The Newport, Boat Mooring Pens

Marine Ecology Assessment

Prepared on behalf of Merivale

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SUMMARY

The Newport has proposed to construct boat mooring pens on the foreshore adjacent to the site. This will consist of mooring pens with a capacity for berthing of 14 vessels and ancillary access gangways. The facility will be for short term private and public use subject to booking with The Newport.

Ocean Environmental was engaged by Merivale to undertake a marine ecological assessment for the site, provide advice relating to the proposed mooring pens to protect marine habitat and to assess potential impacts of the works on the marine environment.

A marine habitat field survey was undertaken to describe the existing marine habitats at the site, including the occurrence and distribution of any aquatic vegetation. Intertidal habitat consisted of a wide muddy / rocky intertidal shore inhabited by rock oysters and macroalgae. Subtidal habitats at the site included subtidal macroalgae beds and extensive areas of unvegetated soft sediment.

Online database searches were undertaken to determine the potential for any threatened or protected marine fauna listed under State and Commonwealth legislation to occur. While a number of threatened and protected species have the potential to occur in the study area, Assessments of Significance under the various Acts found that the proposed works will not have a significant impact on any of these species. In addition, none of these species were detected during the field surveys.

Potential direct and indirect impacts associated with the proposed works include short term noise impacts, generation of waste, short term impacts on water quality (in particular increased turbidity levels), impacts on sessile and mobile marine fauna and impacts on intertidal and subtidal habitats including marine vegetation. While direct impacts to some of the existing marine habitats at the site are unavoidable, many other impacts can be managed / mitigated effectively.

Overall, it is considered the potential impacts of the proposal on the marine environment will be short term and insignificant.

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1. INTRODUCTION

1.1 Project Background

The Newport is located on the eastern shores of Pittwater, Newport, New South Wales (Figure 1.1). The Newport has proposed to construct boat mooring pens on the foreshore adjacent to the site. Ocean Environmental was engaged by Merivale to undertake a marine ecological assessment for the site, provide advice relating to the proposed mooring pens to protect marine habitat and to assess potential impacts of the works on the marine environment.

1.2 Study Area

Figure 1.1 Location of The Newport.

1.3 Proposed Development

The proposed development is for the purpose of boat mooring pens. Current design plans prepared by Superior Jetties are shown in Figure 1.2. A detailed description of the proposed mooring pens is provided below.

Land Use & Operation

- Mooring pens with capacity for berthing of 14 vessels and ancillary access gangways.
- Private and public use subject to booking with The Newport.
- Hours of operation 6 am to 12 pm – 7 days a week.
- Causal berthing only. No permanent boat storage or berthing is proposed.

Siting, Area and Dimensions

- Area of mooring pen structure: 941 m^2 (67.2 m x 14 m).
- Individual mooring pen size: 11.25 m x 4.9 m.
- Piles: Diameter of 450 mm and height tbc above mean high water level.
- Access gangways on water: 2.0 m -2.5 m in width. 0.5 m - 1 m above water level.
- Access gangway ramp for foreshore landing: 2.2 m in width and 29.5 m in length.

Structure and Materials

- Piles: Concrete in grey/black colour with white capping drilled into seabed.
- Access gangways on water: Aluminium upper and plastic lower floating pontoon type.
- Access gangway ramp for foreshore landing: Aluminium structure with standard engineering abutment into concrete footings on land, mid-ramp hinges, and wheel footings at connection with floating gangway on water.

Power and Lighting

- Power service pedestal and low level dock lighting on each access gangway arm. Indicative power pedestal and dock lighting specifications are submitted with the DA.

Signage

- Three mooring pen identification signs are proposed including one sign on the north end, one sign on the south end, and one sign in the centre of the mooring pen structure.
- Each of the mooring pen signs will have a maximum signage area of 1.5 m^2 and a maximum height equal to the top of the piles.

Figure 1.2 Preliminary option sketches of the boat mooring pens (Superior Jetties 4/7/16).

1.4 Scope of Works

Ocean Environmental was engaged by Merivale to undertake a marine habitat survey and marine ecology assessment for the proposed boat moorings pens. The objective of the study was to provide an assessment of existing marine habitats in the vicinity of the development footprint and to determine the potential environmental impacts of the proposal on the marine environment.

As part of this study the following tasks were undertaken:

- Description of existing intertidal and subtidal marine habitats at the site, including the occurrence of any aquatic vegetation, based on a field survey.
- Assessment of the potential for State and Commonwealth listed threatened and protected marine species to occur in the vicinity of the study site and be affected by the proposed works.
- Desktop assessment of the risk of acid sulfate soils occurring at the site.
- Assessment of the potential impacts and risks associated with the development on the marine environment.
- Identification of management and / or mitigation measures to reduce the potential impacts of the proposed development on the marine environment.

2. STUDY METHODS

2.1 Review of Existing Ecological Data

A desktop review undertaken included examination of NSW Industry & Investment (NSW I&I) estuarine vegetation maps, threatened and protected species database searches and a review of acid sulfate soils risk mapping for the area.

2.1.1 NSW DPI Aquatic Vegetation Mapping

Aquatic vegetation (including saltmarsh, mangroves, seagrasses and macroalgae) provides shelter and nursery areas for aquatic fauna. It is an essential component of the food chain in estuarine and coastal environments. Aquatic vegetation helps to stabilise sediments and shorelines, and protects water quality in estuaries for recreational users. Seagrasses, in particular, have suffered dramatic losses around Australia including many sites in NSW. The main causes of this include the erosion of river beds and banks and increased stormwater in coastal catchments leading to elevated sedimentation and turbidity, depriving seagrasses of light. Dredging and reclamation of shallow estuarine areas have also contributed to the degradation of aquatic vegetation.

All aquatic vegetation is protected under the NSW *Fisheries Management* (FM) *Act* 1994. The NSW Department of Primary Industries (NSW DPI) administers legislation, which protects mangroves, seagrasses and seaweeds on public water land and foreshores. Harming or removal of aquatic vegetation is generally only permissible by permit (a Part 7 Permit to Harm Marine Vegetation).

Prior to the marine field survey, mapping of aquatic estuarine vegetation undertaken by NSW I&I (aerial photography in 2005, ground truthed in 2005 and 2008) was referred to, specifically for Pittwater: http://www.dpi.nsw.gov.au/content/research/areas/aquatic-ecosystems/estuarine-habitats-maps/llNSW_EstMac_map37.pdf (**Appendix 1**).

2.1.2 Threatened and Protected Marine Species

The potential for State and Commonwealth listed threatened and protected marine species, as listed under the NSW FM Act 1994, NSW *Threatened Species Conservation* (TSC) *Act* 1995 and Commonwealth *Environment Protection and Biodiversity Conservation* (EPBC) *Act* 1999, to occur in the study area was determined by undertaking online database searches of the following:

- Schedules 4 to 6 of the NSW FM Act 1994 (for species listed under the FM Act 1994) http://www.legislation.nsw.gov.au/xref/inforce/?xref=Type%3Dact%20AND%20Year%3D1994%20AND%20no%3D38&nohits=y (see search results in **Appendix 2**).

- NSW National Parks and Wildlife Service (NPWS) Atlas of NSW Wildlife (BioNet) (for species listed under the TSC Act 1995) (a search area of 10 km radius around the study site is automatically selected by this database) http://www.bionet.nsw.gov.au/ (see search results in **Appendix 3**).
- Department of Sustainability, Environment, Water, Populations and Communities (DSEWPC) Protected Matters Search Tool (for species listed under the EPBC Act 1999) (a search area of 10 km radius around the study site was manually selected) http://www.environment.gov.au/epbc/pmst/index.html (see search results in **Appendix 4**).

For those species considered to have the potential to occur at the study site and be affected by the proposed boat ramp upgrades, an *Assessment of Significance* was undertaken under the relevant Act in accordance with the guidelines below.

- The NSW FM Act 1994 "Threatened Species Assessment Guidelines – Assessment of Significance": http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/226536/Threatened-Species-Guidelines.pdf.
- The NSW TSC Act 1995 "Threatened Species Assessment Guidelines – Assessment of Significance": http://www.environment.nsw.gov.au/resources/threatenedspecies/tsaguide07393.pdf.
- The Commonwealth EPBC Act 1999 "Matters of National Environmental Significance – Significant Impact Guidelines": http://www.environment.gov.au/epbc/publications/pubs/nes-guidelines.pdf.

