

Ferry operator provides feedback and information

- Now and in the past we have had issues where we have run into some areas and that requires logging an incident which impacts the ferry service. We have to suspend the service due to the risks. We also want to be able to communicate effectively to our customers we have to be reliable or people get stuck one way.
- We are not the only commercial operator that needs the channel to be navigable.
- Noted the ferry they use is 1.8 draft
- We continue to monitor the channel. However we do not look at what the tides are doing weeks out to see if there is opportunity. As this is hard to get messaging to the customer.
- Advised that 400 to 500 a week. Numbers of patronage would be good to assess alternative transport options.
- Noted that sandbars are moving into the marked channel. Operations team to inspect/monitor the navigational markers.
- Ferry operators have received complaints, Transport to provide support and communications shortly currently in development.

---

**Item 3:  
Community Impacts**

Importance of dredging for local community and economy

- We have been advocating for a dredging program for years. This is not a new issue. We need consistent dredging program.
- When the State Government took over dredging we expected environmental approval to be in place already.
- Need for alternative transport during ferry diversions. Kids and tradies need these services.
- Need to address the disabled community and ensure access.
- Impact to local businesses and economy.

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**Item 4:  
Environmental Approvals**

Environmental approvals and impacts of Soft Coral

- The Soft Coral is critically endangered. This could potentially trigger a referral and could delay dredging (subject to in water assessment\_.
- Recent flooding has indicated that the Soft Coral has disappeared. We will do thorough investigations.
- With sand moving over the Soft Coral does die. Site two is where we are concerned Soft Coral may be present.

---

### Environmental approvals

- The 10 year approval is more in depth and does take time as we will complete community consultation.
- It is noted that information used in this minor REF will also be used in that so not reinventing the wheel.

---

### Item 5: **Sand placement**

#### Locations of dredged sand placement

- It was suggested that beach nourishment be explored for the sand placement areas.
- It is noted that for the expedited approval process to dredge as soon as possible we are limited in what locations we can use this time around for the Minor REF. We don't want to delay the dredging any further as we will require more assessments.
- We will explore these areas in the long term approval.

---

### Item 6: **Dredging contractor availability**

#### Contractor availability

- Questions raised in regards to the state of the market for dredging contractors currently.
- TfNSW noted that we have reached to dredging contractors and there is appetite and availability to start in October.

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### **Next meeting**

TBC

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## TEMPLATE OF LETTER SENT TO AGENCIES

### Letters sent to:

- Central Coast Council
- Department of Planning and Environment (DPE) – Crown Lands
- Department of Primary Industry – Fisheries
- DPE - Environment, Energy and Science - Biodiversity Conservation
- Transport for NSW – Maritime (Boating Operations)
- NTSCorp

<Date>

<Title First Surname>

<Address>

<SUBURB> <NSW> <XXXX>

Attention: <First Surname>

Dear <Mr/Ms/other Surname>

### Consultation regarding proposed Ettalong Channel Dredging

Transport for NSW is proposing to undertake navigation maintenance dredging of Ettalong Channel at the entrance to Brisbane Water on the Central Coast, NSW. 2023. Further dredging of the channel every 3-4 years for at least the next 10 years is also anticipated. It is expected that the 2023 campaign will mirror recent dredging works and will entail the dredging of several areas of the navigation channel between Little Box Head and Ettalong Ferry Wharf. The dredged material will be placed on the adjacent entrance sand shoals and Ettalong Beach.

The objectives of the proposal are to restore and maintain a suitable navigation depth within Ettalong Channel. This will improve the safety of and useability Ettalong Channel. An outline of the proposal is attached to this letter.

#### Review of Environmental Factors

A review of environmental factors (REF) is currently being prepared to assess the likely impacts of the proposal under Division 5.1 of the *Environmental Planning and Assessment Act 1979*.

You are invited to provide comment on the project. It would be appreciated if NTSCorp could provide comments by 5pm 24 February 2023.

Feedback received will assist Transport for NSW in its decision to determine whether the Proposal should proceed.

Transport for NSW would be pleased to provide further information if required. In this regard [insert Transport for NSW contact] may be contacted on [insert contact number] or by email [insert email contact].

Yours faithfully

[Sender name]

[Sender position]

### **Ettalong Channel Dredging**

At the entrance to Brisbane Water adjacent to Ettalong Channel is a large dynamic ebb tide delta. Sand waves from the delta migrate east and infill the navigation channel. Dredging campaigns at the entrance occurred in 2010, 2017/18 and 2019 to restore safe depths within the channel. Despite this, sand from the delta has migrated into the channel again, restricting navigation for vessels. As such, dredging of the channel is again required and MIDO proposes to undertake dredging of the Ettalong Channel in 2023. Further dredging of the channel every 3-4 years for at least the next 10 years is also anticipated. It is expected that the 2023 campaign will mirror recent dredging works and will entail the dredging of several areas of the navigation channel between Little Box Head and Ettalong Ferry Wharf (Figure 1). The dredged material will be placed on the adjacent entrance sand shoals and Ettalong Beach.



Error! Reference source not found. Indicative proposed dredge and placement locations

## Appendix E: Aquatic Ecology Assessment

# Aquatic Ecology Assessment

## Ettalong Maintenance Dredging Works

Prepared For: TfNSW

Report Date: 19 July 2023





## H2O Consulting Group Pty Ltd

PO Box 3257, Erina NSW 2250  
Email: [info@h2oconsultinggroup.com.au](mailto:info@h2oconsultinggroup.com.au)  
Web: <https://h2oconsultinggroup.com.au>  
Ph: 0414 848 105

### Document Details

Report Title	Aquatic Ecology Assessment
Project Title	Ettalong Maintenance Dredging Works
Prepared For	Transport for NSW
Report Date	19 July 2023
Project Team	David Cummings, Alex Swanson, Simon Kirgis
Job No. / Ref	2110-01

### Document Control

Version	Author	Reviewer	Date
Draft	Alex Swanson BMarBiol	David Cummings BSc (Hons) PhD	28/06/2023
R0	Alex Swanson BMarBiol	David Cummings BSc (Hons) PhD	14/07/2023
R1	Alex Swanson BMarBiol	David Cummings BSc (Hons) PhD	19/07/2023

### Disclaimer:

The information provided in this document is based on knowledge, understanding and field observations at the time of review of associated materials and/or site survey. The report should be read and considered in its entirety including consideration of the limitations described in the report.

H2O Consulting Group Pty Ltd has completed this assessment in accordance with the relevant federal, state and local legislation. H2O Consulting Group Pty Ltd accepts no liability or responsibility for contents of this report in respect of any use of, or reliance upon, by any third party or for any use other than the purposes for which it was commissioned. Unauthorised use of this document is prohibited.

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# Executive Summary

H2O Consulting Group has been engaged by Transport for NSW (TfNSW) to provide an Aquatic Ecology Assessment (AEA) for maintenance dredging works at Ettalong, NSW (“the project”). The purpose of the 2023 Ettalong Maintenance Dredging is to maintain the recreational amenity and navigational safety of the Ettalong Channel between Little Box Head and Wagstaffe Point.

The current 2023 works are proposed to target three priority locations to facilitate the safe navigation of vessels through Ettalong Channel. These areas include two sites to the south of Half Tide Rocks and one site to the north of Half Tide Rocks at Wagstaffe Bar. The project proposes to remove up to an annual maximum of approximately 30,000 m<sup>3</sup> of channel-bed material, primarily clean marine sand, using either a Cutter Suction Dredge or Trailing Suction Hopper Dredge to transfer sand slurry to Sand Placement Areas on Ettalong Entrance shoals. Sand placement will be conducted by either dumping from dredging vessels.

A survey of the Dredging Areas for seagrasses and other sensitive ecological receptors (including soft corals) was undertaken in 2022, with a pre-dredging seabed survey undertaken in July 2023. This data was used to update mapping of estuarine macrophytes, which are known to occur within the locality. Additional desktop searches and assessment has been undertaken for threatened and migratory estuarine and marine species.

The survey works completed in 2022 found that the area proposed for emergency dredging works consisted of clean marine sands and did not include any estuarine macrophytes or other sensitive ecological receptors. Extensive seagrasses beds that included the Endangered *Posidonia australis* occurred near to the works but outside the proposed dredging and placement areas. During these surveys the Endangered Cauliflower Soft Coral (*Dendronephthya australis*) was not observed within the Study Area for the current maintenance dredging works or areas in the channel it had previously been recorded. These findings were concurrent with surveys conducted in July 2023.

Direct impacts from this maintenance dredging project in the Ettalong Channel will include removal of a quantity of seabed material, primarily unvegetated clean marine sandy substrate, resulting in the loss of and/or disturbance to invertebrate infauna and possibly some sessile or slow-moving epibenthic invertebrates that inhabit that seabed material. These losses will not detrimentally impact on the wider populations and communities of infauna of the area to any degree of concern. Impacts that include removal and modification of Key Fish Habitat (KFH) are expected to be confined to Type 3 – Minimally sensitive KFH.

The maintenance dredging works have been designed to avoid all seagrasses previously mapped in the area, while indirect disturbances are expected to be minimal with the majority of seagrasses including any Endangered *P. australis* >50 m from the proposed works. The Endangered Cauliflower Soft Coral (*D. australis*) was not found to occur within the Study Area for these works or within nearby areas the local population previously occupied. Other threatened and migratory marine and estuarine species may occur in the area at times; however, most are likely to be transient visitors or only enter area in search or pursuit of prey items, which they forage across very large expanses of the coastal environment for. Thus, the habitat within the Study Area has minimal ecological significance for the majority of these species. The only notable exception requiring further consideration was Fur-seals, which maintain populations within Broken Bay, however further assessment has identified the proposed works are unlikely to have a significant impact on the species or local population.

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# 1 Background

## 1.1 Overview

H2O Consulting Group has been engaged by Transport for NSW (TfNSW) to provide an Aquatic Ecology Assessment (AEA) for maintenance dredging works at Ettalong, NSW (“the project”). The purpose of the project is to undertake the initial maintenance dredging works required to maintain the recreational amenity and navigational safety of the Ettalong Channel between Little Box Head and Wagstaffe Point.

Estuarine habitats around Ettalong are known to support various threatened species, including key populations of the Endangered *Posidonia australis* and the Cauliflower Soft Coral (*Dendronephthya australis*) in Brisbane Water. The majority of seagrasses that are known to occur in close proximity to the proposed dredging areas are located adjacent to Ettalong and Lobster Beach, with the latter also a significant site for the Cauliflower Soft Coral (H2O Consulting Group 2019).

The maintenance dredging works have been planned to prioritise the most constraint areas for the safe navigation of larger vessels, while avoiding environmentally sensitive areas to minimise approval delays. The project will be assessed under Part 5 of the Environmental Planning and Assessment Act 1979 and development consent is not required. Chapter 2 (Infrastructure) Division 13, section 2.80(8)(a) Transport and Infrastructure SEPP (TISEPP) 2021 permits dredging of an existing navigation channel as development without consent.

The scope of this AEA includes for the identification and consideration of impacts on aquatic and marine habitat, Key Fish Habitat, estuarine macrophytes and species. This includes migratory and threatened species (marine birds and shore birds, marine mammals and reptiles, fish and sharks and other aquatic species) as well as aquatic populations and ecological communities listed under State and Commonwealth legislation.

## 1.2 Locality and Site

The Ettalong Channel is located 40 km north of Sydney CBD and falls within the Central Coast Local Government Area (LGA) (Figure 1). The Ettalong Channel provides for navigational passage and tidal exchange between Broken Bay, at the mouth of the Hawkesbury River and the Brisbane Water estuary, which encompasses a catchment area of 152 km<sup>2</sup> (NSW DPE 2022) that lies to the north of the Hawkesbury River. The Ettalong Channel provides for safe navigation of vessels between Broken Bay and Brisbane Water. Brisbane Water commences at Half Tide Rocks, where a narrow channel occurs between the lake system and Broken Bay. Within Broken Bay the main navigational channel wraps around Box Head between the shore and a large sand spit with breaking waves during easterly swell.

The specific site for the proposed dredging works includes shoals immediately inside (within Brisbane Water) and outside of Half Tide Rocks, and at the entrance to the channel adjacent to Little Box Head (refer to Figure 1). The sand is proposed to be transferred from the Dredging Areas (‘Dredging Area’) and placed in areas on the Ettalong Entrance shoals (‘Sand Placement Areas’) seaward of Ocean Beach, within 350 m of Dredging Areas (refer to Figure 1). Where appropriate, the collective total area within the boundaries of these sites is referred to as the ‘Study Area’ in this report.

A laydown site would be required to temporarily store small plant, machinery and materials for the project. Two sites have been identified depending on contractor requirement:

- An unsealed carpark adjacent to the foreshore opposite 101 The Esplanade
- A section of sealed carpark adjacent to Pretty Beach boat ramp off Araluen Drive, Pretty Beach

### 1.3 Description of the Works

The Dredging Area for the proposed dredging works comprises of several locations between Little Box Head and Wagstaffe Bar in the Ettalong Channel. The project will aim to target three priority locations to facilitate the safe navigation of vessels through Ettalong Channel. These areas include two sites to the south of Half Tide Rocks and one site to the north of Half Tide Rocks at Wagstaffe Bar (Table 1). Dredging works are proposed to occur for a duration of six to eight weeks, subject to weather conditions.

The project proposes to remove up to an annual maximum of approximately 30,000 m<sup>3</sup> of channel-bed material, primarily clean marine sand, using either a Cutter Suction Dredge or Trailing Suction Hopper Dredge to transfer sand slurry to Sand Placement Areas on Ettalong Entrance shoals. Sand placement will be conducted by dumping of sand from dredging vessels in Sand Placement Areas. The Sand Placement Areas comprise of subtidal habitat and will not include placement of material onto onshore locations. The dredging is designed to a 30 m navigational channel, with dredging extents with batters for Areas 1, 3 and 4 (Appendix 1) at 1:4 batter slopes and -2.5 m Lowest Astronomical Tide (LAT) depth between batters.

Table 1: Summary of Dredging Areas and Sand Placement Areas

Area	Type	Total Dredging Volume (m <sup>3</sup> )
Dredge Area 1	Dredging Area	9,900
Dredge Area 3	Dredging Area	3,340
Dredge Area 4	Dredging Area	15,890
Placement Envelope B and C - Shallow Placement Area	Sand Placement Area	n/a
Placement Envelope A – Deep Placement Area	Sand Placement Area	n/a

### 1.4 Background Information

Brisbane Water is a bar-built estuary with a flood tide delts that occurs at Ettalong Point (Drummond *et. al.*, 2019). The navigational channel which passes on the western side of Half Tide Rocks and runs adjacent to the Box Head shoreline requires regular dredging to maintain safe water depth along the length of the channel. The proposed dredging locations have been identified as urgent, high priority locations with low complexity that fulfils the need for maintenance dredging over short-term whilst a long-term dredging strategy is being developed. These areas have been identified through recent hydrographic surveys of the channel and stakeholder consultation, with the project designed to avoid any environmentally sensitive areas that may include seagrasses or soft corals.

The waters around Ettalong include the protected waters inside of Brisbane Water that commences at Half Tide Rocks and the semi protected waters adjacent to Box Head that occur in the northeastern section of Broken Bay. This along with the mixing of the estuarine waters of Brisbane Water and Riverine waters of the Hawkesbury River with coastal ocean waters create a unique and diverse ecological setting, which supports a diversity of estuarine and marine species. This includes the Endangered Ecological Community (EEC) *Posidonia australis* seagrass meadows, which is also an Endangered Population in Brisbane Water

as well as a significant population of the Endangered Cauliflower Soft Coral (*D. australis*). In addition, various other threatened and protected marine and estuarine species may occur in this area.

Seagrasses are widespread around Ettalong with *P. australis* known to occur inside of Half Tide Rocks, while the more common but protected seagrasses of *Zostera capricorni* and *Halophila ovalis* known to occur on shallow areas both inside of Half Tide Rocks and in more protected shallow areas around Box Head (H2O Consulting Group 2019).

## 1.5 Relevant Legislation and Policies

The following legislation and policies have been considered in this ecological assessment:

- NSW *Environmental Planning and Assessment Act 1979*
- NSW *Fisheries Management Act 1994*
- NSW *Biodiversity Conservation Act 2016*
- NSW *Coastal Management Act 2016*
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
- NSW *Protection of the Environment Operations Act 1997*
- TfNSW Biodiversity Policy - CP22004 2022

The legislative context for the assessment is outlined in the following sections.

### 1.5.1 Fisheries Management Act 1994

The objectives of the FM Act are to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations, and in particular to:

- conserve fish stocks and key fish habitats;
- conserve threatened species, populations and ecological communities of fish and marine vegetation;
- promote ecologically sustainable development, including the conservation of biological diversity, consistently with these objectives;
- promote viable commercial fishing and aquaculture industries;
- promote quality recreational fishing opportunities;
- appropriately share fisheries resources among the users of those resources;
- provide social and economic benefits for the wider community of NSW; and
- recognise the spiritual, social and customary significance of fisheries resources to Aboriginal persons, and to protect and promote the continuation of Aboriginal cultural fishing.

To meet the primary objectives, Part 7 of the FM Act deals with the protection of aquatic habitats, with Part 7A addressing the conservation of threatened species. Part 7 commonly applies to dredging and reclamation works, protection of marine vegetation including mangroves and seagrass, protection of spawning of certain fish, and noxious fish and marine vegetation.

If a public authority (including a local council or state agency) is a determining authority under Part 5 of the EP&A Act, they may still be required to obtain the following approvals or undertake consultation under the following provisions:



- Section 199 – Under s199 of the FM Act, the Minister for Primary Industries is required to be consulted over any dredging or reclamation works carried out, or proposed to be authorised, by a public authority (other than a local government authority) (i.e., any excavation within, or filling or draining of, water land or the removal of woody debris, snags, rocks or freshwater native aquatic vegetation or the removal of any other material from water land that disturbs, moves or harms these in-stream habitats). Section 199 consultation will be undertaken by TfNSW a minimum of 28 days before the commencement of the project.
- Section 200 – A permit is required for dredging or reclamation work carried out by a local government authority, unless these works are authorised by a relevant public authority (other than NSW DPI) such as TfNSW or under the Crown Lands Act 1989. A Section 200 permit would not be required for the project given that the project would be undertaken by TfNSW.
- Section 205 – A permit to harm (cut, remove, damage, destroy, shade etc) marine vegetation (saltmarshes, mangroves, seagrass and seaweeds). A Section 205 permit would not be required for the project given that impacts to marine vegetation are not anticipated (refer to Section 4.1.1 and Section 4.1.2).
- Section 219 – A permit to obstruct the free passage of fish. A Section 219 permit would not be required for the project given that fish passage would be maintained.