2.1.3 Acid Sulfate Soils Risk Mapping

Areas that potentially contain acid sulfate soils have been mapped for the entire NSW coastline at a scale of 1:25,000 (NSW Government Department of Environment and Heritage 2013); http://www.environment.nsw.gov.au/acidsulfatesoil/riskmaps.htm.

The acid sulfate soil risk maps show the:

- probability of acid sulfate soil occurring;
- estimated depth to acid sulfate soil;
- environmental risk associated with disturbing the soil; and
- landform element on which the soil occurs.

The Acid Sulfate Soil Risk Map for Hornsby / Mona Vale contains the study site and was referred to for the current study (see risk map in **Appendix 6**).

2.2 Marine Habitat Field Survey

A marine habitat field survey was undertaken on Thursday 30 June 2016. Conditions on the day were fine and sunny with light winds. Underwater visibility was quite poor at less than 1 m. The survey was undertaken from 10.30 am – 11.30 am. Low tide was at 9.15 am.

The field survey followed the *NSW Maritime Marine Habitat Survey Guidelines* which were developed to provide a framework for assessing impacts of development in the marine environment. A marine habitat survey is required when applying for Land Owner's Consent or development under Part 5 of the EP&A Act 1979. It is also required where a proposed structure or activity has the potential to impact on marine habitat. The guidelines require the following information to be obtained:

- Plans showing the existence of any aquatic vegetation below the mean high water mark within a minimum 20 m of the proposal.
- Details of the survey area and sampling method.
- Photographs of the sampling area.
- Description of dominant habitats and species, including their sensitivity to change and the incidence of threatened species.
- The nature of the intertidal and subtidal zone.
- Direct and indirect impacts on marine habitat during and after construction.
- Proposed mitigation measures both during and after construction.
- Proposed monitoring of impacts after construction.

The survey was undertaken using SCUBA. Underwater video was taken using a Canon HD CMOS PRO with underwater housing. The extent of the survey area is shown in Figure 2.1.

Figure 2.1 Approximate extent of the field survey area.

3. RESULTS

3.1 Review of Existing Ecological Data

3.1.1 NSW DPI Aquatic Vegetation Mapping

NSW DPI aquatic vegetation mapping indicates that the seagrass species Posidonia is present in the vicinity of the proposed development. No other marine vegetation (i.e. mangroves or saltmarsh) has been mapped by NSW DPI in the immediate study area (Figure 3.1). The original NSW DPI map showing estuarine vegetation over a larger area within Pittwater is provided in **Appendix 1**.

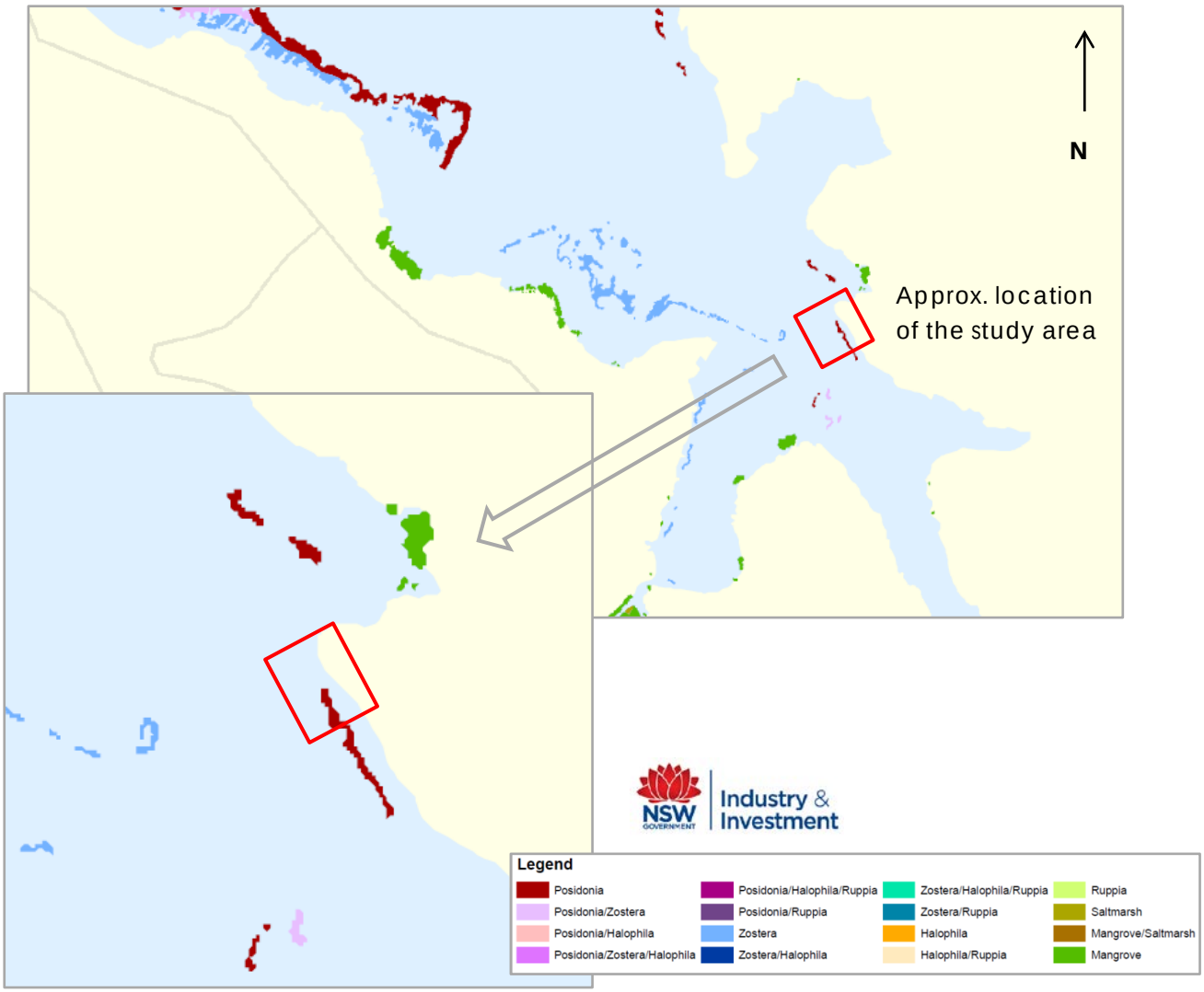


Figure 3.1 NSW DPI aquatic vegetation mapping (excerpt from Pittwater Map).

3.1.2 Database Searches for Threatened and Protected Marine Species

NSW FISHERIES MANAGEMENT ACT 1994

Schedule 4: Endangered species, populations and ecological communities

Species listed under Schedule 4 of the FM Act 1994 with the potential to occur in the study area include the following:

- Southern bluefin tuna (*Thunnus maccoyii*) – endangered species
- Scalloped hammerhead shark (*Sphyrna lewini*) – endangered species
- Strapweed (*Posidonia australis*) Pittwater population – endangered population

Schedule 4A: Critically endangered species and ecological communities

Species listed under Schedule 4A of the FM Act 1994 with the potential to occur in the study area include the following:

- Grey nurse shark (*Carcharius taurus*) – critically endangered species
- Marine slug (*Smeagol hilaris*) – critically endangered species
- Marine brown alga (*Nereia lophocladia*) – critically endangered species

Schedule 5: Vulnerable species and ecological communities

Species listed under Schedule 5 of the FM Act 1994 with the potential to occur in the study area include the following:

- Great white shark (*Carcharodon carcharias*) – vulnerable species
- Black cod (*Epinephelus daemelii*) – vulnerable species
- Great hammerhead shark (*Sphyrna mokarran*) – vulnerable species

Schedule 6: Key threatening processes

No key threatening processes listed under Schedule 6 of the FM Act 1994 are associated with the current proposal.