Listings of threatened species, populations and ecological communities gazetted under the FM Act are relevant to this assessment. Threatened biota impacted by this maintenance dredging must be assessed under section 5A of the EP&A Act.

### **Key fish habitat policy**

NSW DPI recognises that certain types of activities have varying degrees of impact on key fish habitats and, as such, require different levels of control and regulation. As a general principle, NSW DPI requires that proponents should, as a first priority, aim to avoid impacts upon key fish habitats. Where avoidance is impossible or impractical, proponents should then aim to minimise impacts. For any unavoidable remaining impacts consideration is to be given to establishment of suitable offsets or compensation.

Where key fish habitat is impacted by this construction proposal, suitable offsets or compensation may be required to be negotiated with NSW DPI Fisheries.

### **1.5.2 Biodiversity Conservation Act 2016**

The Biodiversity Conservation Act 2016 (BC Act) provides for legal protections of biodiversity and threatened species in NSW. Specifically, it provides for the following:

- A process for declaring and protecting areas of outstanding biodiversity value.
- The listing of threatened species, populations and ecological communities, with critically endangered, endangered and vulnerable species under Schedule 1.
- The listing of critically endangered, endangered and vulnerable ecological communities under Schedule 2.
- The listing of extinct species, species extinct in the wild and collapsed ecological communities of animals and plants under Schedule 3.
- Requirements for the preparation of a species impact statement (SIS).
- Determining where the Biodiversity Offset Scheme (BOS) applies to proposals.

The BC Act sets the criteria for determining whether a proposal is likely to have a significant impact on threatened biodiversity listed under the BC Act. If significant impacts are identified, it would necessitate the preparation of a SIS or Biodiversity Development Assessment Report (BDAR).

To identify areas with outstanding biodiversity value the Biodiversity Values (BV) Map has been prepared under Part 7 of the BC Act to protected land sensitive to impacts from development and clearing. The map forms part of the Biodiversity Offsets Scheme Threshold. Types of land the Environment Agency Head can include on the BV Map include the following:

- Coastal wetlands and littoral rainforest mapped under the State Environmental Planning Policy – Resilience and Hazards SEPP 2021.
- Core koala habitat identified in a plan of management under State Environmental Planning Policy Koala SEPP 2021.
- Declared Ramsar wetlands defined by the Environment Protection and Biodiversity Conservation Act 1999.
- Land containing threatened species or threatened ecological communities identified as having potential for serious and irreversible impacts (SAII) under section 6.5 of the BC Act.
- Protected riparian land.
- High conservation-value grasslands or groundcover.
- Old growth forest identified in mapping developed under the National Forests Policy Statement but excluding areas not meeting the criteria published jointly by the Minister for the Environment and the Minister for Primary Industries.
- Rainforest identified in mapping developed under the National Forests Policy Statement but excluding areas not meeting the criteria published jointly by the Minister for the Environment and the Minister for Primary Industries.
- Declared areas of outstanding biodiversity value.
- Council-nominated areas with connectivity or threatened species habitat that the Minister for the Environment considers will conserve biodiversity at bioregional or state scale.
- Land that, in the opinion of the Environment Agency Head, is of sufficient biodiversity value to be included.

Listed items of threatened biodiversity under the BC Act with potential to be impacted by this construction proposal will require further consideration. For Division 5.1 projects, a significant impact may trigger the requirement for determination under the BOS. Assessments of Significance where required have been undertaken in Section 4.3 of this AEA.

### **1.5.3 Environmental Planning and Assessments Act 1979**

Development in NSW falls under the provisions of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and subordinate legislation. Under Section 5.1 of the EP&A Act, there is a duty for the determining authority to consider the environmental impacts of proposed activities. The specific aspects of these environmental considerations are detailed in Clause 228 of the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation). Under section 5.1 of this Act, determining authorities are required to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity. These include items of biodiversity listed under the BC and FM Acts.

The 2023 REF (TfNSW In Prep) associated with the current scope of the maintenance dredging program schedule prepared for the proposed project, fulfils these requirements in terms of the currently proposed maintenance dredging activities.

#### **1.5.4 Coastal Management Act 2016**

The objectives of the *Coastal Management Act 2016* (CM Act) are to manage the coastal environment of NSW in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic wellbeing of the people of the State.

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

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

Part 2 of the CM Act establishes management objectives specific to each of these management areas, reflecting their different values to coastal communities.

The CM Act, along with the Resilience and Hazards SEPP 2021, forms part of the Coastal management framework. The proposed dredging works will be required to be carried out in a manner that is consistent with the objectives of the CM Act.

#### **Resilience and Hazards SEPP 2021**

The Resilience and Hazards SEPP 2021 replaced the Coastal Management SEPP 2018. The SEPP promotes an integrated and coordinated approach to development assessment, with tailored development controls to ensure development proponents and consent authorities consider and address the most important issues for the coastal management area(s) their proposal falls within. The SEPP is supported by detailed mapping of Coastal Wetlands, Littoral Rainforests and associated proximity areas.

Clause 2.7 of the SEPP, which states that development on land in coastal wetlands requires an EIS and council consent, and Clause 2.8 requires proponents in proximity land to assess the potential for a significant impact on the adjacent coastal wetland. The proposed dredging works will not impact on coastal wetlands, thus these controls will not be required.

#### **1.5.5 Environmental Protection and Biodiversity Conservation Act 1999**

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

The EPBC Act identifies and categorises matters of national environmental significance (MNES) as the following:

- World heritage properties
- National heritage places

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

Listings of MNES deemed relevant to this construction proposal will require further consideration under the guidance provided by the EPBC Act, with additional consideration that where the dredging activity is undertaken as part of normal operations for maintenance of an existing navigational channel that would not normally be expected to have a significant impact and where the disposal of marine sediments does not have a significant impact (Department of Environment 2013). MNES listings are provided in Section 3.1.1 of this AEA, with further consideration given in Section 4, where appropriate.

### **1.5.6 Protection of the Environment Operations Act 1997**

The *Protection of the Environment Operations Act 1997* (POEO Act) is the key piece of environment protection legislation administered by the NSW Environmental Protection Authority (EPA). The POEO Act relates to noise, air and water pollution and waste management. There is a broad allocation of responsibilities under the Act between the EPA, local councils and other public authorities. The EPA is made the regulatory authority for:

- activities listed in Schedule 1 to the Act and the premises where they are carried out;
- activities carried out by a State or public authority; and
- other activities in relation to which a licence regulating water pollution is issued.

The POEO Act provides for the provision of and conditioning of activities requiring environmental protection licensing. Scheduled activities as listed under Schedule 1 of the Act require an Environmental Protection License (EPL) from the EPA, unless clauses in Schedule 1 specify otherwise. No more than 30,000 m<sup>3</sup> p.a. will be removed by dredging activities done as part of this project, so an EPL will not be required.

Any removal of material undertaken as part of these proposed dredging works will require further consideration in regard to waste classification, Acid Sulphate Soil (ASS) risk, and the potential direct and indirect ecological consequences these items may have on the environment.

### **1.5.7 TfNSW Biodiversity Policy**

Transport strives to protect and enhance biodiversity, with the goal of achieving a no net loss of biodiversity as a consequence of its infrastructure development activities. This Policy outlines what TfNSW do to protect and enhance biodiversity for NSW.

The development of transport infrastructure can lead to unavoidable direct and indirect impacts on biodiversity including habitat fragmentation effects that can persist long after the infrastructure is built. Mitigation measures can reduce the severity of impacts, including supporting habitat connectivity, and are critical to the ongoing sustainable operation of transport infrastructure.

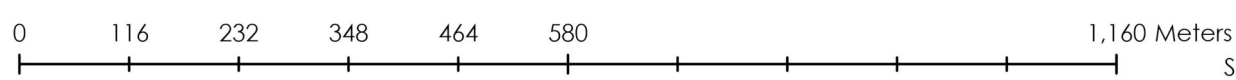
The first priority is to avoid impacts to biodiversity from Transport infrastructure and then to minimise and mitigate remaining impacts as far as practicable. For these works sensitive areas have been avoided through updates and modification to the original dredge design proposed in 2021.

## 1.6 Assessment Objectives

The objectives of this assessment are to:

- Identify any potential impacts from the proposed works on threatened biodiversity, MNES, water quality, fish habitat, marine vegetation and fauna, and areas of outstanding biodiversity value; and
- Provide recommendations regarding adoption of environmental controls and mitigation measures into the Construction Environmental Management Plan (CEMP) and identify any additional permitting and approval requirements under the FM Act, including any requirements for an SIS.





Ettalong Channel - NSW 2256

<b>Figure 1: Location of Works</b>		DATE : 14/07/2023	Map Version : 1_2
<ul style="list-style-type: none"> <li><span style="color: red;">—</span> Nominal 30m channel rev1 GDA2020</li> <li><span style="background-color: yellow; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span> Dredge Areas rev2 GDA2020</li> <li><span style="border: 2px solid blue; display: inline-block; width: 20px; height: 10px;"></span> StudyArea</li> </ul>		Projected Coordinate System : GDA 2020 Zone 56 Aerial Imagery: Nearmap - 27/05/2023	
		Although all care has been taken - WiZarDtech accepts no responsibility from the use or inaccuracies of this map and spatial data. Copyright © WiZarDtech Spatial Services 2022.	



## **2 Methodology and Approach**

### **2.1 Desktop Review**

#### **2.1.1 Threatened Species Searches**

Relevant databases were searched during March 2022 during planning stages of works, applying a ~10 km radius around the Study Area to identify threatened biodiversity, migratory species and MNES that may potentially occur at the locality. The following databases and information sources were searched:

- Bionet, Atlas of NSW Wildlife (last 20 years),
- NSW DPI Fisheries Threatened Species Lists (NSW DPI 2023a); and
- EPBC Act Protected Matters Report tool.
- Atlas of Living Australia (fish, sharks and rays only).

#### **2.1.2 Existing Ecological Mapping**

Mapping of existing ecological features important to this assessment was reviewed using the Fisheries NSW Spatial Data Portal. This included review of Estuarine Macrophytes, Aquaculture, Marine Protected Areas, Key Fish Habitats and Resilience and Hazards SEPP layers (NSW DPI 2023b).

A review of the potential environmental constraints identified via these maps was undertaken.

#### **2.1.3 Existing Seagrass Mapping**

A preliminary desktop assessment of areas of seagrass requiring mapping was prepared via GIS using the following data sources:

- Preliminary channel design and bathymetry.
- Various recent aerial image captures (Nearmap 2022)
- Previous NSW DPI Fisheries estuarine macrophyte mapping
- Additional habitat mapping data collected in area during previous dredging works (H2O Consulting Group 2019).

These data sources were used to develop preliminary habitat maps to guide site survey effort, detailed in Section 3.2.

## **2.2 Site Investigations**

### **2.2.1 Detailed Site Survey Works - 2022**

Site investigations included survey and visual inspection of representative areas of the seabed during May 2022. This included area inside and within 25 m of each of the Dredging Areas and Sand Placement Areas (Note: Based on preliminary Dredge Plan) identified as part of the project.

These included surveys of benthic habitat to identify and map any seagrasses or other sensitive communities e.g. macroalgae and soft corals. Visual observations to verify the seabed habitat were made using a combination of towed camera transects and spot observations using a bathyscope, drop camera or,



in the cases of shallow areas and during periods of clear water, observation from the side of the boat. The towed camera was towed within 1 m of the seabed and positioned so imagery was being provided from directly under or within 2 m of the stern of the survey vessel. The towed and drop cameras allowed for *in situ* field verification of mapping by providing video imagery live to the topside monitor on the survey vessel. The vessel sonar, which included CHIRP ClearVu and SideVu sonar that incorporates a thin, wide beam to provide clear images of structure and fish below the vessel, was also used to aid mapping and target seabed areas with structure.

Mapping data were collected using a customised GIS-based form within the Field Maps Application. Data collected included:

- Habitat Type (seagrass, soft sediment, rock/reef/rubble, macroalgae, soft coral).
- Seagrass Bed Species Composition (*Posidonia australis*, *Zostera* sp., *Halophila* sp., *Posidonia* mixed (*P. australis* + *Zostera* and/or *Halophila*), *Zostera*/ *Halophila* (mixed)).
- Seagrass Density, including recording of low, medium and high as per King and Barclay (1986).
- Macroalgae Types, with care to record occurrences of *Caulerpa taxifolia*.

Field survey effort inside the Study Area consisted of collection of *in situ* verification points to inform and update mapping.

### 2.2.2 Pre-Works Clearance Site Investigations

A pre-works clearance survey of potential habitat for seagrass and soft corals establishment inside and within 25 m of each of the current identified Dredging Areas and Sand Placement Areas were conducted in July 2023. The current Dredging Areas 1, 3 and 4 (Table 1) and the proposed placement areas are hereafter termed the ‘Study Area’ (Figure 2).

Site surveys of benthic habitat to identify changed presence of any seagrass plants or beds and any soft corals were undertaken from a small survey vessel. This included visual observations to inspect the seabed habitat and use of a Chasing M2 Remotely Operated Vehicle (ROV) with Ultra High Definition (UHD) video and still imagery capture capability. Marine habitat and features of interest were photographed with the ROV. The vessel sonar, which included CHIRP ClearVu and SideVu sonar that incorporates a thin, wide beam to provide clear images of structure and fish below the vessel, was also used to aid mapping and target seabed areas with structure. Mapping of seagrasses and soft corals from initial site investigations were verified *in-situ*.

## 2.3 Habitat Mapping

### 2.3.1 Seagrass Habitat

Following site surveys, habitat maps and recent aerial high-resolution imagery (Nearmaps) were updated to develop habitat maps showing seagrass and any other sensitive (e.g. soft corals) or other estuarine macrophyte habitats. For seagrasses, a density was also assigned to each polygon based on observations recorded during the site survey (Table 2).

Table 2: Seagrass categories for density and patchiness developed from King and Barclay 1986.

Density	
Low	Sparse growth, up to 15% cover

Medium	Moderate growth 15 – 50% cover
High	Abundant growth greater than 50% cover

## 2.4 Threatened Species Assessment

The threatened species assessment was undertaken by desktop review of ‘sightings’, assessment of the habitat in the Study Area, and determining the likelihood of occurrence of each species using the criteria outlined in Table 3. Species considered further were those in the ‘Known’, ‘High’ and ‘Moderate’ categories and where impacts on the species from the proposed works are considered to possibly or likely occur. Those species with a moderate or higher likelihood of occurrence and possible likelihood or higher of being impacted will trigger further assessment through the 5 / 7 Part Test and/ or Impact Assessment criteria processes.

Table 3: Likelihood of occurrence criteria

Likelihood of occurrence	Criteria
Known	The species was observed within the Study Area. The species is known to inhabit the Study Area.
High	The species has frequently been recorded previously in the Study Area or similar habitats in the locality. The species is known or likely to maintain resident populations surrounding the Study Area. It is likely that the species utilises habitat or resources that are abundant or in good condition within the Study Area. The species is known or likely to visit the Study Area during regular seasonal movements or migrations.
Moderate	The species has infrequently been recorded previously in the Study Area or similar habitats in the locality. The Study Area contains potential marginal and/or modified habitat and resources for the species, which it may occasionally utilise. The species is unlikely to maintain sedentary populations but may seasonally use resources within the Study Area opportunistically or during migrations.
Low	The species has not been recorded previously in the Study Area or similar habitats in the locality. The Study Area is beyond the current distribution range of the species. If present in the Study Area the species would likely be a transient visitor. The Study Area contains only very marginal habitat for the species, which would not be relied upon for its on-going local existence.
Unlikely	The species is highly restricted to certain geographical areas not including the Study Area. The habitat within the Study Area is unsuitable for the species.

## 2.5 Limitations

Threatened species sightings searches were limited to sightings data within Bionet (from the last 20 years), with the exception of fish, shark and rays for which sightings data from the Atlas of Living Australia were also reviewed. Threatened species searches were undertaken in 2022 following engagement by TfNSW for

this project. Some more current sightings data may be available for some species; however, this additional data is unlikely to include fish, sharks, rays or marine invertebrates that have potential to be impacted by this proposal.

Fauna surveys were limited to the assessment of habitat values and other opportunistic observations. Habitat assessments are conservative, defaulting to assume presence where there is insufficient knowledge to determine otherwise.

Numerous threatened species of fauna are seasonal in geographical distribution and/or may be transient in nature. For instance, some migratory bird species may be seen only at certain times of the year as they migrate to more significant nearby sites, while other fauna are only present during certain seasons (e.g. migration patterns or seasons).

The density and coverage of seagrass will change seasonally and/or in response to weather events. Weather events that result in high levels of sediment mobilisation and subsequent sedimentation may smother and cover shorter seagrasses such as *Halophila* and turfing *Zostera* beds. Seagrass, especially *Halophila*, may increase in coverage during summer months and retract in coverage and density during winter months.

The presence of Cauliflower Soft Corals (*D. australis*) in estuarine and coastal environments can be highly variable. The species requires specific habitat conditions affected by seabed slope, tidal current speed and bathymetry. Given the highly mobile sandbanks and varying tidal currents present in the Ettalong Channel, habitat conditions for this species may change in suitability at different times. Large sediment movement and accumulation may also result in the smothering of existing individuals.

This assessment is specifically limited to assessment of the Dredging Zones based on preliminary designs provided in 2022 and assumes sand placement for project will be confined to unvegetated areas of subtidal habitat associated with the existing shoal seaward of Ocean Beach.

Mapping is limited to broad-scale GPS mapping and a typical accuracy of +/- 3 m. More detailed spatial and temporal mapping may be required to identify more precise boundaries and seasonal changes in habitat.

## 3 Results and Findings

### 3.1 Desktop Review

#### 3.1.1 Threatened Biodiversity and Protected Matters

Searches of the Bionet database identified sightings data for 47 items listings under the BC Act within a ~10 km radius of the Study Area (Figure 2). These included:

- 20 Threatened marine birds and/or shorebirds,
- 4 Threatened marine mammals; and
- 3 Threatened marine reptiles.

Review of Threatened Species Listings under the FM Act that may occur in the Study Area or wider locality (catchment or adjacent waters) identified the following listings relevant to this study:

- 4 Threatened sharks and rays,
- 3 Threatened fish; and
- 1 Invertebrate.

The EPBC Protected Matters Report Search identified the following MNES relevant to this study (i.e. marine/estuarine species or those that use marine/estuarine habitat) within ~10 km radius of the Study Area (Appendix 2):

- 50 Listed Threatened species,
- 70 Listed Migratory species; and
- 8 Threatened Ecological Communities (TEC).