Of the species listed above, the only ones considered to have a moderate to high chance of occurring at the site are the seagrass *P. australis* (which has been mapped nearby to the site by NSW DPI; refer to Section 3.1.1 and **Appendix 1**) and black cod (*E. daemelii*). The estuarine habitat at the site is not considered to be typical for the other species listed. Assessments of Significance under the FM Act 1994 were undertaken for *P. australis* and *E. daemelii* (**Appendix 5**). If appropriate mitigation measures are adopted during construction no significant impacts on either species are expected to occur as a result of the proposed works.

NSW THREATENED SPECIES CONSERVATION ACT 1995

Results of the NPWS Atlas of NSW Wildlife database search are provided in **Appendix 3**. Fifteen marine species listed under the TSC Act 1995 were reported to occur within the study area. Listed marine and migratory bird species (with the exception of the little penguin) were excluded from the results as the proposed development will not have any effect on significant feeding or nesting areas in Pittwater for these bird species.

The species listed, their conservation status and likelihood of occurrence at the study site (determined using known habitat data) are provided in Table 3.1. Of these species the loggerhead turtle, green turtle, little penguin, common dolphin and bottlenose dolphin are all considered to have a moderate or high potential of occurring in the vicinity of the study site. For each of these species an Assessment of Significance under the TSC Act 1995 was undertaken (**Appendix 5**). The results of this assessment indicated that no significant impacts are expected to occur, as a result of the proposed works, on threatened species listed under the TSC ACT 1995 that have potential to occur at the study site.

Table 3.1 Marine species listed under the TSC Act 1995 reported within the study area.

Common Name	Species Name	Conservation Status	Potential to Occur in Study Area
Loggerhead Turtle	*Caretta caretta*	Endangered Protected	**Moderate** – oceanic species but spends much of its life in saltwater and estuarine habitats.
Green Turtle	*Chelonia mydas*	Vulnerable Protected	**Moderate** – mainly oceanic but adults known to frequent inshore bays, lagoons and shoals with lush seagrass meadows.
Unidentified Sea Turtle	*Cheloniidae sp.*	Protected	**Moderate** – may occur / forage in shallow subtidal waters.
Little Penguin	*Eudyptula minor*	Protected	**High** – Seen swimming in Pittwater throughout the year. Nest on nearby Lion Island, which has the largest breeding colony in the Sydney region.
Dugong	*Dugong dugon*	Endangered Protected	Low – usually found in shallow protected waters where seagrass is present however unlikely this far south.
Unidentified Fur-seal	*Arctocephalus sp.*	Protected	Low – oceanic but may 'haul out' on rocky shores along the NSW coastline.

Leopard Seal	*Hydrurga leptonyx*	Protected	Low – oceanic and generally an arctic / sub-arctic dweller.
Southern Right Whale	*Eubalaena australis*	Endangered Protected	Low – oceanic species.
Humpback Whale	*Megaptera novaeangliae*	Vulnerable Protected	Low – oceanic species.
Pygmy Sperm Whale	*Kogia breviceps*	Protected	Low – oceanic species.
Long Finned Pilot Whale	*Globicephala melas*	Protected	Low – oceanic species
Common Dolphin	*Delphinus delphis*	Protected	**Moderate** – mainly oceanic but known to occur in in NSW estuaries.
Unidentified Dolphin	*Dolphin sp.*	Protected	**Moderate** – known to occur in in NSW estuaries.
Bottlenose Dolphin	*Tursiops truncatus*	Protected	**Moderate** – mainly oceanic but known to occur in in NSW estuaries.
Dusky Dolphin	*Lagenorhynchus obscurus*	Protected	Low – oceanic species

* Conservation status: P = protected, V = vulnerable, E1 = endangered, E2 = endangered population.

ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

Results of the EPBC Act 1999 Protected Matters Search are provided in **Appendix 4**. The Protected Matters Search lists no wetlands of international importance, 73 threatened species (23 of which are marine mammals, reptiles or fish), 65 listed marine species (including 34 birds, 22 Syngnathids, 3 mammals and 6 reptiles), 21 migratory marine birds and 14 whales and other cetaceans which are known to occur, or have the potential to occur, in the study area (i.e. within a 10 km radius of the study site).

All marine species (excluding migratory and marine birds) with the potential to occur in the study area are listed in Table 3.2 along with their conservation status. This table also provides a likelihood of occurrence (which is determined by the database) and relates to the likelihood of each species occurring within a 10 km radius of the study site.

Species for which species or species habitat are “likely to occur” in the study area include black cod, porbeagle shark, grey nurse shark , Southern right whale, Indo-Pacific humpback dolphin and Indian Ocean bottlenose dolphin.

Species for which species or species habitat are “known to occur” in the study area include the hawksbill turtle, great white shark and humpback whale.

Species for which foraging, feeding or related behaviour are “known to occur” in the study area include the loggerhead turtle, green turtle, leatherback turtle and flatback turtle.

While only listed as "species or species habitat may occur" in the study area, it is considered that there is the potential for syngnathids (seahorses, pipefishes and pipehorses) to occur around artificial structures at the site.

Due to a lack of suitable habitat it is not expected that any whale or shark species listed above would occur at the site or be impacted by the proposed development. Those species which may be expected to occur include all species of turtle, dolphin, black cod and syngnathids.

Assessments of significance under the EPBC Act 1999 for each of these species were undertaken and are provided in **Appendix 5**. The results of this assessment indicate, providing appropriate management / mitigation is applied to the project, then no significant impacts are expected to occur on these species.

Table 3.2 Species listed under the *EPBC Act* 1999 with the potential to occur in the study area.

Common Name	Species Name	Conservation Status *EPBC Act* 1999*	Likelihood of Occurrence
Black Cod	*Epinephelus daemelii*	V	Species or species habitat **likely to occur**
Green Sawfish	*Pristis zijsron*	V	Species or species habitat may occur
Loggerhead Turtle	*Caretta caretta*	E, M, L	Foraging, feeding or related behaviour **known to occur**
Green Turtle	*Chelonia mydas*	V, M, L	Foraging, feeding or related behaviour **known to occur**
Leatherback Turtle	*Dermochelys coriacea*	E, M, L	Foraging, feeding or related behaviour **known to occur**
Hawksbill Turtle	*Eretmochelys imbricata*	V, M, L	Species or species habitat **known to occur**
Flatback Turtle	*Natador depressus*	V, M, L	Foraging, feeding or related behaviour **known to occur**
Dugong	*Dugong dugon*	M, L	Species or species habitat may occur
Yellow Bellied Sea Snake	*Pelamis platurus*	L	Species or species habitat may occur
Giant Manta Ray	*Manta birostris*	M	Species or species habitat may occur
Porbeagle Shark	*Lamna nasus*	M	Species or species habitat **likely to occur**
Great White Shark	*Carcharodon carcharias*	V, M	Species or species habitat **known to occur**
Grey Nurse Shark (east coast pop'n)	*Carcharias taurus (east coast population)*	CE,	Species or species habitat **likely to occur**
Whale Shark	*Rhincodon typus*	V, M	Species or species habitat may occur
Blue Whale	*Balaenoptera musculus*	E, M, W	Species or species habitat may occur
Southern Right Whale	*Eubalaena australis*	E, M, W	Species or species habitat **likely to occur**
Humpback Whale	*Megaptera novaeangliae*	V, M, W	Species or species habitat **known to occur**

Brydes Whale	*Balaenoptera edeni*	M, W	Species or species habitat may occur
Pygmy Right Whale	*Caperea marginata*	M, W	Species or species habitat may occur
Minke Whale	*Balaenoptera acutorostrata*	W	Species or species habitat may occur
Orca (Killer Whale)	*Orcinus orca*	M, W	Species or species habitat may occur
Australian Fur Seal	*Arctocephalus pusillus*	L	Species or species habitat may occur
New Zealand Fur Seal	*Arctocephalus forsteri*	L	Species or species habitat may occur
Dusky Dolphin	*Lagenorhynchus obscurus*	M, W	Species or species habitat may occur
Indo-Pacific Humpback Dolphin	*Sousa chinensis*	M, W	Species or species habitat **likely to occur**
Common Dolphin	*Delphinus delphis*	W	Species or species habitat may occur
Risso's Dolphin	*Grampus griseus*	W	Species or species habitat may occur
Spotted Dolphin	*Stenella attenuata*	W	Species or species habitat may occur
Indian Ocean Bottlenose Dolphin	*Tursiops aduncus*	W	Species or species habitat **likely to occur**
Bottlenose Dolphin	*Tursiops truncatus s. str.*	W	Species or species habitat may occur
22 Syngnathids (seahorses, pipfishes and pipehorses)	*22 species*	L	Species or species habitat may occur

* Conservation status: V = vulnerable, CE = critically endangered, E = endangered, M = migratory marine species, L = listed marine species, W = whales and other cetaceans.

3.1.3 Acid Sulfate Soils

Acid sulfate soil risk maps predict the distribution of acid sulfate soils based on the geomorphic environment. The risk map for Hornsby / Mona Vale, which includes the study area, indicates that there is a high probability of acid sulfate soils occurring below water level in the bottom sediments at the site (Figure 3.2), and throughout much of Pittwater (refer to original risk map in **Appendix 6**). The Risk Map states that there is a "severe environmental risk if bottom sediments are disturbed by activities such as dredging". Typical landforms associated with acid sulfate soils include bottom sediments associated with lakes, lagoons, tidal creeks, rivers and estuaries. It must be noted that the risk maps do not provide site specific information. Extreme variations in the nature and distribution of acid sulfate soils can be expected and the depth to the acid sulfate soil layer (if present) can be highly variable.

Acid Sulfate Soil Risk Maps do not provide site specific acid sulfate soils information. Extreme variations in the nature and distribution of acid sulfate soils acid sulfate soils can be expected and the depth to the acid sulfate soils layer (if present) can be highly variable. Therefore, if dredging or excavation of sediments are to occur at the site it is recommended that targeted sampling of sediments is undertaken to assess the actual probability of acid sulphate soils occurring. It is noted that these activities are not currently proposed so the risks associated with acid sulfate soils are low.

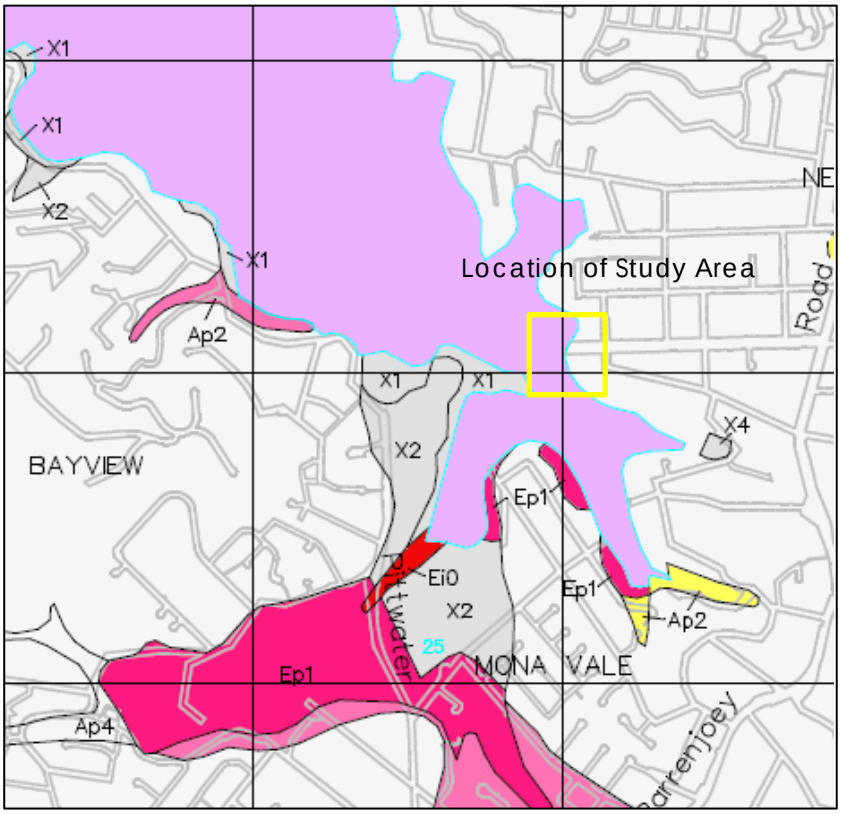


Figure 3.2 Excerpt from the Acid Sulfate Soil Risk Map showing the study site.

3.2 Marine Habitat Field Survey

Marine habitats present within the study area included an intertidal muddy / rocky foreshore with macroalgae, subtidal rocky reef inhabited by macroalgae, soft sediment muddy subtidal seafloor with patchy macroalgae and unvegetated muddy subtidal seafloor (which covered the majority of the site). One very small area of Halophila seagrass in poor condition was detected (< 0.5 m^2). The Posidonia beds mapped in this general area by NSW DPI were not apparent during this survey and most likely lie further south of the site. The general location of habitats in the study area is shown in Figure 3.3.

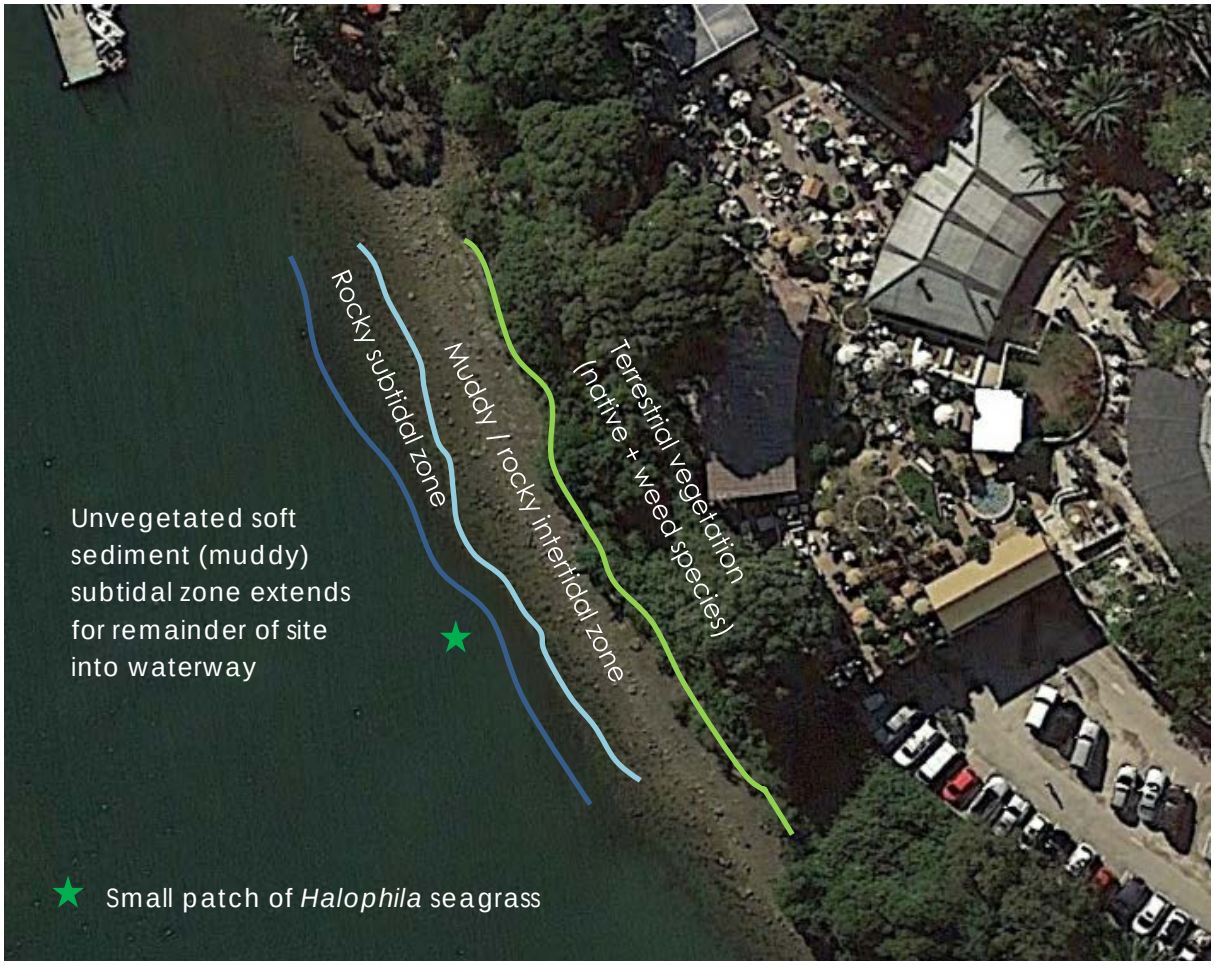


Figure 3.3 Mud map of marine habitats in the study area.