In addition to the above, the EPBC Protected Matters Report Search identified 91 protected marine species that include certain species of fish, along with some marine birds, reptiles and mammals. A total of 2 marine mammals were identified as part of protected listings for cetaceans (Appendix 2).

Of the Commonwealth listed Threatened and/or Migratory species and communities, the following were identified for consideration as part of this assessment:

- 37 Marine birds and shorebirds,
- 2 Marine mammals,
- 5 Marine turtles,
- 6 Fish.

In total 71 marine birds (including shorebirds and waders), 11 marine mammals, 5 marine reptiles, 9 sharks and rays, 6 fish, 1 invertebrate and 1 TEC which are considered threatened and/or migratory species were identified to require a review of habitat and potential of occurrence.. A summary of all threatened and migratory species considered as part of this assessment, along with consideration of their likelihood of occurrence within the Study Area and potential to be impacted, is provided in Table 4.

Species with a likelihood of occurrence of 'Moderate' or higher are considered further as part of this assessment in Section 4.1.

Table 4: Habitat and likelihood of occurrence table for threatened and migratory marine species identified from searches.

Common Name	Scientific Name	NSW status	Comm. Status	Likelihood of Occurrence
<i>Marine Birds and Shorebirds</i>				
Common Sandpiper	<i>Actitis hypoleucos</i>		MI	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Common Noddy	<i>Anous stolidus</i>		MI	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Fork-tailed Swift	<i>Apus pacificus</i>		MI	Low – No records in locality, only very marginal foraging habitat present in the Study Area.
Flesh-footed Shearwater	<i>Ardenna carneipes</i>		MI	Low – No records in locality, only very marginal foraging habitat present in the Study Area.
Sooty Shearwater	<i>Ardenna grisea</i>		MI	Low – No records in locality, only very marginal foraging habitat present in the Study Area.
Wedge-tailed Shearwater	<i>Ardenna pacifica</i>		MI	Low – No records in locality, only very marginal foraging habitat present in the Study Area.
Short-tailed Shearwater	<i>Ardenna tenuirostris</i>	P	M, MI	Low – Records in the locality, however likely only a transient visitor, only marginal foraging habitat present within Study Area
Australasian Bittern	<i>Botarus poiciloptilus</i>		E	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Bush Stone-curlew	<i>Burhinus grallarius</i>	E, P		Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>		MI	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Red Knot	<i>Calidris canutus</i>		E, MI	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Curlew Sandpiper	<i>Calidris ferruginea</i>		CE, MI	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Pectoral Sandpiper	<i>Calidris melanotos</i>		MI	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Streaked Shearwater	<i>Calonectris leucomelas</i>		MI	Low – No records in locality, only very marginal foraging habitat present within the Study Area.
Double-banded Plover	<i>Charadrius bicinctus</i>		MI	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.

Common Name	Scientific Name	NSW status	Comm. Status	Likelihood of Occurrence
Greater Sand Plover, Large Sand Plover	<i>Charadrius leschenaultii</i>		V, MI	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Antipodean Albatross	<i>Diomedea antipodensis</i>		V, MI	Low – No records in locality, only very marginal foraging habitat present in the Study Area.
Gibson's Albatross	<i>Diomedea antipodensis gibsoni</i>		V, MI	Low – No records in locality, only very marginal foraging habitat present in the Study Area.
Southern Royal Albatross	<i>Diomedea epomophora</i>		V, MI	Low – No records in locality, only very marginal foraging habitat present in the Study Area.
Wandering Albatross	<i>Diomedea exulans</i>		V, MI	Low – No records in locality, only very marginal foraging habitat present in the Study Area.
Northern Royal Albatross	<i>Diomedea sanfordi</i>		V, MI	Low – No records in locality, only very marginal foraging habitat present in the Study Area.
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	E, P		Low – Infrequent records in locality, only very marginal foraging habitat present in the Study Area.
Grey Falcon	<i>Falco hypoleucos</i>		V	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Lesser Frigatebird, Least Frigatebird	<i>Fregata ariel</i>		MI	Low – No records in locality, only very marginal foraging habitat present in the Study Area.
Great Frigatebird	<i>Fregata minor</i>		MI	Low – No records in locality, only very marginal foraging habitat present in the Study Area.
White-bellied Storm-Petrel	<i>Fregetta grallaria grallaria</i>		V	Low – No records in locality, only very marginal foraging habitat present in the Study Area.
Latham's Snipe	<i>Gallinago hardwickii</i>		MI	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Swinhoe's Snipe	<i>Gallinago megala</i>		MI	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Pin-tailed Snipe	<i>Gallinago stenura</i>		MI	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Sooty Oystercatcher	<i>Haematopus fuliginosus</i>	V, P		Low – Records in the locality, however, habitat within the Study Area is confined to estuarine waters.
Pied Oystercatcher	<i>Haematopus longirostris</i>	E, P		Low – Records in the locality, however, habitat within the Study Area is confined to estuarine waters.

Common Name	Scientific Name	NSW status	Comm. Status	Likelihood of Occurrence
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	V, P		<b>Moderate</b> – Records in the locality, marginal habitat present but likely to occur only aerially and utilise habitat for foraging.
White-throated Needletail	<i>Hirundapus caudacutus</i>	P	V, M, MI	Low – Infrequent records in locality, only very marginal foraging habitat present in the Study Area.
Black Bittern	<i>Ixobrychus flavicollis</i>	V, P		Low – Infrequent records in locality, only very marginal foraging habitat present in the Study Area.
Bar-tailed Godwit	<i>Limosa lapponica</i>	P	M, MI	Low – Infrequent records in locality, habitat within the Study Area is confined to estuarine waters.
Nunivak Bar-tailed Godwit	<i>Limosa lapponica baueri</i>		V	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Southern Giant-Petrel	<i>Macronectes giganteus</i>		E, MI	Low – No records in locality, only very marginal foraging habitat present in the Study Area.
Northern Giant Petrel	<i>Macronectes halli</i>		V, MI	Low – No records in locality, only very marginal foraging habitat present in the Study Area.
Eastern Curlew	<i>Numenius madagascariensis</i>	P	CE, M, MI	Low – Infrequent records in locality, habitat within the Study Area is confined to estuarine waters.
Little Curlew	<i>Numenius minutus</i>	P	M, MI	Low – Infrequent records in locality, habitat within the Study Area is confined to estuarine waters.
Whimbrel	<i>Numenius phaeopus</i>	P	M, MI	Low – Infrequent records in locality, habitat within the Study Area is confined to estuarine waters.
Fairy Prion (southern)	<i>Pachyptila turtur subantarctica</i>		V	Low – No records in locality, only very marginal foraging habitat present within the Study Area.
Eastern Osprey	<i>Pandion cristatus</i>	V, P		Low – Records in the locality, only marginal habitat within the Study Area.
Osprey	<i>Pandion haliaetus</i>		MI	Low – No records in locality, only very marginal habitat present
Sooty Albatross	<i>Phoebastria fusca</i>		V, MI	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Pacific Golden Plover	<i>Pluvialis fulva</i>	P	M, MI	Low – Infrequent records in locality, habitat within the Study Area is confined to estuarine waters.
Grey Plover	<i>Pluvialis squatarola</i>	P	M	Low – Infrequent records in locality, habitat within the Study Area is confined to estuarine waters.
Gould's Petrel	<i>Pterodroma leucoptera leucoptera</i>		E	Low – No records in locality, only very marginal foraging habitat present within the Study Area.



Common Name	Scientific Name	NSW status	Comm. Status	Likelihood of Occurrence
Kermadec Petrel (western)	<i>Pterodroma neglecta neglecta</i>		V	Low – No records in locality, only very marginal foraging habitat present within the Study Area.
Pilotbird	<i>Pycnoptilus floccosus</i>		V	Low – No records in locality, habitat within the Study Area is confined to estuarine waters.
Australian Painted Snipe	<i>Rostratula australis</i>		E, MI	Low – No records in locality, only very marginal foraging habitat present within the Study Area.
Common Tern	<i>Sterna hirundo</i>	P	M	<b>Moderate</b> – Infrequent records in locality, habitat within the Study Area is confined to estuarine waters, some marginal foraging habitat present within the Study Area.
Little Tern	<i>Sternula albifrons</i>	E, P	M, MI	Low – Infrequent records in locality, habitat within the Study Area is confined to estuarine waters, only very marginal foraging habitat present within the Study Area.
Australian Fairy Tern	<i>Sternula nereis nereis</i>		V	Low – No records in locality, habitat within the Study Area is confined to estuarine waters, only very marginal foraging habitat present within the Study Area.
Buller's Albatross	<i>Thalassarche bulleri</i>		V, MI	Low – No records in locality, only very marginal foraging habitat present within the Study Area.
Northern Buller's Albatross	<i>Thalassarche bulleri platei</i>		V, MI	Low – No records in locality, only very marginal foraging habitat present within the Study Area.
Indian Yellow-nosed Albatross	<i>Thalassarche carteri</i>		V, MI	Low – No records in locality, only very marginal foraging habitat present within the Study Area.
Shy Albatross	<i>Thalassarche cauta</i>		E, MI	Low – No records in locality, only very marginal foraging habitat present within the Study Area.
Chatham Albatross	<i>Thalassarche eremita</i>		E, MI	Low – No records in locality, only very marginal foraging habitat present within the Study Area.
Campbell Albatross	<i>Thalassarche impavida</i>		V, MI	Low – No records in locality, only very marginal foraging habitat present within the Study Area.
Black-browed Albatross	<i>Thalassarche melanophris</i>		V, MI	Low – No records in locality, only very marginal foraging habitat present within the Study Area.
Salvin's Albatross	<i>Thalassarche salvini</i>		V, MI	Low – No records in locality, only very marginal foraging habitat present within the Study Area.
White-capped Albatross	<i>Thalassarche steadi</i>		V, MI	Low – No records in locality, only very marginal foraging habitat present within the Study Area.
Grey-tailed Tattler	<i>Tringa brevipes</i>	P	M, MI	Low – Infrequent records in locality, habitat within the Study Area is confined to estuarine waters.

Common Name	Scientific Name	NSW status	Comm. Status	Likelihood of Occurrence
Common Greenshank	<i>Tringa nebularia</i>	P	M, MI	Low – Infrequent records in locality, habitat within the Study Area is confined to estuarine waters.
Terek Sandpiper	<i>Xenus cinereus</i>	V, P	M	Low – Infrequent records in locality, habitat within the Study Area is confined to estuarine waters.
<i>Marine Mammals</i>				
New Zealand Fur-seal	<i>Arctocephalus forsteri</i>	V, P		<b>Moderate</b> – Records in locality, may forage within the Study Area at times
Australian Fur-seal	<i>Arctocephalus pusillus doriferus</i>	V, P		<b>Moderate</b> – Records in locality, may forage within the Study Area at times
Bryde's Whale	<i>Balaenoptera edeni</i>		MI	Low – No records in locality, likely to be only a transient visitor
Blue Whale	<i>Balaenoptera musculus</i>		E, MI	Low – No records in locality, likely to be only a transient visitor
Pygmy Right Whale	<i>Caperea marginata</i>		MI	Low – No records in locality, likely to be only a transient visitor
Dugong	<i>Dugong dugon</i>	E, P	MI	Low – One record dating back 20 years indicating any occurrence is very rare and part of transient visits only.
Southern Right Whale	<i>Eubalaena australis</i>		E, MI	Low – No records in locality, likely to be only a transient visitor to deeper areas of Broken Bay
Dusky Dolphin	<i>Lagenorhynchus obscurus</i>		MI	Low – No records in locality, likely to be only a transient visitor
Humpback Whale	<i>Megaptera novaeangliae</i>		MI	Low – Records in locality, however unlikely to occur within the shallow waters and confined navigational channels associated with the Study Area.
Killer Whale	<i>Orcinus orca</i>		MI	Low – No records in locality, likely to be only a transient visitor
Australian Humpback Dolphin	<i>Sousa sahulensis</i>		MI	Low – No records in locality, likely to be only a transient visitor
<i>Marine Turtles</i>				
Loggerhead Turtle	<i>Caretta caretta</i>	E, P	E, MI	<b>Moderate</b> – Infrequent records within Study Area, unlikely to maintain sedentary populations but may seasonally use resources within the Study Area.
Green Turtle	<i>Chelonia mydas</i>	V, P	V, MI	<b>High</b> – Records within Study Area, where it may utilise marginal habitat and resources within the Study Area.

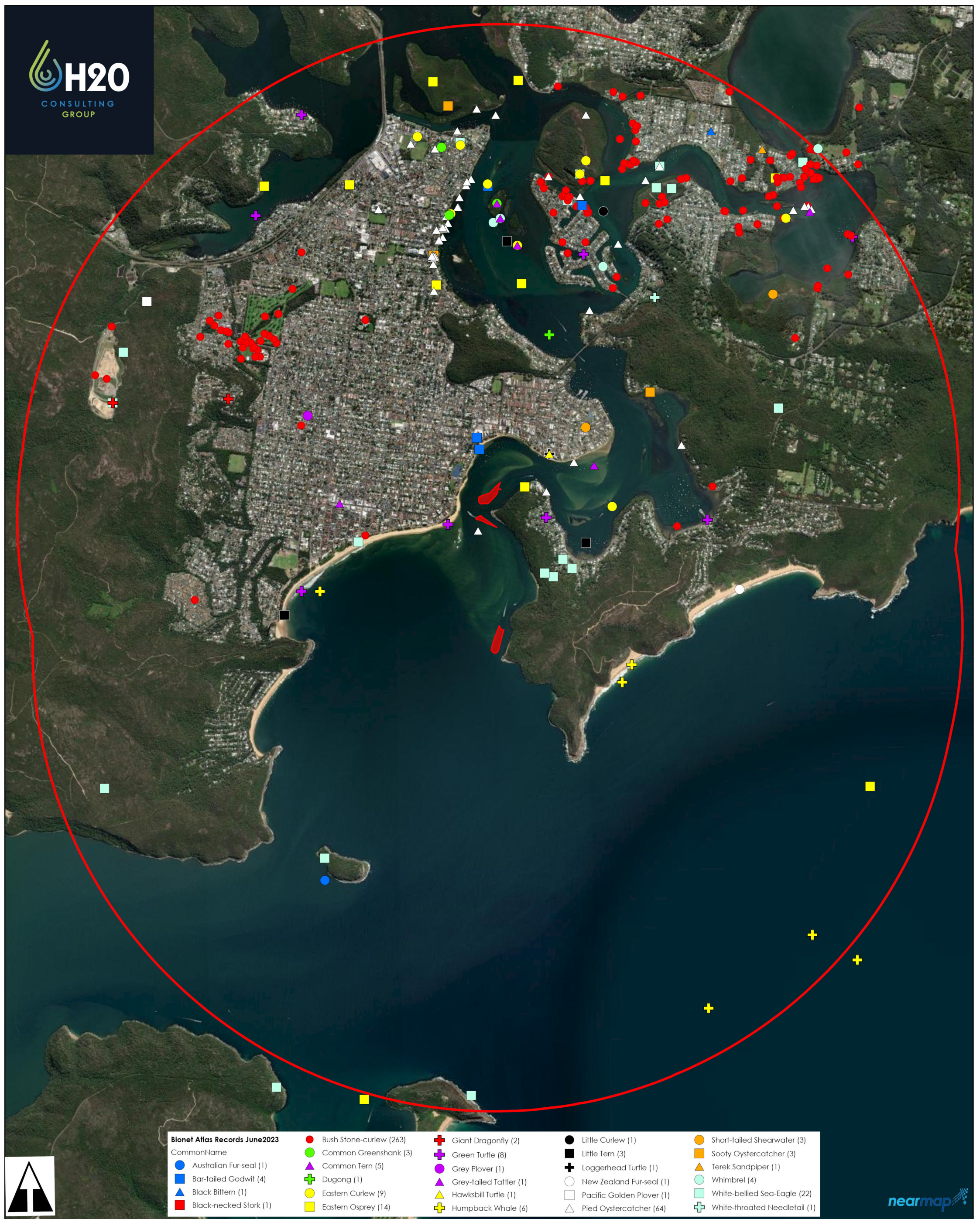
Common Name	Scientific Name	NSW status	Comm. Status	Likelihood of Occurrence
Leatherback Turtle	<i>Dermochelys coriacea</i>		E, MI	Unlikely – No records in locality, likely to be only a transient visitor.
Hawksbill Turtle	<i>Eretmochelys imbricata</i>	P	V, MI	<b>Moderate</b> – Infrequent records within Study Area, unlikely to maintain sedentary populations but may seasonally use resources within the Study Area.
Flatback Turtle	<i>Natator depressus</i>		V, MI	Unlikely – No records in locality, likely to be only a transient visitor.
<i>Fish, Sharks, and Rays</i>				
Black Rockcod	<i>Epinephelus daemeli</i>	V	V	Low – Only one record in the locality, which was from Barrenjoey in 1977. The habitat present in the Study Area is confined to very marginal areas of rocky substrate at Half Tide Rocks, however, this is outside of the dredging and sand placement footprints.
White's Seahorse	<i>Hippocampus whitei</i>	E	E	Low – Records from the locality confined to estuarine waters inside Pittwater and Brisbane Water, minimal potential habitat within the Study Area due to absence of <i>P. australis</i> seagrass beds, suitable habitat is confined to isolated occurrences of <i>Zostera</i> seagrass patches and macroalgae associated with edges of the shoreline, which are considered to provided only very marginal habitat for the species. These <i>Zostera</i> patches and macroalgae are outside of the dredging and sand placement footprints.
Macquarie Perch	<i>Macquaria australasica</i>	E	E	Low – No records in the locality, freshwater species and habitat within the Study Area is confined to estuarine waters.
Australian Grayling	<i>Prototroctes maraena</i>	V	V	Low – No records in the locality, only very marginal habitat present and typically confined to upper tidal and freshwater reaches of river systems.
Blue Warehou	<i>Seriolella brama</i>		CD	Low – No records in the locality, species typically remains in offshore waters.
Southern Bluefin Tuna	<i>Thunnus maccoyii</i>	E	CD	Low – No records in the locality, species typically remains in offshore waters.
<i>Sharks and Rays</i>				
Oceanic Whitetip Shark	<i>Carcharhinus longimanus</i>		B	Low – No records in the locality, species typically remains in offshore waters.
Grey Nurse Shark (east coast population)	<i>Carcharias taurus</i> (east coast population)	CE	CE	Low – May occur in the locality, only sighting is confined to dead shark that washed up on the beach near to the Study Area in 2020. Typically confined to coastal and offshore reefs and sand gutters.