3.2.1 Intertidal Habitats

The intertidal zone consisted of a gently sloping muddy bank covered in small to medium sized rocks. These were encrusted by sessile invertebrates including Sydney rock oysters (*Saccostrea glomerata*), small limpets and periwinkles. The marine macroalgae *Hormosira banksii* (Neptune's necklace) was commonly attached to the hard substrate throughout the mid-lower tidal levels. This species is typically abundant on low energy rocky shores at mid-

tide levels due to its high tolerance to desiccation. A small number (< 5) of juvenile mangrove plants were found across the intertidal zone. Bioturbation of the muddy substrate by burrowing organisms (e.g. crustaceans) was seen. Images of the intertidal zone in the study area are provided in Figure 3.4. Proposed works in this area include a gangway. Highly localised and minor impacts on intertidal habitat from the piles / footings would occur.

Rocky / muddy intertidal inhabited by rock oysters and marine algae.

The marine algae Neptune's necklace and rock oysters dominated the hard rocky substrates in the intertidal zone.

Bioturbation of the muddy intertidal substrate from burrowing organisms was evident. Occasional juvenile mangroves were also present in the intertidal zone.

Figure 3.4 Intertidal habitat and associated organisms in the study area.

3.2.2 Subtidal Habitats

Subtidal habitats present in the study area included a subtidal rocky drop off area inhabited by macroalgae and a largely unvegetated area of soft sediment which extended over the majority of the study area. The intertidal foreshore made way to a subtidal rocky area which dropped off quite steeply to the soft sediment seafloor. The subtidal rocky area was dominated by a dense bed of the brown marine macroalgae Sargassum sp. along the entire length of the site. Juvenile fish were seen amongst the algae. The macroalgae bed extended seawards for ~ 2 - 3 m and had a high cover of silt.

Seawards of the macroalgae bed the seafloor was muddy and was mainly unvegetated for the remainder of the site (some occasional macroalgae plants occurred). The unvegetated seafloor was covered in leaf litter (terrestrial vegetation) in the nearshore zone and bioturbation from burrowing organisms (e.g. crustaceans) and filter feeding organisms (e.g. polychaete worms) was seen. Some mobile marine invertebrates were also present (e.g. echinoderms).

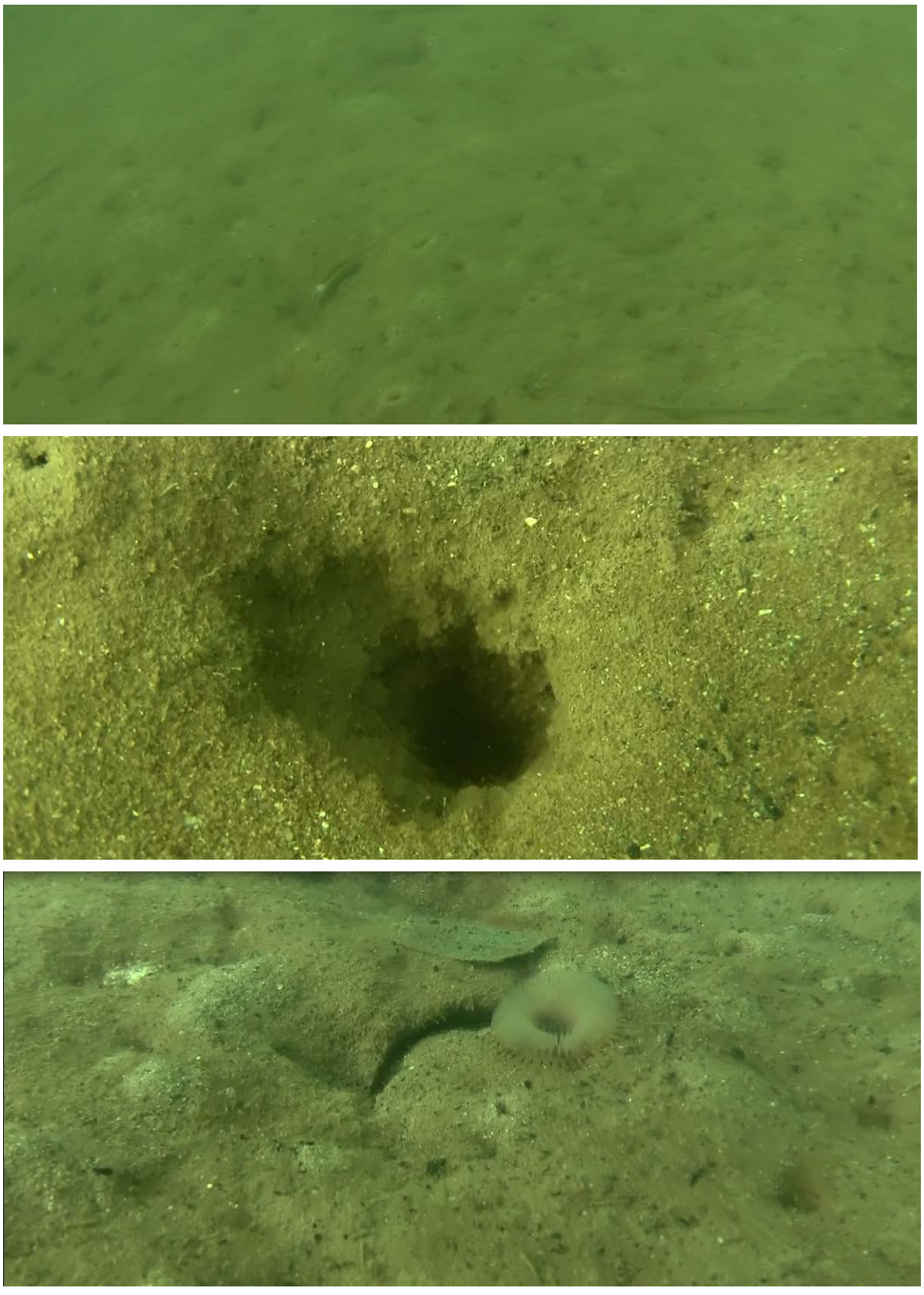
One very small patch of Halophila seagrass (< 0.5 m^2) was recorded at the site which was in poor condition and covered in silt. This occurred immediately seawards of the rocky subtidal zone in water depths of < ~3 m. The Posidonia beds mapped by NSW DPI were not apparent within the study area and most likely lie further south of the site.

Structures proposed over the subtidal zone include floating pontoons and walkways and concrete piles will be driven into the seabed here. Details of the structures are provided in Section 1.3.

A variety of images of the various habitats in the subtidal zone of the site are provided in Figure 3.5.

Upper and lower rocky subtidal zones inhabited by dense macroalgae beds (Sargassum sp.).

Transition between rocky subtidal and soft sediment seafloor (leaf litter was common here).



Typical soft sediment seafloor at the site with bioturbation and polychaete worms.

Echinoderm on the muddy seafloor at the transition between rocky subtidal and soft sediment habitat zone.

Very small patch of Halophila seagrass on the subtidal seafloor.

Figure 3.5 Subtidal habitats and associated organisms in the study area.

3.2.3 Riparian Vegetation

Behind the intertidal foreshore a steep rocky slope leads up to The Newport on which a mix of native and introduced terrestrial vegetation was growing. No significant native trees were apparent in the area over which the proposed access from The Newport to the gangway is planned. In this area low lying vegetation, consisting of mainly introduced and weed species were present (Figure 3.6). Due to the very small footprint of the proposed structure no significant impacts on terrestrial fauna utilising this area are expected.

Figure 3.6 Riparian terrestrial vegetation behind the intertidal bank. The approximate proposed location of the walkway is indicated and is free of any significant native trees.

4. POTENTIAL IMPACTS & MITIGATION

Potential impacts on the marine environment from construction of the boat mooring pens are discussed below.

4.1 Noise

4.1.1 Potential Impacts

There are likely to be short term noise impacts from the construction works. There are essentially two main sources of noise relating to the proposal including:

1) Vehicle / vessel and equipment engine noise; and
2) Impact or high frequency pulse noise from use of equipment (e.g. from piling, hammering, cutting and drilling tools).

These have the potential to have behavioural impacts on marine fauna, especially that of fish, marine birds and marine mammals (e.g. penguins, seals, dolphins, whales).

Considering that the area is already subjected to regular underwater noise from recreational vessels from the marinas either side it is not expected that the short term noise impacts relating to any construction vehicles / vessels would be significant. Any short term pulse noises from the use of construction equipment and from piling associated with the floating pontoons may result in behavioural responses from marina fauna, most likely fish and birds which are expected to simply remove themselves from the area during works. Since the likelihood of marine mammals occurring in this area is generally quite low the overall risk of construction noise directly affecting marine mammals is also low.

Overall, considering the relatively small scale of the works proposed and fauna expected to occur at the site any potential noise impacts are considered to be minor, will be localised and short term in nature. No significant impacts on marine fauna relating to noise are expected. In addition, the potential impacts of noise on marine fauna can be mitigated.

4.1.2 Mitigation Measures

- Noise should be managed in accordance with the Office of Environment and Heritage (OEH) Interim Construction Noise Guideline 2009.
- Silencers on engines and machinery should be used where possible to minimise noise impacts on marine biota.
- Soft start procedures could be employed for any piling activities to allow marine fauna a chance to remove themselves from the area and reduce the risk of noise associated impacts.

4.2 Generation of Waste & Water Pollution

4.2.1 Potential Impacts

Construction of the mooring pens has the potential to generate general waste, waste from construction materials and impact on marine water quality.

There is the potential for fuel and / or oil leaks from both land and marine based construction equipment. This can be harmful to marine mammals and birds.

There is the potential for incorrect disposal of general waste generated by contractors. This can create water pollution and cause harm to marine vertebrates (e.g. shorebirds, fish and mammals). Ingestion and entanglement of marine fauna in marine debris is listed as a Key Threatening Process (i.e. a process that 'threatens or may threaten the survival, abundance or evolutionary development of a native species or ecological community') under both the NSW TSC Act 1995 and the EPBC Act 1999. While the potential for marine mammals to occur in the area is relatively low, shorebirds and fish are under risk from such activities if not managed correctly.

Disturbance of the substratum and associated marine sediments during the construction process (through piling and from construction vessels and equipment) may cause short term increases in turbidity. It may also lead to re-suspension of contaminated marine sediments if they are present. Turbidity increases may result in short term reductions in light penetration, which, if sustained, can impact on light requiring marine vegetation (e.g. seagrass and macroalgae) and on filter feeding organisms (e.g. sponges and ascidians) through clogging of pores and filter apparatus with fine suspended sediment. The field surveys showed that beds of marine macroalgae were present, however, seagrass was rare at the site. While these were already seen to have quite high levels of siltation, further siltation from construction activities should be avoided where possible to prevent causing further harm. With appropriate mitigation the spread of resuspended marine sediment can be confined and this will prevent potential impacts occurring outside the immediate construction area.

4.2.2 Mitigation Measures

- All equipment used should be well maintained and serviced to ensure they are in proper working order and reduce the likelihood of fuel / oil leaks and spills.
- Oil spill response kits should be onsite at all times during the works.
- All general waste generated during the construction process should be contained and disposed of appropriately offsite to prevent it from entering the marine environment.
- To reduce the spread of suspended marine sediments and the potential impact of turbidity and further sedimentation of marine habitats, vegetation and fauna, a silt curtain should be erected around the area of operations to contain any sediment disturbed by construction activities. Especially between any areas of piling in the muddy subtidal and the macroalgae beds.

- The use of a silt curtain around the immediate construction area will simultaneously reduce the risks of physical / chemical stress on biota from increased turbidity, sedimentation and reduced light; and the dispersal of any potentially disturbed sediment contaminants.

4.3 Direct Damage to Marine Habitat & Vegetation

4.3.1 Potential Impacts

The proposed works will have direct and indirect impacts on intertidal and subtidal marine habitats, marine vegetation and sessile and mobile fauna.

The use of vessels to undertake construction works may cause direct impacts on benthic communities including soft sediment subtidal communities and marine vegetation through anchoring, disturbance of the seabed through dragging in shallow areas, impacts of engines and potential pollution.

Installation of the gangway over the intertidal zone will have highly localised direct impacts on the substratum in area in which piles are driven.

Piles driven into the subtidal seafloor will have localised direct impacts on the subtidal seafloor and habitat which occurs in each location. In most cases this should be over unvegetated soft sediment but may impact some areas of macroalgae closer in to shore.

The proposed mooring pens will increase the level of shading of the macroalgae beds at the site near to shore. The further out from shore the pens are placed the less impact from shading there will be. However, impacts to macroalgae from shading are not likely to be significant as these species tend to thrive in shaded areas (e.g. under jetties and pontoons). As boats will not be moored permanently at the site shading from boats is not thought to be a significant issue.

There will be a temporary indirect effect on mobile marine fauna such as fish and larger mobile invertebrates (e.g. crustaceans) that utilise the subtidal and intertidal habitats for shelter and feeding. These fauna will need to find alternative areas during construction. It is possible that harm will come to some mobile invertebrates which live amongst the rocks in the intertidal zone during piling and also to infauna and mobile fauna utilising the subtidal soft sediment habitat at the site.

Disturbance of the seafloor through construction activities (e.g. vessel movements and anchoring) will result in localised and short term, increases in turbidity. This can impact light requiring species at the site such as macroalgae and sessile filter feeding marine invertebrates (e.g. ascidians). Increases in turbidity are likely to be short lived and localised if mitigated effectively.

The construction of the new floating pontoons will provide new areas of intertidal and subtidal habitat which over time are likely be colonised by a diverse suite of sessile invertebrates and marine flora.

With adoption of the mitigation measures listed below the potential impacts on marine habitats and fauna can be lessened, however, due to the nature of the proposal, not all impacts can be avoided.

4.3.2 Mitigation Measures

- Contractors should aim to minimise the area of direct impacts on marine habitat (especially areas of aquatic vegetation) at the site. This may be done by limiting any unnecessary / temporary construction at the site (i.e. through selection of the most appropriate construction methods) and limiting any anchoring which is required by vessels.
- Consideration to the location of the subtidal macroalgae beds adjacent to the intertidal zone should be given when assessing the final location of the floating structures. Moving the structures slightly seawards will help to decrease any potential impacts on these areas and fauna which use them.
- Silt curtains should be used between areas of construction and marine vegetation to maintain the spread of resuspended soft sediments and prevent impacts associated with this.
- Construction vessels should anchor in and remain over unvegetated soft sediment habitat.
- By reducing pollution and water quality impacts as per the recommendations listed in Section 4.2.2, damage to marine habitat will also be minimised.

4.4 Impacts on Marine Fauna

4.4.1 Potential Impacts

Impacts on mobile marine fauna (such as invertebrates, birds, fish, mammals and turtles) have the potential to occur during construction works. These include:

- Avoidance of the area during the proposed works due to noise impacts.
- Short term loss of habitat, sheltering and / or feeding areas.
- Ingestion of or entanglement in marine debris.
- Direct impacts on sessile and mobile benthic invertebrates in the intertidal and subtidal zones through piling.

It is expected that the majority of impacts to marine fauna would be short term and would not threaten the livelihood of individuals or populations. Assessments of Significance under the FM Act 1994, TSC Act 1995 and EPBC Act 1999 found that the proposed works are unlikely to have any significant impact on any species of threatened or protected marine fauna that have the potential to occur at the study site if appropriate mitigation measures are adopted.

4.4.2 Mitigation Measures

- Silencers on engines and machinery should be used where possible to minimise noise impacts on marine fauna.
- All general waste generated during the construction process should be contained and disposed of appropriately to prevent it from entering the marine environment and becoming a hazard for marine fauna.
- Contractors should be aware of the presence of marina fauna. If any large mobile marine fauna (e.g. turtles, penguins) are present at or near to the study site during construction works should cease until they have left the area.

4.5 Acid Sulfate Soils

4.5.1 Potential Impacts

Potential acid sulfate soils can pose an environmental risk if disturbed by activities such as dredging. On exposure to air, potential acid sulfate soils oxidise and produce acid. Therefore they pose an environmental risk if they are not treated appropriately when removed from a waterway.