Common Name	Scientific Name	NSW status	Comm. Status	Likelihood of Occurrence
White Shark	<i>Carcharodon carcharias</i>	V	V, B	<b>Known</b> – Known to occur within the locality, marginal habitat present that may be utilised for foraging or during transient movements to and from estuarine waters.
School Shark	<i>Galeorhinus galeus</i>		CE	Low – No records in the locality, only very marginal foraging habitat present in the Study Area.
Porbeagle	<i>Lamna nasus</i>		B	Low – No records in the locality, only very marginal foraging habitat present in the Study Area.
Reef Manta Ray	<i>Mobula alfredi</i>		B	Low – No records in the locality, only very marginal foraging habitat present, likely to only be a transient visitor.
Giant Manta Ray	<i>Mobula birostris</i>		B	Low – No records in the locality, only very marginal habitat present, likely to only be a transient visitor
Whale Shark	<i>Rhincodon typus</i>		V, B	Low – No records in the locality, only very marginal habitat present, likely to only be a transient visitor
Scalloped Hammerhead	<i>Sphyrna lewini</i>	E	CD	Low – Only one record from within the locality, which was in Pittwater in 1998. Nearshore waters typically only used by juveniles. Only very marginal foraging habitat present within the Study Area.
Great Hammerhead Shark	<i>Sphyrna mokarran</i>	V		Low – No records in the locality, only very marginal habitat present, species typically remains in offshore waters.
<i>Invertebrates</i>				
Cauliflower Soft Coral	<i>Dendronephthya australis</i>	E	E	Low – The locality included a significant population that has been previously identified to be confined to areas outside the Study Area in shallow areas adjacent to Lobster Beach in 2019 (Appendix 4). The area where this species has been known to occur has been subject to dredging since 2018 (FSC 2021). Site surveys done in 2022 (H2O Consulting Group 2022) and 2023 did not find it to be present within the Study Area or previously known population outside the Study Area (adjacent to Lobster Beach).
<i>Communities / Populations</i>				
<i>Posidonia australis</i> seagrass meadows of the Manning-Hawkesbury ecoregion / <i>Posidonia australis</i> Endangered Population in Brisbane Water		E	E	Low – Previous mapping indicates this EEC is confined to areas inside Brisbane Waters and outside of the navigational Channel. Site surveys done in 2022 did not identify the EEC to occur within the Study Area.
Subtropical and Temperate Coastal Saltmarsh / Coastal Saltmarsh in the New		E	V	None – Occurs in the locality, however habitat within the Study Area is confined to estuarine waters.

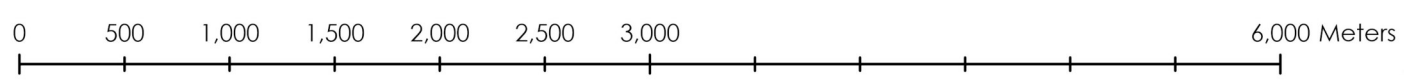
Common Name	Scientific Name	NSW status	Comm. Status	Likelihood of Occurrence
South Wales North Coast, Sydney Basin and South East Corner Bioregions				

*CD = Conservation Dependent, P = Protected, V = Vulnerable, E = Endangered, CE = Critically Endangered, MA = Marine Species, MI = Migratory, C = Cetacean.*





Bionet Atlas Records June2023			
CommonName			
Australian Fur-seal (1)	Bush Stone-curlew (263)	Giant Dragonfly (2)	Little Curlew (1)
Bar-tailed Godwit (4)	Common Greenshank (3)	Green Turtle (8)	Little Tern (3)
Black Bittern (1)	Common Tern (5)	Grey Plover (1)	Loggerhead Turtle (1)
Black-necked Stork (1)	Dugong (1)	Grey-tailed Tattler (1)	New Zealand Fur-seal (1)
	Eastern Curlew (9)	Hawksbill Turtle (1)	Pacific Golden Plover (1)
	Eastern Osprey (14)	Humpback Whale (6)	Pied Oystercatcher (64)
			Short-tailed Shearwater (3)
			Sooty Oystercatcher (3)
			Terek Sandpiper (1)
			Whimbrel (4)
			White-bellied Sea-Eagle (22)
			White-throated Needletail (1)



Scale: 1:36,000

Ettalong Channel - NSW 2256

**Figure 2: Bionet Sightings within 5km (Marine/Estuarine sp.)**

- Dredge Areas 5km buffer
- Dredge Areas rev2 GDA2020

DATE : 14/07/2023      Map Version : 1\_2

Projected Coordinate System : GDA 2020 Zone 56

Aerial Imagery: ESRI World Imagery

Although all care has been taken - WiZarDTech accepts no responsibility from the use or inaccuracies of this map and spatial data.  
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### 3.1.2 Existing Ecological Mapping and Aerial Imagery

Existing mapping of estuarine macrophytes by NSW DPI (2023b) identified extensive fringing seagrass beds and small areas of mangroves in shallow areas of Brisbane Water (Appendix 3, Item 1), but outside of proposed dredging areas (Figure 1). Mapping indicates the presence of a large sparse *Zostera capricorni* bed running north along Lobster Beach and to Half Tide Rocks, to the southeast of Area 3. To the southeast of Area 4 to the north of Half Tide Rocks, mapping indicated a large fringing bed of the Endangered *Posidonia australis*, with *Z. capricorni* in eastern areas of Wagstaffe Bar. Fringing beds of these seagrass species extended along much of the southern shore and isolated patches of the northern shore of Brisbane Water, becoming more extensive further upstream and beyond the Study Area. Mapping also identified mangrove stands in shallow areas of the southern shore of Brisbane Water to the east of the Study Area (Appendix 3).

Mapping of the Endangered Cauliflower Soft Coral (*D. australis*) in the vicinity of the navigational between Half Tide Rocks and Little Box Head was undertaken in 2019 (H2O Consulting Group 2019). This mapping identified this species to be present adjacent to Lobster Beach extending north through the Channel towards Half Tide Rocks (Appendix 4).

The nearest Marine Protected Area (MPA) to the Study Area is the Barrenjoey Head Aquatic Reserve, located at the northern headland of the Northern Beaches at the mouth of the Hawkesbury River, approximately 4.8 km from the Study Area (Appendix 3).

The entirety of tidal areas within the Study Area are identified as Key Fish Habitat (KFH) – Central Rivers and Hawkesbury-Nepean (Appendix 3).

Mapping done as part of the Resilience and Hazards SEPP (2021) identifies a small section of the southern shore of Brisbane Water to the east of the Study Area to be mapped as part of the Coastal Wetlands Area under the SEPP. A small section of the southern shore of Brisbane Waters >1 km east of the Project is mapped as Proximity Area for Coastal Wetlands, overlapping sections of mapped *P. australis* and *Z. capricorni* (Appendix 3).

Some aquaculture leases are present to the east of the Study Area, further upstream into Brisbane Water, approximately 1.5 km from the Study Area (NSW DPI 2023b).

The project will not encroach into any of these mapped environmentally sensitive areas.

## 3.2 Description of Habitat and Biota

### 3.2.1 Dredging Areas

The subtidal habitat within each of the Study Areas is characterised primarily by soft sediment seabed composed of clean marine sands with minimal silt, mostly devoid of vegetation cover. Shallow areas adjacent to Area 3 were found to be continuously or patchily covered by extensive seagrass beds of variable species composition, however, these seagrass stands were over 70 m from the proposed Dredging Area.

#### Dredge Area 1

Area 1 is located at the mouth of the Ettalong Channel in Brisbane Water, adjacent to Little Box Head. The proposed dredge area encompasses approximately 19,800 m<sup>2</sup> and runs adjacent approximately 50 – 80 m



from the shore. The seabed in this area is comprised of in most part unvegetated clean marine sand, which is classified as Type 3 – Minimally sensitive KFH. A small patch of low-density *Zostera capricorni* seagrass occurs approximately 10 m east of the proposed Dredge Area, which is considered Type 2 – Moderately sensitive KFH, however this patch of seagrass was found to be no longer present during the recent pre-dredge survey in July 2023, and is not considered further as part of this assessment.

### Dredge Area 3

Area 3 is located south (outside) of Half Tide Rocks, parallel to the rocky shore. The proposed dredge area encompasses approximately 6,100 m<sup>2</sup> and is situated between 25 – 50 m from the rocky shore. The seabed in this area is comprised of in most part unvegetated clean marine sand, which is classified as Type 3 – Minimally sensitive KFH. Towards the edges of the Study Area, however, outside the dredge footprint (approximately 20 m towards shore) some rock and rubble reef habitat that includes common macroalgae dominated by Kelp (*Ecklonia radiata*) and Gulfweed (*Sargassum* sp.) occurs, which is considered Type 2 – Moderately sensitive KFH. Some scattered seagrass beds were also identified 50-60m to the southeast of Area 3 continuing towards Lobster Beach (Figure 3). These beds were comprised of low-density Mixed *Z. capricorni* and *Halophila ovalis* and low-density *H. ovalis*. During these surveys no evidence of the Cauliflower Soft Corals (*D. australis*) was found to within the Study Area or nearby areas where it was mapped to occur adjacent to Lobster Beach in 2019 (H2O Consulting Group 2022).

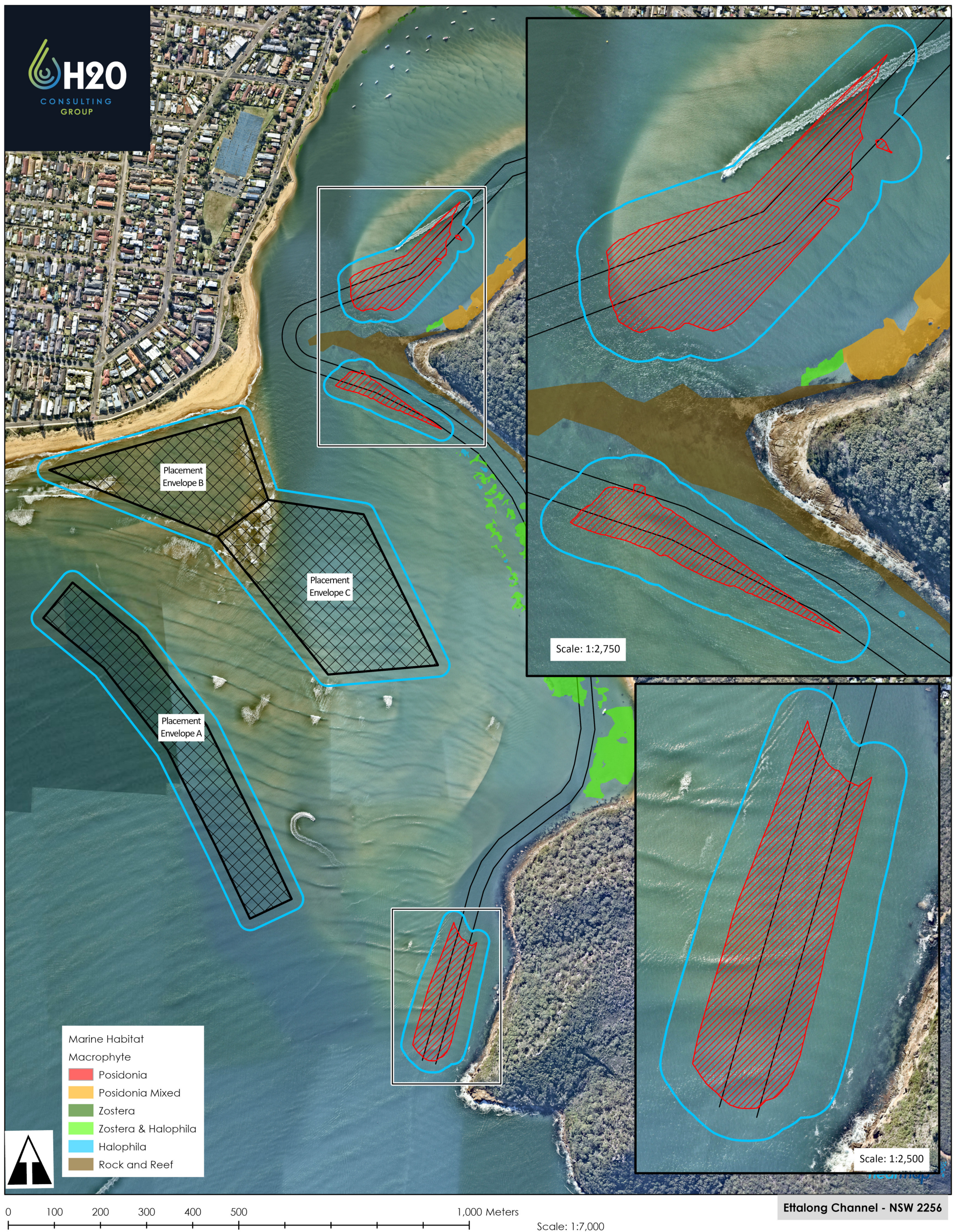
### Dredge Area 4

Area 4 is located north (inside) of Half Tide Rocks, parallel to the rocky shore. The proposed dredge area encompasses approximately 20,200 m<sup>2</sup> with the southwestern boundary approximately 50 m from the rocky shore of Half Tide Rocks and the southeast boundary >100 m from the rocky shore of Kourung Gourung Point. The seabed in this area is comprised of unvegetated clean marine sand and is classified as Type 3 – Minimally sensitive KFH. Fringing mixed species seagrass beds that included *P. australis* were identified along the shore adjacent to Area 4, however, they were >90 m from the proposed Dredge Area. These beds included a large fringing Mixed *P. australis* bed that ran along a majority of the shore between Kourung Gourung Point and Half Tide Rocks towards Wagstaffe. A large bed of Mixed *Z. capricorni* and *H. ovalis* was present approximately 70 m southeast of the Area 4 at the start of Half Tide Rocks (Figure 3).

## **3.2.2 Sand Placement Sites**

The Sand Placement Sites include Placement Envelope A on the back of the shoal (Deep Placement Area) and Placement Envelopes B and C in shallow areas on the shoal (Shallow Placement Area). The Shallow Placement Area comprises the shoal that forms 50 m seaward of the eastern end of Ocean Beach and extends across the shallow shoal towards Little Box Head (Figure 3). The Deep Placement Area comprises of an area on the southwest side of the shoal further from shore, commencing approximately 300 m from shore (Figure 3). Subtidal habitat in these Placement Areas consist of unvegetated clean marine sand and is classified as Type 3 – Minimally sensitive KFH.





0 100 200 300 400 500 1,000 Meters

Scale: 1:7,000

Ettalong Channel - NSW 2256

**Figure 3: Habitat Map (H2O 2022/2023 Survey)**

	Study Area
	Nominal 30m channel rev1 GDA2020

	Dredge Areas rev2 GDA2020
	Placement envelopes rev1 GDA2020

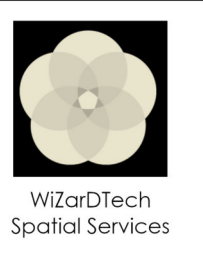
DATE : 14/07/2023

Map Version : 1\_3

Projected Coordinate System : GDA 2020 Zone 56

Aerial Imagery: Nearmap - 27/05/2023

Although all care has been taken - WiZarDTech accepts no responsibility from the use or inaccuracies of this map and spatial data. Copyright © WiZarDTech Spatial Services 2022.





## 4 Impact Assessment

Dredging activities can have significant impacts on benthic marine organisms, particularly phototrophic macrophytes (e.g. seagrasses) and fauna of limited mobility living in seabed sediment (e.g. infauna such as worms and bivalves) (Fraser *et al.* 2017). Such disturbances may occur through mechanisms such as direct removal for those situated on/in sediments to be dredged, and excessive sedimentation and reduction in light availability as a result of increased mobilisation and suspension of sediments during dredging. Direct and indirect impacts may also occur at the site of sand placement as a result of changed water quality. Dumped sediments in Sand Placement Areas can result in a temporary reduction of water quality as sediments settle, resulting in altered physical chemistry, increased turbidity, reduced water clarity.

The Guidelines for Aquatic Ecology in Environmental Impact Assessment identifies that environmental disturbances to aquatic ecology can be categorised in terms of potential physical, chemical and biological effects, which allows for the nature of impacts and their likely magnitude to be assessed (Lincoln Smith 2003). More recently, research on impacts to marine fauna has had increased focus on behavioural impacts as a result of additional sources of disturbance such as underwater noise (Erbe 2012) and light (Tidau 2021). To recognise this, behavioural effects have been added as a fourth category of impacts summarised in Table 5.

Table 5: Identification of potential aquatic impacts from the project.