4.5.2 Mitigation Measures

- If any dredging or excavation of marine sediments is required at the site (N.B. this is not currently expected) appropriate soil investigations in regards to acid sulfate soils should be undertaken.
- An acid sulfate soil management plan (ASSMP) may be required to avoid environmental degradation if sediments which are to be disturbed are found to contain actual or potential acid sulfate soils.

4.6 Monitoring During and After Construction

Due to the relatively minor impact that the proposed works are expected to have, monitoring during and after construction is considered unnecessary.

However, during construction activities, all care should be taken to avoid impacts to water quality and marine habitats / vegetation. In addition, if any spills of fuel or oil occur from any equipment at the site all work shall cease while the spill is remediated.

5. REFERENCES

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NSW NPWS (2016). Atlas of NSW Wildlife (BioNet). http://www.bionet.nsw.gov.au NSW National Parks and Wildlife Service.

OEH (2009). Interim Construction Noise Guideline 2009. Available from: http://www.environment.nsw.gov.au/resources/noise/09265cng.pdf Office of Environment and Heritage.

Appendix 1 – I&I Aquatic Vegetation Map

Pittwater

151°15'0"E

151°20'0"E

33°35'0"S

33°40'0"S

Patonga

Broken Bay

West Head

Barrenjoey Head

Palm Beach

The Basin

Pittwater

Church Point

Avalon

Mona Vale

HR Map 1

HR Map 2

HR Map 3

HR Map 4

Brisbane Water

Pittwater

Pittwater
Air photo date: 2005
Field survey: 2005, 2008

Legend

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

N

0 0.5 1

Kilometres

NSW GOVERNMENT Industry & Investment

NSW

Not all habitats may be present in this map.

Appendix 2 – FM Act 1994 Search

New South Wales Consolidated Acts

FISHERIES MANAGEMENT ACT 1994 - SCHEDULE 4

SCHEDULE 4 – Endangered species, populations and ecological communities

(Section 220C)

Part 1 - Endangered species

Fish

Archaeophya adamsi Fraser, 1959	Adam's emerald dragonfly
Austrocordulia leonardi	Sydney Hawk dragonfly
* Maccullochella ikei Rowland	eastern freshwater cod
* Maccullochella macquariensis (Cuvier)	trout cod
Macquaria australasica (Cuvier, 1830)	Macquarie perch
Mogurnda adspersa (Castelnau, 1878)	purple spotted gudgeon
Nannoperca australis Günther, 1861	southern pygmy perch
* Nannoperca oxleyana Whitley	Oxleyan pygmy perch
Notopala sublineata (Conrad, 1850)	river snail
Sphyrna lewini (Griffith & Smith, 1834)	scalloped hammerhead shark
Thunnus maccoyii	southern bluefin tuna

Marine vegetation

Part 2 - Endangered populations

Fish

Ambassis agassizii Steindachner, 1866, olive perchlet, western New South Wales population
Craterocephalus amniculus (Crowley and Ivanstoff, 1990), Darling River Hardyhead, Hunter River population
Gadopsis marmoratus, river blackfish, Snowy River population
Tandanus tandanus (Mitchell, 1838), eel tailed catfish, Murray-Darling Basin population

Marine vegetation

Posidonia australis Hook. f. (1858), seagrass, Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie populations

Part 3 - Endangered ecological communities

Aquatic ecological community in the natural drainage system of the lower Murray River catchment (as described in the recommendation of the Fisheries Scientific Committee to list the ecological community)

Aquatic ecological community in the natural drainage system of the lowland catchment of the Darling River (described in the recommendation of the Fisheries Scientific Committee to list that aquatic ecological community, as the area covered by that recommendation)

Aquatic ecological community in the natural drainage system of the lowland catchment of the Lachlan River (described in the recommendation of the Fisheries Scientific Committee to list that aquatic ecological community, as the area covered by that recommendation)

Aquatic ecological community in the catchment of the Snowy River in NSW (as described in the final determination of the Fisheries Scientific Committee to list that aquatic ecological community)

Part 4 - Species presumed extinct

Fish

Hadrachaeta aspeta Hutchings, 1977	marine worm
Pristis zijsron Bleeker, 1851	green sawfish
Metaprotella haswelliana Mayer, 1882	Haswells caprellid

Marine vegetation

Vanvoorstia bennettiana (Harvey) Papenfuss (1956)	Bennetts seaweed

New South Wales Consolidated Acts

FISHERIES MANAGEMENT ACT 1994 - SCHEDULE 4A

SCHEDULE 4A – Critically endangered species and ecological communities

(Section 220C)

Part 1 - Critically endangered species

Fish

* Carcharias taurus Rafinesque, 1810	grey nurse shark
Craterocephalus fluviatilis (McCulloch, 1913)	Murray hardyhead
Euastacus dharawalus (Morgan, 1997)	Fitzroy Falls spiny crayfish
Galaxias rostratus	flathead galaxias
Smeagol hilaris Tillier & Ponder, 1992	marine slug

Marine vegetation

Nereia lophocladia J. Agardh (1897)	marine brown alga

Part 2 - Critically endangered ecological communities

New South Wales Consolidated Acts

FISHERIES MANAGEMENT ACT 1994 - SCHEDULE 5

SCHEDULE 5 – Vulnerable species and ecological communities

(Section 220C)

Part 1 - Vulnerable species

Fish

Austropetalia tonyana (Theischinger, 1995)	Alpine Redspot Dragonfly
Bidyanus bidyanus (Mitchell, 1838)	silver perch
Branchinella buchananensis Geddes, 1981	Buchanans fairy shrimp
* Carcharodon carcharias (Linnaeus, 1758)	great white shark
Epinephelus daemelii (Günther, 1876)	black cod
Euastacus armatus (von Martens 1866)	Murray crayfish
Microrchestia bousfieldi Lowry & Peart, 2010	Bousfields marsh-hopper
Sphyrna mokarran Ruppell, 1837	great hammerhead shark

Marine vegetation

Part 2 - Vulnerable ecological communities

New South Wales Consolidated Acts

FISHERIES MANAGEMENT ACT 1994 - SCHEDULE 6

SCHEDULE 6 – Key threatening processes

(Section 220C)

Degradation of native riparian vegetation along New South Wales water courses

Hook and line fishing in areas important for the survival of threatened fish species

Human-caused climate change

Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams

Introduction of fish to waters within a river catchment outside their natural range

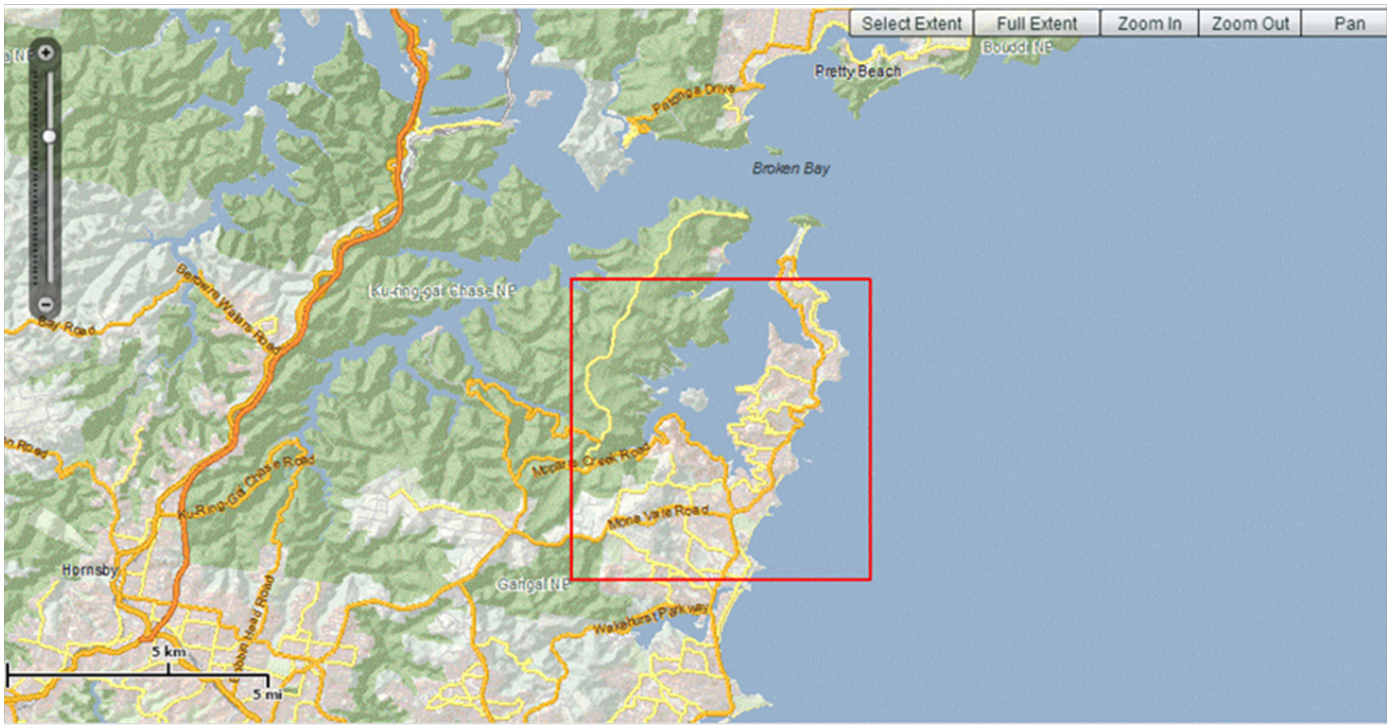
Introduction of non-indigenous fish and marine vegetation to the coastal waters of New South Wales