Impact	Likelihood	Description
Physical		
Removal or modification of Key Fish Habitat	Known	The subtidal habitat within the Dredging Area consists of unvegetated, clean marine sandy sediment, which are considered Type 3 – Minimally sensitive KFH. These sediments will require removal via dredging to remove shoaling sands and provide sufficient draught for safe navigation of Ettalong Channel. Given the expansive KFH in the Ettalong Channel, this is not expected to have a detrimental impact on fish in the locality.
Removal or loss of marine vegetation	Unlikely	The dredging works are confined to removal of marine sands that were found to be unvegetated and are typical part of an active shoal. The dredging works (including placement areas) have also been designed to avoid all seagrasses with greater than 50m buffer to the nearest mapped beds (refer to Figure 3). Thus, are not expected to result in direct impact, removal or loss of marine vegetation.
Removal or loss of a threatened ecological community or population	Unlikely	The proposed dredging activities are unlikely to have the potential to result in removal or loss of any threatened ecological community or population. The Endangered EEC and Population of <i>P. australis</i> does occur in areas adjacent to Dredging Areas, however, is >80 m from any proposed dredging activities. No dredging works (including placement areas and/or the use of pipelines if required) are expected to be undertaken in any known areas of threatened seagrass (Figure 3). The project is not expected to impact on any of the threatened Coastal Saltmarsh community, which is known to occur in small stands in areas further upstream.
Removal or loss of a threatened species	Unlikely	The proposed dredging activities are not expected to result in the removal of any threatened species. The Endangered Cauliflower

		Soft Coral was previously recorded to occur adjacent to Lobster Beach in 2019 surveys (Appendix 4). The location where these soft corals were recorded is >180 m from the current proposed dredging areas. Surveys in 2022 and 2023 did not find this species to occur in the Study Area or the previously mapped areas nearby. Dredging areas have also been selected to avoid areas that the Endangered Cauliflower Soft Coral has previously been recorded.
Disturbance to a threatened aquatic species or their habitat	Possible	<p>The Vulnerable Australian and New Zealand Fur-seals maintain populations in Broken Bay. These fur seals regularly utilise haul out habitat at Barrenjoey and at times may utilise the shoreline around Little Box Head to rest and shelter. The waters within Broken Bay are likely important foraging grounds for the local population. Some disturbance to this foraging habitat may occur during the dredging works, especially if some individuals are using haul locations near to Little Box Head.</p> <p>Detailed surveys of the dredge areas were undertaken in 2022 and the Endangered seagrass <i>P. australis</i> and Cauliflower Soft Coral (<i>D. australis</i>) were not found to occur within the associate Study Areas. While significance of the habitat to be disturbed is considered of minimal ecological significance to other threatened species that may occur in the Study Area or wider locality. The habitat to be modified will be limited to unvegetated marine sands. Dredging will be confined to active shoals of clean marine sands associated with the Ettalong and Wagstaff bars. Sand will be deposited back on to the large shoal that forms across the Ettalong bar and or its south-western edge, which part of the active sand transport system that occurs in this location.</p> <p>An additional seabed check of both the Dredge Areas and Sand Placement Areas will also be undertaken before any works commence.</p>
Physical disturbance to marine fauna and flora	Known	The dredging will result in some physical disturbance to marine flora and fauna, particularly epibenthic organisms (sessile invertebrates) and benthic infauna associated with soft sediments. This disturbance will include removal of infauna amongst the sediments to be removed or smothering of infauna amongst surface sediments in the Sand Placement Areas. The more motile fauna such as benthic fish and decapods may either disperse away from the disturbance as an avoidance response to sudden increases in turbidity, or alternatively be attracted to the turbid plume to opportunistically feed on elutriated infauna or other dispersing prey items.
Barriers to fish passage	None	The works are not expected to result in any temporary or permanent barriers to fish passage.
Injury caused by ingestion of, or entanglement in, harmful marine debris	Possible	Materials used during construction work that are not contained or disposed of correctly have potential to find their way into the water and be ingested by marine fauna.
Potential for increased risk of vessel strike for marine fauna	Unlikely	The works are not expected to result in any notable or sustained increase in vessel movements in the Study Area that pose a risk to marine fauna that occupy waters at or near the surface.
Generation of noise resulting in injury	Unlikely	The level of underwater noise expected to be generated via the dredging machinery will be well below levels considered potentially harmful to marine fauna. Given this, the potential to produce levels of underwater noise capable of injury to marine fauna is negligible.
Chemical		

Changes in water quality	Likely	The maintenance dredging is expected to result in very localised and short-term elevated levels of turbidity in the vicinity (wider Study Area) of active dredging works and sand placement activities. Given the strong tidal flows in this area and nature of the material (clean marine sands) suspended sediments are expected to dissipate quickly.
Mobilisation of contaminants	Unlikely	The sediments present in the proposed Dredging Areas are primarily comprised of clean marine sands are not expected to have any elevated risk of contamination (TfNSW, In Prep)
Nutrification	Unlikely	The sediments present in the proposed Dredging Areas are primarily comprised of clean marine sands are not expected to include any material with elevated levels of risk of mobilisation of nutrients (TfNSW, In Prep)
<b>Biological</b>		
Invasion or spread of non-native or invasive species	Possible	The invasive green marine alga <i>C. taxifolia</i> occurs amongst soft sediment habitats in upstream areas of Brisbane Water. Its distribution can be highly spatially and temporally variable. Surveys in 2022 did not detect this species to occur within the Study Area, however, it has been previously mapped to occur in parts of the Ettalong Channel. There remains some potential that it may occur in the Study Area at the time of dredging works. Further, equipment brought to site during construction works has potential to introduce non-native or invasive species (including <i>C. taxifolia</i> ) to the site from other areas.
Introduction of disease or pathogens	Unlikely	No known diseases or pathogens have been identified in the Study Area that pose an environmental issue for marine fauna and flora.
<b>Behavioural</b>		
Generation of underwater noise with potential for behaviour affect	Unlikely	The level of underwater noise expected to be generated via the dredging machinery will be highly unlikely to have potential to impact on the behaviour of any marine fauna.
Generation of construction noise with potential for ecological affect	Unlikely	Vessel movements, dredge and pump operation and shoreline staging of machinery may at times produce some construction noise. However, it is expected to be negligible in comparison with the existing vessel and recreational boating that occur at this location and not of a magnitude for ecological impact.

## 4.1 Estuarine Flora and Fauna

### 4.1.1 Seagrasses

Seagrasses are susceptible to physical damage and removal during dredging activities, while sediment placement can smother and rapidly kill seagrass plants. There is also potential that mobilised sediments and turbid waters from dredging activities may disperse towards surrounding beds of seagrasses. Seagrasses are susceptible to changes in light availability and sedimentation (Kirkman and Kuo 2012) that may arise from water quality disturbances during dredging. The Ettalong Channel and the lower Brisbane Water estuary is open to the ocean with high tidal flow and highly mobile sand banks, while the sediments consist of clean marine sands. As a result, any mobilised sediment will likely take settle and dissipate very quickly during the normal tidal regimes.

Surveys of the Study Areas found the seagrass *Posidonia australis*, considered an Endangered Population under the FM Act and an Endangered Ecological Community under the EPBC Act, to occur well outside

and to the east of Dredging Area 4 (refer to Figure 3). The proposed dredging activities are expected to be confined to a distance of 80 m or more from the nearest *P. australis* stand (based on mapping completed in 2022). This is also likely to provide a sufficient buffer from any localised and short-term reductions in water quality and increased sedimentation. Any required dredge pipelines area also likely to be positioned to adequately avoid nearby seagrasses, which do not occur within potential routes between the dredge and disposal areas. Given the avoidance of these seagrass areas, the proposed dredging activities are not expected to have any direct impact on *P. australis* seagrass beds, which are located well outside the Study Area, and thus does not require further consideration.

Other seagrass species in the vicinity of Dredging Areas included low-density *Zostera capricorni* and Mixed *Z. capricorni* and *Halophila ovalis*. A majority of these seagrass beds are a minimum of 50 m from proposed dredging areas (based on mapping done in 2022 and the pre-dredge survey done in July 2023) and outside the Study Area, thus any direct impacts from dredging activities are not expected. This is also likely a sufficient buffer from any localised and short-term reductions in water quality and increased sedimentation.

Given that the proposed dredging activities, including Sand Placement Areas, have been designed to avoid any areas of previously mapped seagrass, it is considered unlikely that dredging activities would result in any direct loss and or removal of seagrasses. The potential for indirect impacts as a result of reduced water quality and increased sedimentation are also considered to be minimal given the location, nature of the sediments, and distance from the majority of seagrasses.

#### **4.1.2 Marine Birds, Shorebirds and Waders**

Marine birds regularly use the aerial and subtidal estuarine habitats associated with the Study Areas to forage, while shorebirds and waders may at times use aerial habitats to travel between foraging, resting and roosting habitats. Given that proposed dredging works are confined to subtidal areas and therefore are not expected to result in any direct impacts to shorebirds or waders, these species will not be considered further in this assessment.

A wide diversity of marine birds that forage along the NSW coastline are likely to also forage in habitat within the Study Area at times. These species are typically birds of flight that forage aerially over large areas of water along the coastline and at sea (SEWPAC 2012). Such species may include the White-bellied Sea Eagle (*Haliaeetus leucogaster*), Common Tern (*Sterna hirundo*) and other raptors (Robinson 2006). These marine birds and raptors typically forage over the water and rely on detecting prey aerially from above (Billerman *et. al.* 2020, DAWE 2020). There is potential that reduced prey detection success from waters with elevated levels of turbidity may impact on some species that forage aerially (Lunt and Smees 2015), or due to a decrease in available prey as a result of disturbance from dredging works. The potential for detrimental impacts to the water quality from the proposed dredging operations is considered to be generally minor in spatial extent considering the vast areas of coastal waters these species utilise for foraging. Any potential impacts are also likely to be very short-term, given the tidal exchange of the area and the clean marine sand substrate, allowing the substrate to settle and disperse quickly. Given the above, it is highly unlikely that any disturbance to aerial foraging for these species would be of ecological significance, thus further assessment is not required.

#### **4.1.3 Marine Mammals**

The proposed maintenance dredging is confined to dredging areas in the main channel of Brisbane Water at the mouth of the estuary. It is unlikely that larger marine mammals such as cetaceans (whales) would

enter the shallow, narrow channels. Use of channel waters by any smaller marine mammals, such as dolphins and fur-seals, is likely to occur on occasions as part of transient movements in and out of Brisbane Waters for opportunistic feeding or for refuge. Given these species forage over very large areas including those within the channel, and particularly coastal waters outside the channel entrance, when considered against the relatively small extent of the Study Areas the potential for ecologically significant impacts on these species as a result of the proposed maintenance dredging works is minimal. Fur-seals are known to maintain a resident population in Broken Bay and near to the Ettalong Channel. The nearby Half Tide Rocks and the shoreline adjacent to Little Box Head may provide suitable resting habitat for fur-seals to haul out to, which may increase the significance of foraging habitat quality in the adjacent waters close to safe haul out areas, such as when avoiding predators. Dredging activities are not expected to limit the use of these areas by fur-seals, given the species' regularly use the channel in the presence of vessels and the large extent of similar haul-out habitat available in the area. The maintenance dredging is not expected to generate any ecologically significant levels of underwater noise with potential for detrimental physiological or behavioural responses by any marine mammals should they be present in the vicinity.

Given the above, the proposed maintenance dredging may have potential to impact on some areas of foraging and refuge habitat for threatened fur-seal species that may occasionally occur in the Study Area or adjacent waters. A Five-Part Test was conducted to consider these potential impacts further (Appendix 4), with significance detailed in Section 4.3.

#### **4.1.4 Marine Reptiles**

Seagrass habitat provides foraging habitat for some marine turtles, particularly the Green Turtle (*Chelonia mydas*). No seagrass loss or seagrass habitat modification as a result of the proposed works is expected to occur. Dredging is proposed to avoid areas of previously mapped established seagrasses and adhere to 5 m buffer zones around any remaining seagrasses that occur within the Study Area in the Ettalong Channel. While these species may visit the area at times, they typically forage over very large areas of coastline and the lack of seagrasses within the Study Area renders the habitat of minimal significance to marine turtles. Any small-scale habitat changes confined to the Study Area during or following dredging works are considered to be of minimal ecological significance to foraging prospects for species of marine turtles.

The proposed maintenance dredging works are not expected to generate any ecologically significant levels of underwater noise that has potential for detrimental physiological or behavioural responses by marine turtles should they be present in the vicinity.

The works are also not considered likely to result in any short-term or sustained increases in vessel movements that could potentially pose an increased risk of vessel strike for any marine turtles that may transiently occur in the Study Area during dredging operations. In general, impacts from the maintenance dredging on threatened and migratory marine turtles that may occur in the Study Area during dredging activities are considered very minimal.

Given the above, the proposed maintenance dredging is not considered to have potential to impact on any threatened marine turtles that may occasionally occur in the Study Area or adjacent waters to any biologically or ecologically significant degree.



#### 4.1.5 Fish, Sharks and Rays

Large sharks and rays including the Threatened Great White Shark (*Carcharodon carcharias*) and Grey Nurse Shark (*Carcharias taurus*) are known to occur in the locality. The Vulnerable Great White Shark is also likely to utilise waters within the Ettalong Channel to travel between habitats within the Brisbane Water Estuary and Broken Bay and the associated adjacent coastal waters. However, any occurrence in the Study Area, is most likely part of transient movements, while any disturbance to prey availability from these works is considered to be of minimal ecological significance to this species that forages over vast areas of the coastline and throughout the surrounding estuaries (NSW DPI 2015). The Critically Endangered Grey Nurse Shark is known to be common around headlands and reefs in nearby coastal waters, especially in depth of 10 m or more and where large drop-offs and deep gutters occur amongst the reef structure. Use of habitat inside Broken Bay by Grey Nurse Sharks is considered rare and the predominately shallow sandy shoals are unlikely to be of ecological significance to primarily reef dwelling species (NSW DPI 2013).

Given the relatively slow forward progress of the dredging machinery during dredging activities, any fish, sharks and rays in the path of the dredge machinery would have sufficient levels of alertness and mobility to evade it and possibly quickly settle in suitable alternative areas nearby. Given this, direct detrimental impacts on any pelagic or benthic fish, sharks or rays are considered unlikely. It is also possible, however, that the disturbed seabed immediately behind the operating dredge machinery and associated sediment plume will attract many of these species, including Yellowfin Bream (*Acanthopagrus australis*) and Dusky Flathead (*Platycephalus fuscus*), due to the expected elutriation of substantial amounts of benthic infauna prey items into the water column.

Cryptic species such as protected Syngnathid fishes are likely to utilise habitat associated with the seagrasses in the vicinity of dredging areas. This may potentially include the Endangered White's Seahorse (*Hippocampus whitei*), which is known to occur within Brisbane Water. Loss of seagrass habitat, or reduction in seagrass habitat quality also may impact on future residency in the locality by this species. The natural habitat of White's Seahorse includes seagrass beds, with a preference for *P. australis* in some estuaries (NSW DPI 2019), so the potential for its use of seagrass habitat in those areas is high. Given the *P. australis* and other seagrass beds that are present in Brisbane Water, as well as any previously mapped soft coral, are not within any proposed dredging areas and not expected to be directly or indirectly impacted, the proposed dredging works are not expected to impact on either habitat for the White's Seahorse directly.

The proposed maintenance dredging works are not expected to generate any ecologically significant levels of underwater noise that has potential for detrimental physiological or behavioural responses by fish, sharks or rays should they be present in the vicinity.

The Vulnerable Black Rockcod (*Epinephelus daemeli*) may occur in the locality, however use of habitat is typically confined to deep drop-offs and ledges associated with headlands and coastal waters (NSW DPI 2012). The occurrence of the species in the Study Area is considered to be rare while the significance of habitat (shallow areas of shoaling clean marine sands) to be disturbed during these dredging works is considered to be of minimal ecological significance to this species.

#### 4.1.6 Marine Invertebrates

Removal of soft sediment from within the Dredging Area will result in the loss of infaunal community assemblages inhabiting the volume of sediment that will be removed. These assemblages are likely to consist of various polychaetes, gastropods and bivalves. Although, given the very active and unstable

nature of these shoals, abundance of infauna is likely to be lesser than less active and more stable benthic sediments. Where losses do occur, the recolonisation of the seabed sediment in the newly dredged channel section will likely begin soon after dredging and recover to pre-dredging diversity and abundance quickly (Dernie *et al.* 2003). The extent and magnitude of any disturbance to or loss of infauna as a result of this proposed maintenance dredging is not expected to occur at any ecologically relevant scale.

In addition, infauna occupying surface sediments may also be smothered during the Sand Placement and as a result some animals may perish where they cannot escape or migrate away from the sediment that is placed. Given the sediment volumes proposed to be moved and the very active sand movements that occur on the Ettalong Shoal, the magnitude of any smothering processes is likely to also be of minimal ecological significance, as most placed sands are expected to reduce and level by at least 50% within a 24 hour tidal cycle based on observation made during previous dredge campaigns at this location (D. Hopper Pers. Comm).

Other sessile and mobile epibenthic invertebrates may occur on the sandy seabed within the channel area from which sediment is proposed to be removed or placed. During the Site Survey a search of the Dredging Area and surrounding seabed areas was undertaken for the Endangered Cauliflower Soft Coral (*D. australis*), which has previously been recorded near to Lobster Beach approximately 185 m to the southeast of Area 3 (H2O Consulting Group 2019). However, the Cauliflower Soft Coral was not found to occur at this or any other location in the Study Area during site surveys in 2022. Thus, it is possible that significant flooding events and prolonged periods of freshwater flows within the Hawkesbury River that discharges into Broken Bay between 2019 and 2022 may have impacted on this species and the local population that occurs in the locality. The mobile nature of the Ettalong shoals may have also resulted in the smothering of existing Cauliflower Soft Corals or their habitat, due to high amounts of sediment movement and sand accumulation (NSW DPI 2021). The current dredging proposal has also been designed to avoid the areas that this species has been previously recorded within. Thus based on the absence of this species in the wider locality, which was surveyed in 2022 and detection during the pre-dredging surveys in July 2023, it has been assumed to have a low likelihood to currently occur within the Study Area. Further assessment through a 7-Part test as well as the Significant Impact Criteria is not required.

#### **4.1.7 Macroalgae**

Subtidal habitat within the Study Areas consisted of unvegetated clean marine sands. Any macroalgae present in the vicinity of the works is expected to be limited to Half Tide Rocks adjacent to Areas 3 and 4, and in shallow areas closer to shore to the southeast of Area 1 near previously mapped seagrass communities. Given that the dredging maintenance works are not proposed to dredge material from these areas, no direct disturbances or removal of macroalgae is expected as part of these emergency dredging works.

## **4.2 Key Threatening Processes**

### **4.2.1 Debris and Harmful Substances**

Injury and fatality to vertebrate marine life cause by ingestion of, or entanglement in, harmful marine debris is considered a Key Threatening Process under both the *FM* and *EPBC Acts*. The planned or unplanned disposal of any wastes, petroleum-based products and other debris has potential to have direct and indirect impacts on marine fauna in the Study Area. For example, petroleum products destroy the insulating ability

of fur-bearing mammals such as seals and the water repellence of bird feathers, while they can also have an effect on the health, fitness, condition, growth rates, and larval survival of fish and invertebrates (Clarke 2001). During dredging activities, and during mobilisation or demobilisation of dredging equipment, uncontained debris and contaminants from unplanned spills can enter the waterways. The implementation of management measures to manage wastes and minimise the likelihood of unplanned spills will be required to minimise this risk and should be included as part of the Construction Environmental Management Plan (CEMP) or equivalent document (refer to Section 5.1.1).

#### **4.2.2 Introduction of non-indigenous fish and marine vegetation**

The introduction of non-indigenous fish and marine vegetation to the coastal waters of NSW is considered a Key Threatening Process under the FM Act. Introduced fish and marine vegetation, or noxious (invasive or toxic) species, that may occur and be transferred between locations on dredging equipment and associated vessels can pose a risk in terms of infestation by non-native or invasive species. While areas of colonisation by the invasive green alga *C. taxifolia* have previously been mapped by NSW DPI in nearby areas in Brisbane Water to the north of Area 4 near Ettalong Beach and further upstream, it has not yet been recorded inside the Study Area (NSW DPI 2022). This species can colonise areas of soft substrate rapidly and out-compete seagrasses, particularly *Zostera* and *Halophila* (Williams 2007, Glasby 2013). Given this, consideration of measures to minimise risk of the introduction and spread of non-native and invasive species should be considered as part of the Construction Environmental Management Plan (CEMP) or equivalent document (refer to Section 5.1.1).

#### **4.2.3 Coastal Wetlands**

The proposed works are not expected to impact on the adjacent coastal wetlands that have been previously mapped to the east of Area 4 and further upstream Brisbane Waters. Thus, the works are not expected to result in any direct disturbances to these wetlands identified under the Resilience and Hazards SEPP 2021.

### **4.3 Assessments of Significance**

The findings of 5-Part Test for Threatened fur-seals listed under the BC Act included the Vulnerable New-Zealand Fur-seal (*Arctocephalus forsteri*) and Australian Fur-seal (*Arctocephalus pusillus doriferus*) (Appendix 4). This assessment found that the shoreline habitat between Little Box head and Half Tide Rocks provides some marginal habitat for fur-seals to haul out. During use of this section of the shoreline, the adjacent waters, which include some of the dredge areas and adjacent channel likely provide convenient and safe foraging grounds for these fur-seals. However, this stretch of shoreline in Broken Bay is not considered preferred habitat for fur-seals in Broken Bay and is typically only used occasionally by likely overflow from the main haul-out location at Barrenjoey Headland (on the other side of Broken Bay). The habitat in the Study Area may be of short-term importance to individuals to forage when they use areas along this shoreline to haul-out, however it is unlikely of significance to their long-term survival in the locality or the population in Broken Bay. Furthermore the proposed works are unlikely to directly impact on Fur-seals, while those disturbances that do occur will likely be confined to short-term disturbances of habitat quality, for the duration of dredging activities. Thus, the proposed action is not expected to have a significant impact on Fur-seals or the local population that occurs within Broken Bay.

## 5 Recommendations and Conclusions

### 5.1 Recommendations

This section details how the project proposal would, in the first instance, avoid ecological impacts on the marine environment, then apply mitigation measures where avoidance is not possible.

#### 5.1.1 Management Measures

##### Before works Commence

The following recommendation should be implemented to avoid, minimise and mitigate impacts to marine flora, fauna, infauna and their habitats before works commence:

- Seagrass maps are to be prepared for incorporation into the project CEMP or equivalent that identify seagrass boundaries (or any other sensitive habitats) and required buffers.
- The CEMP or equivalent document should include information to assist in identifying the threatened *P. australis* seagrass community and Endangered Cauliflower Soft Coral that occurs or may occur within the locality.
- All vessels and the site compound are to have on hand appropriate spill kits and bins for disposal of all rubbish and debris. This should include adequate hydrocarbon booms.
- Local NPWS officers are to be contacted regarding recent use of the shoreline between Little Box Point and Half Tide Rocks by Fur-seals.

##### During works

The following recommendation should be implemented to avoid, minimise and mitigate impacts to marine flora, fauna, infauna and their habitats during works:

- No works, including vessel launching, beaching, or any operation, or laying of pipes are to occur within 10 m of any seagrasses.
- If any Cauliflower Soft Corals are seen during within 10m of any works, works must stop immediately and a marine ecologist should be notified. The marine ecologist and project team must consult with DPI Fisheries to assess appropriate management actions as above.
- No mooring or beaching of vessels within any seagrass areas or any other marine vegetation.
- The NSW NPWS Guidelines for approach distance to Seals (Figure 4) must be adhered to at all times. Should this not be possible the project ecologist and NPWS must be notified immediately.
- No dredge pipes are to be placed over seagrasses or rocky intertidal or subtidal areas.
- The storing hydrocarbon-based products on any on water sites within the Study Area. Should be avoided and must be stored in a suitable bunded area within the site laydown area.
- Visual and turbidity monitoring of dredge pluming should be undertaken as part of standard water quality monitoring during dredging works.
- Hydrocarbon booms should be placed around all stationary machinery on the water and be on hand for deployment around vessels.

- All machinery must be routinely checked for leaks, with an emergency spill kit to be kept on site at all times. Where practical, floating containment booms should be in place to control any unplanned spills of hydrocarbons around machinery operating on or over water.
- Hydrocarbons are to be stored in a bunded area with adequate spill kits available. All staff are to be made aware of the location of the spill kit and trained in its use.
- All equipment to be brought to the Study Area must be thoroughly cleaned and free of substrate to avoid introduction of species such as *C. taxifolia*. Given the potential for *C. taxifolia* in nearby areas, equipment should be also thoroughly cleaned following the completion of the project to prevent spread of the species to other areas.
- If *C. taxifolia* is found within the Study Area, it should be avoided and not disturbed to minimise further spread to other areas of the Study Area. If dredging vessels or equipment are found to have caught *C. taxifolia* during works, they should be thoroughly cleaned with fresh water, with all biota safely disposed of on land.
- Environmental controls such as sediment and erosion controls, and if necessary, the position of dredge pipes, should be inspected weekly by a TfNSW Environmental Scientist or an independent environmental consultant.

#### Following completion of the works

The following recommendation should be implemented to avoid, minimise and mitigate impacts to marine flora, fauna, infauna and their habitats following completion of the works:

- All materials, machinery and rubbish must be removed from site.
- An inspection of the site by TfNSW Environment Officer or Project Manager must be undertaken.

No dredging of additional areas is to occur without further consideration of aquatic ecological impacts. For future dredging works scheduled to occur greater than 12 months following completion of the site surveys done as part of this AEA, seagrass mapping will need to be updated for inclusion into an updated version of the CEMP. In addition seabed inspections and surveys for the Endangered Cauliflower Soft Coral should also be included as part of these surveys. This should include updates to habitat maps, including soft corals and any associated dredge pipe routes and required buffers.

A long-term strategy that manages both the risks associated with navigational safety and ecological values needs to be developed. This is required to ensure future navigational dredging of the entire channel can be achieved in a manner that adequately meets community expectations and appropriately manages the risks to protected and threatened species and communities that occur or may utilise habitat within or adjacent to the Ettalong Channel.

#### **5.1.2 Permits and Consultation**

The requirement for a Permit under Section 205 of the FM Act will not be required at this stage. Based on survey work done in 2022, the proposed dredging works are not expected to directly impact on any estuarine vegetation (seagrass, mangroves or saltmarsh), while adoption and application of the management measures in this report are considered adequate to avoid potential harm. However, NSW DPI Fisheries will make the final determination regarding permit requirements during the s.199 of the FM Act consultation process for dredging projects.



However, should seagrasses, soft corals or any macroalgae be found within any of these areas during pre-dredging inspections, and cannot be avoided this permit may be required before works can commence in these areas.

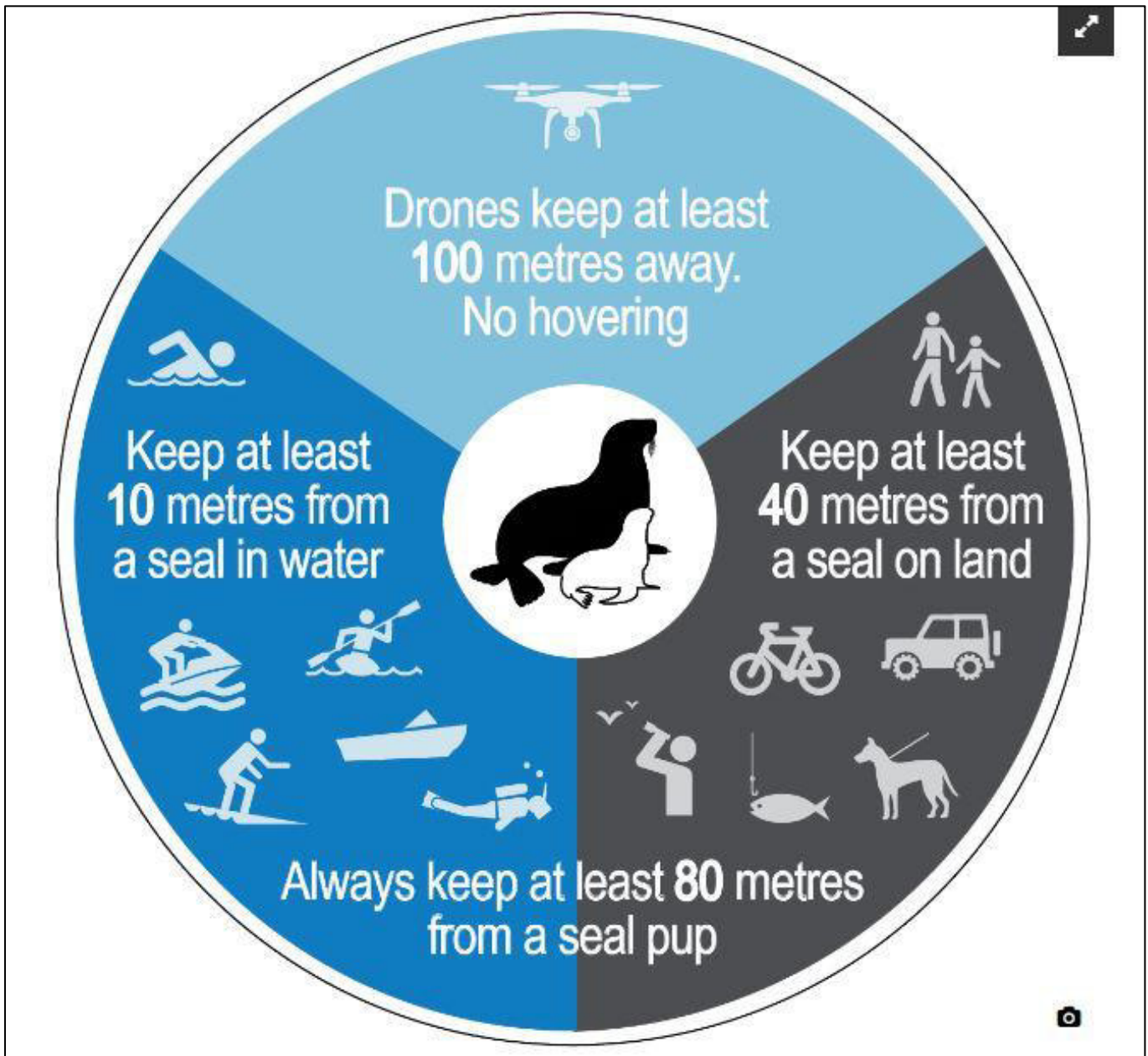


Figure 4: NSW NPWS Guidelines for approach distances to fur-seals (Source: NPWS).

### 5.1.3 Offsetting

NSW DPI enforces a 'no net loss' habitat policy as a permit condition or condition of consent. This may require proponents to conduct habitat rehabilitation and/or provide environmental compensation. In circumstances where seagrass is likely to be negatively impacted to a degree that cannot be avoided or mitigated, environmental compensation will be required and calculated at the rate of 2:1 habitat offset requirement (Fairfull 2013). If a 5 m buffer between the mapped seagrass beds and dredging works is applied, along with the recommendations above, direct disturbance and/or removal of any estuarine vegetation can be avoided.

## 5.2 Conclusions

Direct impacts from this maintenance dredging project in the Ettalong Channel will include removal of a quantity of seabed material, primarily unvegetated clean marine sandy substrate, resulting in the loss of and/or disturbance to invertebrate infauna and possibly some sessile or slow-moving epibenthic invertebrates that inhabit that seabed material. These losses will not detrimentally impact on the wider populations and communities of infauna of the area to any degree of concern. Impacts that include removal and modification of KFH are expected to be confined to Type 3 – Minimally sensitive KFH.

The project has been designed to avoid all seagrasses previously mapped in the area, while indirect disturbances are expected to be minimal with the majority of seagrasses including any Endangered *P. australis* >70 m from the proposed works. The Endangered Cauliflower Soft Coral (*D. australis*) was not found to occur within the Study Area for the project or within nearby areas the local population previously occupied. Other threatened and migratory marine and estuarine species may occur in the area at times; however, most are likely to be transient visitors or only enter area in search or pursuit of prey items, which they forage across very large expanses of the coastal environment for. Thus, the habitat within the Study Area has minimal ecological significance for the majority of these species. The only notable exception requiring further consideration was Fur-seals, which maintain populations within Broken Bay, however further assessment has identified the proposed works are unlikely to have a significant impact on the species or local population.

To manage the potential risks that this project may pose to marine and estuarine habitat, flora and fauna, a series of recommendations has been provided in Section 5.1. This includes some recommendations for measures to avoid potential impacts, while a series of additional recommendations to minimise and mitigate remaining potential impacts have also been provided and should be adopted into the CEMP for proposed dredging activities. With adoption of these recommendations, the project is considered unlikely to have a significant impact on State- and/or Commonwealth-listed threatened aquatic biodiversity. As such, referral to the Department of the Environment under the EPBC Act is not required. Similarly, the preparation of a Species Impact Statement (SIS) And or BDAR (Biodiversity Development Assessment Report) for aquatic and or marine ecological values based on the provisions of the BC and FM Act should not be required.

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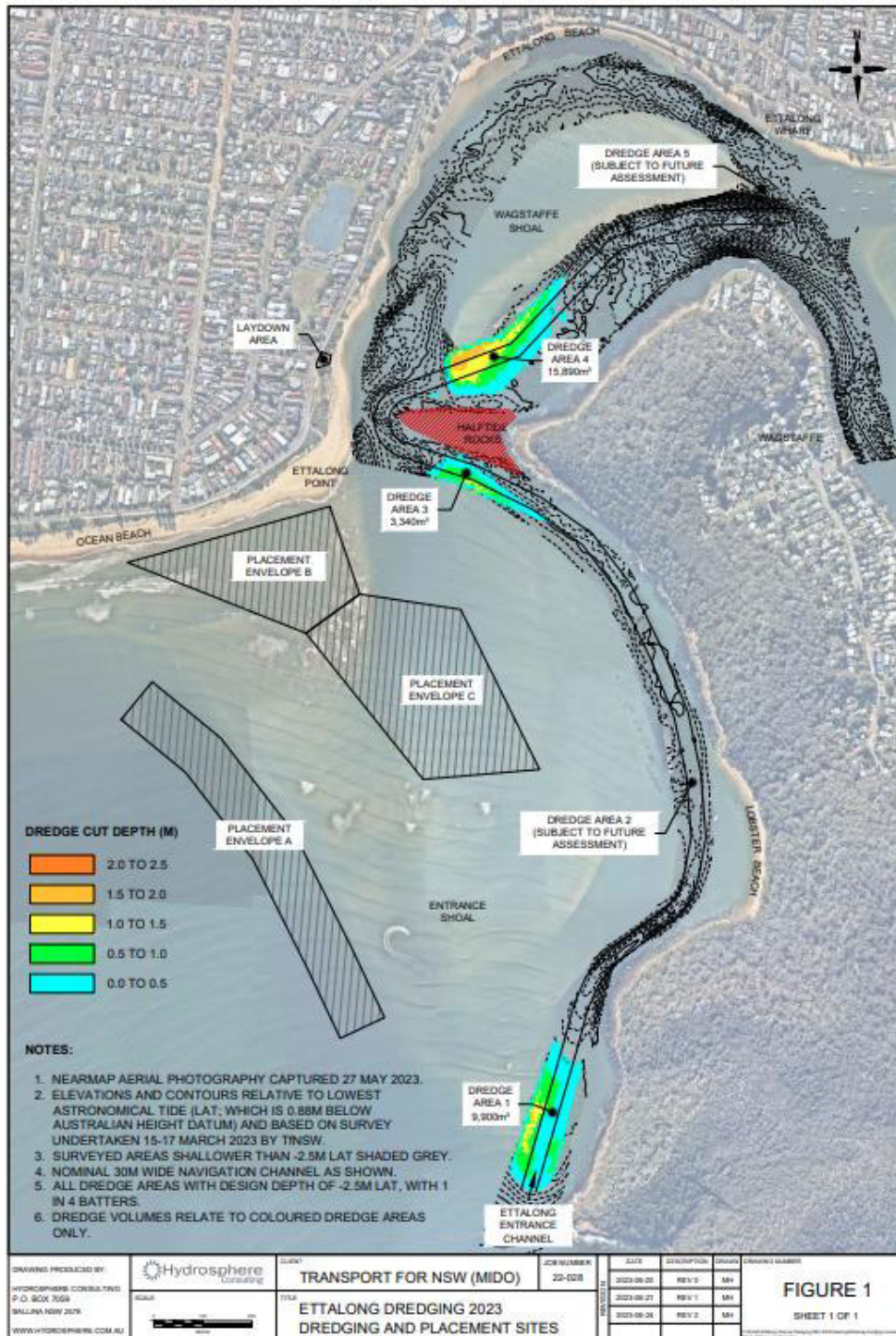
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# Appendix 1 – Proposed Project Plans

































## Appendix 2 – Threatened Species Searches

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria : Public Report of all Valid Records of Threatened (listed on BC Act 2016) ,Commonwealth listed ,CAMBA listed or ROKAMBA listed Entities in selected area [North: -33.48 West: 151.28 East: 151.38 South: -33.58] recorded since 01 Mar 2002 until 02 Mar 2022 returned a total of 1,145 records of 71 species.

Report generated on 2/03/2022 2:05 PM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Animalia	Amphibia	Myobatrachidae	3116	<i>Pseudophryne australis</i>		Red-crowned Toadlet	V,P		53	
Animalia	Amphibia	Hylidae	3166	<i>Litoria aurea</i>		Green and Golden Bell Frog	E1,P	V	8	
Animalia	Amphibia	Limnodynastidae	3042	<i>Heleioporus australiacus</i>		Giant Burrowing Frog	V,P	V	57	
Animalia	Reptilia	Cheloniidae	2004	<i>Caretta caretta</i>		Loggerhead Turtle	E1,P	E	1	
Animalia	Reptilia	Cheloniidae	2007	<i>Chelonia mydas</i>		Green Turtle	V,P	V	8	
Animalia	Reptilia	Cheloniidae	2008	<i>Eretmochelys imbricata</i>		Hawksbill Turtle	P	V	1	
Animalia	Reptilia	Varanidae	2287	<i>Varanus rosenbergi</i>		Rosenberg's Goanna	V,P		2	
Animalia	Aves	Apodidae	0334	<i>Hirundapus caudacutus</i>		White-throated Needletail	P	V,C,J,K	1	
Animalia	Aves	Procellariidae	0071	<i>Ardenna tenuirostris</i>		Short-tailed Shearwater	P	C,J,K	3	
Animalia	Aves	Ciconiidae	0183	<i>Ephippiorhynchus asiaticus</i>		Black-necked Stork	E1,P		1	
Animalia	Aves	Ardeidae	0196	<i>Ixobrychus flavicollis</i>		Black Bittern	V,P		1	
Animalia	Aves	Accipitridae	0226	<i>Haliaeetus leucogaster</i>		White-bellied Sea-Eagle	V,P		22	
Animalia	Aves	Accipitridae	8739	^^ <i>Pandion cristatus</i>		Eastern Osprey	V,P,3		14	
Animalia	Aves	Burhinidae	0174	<i>Burhinus grallarius</i>		Bush Stone-curlew	E1,P		263	
Animalia	Aves	Haematopodidae	0131	<i>Haematopus fuliginosus</i>		Sooty Oystercatcher	V,P		3	
Animalia	Aves	Haematopodidae	0130	<i>Haematopus longirostris</i>		Pied Oystercatcher	E1,P		64	
Animalia	Aves	Charadriidae	8006	<i>Pluvialis fulva</i>		Pacific Golden Plover	P	C,J,K	1	
Animalia	Aves	Charadriidae	0136	<i>Pluvialis squatarola</i>		Grey Plover	P	C,J,K	1	
Animalia	Aves	Scolopacidae	0153	<i>Limosa lapponica</i>		Bar-tailed Godwit	P	C,J,K	4	
Animalia	Aves	Scolopacidae	0149	<i>Numenius madagascariensis</i>		Eastern Curlew	P	CE,C,J,K	9	
Animalia	Aves	Scolopacidae	0151	<i>Numenius minutus</i>		Little Curlew	P	C,J,K	1	
Animalia	Aves	Scolopacidae	0150	<i>Numenius phaeopus</i>		Whimbrel	P	C,J,K	4	
Animalia	Aves	Scolopacidae	0155	<i>Tringa brevipes</i>		Grey-tailed Tattler	P	C,J,K	1	
Animalia	Aves	Scolopacidae	0158	<i>Tringa nebularia</i>		Common Greenshank	P	C,J,K	3	
Animalia	Aves	Scolopacidae	0160	<i>Xenus cinereus</i>		Terek Sandpiper	V,P	C,J,K	1	
Animalia	Aves	Laridae	0953	<i>Sterna hirundo</i>		Common Tern	P	C,J,K	5	
Animalia	Aves	Laridae	0117	<i>Sternula albifrons</i>		Little Tern	E1,P	C,J,K	3	
Animalia	Aves	Cacatuidae	0265	^ <i>Calyptorhynchus lathami</i>		Glossy Black-Cockatoo	V,P,2		52	
Animalia	Aves	Psittacidae	0260	<i>Glossopsitta pusilla</i>		Little Lorikeet	V,P		2	
Animalia	Aves	Psittacidae	0309	^^ <i>Lathamus discolor</i>		Swift Parrot	E1,P,3	CE	10	
Animalia	Aves	Strigidae	0246	^^ <i>Ninox connivens</i>		Barking Owl	V,P,3		24	
Animalia	Aves	Strigidae	0248	^^ <i>Ninox strenua</i>		Powerful Owl	V,P,3		145	
Animalia	Aves	Tytonidae	0250	^^ <i>Tyto novaehollandiae</i>		Masked Owl	V,P,3		7	
Animalia	Aves	Tytonidae	9924	^^ <i>Tyto tenebricosa</i>		Sooty Owl	V,P,3		3	
Animalia	Aves	Meliphagidae	0603	<i>Anthochaera phrygia</i>		Regent Honeyeater	E4A,P	CE	1	
Animalia	Aves	Pomatostomidae	8388	<i>Pomatostomus temporalis temporalis</i>		Grey-crowned Babbler (eastern subspecies)	V,P		1	

Animalia	Aves	Neosittidae	0549	<i>Daphoenositta chrysoptera</i>	Varied Sittella	V,P		1	
Animalia	Aves	Petroicidae	0380	<i>Petroica boodang</i>	Scarlet Robin	V,P		1	
Animalia	Mammalia	Dasyuridae	1008	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V,P	E	21	
Animalia	Mammalia	Phascolarctidae	1162	<i>Phascolarctos cinereus</i>	Koala	V,P	E	22	
Animalia	Mammalia	Burramyidae	1150	<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V,P		7	
Animalia	Mammalia	Petauridae	1136	<i>Petaurus australis</i>	Yellow-bellied Glider	V,P		2	
Animalia	Mammalia	Petauridae	1137	<i>Petaurus norfolcensis</i>	Squirrel Glider	V,P		1	
Animalia	Mammalia	Pseudocheiridae	1133	<i>Petauroides volans</i>	Greater Glider	P	V	5	
Animalia	Mammalia	Pteropodidae	1280	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	V	77	
Animalia	Mammalia	Emballonuridae	1321	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V,P		5	
Animalia	Mammalia	Molossidae	1329	<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V,P		16	
Animalia	Mammalia	Vespertilionidae	1353	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V,P	V	7	
Animalia	Mammalia	Vespertilionidae	1372	<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V,P		3	
Animalia	Mammalia	Vespertilionidae	1357	<i>Myotis macropus</i>	Southern Myotis	V,P		7	
Animalia	Mammalia	Vespertilionidae	1369	<i>Phoniscus papuensis</i>	Golden-tipped Bat	V,P		1	
Animalia	Mammalia	Vespertilionidae	1361	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V,P		13	
Animalia	Mammalia	Vespertilionidae	1025	<i>Vespadelus troughtoni</i>	Eastern Cave Bat	V,P		3	
Animalia	Mammalia	Miniopteridae	1346	<i>Miniopterus australis</i>	Little Bent-winged Bat	V,P		24	
Animalia	Mammalia	Miniopteridae	3330	<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V,P		27	
Animalia	Mammalia	Muridae	1466	<i>Pseudomys gracilicaudatus</i>	Eastern Chestnut Mouse	V,P		1	
Animalia	Mammalia	Muridae	1455	<i>Pseudomys novaehollandiae</i>	New Holland Mouse	P	V	1	
Animalia	Mammalia	Dugongidae	1558	<i>Dugong dugon</i>	Dugong	E1,P		1	
Animalia	Mammalia	Otariidae	1543	<i>Arctocephalus forsteri</i>	New Zealand Fur-seal	V,P		1	
Animalia	Mammalia	Otariidae	1882	<i>Arctocephalus pusillus doriferus</i>	Australian Fur-seal	V,P		1	
Animalia	Mammalia	Balaenopteridae	1575	<i>Megaptera novaeangliae</i>	Humpback Whale	V,P	V	6	
Animalia	Insecta	Petaluridae	1007	<i>Petalura gigantea</i>	Giant Dragonfly	E1		2	
Plantae	Flora	Araliaceae	1200	<i>Astrotricha crassifolia</i>	Thick-leaf Star-hair	V	V	55	
Plantae	Flora	Dilleniaceae	2544	<i>Hibbertia procumbens</i>	Spreading Guinea Flower	E1		8	
Plantae	Flora	Lamiaceae	9885	<i>Prostanthera askania</i>	Tranquility Mintbush	E1	E	1	
Plantae	Flora	Myrtaceae	4007	<i>Callistemon linearifolius</i>	Netted Bottle Brush	V,3		32	
Plantae	Flora	Myrtaceae	6809	<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	V	3	
Plantae	Flora	Myrtaceae	4283	<i>Rhodamnia rubescens</i>	Scrub Turpentine	E4A	CE	1	
Plantae	Flora	Myrtaceae	4284	<i>Rhodomyrtus psidioides</i>	Native Guava	E4A		1	
Plantae	Flora	Myrtaceae	4293	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E1	V	7	
Plantae	Flora	Proteaceae	5400	<i>Grevillea shiressii</i>		V	V	1	



# 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: 02-Mar-2022

[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](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	1
<a href="#">Wetlands of International Importance (Ramsar)</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	8
<a href="#">Listed Threatened Species:</a>	102
<a href="#">Listed Migratory Species:</a>	70

## 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

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

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

<a href="#">Commonwealth Lands:</a>	9
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	91
<a href="#">Whales and Other Cetaceans:</a>	14
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None
<a href="#">Habitat Critical to the Survival of Marine Turtles:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	9
<a href="#">Regional Forest Agreements:</a>	1
<a href="#">Nationally Important Wetlands:</a>	1
<a href="#">EPBC Act Referrals:</a>	5
<a href="#">Key Ecological Features (Marine):</a>	None
<a href="#">Biologically Important Areas:</a>	5
<a href="#">Bioregional Assessments:</a>	2
<a href="#">Geological and Bioregional Assessments:</a>	None

# Details

## Matters of National Environmental Significance

### National Heritage Places [\[ Resource Information \]](#)

Name	State	Legal Status	Buffer Status
Natural			
<a href="#">Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves</a>	NSW	Listed place	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
<a href="#">Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community</a>	Endangered	Community likely to occur within area	In feature area
<a href="#">Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland</a>	Endangered	Community known to occur within area	In feature area
<a href="#">Coastal Upland Swamps in the Sydney Basin Bioregion</a>	Endangered	Community likely to occur within area	In feature area
<a href="#">Eastern Suburbs Banksia Scrub of the Sydney Region</a>	Critically Endangered	Community may occur within area	In buffer area only
<a href="#">Littoral Rainforest and Coastal Vine Thickets of Eastern Australia</a>	Critically Endangered	Community likely to occur within area	In buffer area only
<a href="#">Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion</a>	Endangered	Community likely to occur within area	In feature area
<a href="#">River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria</a>	Critically Endangered	Community likely to occur within area	In feature area
<a href="#">Subtropical and Temperate Coastal Saltmarsh</a>	Vulnerable	Community likely to occur within area	In buffer area only

### 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
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Scientific Name	Threatened Category	Presence Text	Buffer Status
<b>BIRD</b>			
<a href="#">Anthochaera phrygia</a> Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Botaurus poiciloptilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Callocephalon fimbriatum</a> Gang-gang Cockatoo [768]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Dasyornis brachypterus</a> Eastern Bristlebird [533]	Endangered	Species or species habitat known to occur within area	In buffer area only
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea antipodensis gibsoni</a> Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea epomophora</a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Diomedea exulans</a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Falco hypoleucos</a> Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Fregetta grallaria grallaria</a> 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
<a href="#">Grantiella picta</a> Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Limosa lapponica baueri</a> Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Numenius madagascariensis</a> 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
<a href="#">Pachyptila turtur subantarctica</a> Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Phoebetria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<a href="#">Pterodroma leucoptera leucoptera</a> Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Pterodroma neglecta neglecta</a> Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area	In feature area
<a href="#">Pycnoptilus floccosus</a> Pilotbird [525]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Sternula nereis nereis</a> Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalassarche bulleri</a> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche bulleri platei</a> Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Thalassarche cauta</a> Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Thalassarche eremita</a> Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche salvini</a> Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<b>FISH</b>			
<a href="#">Epinephelus daemeli</a> Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Hippocampus whitei</a> White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Macquaria australasica</a> Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Prototroctes maraena</a> Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">SeriOLElla brama</a> Blue Warehou [69374]	Conservation Dependent	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Thunnus maccoyii</a> Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area
<b>FROG</b>			
<a href="#">Heleioporus australiacus</a> Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Litoria aurea</a> Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Mixophyes balbus</a> Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Mixophyes iteratus</a> Giant Barred Frog, Southern Barred Frog [1944]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
<b>MAMMAL</b>			
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Chalinolobus dwyeri</a> Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Dasyurus maculatus maculatus (SE mainland population)</a> 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
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Isoodon obesulus obesulus</a> Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south- eastern) [68050]	Endangered	Species or species habitat likely to occur within area	In buffer area only
<a href="#">Petauroides volans</a> Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area	In feature area



Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Petaurus australis australis</a> Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Petrogale penicillata</a> Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</a> 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
<a href="#">Potorous tridactylus tridactylus</a> Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Pseudomys novaehollandiae</a> New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Pteropus poliocephalus</a> Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area	In feature area
<b>OTHER</b>			
<a href="#">Dendronephthya australis</a> Cauliflower Soft Coral [90325]	Endangered	Species or species habitat may occur within area	In feature area
<b>PLANT</b>			
<a href="#">Acacia bynoeana</a> Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Acacia pubescens</a> Downy Wattle, Hairy Stemmed Wattle [18800]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<a href="#">Acacia terminalis subsp. terminalis MS</a> Sunshine Wattle (Sydney region) [88882]	Endangered	Species or species habitat may occur within area	In buffer area only
<a href="#">Asterolasia elegans</a> [56780]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Astrotricha crassifolia</a> Thick-leaf Star-hair [10352]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Baloskion longipes</a> Dense Cord-rush [68511]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<a href="#">Caladenia tessellata</a> Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Cryptostylis hunteriana</a> Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Cynanchum elegans</a> White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area	In buffer area only
<a href="#">Darwinia biflora</a> [14619]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<a href="#">Eucalyptus camfieldii</a> Camfield's Stringybark [15460]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Genoplesium baueri</a> Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Grevillea shiressii</a> [19186]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Haloragis exalata subsp. exalata</a> Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<a href="#">Haloragodendron lucasii</a> Hal [6480]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Kunzea rupestris</a> [8798]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
<a href="#">Lasiopetalum joyceae</a> [20311]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Melaleuca biconvexa</a> Biconvex Paperbark [5583]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Melaleuca deanei</a> Deane's Melaleuca [5818]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Persicaria elatior</a> Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Persoonia hirsuta</a> Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Pimelea curviflora var. curviflora</a> [4182]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
<a href="#">Prostanthera askania</a> Tranquillity Mintbush, Tranquillity Mintbush [64958]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Prostanthera densa</a> Villous Mintbush [12233]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Prostanthera junonis</a> Somersby Mintbush [64960]	Endangered	Species or species habitat may occur within area	In buffer area only
<a href="#">Rhizanthella slateri</a> Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Rhodamnia rubescens</a> Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Rhodomyrtus psidioides</a> Native Guava [19162]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Syzygium paniculatum</a> 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
<a href="#">Thesium australe</a> Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area	In feature area
<b>REPTILE</b>			
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Hoplocephalus bungaroides</a> Broad-headed Snake [1182]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area

## SHARK

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Carcharias taurus (east coast population)</a> Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Galeorhinus galeus</a> School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area	In buffer area only
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Sphyrna lewini</a> Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area

## SNAIL

<a href="#">Meridolum maryae</a> Maroubra Woodland Snail, Maroubra Land Snail [89884]	Endangered	Species or species habitat known to occur within area	In buffer area only
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## Listed Migratory Species [ [Resource Information](#) ]

Scientific Name	Threatened Category	Presence Text	Buffer Status
<b>Migratory Marine Birds</b>			
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat likely to occur within area	In feature area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
<a href="#">Ardenna carneipes</a> Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Ardenna grisea</a> Sooty Shearwater [82651]		Breeding known to occur within area	In feature area



Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Ardenna pacifica</a> Wedge-tailed Shearwater [84292]		Breeding known to occur within area	In buffer area only
<a href="#">Ardenna tenuirostris</a> Short-tailed Shearwater [82652]		Breeding known to occur within area	In buffer area only
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat known to occur within area	In feature area
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea epomophora</a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea exulans</a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In feature area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area	In feature area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Phoebetria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<a href="#">Sternula albifrons</a> Little Tern [82849]		Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche bulleri</a> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Thalassarche cauta</a> Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalassarche eremita</a> Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche salvini</a> Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

## Migratory Marine Species

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Caperea marginata</a> Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area
<a href="#">Carcharhinus longimanus</a> Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In feature area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Dugong dugon</a> Dugong [28]		Species or species habitat may occur within area	In feature area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Eubalaena australis as Balaena glacialis australis</a> Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Lagenorhynchus obscurus</a> Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
<a href="#">Lamna nasus</a> Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area	In feature area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
<a href="#">Mobula alfredi as Manta alfredi</a> Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat may occur within area	In feature area
<a href="#">Mobula birostris as Manta birostris</a> Giant Manta Ray [90034]		Species or species habitat may occur within area	In feature area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Sousa sahalensis as Sousa chinensis</a> Australian Humpback Dolphin [87942]		Species or species habitat likely to occur within area	In feature area
<b>Migratory Terrestrial Species</b>			
<a href="#">Cuculus optatus</a> Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area	In feature area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat likely to occur within area	In feature area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
<a href="#">Symposiachrus trivirgatus as Monarcha trivirgatus</a> Spectacled Monarch [83946]		Species or species habitat known to occur within area	In feature area
<b>Migratory Wetlands Species</b>			
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat known to occur within area	In feature area



Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Charadrius bicinctus</a> Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area	In feature area
<a href="#">Gallinago megala</a> Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Gallinago stenura</a> Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Numenius minutus</a> Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Numenius phaeopus</a> Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Pluvialis fulva</a> Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Tringa brevipes</a> Grey-tailed Tattler [851]		Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat likely 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
<b>Communications, Information Technology and the Arts - Telstra Corporation Limited</b>		
Commonwealth Land - Australian Telecommunications Commission [11827]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [11830]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [11763]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [11762]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [16092]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [11829]	NSW	In buffer area only
<b>Defence - Defence Housing Authority</b>		
Commonwealth Land - Director of War Service Homes [11828]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [11764]	NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [16556]	NSW	In buffer area only

### Listed Marine Species [\[ Resource Information \]](#)

Scientific Name	Threatened Category	Presence Text	Buffer Status
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Scientific Name	Threatened Category	Presence Text	Buffer Status
<b>Bird</b>			
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat likely to occur within area	In feature area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
<a href="#">Ardenna carneipes as Puffinus carneipes</a> Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Ardenna grisea as Puffinus griseus</a> Sooty Shearwater [82651]		Breeding known to occur within area	In feature area
<a href="#">Ardenna pacifica as Puffinus pacificus</a> Wedge-tailed Shearwater [84292]		Breeding known to occur within area	In buffer area only
<a href="#">Ardenna tenuirostris as Puffinus tenuirostris</a> Short-tailed Shearwater [82652]		Breeding known to occur within area	In buffer area only
<a href="#">Bubulcus ibis as Ardea ibis</a> Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area	In feature area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat known to occur within area	In feature area
<a href="#">Charadrius bicinctus</a> Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In feature area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea antipodensis gibsoni as Diomedea gibsoni</a> Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea epomophora</a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea exulans</a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Eudyptula minor</a> Little Penguin [1085]		Breeding known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In feature area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area	In feature area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area overfly marine area	In feature area
<a href="#">Gallinago megala</a> Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In feature area
<a href="#">Gallinago stenura</a> Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In feature area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
<a href="#">Himantopus himantopus</a> Pied Stilt, Black-winged Stilt [870]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In feature area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area



Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area	In feature area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat likely to occur within area overfly marine area	In feature area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area
<a href="#">Neophema chrysostoma</a> Blue-winged Parrot [726]		Species or species habitat likely to occur within area overfly marine area	In feature area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Numenius minutus</a> Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Numenius phaeopus</a> Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Pachyptila turtur</a> Fairy Prion [1066]		Species or species habitat known to occur within area	In feature area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area	In feature area
<a href="#">Phoebetria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<a href="#">Pluvialis fulva</a> Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area
<a href="#">Rostratula australis as Rostratula benghalensis (sensu lato)</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
<a href="#">Stercorarius skua as Catharacta skua</a> Great Skua [823]		Species or species habitat may occur within area	In buffer area only
<a href="#">Sternula albifrons as Sterna albifrons</a> Little Tern [82849]		Species or species habitat may occur within area	In feature area
<a href="#">Symposiachrus trivirgatus as Monarcha trivirgatus</a> Spectacled Monarch [83946]		Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Thalassarche bulleri</a> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche bulleri platei as Thalassarche sp. nov.</a> Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Thalassarche cauta</a> Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalassarche eremita</a> Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche salvini</a> Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Tringa brevipes as Heteroscelus brevipes</a> Grey-tailed Tattler [851]		Foraging, feeding or related behaviour known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area	In feature area
<b>Fish</b>			
<a href="#">Acentronura tentaculata</a> Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area	In feature area
<a href="#">Festucalex cinctus</a> Girdled Pipefish [66214]		Species or species habitat may occur within area	In feature area
<a href="#">Filicampus tigris</a> Tiger Pipefish [66217]		Species or species habitat may occur within area	In feature area
<a href="#">Heraldia nocturna</a> Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In feature area
<a href="#">Hippichthys penicillus</a> Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area	In feature area
<a href="#">Hippocampus abdominalis</a> Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area	In feature area
<a href="#">Hippocampus whitei</a> White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Histiogamphelus briggsii</a> Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area	In feature area
<a href="#">Lissocampus runa</a> Javelin Pipefish [66251]		Species or species habitat may occur within area	In feature area
<a href="#">Maroubra perserrata</a> Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Notiocampus ruber</a> Red Pipefish [66265]		Species or species habitat may occur within area	In feature area
<a href="#">Phyllopteryx taeniolatus</a> Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In feature area
<a href="#">Solegnathus spinosissimus</a> Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area	In feature area
<a href="#">Solenostomus cyanopterus</a> Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area	In feature area
<a href="#">Solenostomus paradoxus</a> Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area	In feature area
<a href="#">Stigmatopora argus</a> Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In feature area
<a href="#">Stigmatopora nigra</a> Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In feature area
<a href="#">Syngnathoides biaculeatus</a> Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area	In feature area
<a href="#">Trachyrhamphus bicoarctatus</a> Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area	In feature area
<a href="#">Urocampus carinirostris</a> Hairy Pipefish [66282]		Species or species habitat may occur within area	In feature area
<a href="#">Vanacampus margaritifer</a> Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In feature area

Mammal



Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Arctocephalus forsteri</a> Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area	In feature area
<a href="#">Arctocephalus pusillus</a> Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area	In feature area
<a href="#">Dugong dugon</a> Dugong [28]		Species or species habitat may occur within area	In feature area
<b>Reptile</b>			
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Pelamis platurus</a> Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area	In feature area

Whales and Other Cetaceans			[ Resource Information ]
Current Scientific Name	Status	Type of Presence	Buffer Status
<b>Mammal</b>			

Current Scientific Name	Status	Type of Presence	Buffer Status
<a href="#">Balaenoptera acutorostrata</a> Minke Whale [33]		Species or species habitat may occur within area	In buffer area only
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Caperea marginata</a> Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area
<a href="#">Delphinus delphis</a> Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In feature area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In buffer area only
<a href="#">Lagenorhynchus obscurus</a> Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
<a href="#">Sousa sahalensis as Sousa chinensis</a> Australian Humpback Dolphin [87942]		Species or species habitat likely to occur within area	In feature area

Current Scientific Name	Status	Type of Presence	Buffer Status
<a href="#">Stenella attenuata</a> Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area	In feature area
<a href="#">Tursiops aduncus</a> Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In feature area
<a href="#">Tursiops truncatus s. str.</a> Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In feature area

## Extra Information

State and Territory Reserves			[ <a href="#">Resource Information</a> ]
Protected Area Name	Reserve Type	State	Buffer Status
Barrenjoey	Aquatic Reserve	NSW	In buffer area only
Bouddi	National Park	NSW	In feature area
Brisbane Water	National Park	NSW	In buffer area only
Cockle Bay	Nature Reserve	NSW	In buffer area only
Ku-ring-gai Chase	National Park	NSW	In buffer area only
Lion Island	Nature Reserve	NSW	In buffer area only
Pelican Island	Nature Reserve	NSW	In buffer area only
Rileys Island	Nature Reserve	NSW	In buffer area only
Saratoga Island	Nature Reserve	NSW	In buffer area only

## Regional Forest Agreements

[ [Resource Information](#) ]

Note that all areas with completed RFAs have been included.

RFA Name	State	Buffer Status
<a href="#">North East NSW RFA</a>	New South Wales	In feature area

## Nationally Important Wetlands

[ [Resource Information](#) ]

Wetland Name	State	Buffer Status
<a href="#">Brisbane Water Estuary</a>	NSW	In feature area

## EPBC Act Referrals

[ [Resource Information](#) ]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
<b>Controlled action</b>				
<a href="#">Vegetation Clearing North Pearl Estate section of Kahibah Creek</a>	2003/997	Controlled Action	Post-Approval	In buffer area only
<b>Not controlled action</b>				
<a href="#">Construction of a high-capacity fibre optic submarine cable</a>	2006/2914	Not Controlled Action	Completed	In buffer area only
<a href="#">Demolition of Ablutions Block, Snapper Island, NSW</a>	2018/8303	Not Controlled Action	Completed	In buffer area only
<a href="#">Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia</a>	2015/7522	Not Controlled Action	Completed	In feature area
<b>Referral decision</b>				
<a href="#">Breeding program for Grey Nurse Sharks</a>	2007/3245	Referral Decision	Completed	In feature area
<b>Biologically Important Areas</b>				
Scientific Name		Behaviour	Presence	Buffer Status
<b>Dolphins</b>				
<a href="#">Tursiops aduncus</a>				
Indo-Pacific/Spotted Bottlenose Dolphin [68418]		Breeding	Likely to occur	In feature area
<b>Seabirds</b>				
<a href="#">Ardenna pacifica</a>				
Wedge-tailed Shearwater [84292]		Foraging	Likely to occur	In feature area
<a href="#">Ardenna tenuirostris</a>				
Short-tailed Shearwater [82652]		Foraging	Likely to occur	In buffer area only
<b>Sharks</b>				
<a href="#">Carcharias taurus</a>				
Grey Nurse Shark [64469]		Foraging	Known to occur	In feature area
<b>Whales</b>				
<a href="#">Megaptera novaeangliae</a>				
Humpback Whale [38]		Foraging	Known to occur	In feature area
<b>Bioregional Assessments</b>				
SubRegion	BioRegion	Website		Buffer Status
Hunter	Northern Sydney Basin	<a href="#">BA website</a>		In feature area
Sydney	Sydney Basin	<a href="#">BA website</a>		In buffer area only

# 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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## **Appendix 3 – Existing Ecological Mapping**

**NSW Estuarine Macrophytes**

**NSW Marine Protected Areas**

**NSW Key Fish Habitat**

**Resilience and Hazards SEPP – Coastal Wetlands and Littoral Rainforests**

**NSW Aquaculture**

**Soft Coral Mapping Ettalong 2019 (H2) Consulting Group 2019)**



### Legend

#### NSW Estuarine Macrophytes

- Posidonia
- Posidonia - Sparse
- Posidonia/Zostera
- Posidonia/Zostera/Halophila
- Posidonia/Halophila
- Posidonia/Halophila/Ruppia
- Posidonia/Ruppia
- Zostera
- Zostera - Sparse
- Zostera/Halophila
- Zostera/Halophila/Ruppia
- Zostera/Ruppia
- Halophila
- Halophila/Ruppia
- Ruppia
- Mangrove
- Mangrove/Saltmarsh
- Saltmarsh

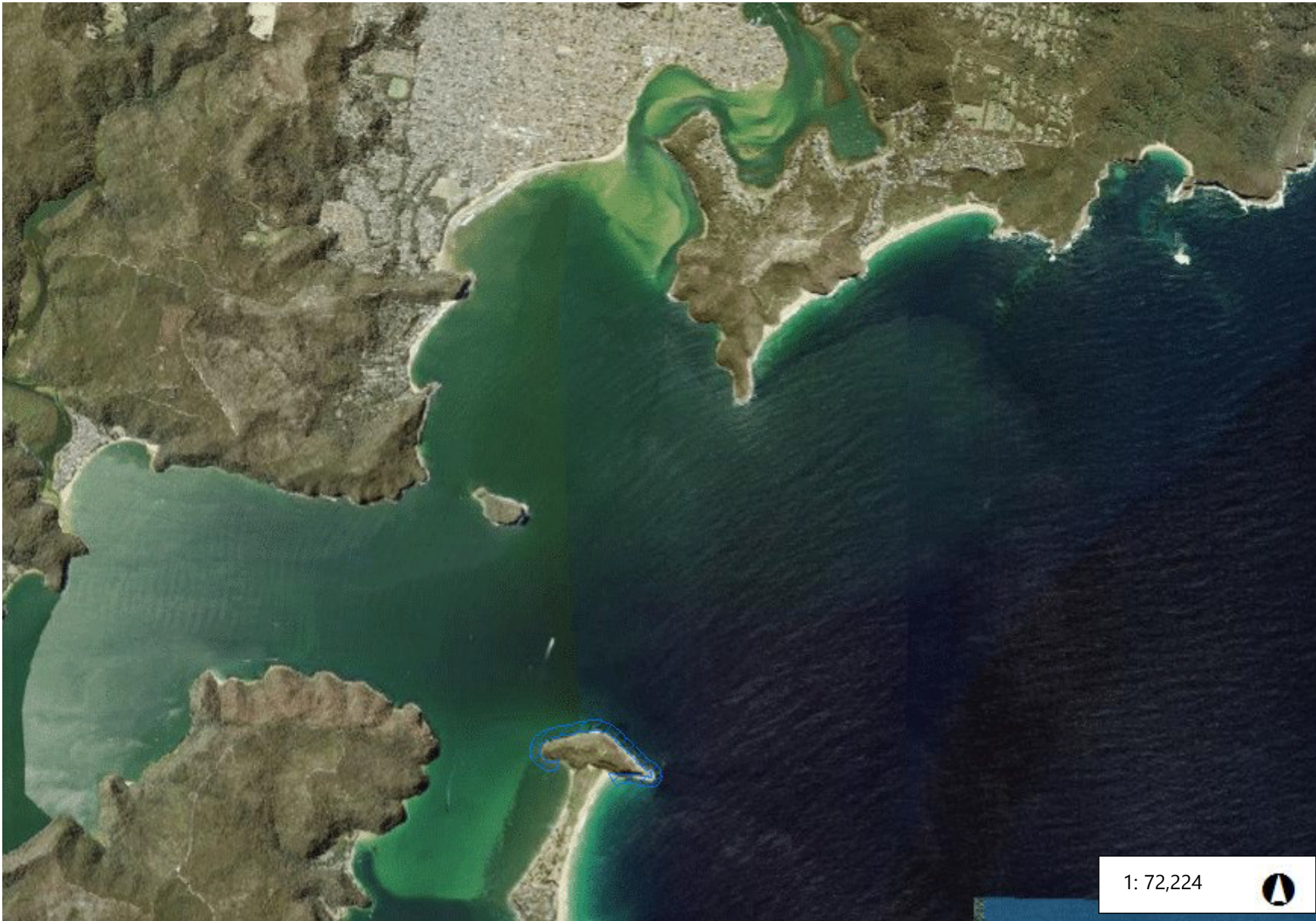
1: 18,056



0.9 0 0.46 0.9 Kilometers

### Notes





1: 72,224



**Legend**

- NSW Marine Protected Areas**
- Aquatic Reserve (IUCN IV)
  - Aquatic Reserve (Sanctuary) (IUCN VI)
  - General Use Zone (IUCN VI)
  - Habitat Protection Zone (IUCN IV)
  - Habitat Protection Zone (Restrictor)
  - Sanctuary Zone (IUCN II)
  - Special Purpose Zone (IUCN VI)



Notes





**Legend**

- Key Fish Habitat - Hawkesbury
- Key Fish Habitat - Central Rive

1: 36,112



1.8 0 0.92 1.8 Kilometers

**Notes**

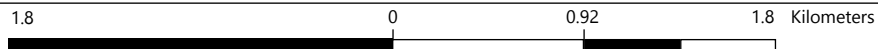




**Legend**

- Coastal Wetlands
- Proximity Area for Coastal Wet
- Littoral Rainforests
- Proximity Area for Littoral Rain
- Coastal Vulnerability Area Map  
this time
- Coastal Environment Area Map
- Coastal Use Area Map
- Land Application Map

1: 36,112



**Notes**

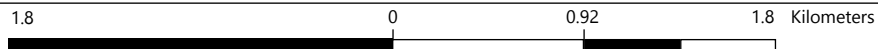




**Legend**

- Aquaculture Leases (Current)
- Priority Oyster Aquaculture Area
- National Park Estate
- Priority area

1: 36,112



**Notes**





Ettalong Channel - NSW 2256

0 100 200 300 400 500 1,000 Meters  
Scale: 1:7,000

**Figure 4: Habitat Map - Soft Coral**

	Dredge Areas rev2 GDA2020
	StudyArea

<b>H2O Habitat Assessment</b>	
	Soft Corals - 2019

DATE : 26/06/2023

Map Version : 1\_1

Projected Coordinate System : GDA 2020 Zone 56

Aerial Imagery: Nearmap - 27/05/2023

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# Appendix 4 – Assessments of Significance

## Threatened Fur-seals

### Review of Species

Name /Species		Status BC Act	Status EPBC Act
New Zealand Fur-seal ( <i>Arctocephalus forsteri</i> )		Vulnerable	Marine-
Australian Fur-seal ( <i>Arctocephalus pusillus doriferus</i> )		Vulnerable	Marine
Species	Distribution	Habitat and Prey	Breeding
<i>A. forsteri</i>	Occurs in Australia and New Zealand. Non-breeding animals occur along the southern NSW coastline, particularly on Montague Island. They may also occur at other isolated locations to the north of Sydney.	Prefers rocky parts of islands with jumbled terrain and boulders. Feeds principally on cephalopods and fish but may occasionally feed on seabirds and penguins.	Australian breeding colonies are known to occur on islands off Western Australia, South Australia and Tasmania, including Macquarie Island.
<i>A. pusillus doriferus</i>	The majority of the population is around the islands of Bass Strait, parts of Tasmania and southern Victoria. They are regularly seen hauling out in southern NSW, such as at Montague Island, while on occasions as far north as the Queensland border.	Often seen in the water near the coast or around offshore islands where they may haul out. Prefers rocky parts of islands with flat, open terrain. May also haul out inside harbours and on protected areas of the coastline. Skillful hunters that prey on bony fish, squid and octopus.	Typically breeds at colonies in southern Australia. Reported to have bred at Seal Rocks, near Port Stephens, and Montague Island in southern NSW. Pups are typically born between October and December.

Sources: DPIE (2020), Australian Museum (2020) and OEH (2014)

### 5-Part Test – BC Act

Threatened Fur-seals – BC Act
(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.
The Australian and New Zealand Fur-seal may enter the Ettalong Channel and Brisbane Water for opportunistic foraging in subtidal habitats within and adjacent to the Study Area. Intertidal rocky habitat associated with the shoreline between Little Box head and Half Tide Rocks provides refuge and resting opportunity (Hull-out habitat) for these species, with fur-seals known to utilise this area to haul out and rest at times. Neither species of fur-seal are known to breed in the vicinity of the Study Area, as <i>A. forsteri</i> breeds on offshore islands off southern and western Australia, while <i>A. pusillus doriferus</i> typically breeds in southern Australia. Records have indicated that previous breeding events have occurred on the Central Coast of NSW at Seal Rocks during the 1970s, however, breeding events have not been observed here in recent decades. Given the above, any potential for disturbances of foraging habitat or refuge habitat in intertidal areas during dredging operations is unlikely to adversely impact the lifecycle of the individuals of the species that may occur within the locality.
(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: <ul style="list-style-type: none"> <li>(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or</li> <li>(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction</li> </ul>
Not Applicable



<p>(c) in relation to the habitat of a threatened species or ecological community:</p> <ul style="list-style-type: none"> <li>(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and</li> <li>(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and</li> <li>(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality</li> </ul>	
<p>The proposed footprint for dredging and sand placement areas is limited to areas of subtidal habitat comprised of unvegetated, clean marine sands. Modifications to subtidal habitat will be restricted to a small amount of foraging habitat that fur-seals may use for opportunistic feeding or transient movements. These areas may also be impacted by short-term disturbances to water quality.</p> <p>The proposal is not expected to result in any habitat used for either hulling out or foraging to become fragmented or isolated from other areas of habitat within Broken Bay. Any disturbances will likely be short-term and confined to minor changes in habitat quality during periods of works.</p> <p>The shoreline habitat between Little Box head and Half Tide Rocks is not considered preferred habitat for fur-seals in Broken Bay and is typically only used occasionally by likely overflow from the main haul-out location at Barrenjoey Headland (on the other side of Broken Bay). The habitat in the Study Area may be of short-term importance to individuals to forage when they use areas along this shoreline to haul-out, however it unlikely of significance to their long-term survival in the locality.</p>	
<p>(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).</p>	
<p>Not Applicable – No declared areas of outstanding biodiversity value for fur-seals in New South Wales.</p>	
<p>(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process</p>	
<p>NSW KTPs with potential to be exacerbated by the proposed development do not have potential to impact Fur-seals</p>	
<p><b>Conclusion</b></p>	<p>The shoreline habitat between Little Box head and Half Tide Rocks provides some marginal habitat for fur-seals too haul out. During use of this section of the shoreline, the adjacent waters, which include some of the dredge areas and adjacent channel likely provide convenient and safe foraging grounds for these fur-seals. However, this stretch of shoreline in Broken Bay is not considered preferred habitat for fur-seals in Broken Bay and is typically only used occasionally by likely overflow from the main haul-out location at Barrenjoey Headland (on the other side of Broken Bay). The habitat in the Study Area may be of short-term importance to individuals to forage when they use areas along this shoreline to haul-out, however it unlikely of significance to their long-term survival in the locality or the population in Broken Bay. Furthermore the proposed works are unlikely to directly impact on Fur-seals, while those disturbances that do occur will likely be confined to short-term disturbances of habitat quality. Thus, the proposed action is not expected to have a significant impact on Fur-seals or the local population that occurs within Broken Bay.</p>

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