Removal of large woody debris from New South Wales rivers and streams

The current shark meshing program in New South Wales waters

Appendix 3 – TSC Act 1995 Search

ATLAS OF NSW WILDLIFE SEARCH - MARINE SPECIES LISTED UNDER TSC Act 1995



Data from the BioNet Atlas of NSW Wildlife 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 0.1Â°; ^^ rounded to 0.01Â°). Copyright the State of NSW through the Office of Environment and Heritage. Search criteria : Public Report of all Valid Records of Animals in selected area [North: -33.6 West: 151.25 East: 151.35 South: -33.7] returned a total of 6,174 records of 350 species.

Report generated on 9/02/2015 2:06 PM

Kingdom	Class	Family	Scientific Name	Common Name	NSW status
Animalia	Reptilia	Cheloniidae	*Caretta caretta*	Loggerhead Turtle	E1,P
Animalia	Reptilia	Cheloniidae	*Chelonia mydas*	Green Turtle	V,P
Animalia	Reptilia	Cheloniidae	*Cheloniidae sp.*	unidentified sea turtle	P
Animalia	Mammalia	Dugongidae	*Dugong dugon*	Dugong	E1,P
Animalia	Mammalia	Otariidae	*Arctocephalus sp.*	Unidentified Fur-seal	P
Animalia	Mammalia	Phocidae	*Hydrurga leptonyx*	Leopard Seal	P
Animalia	Mammalia	Balaenidae	*Eubalaena australis*	Southern Right Whale	E1,P
Animalia	Mammalia	Balaenopteridae	*Megaptera novaeangliae*	Humpback Whale	V,P
Animalia	Mammalia	Kogiidae	*Kogia breviceps*	Pygmy Sperm Whale	P
Animalia	Mammalia	Delphinidae	*Delphinus delphis*	Common Dolphin	P
Animalia	Mammalia	Delphinidae	*Dolphin sp.*	Unidentified Dolphin	P
Animalia	Mammalia	Delphinidae	*Globicephala melas*	Long-finned Pilot Whale	P
Animalia	Mammalia	Delphinidae	*Lagenorhynchus obscurus*	Dusky Dolphin	P
Animalia	Mammalia	Delphinidae	*Tursiops truncatus*	Bottlenose Dolphin	P
Animalia	Aves	Spheniscidae	*Eudyptula minor*	Little Penguin	P

Appendix 4 – EPBC Act 1999 Search

Australian Government

Department of the Environment

EPBC Act Protected Matters Report

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

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

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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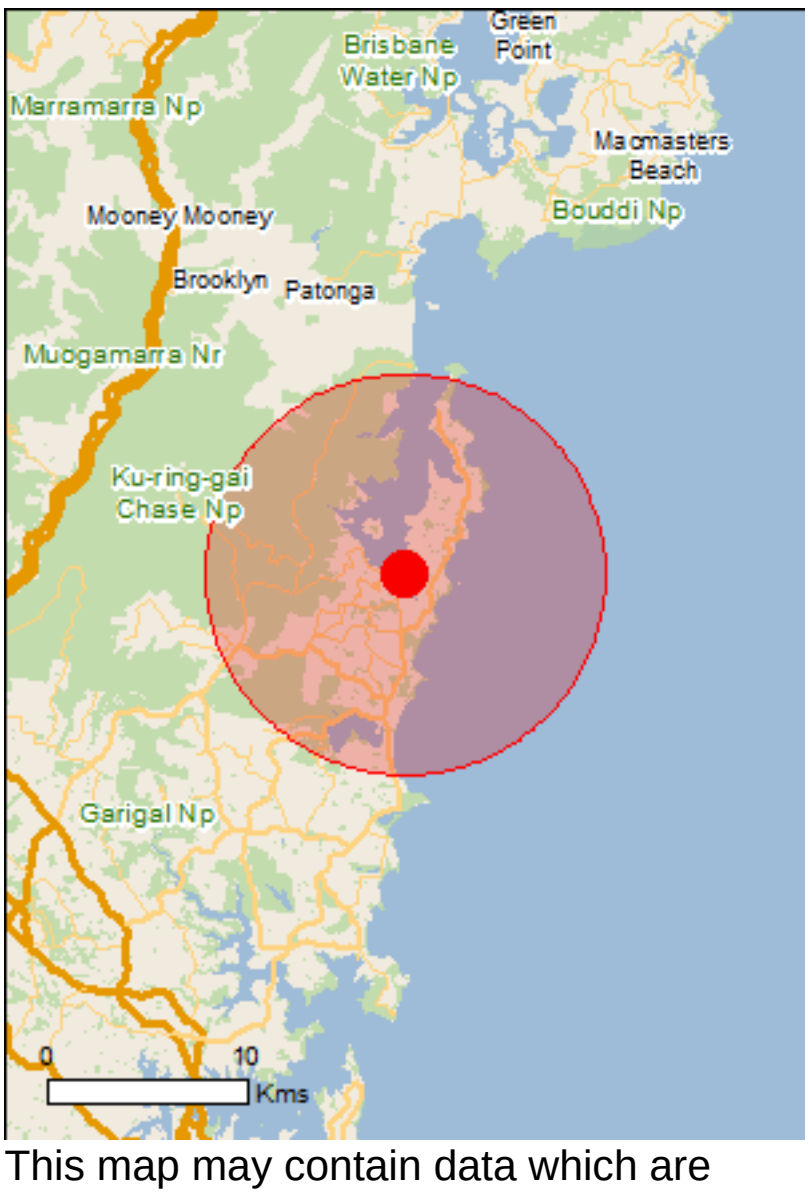
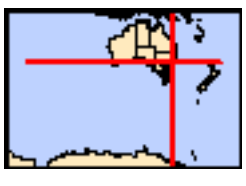


This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	1
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	73
Listed Migratory Species:	50

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

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

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

Commonwealth Land:	9
Commonwealth Heritage Places:	None
Listed Marine Species:	65
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine	None

Extra Information

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

Place on the RNE:	28
State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	49
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

National Heritage Properties [Resource Information]

Name	State	Status
Natural		
Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves	NSW	Listed place

Commonwealth Marine Areas [Resource Information]

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

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

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

Name
Temperate East

Listed Threatened Ecological Communities [Resource Information]

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

Name	Status	Type of Presence
Coastal Upland Swamps in the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia		
Regent Honeyeater [82338]	Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat known to occur

Name	Status	Type of Presence
		within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora epomophora Southern Royal Albatross [25996]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora sanfordi Northern Royal Albatross [82331]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans antipodensis Antipodean Albatross [82269]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans exulans Tristan Albatross [82337]	Endangered	Species or species habitat may occur within area
Diomedea exulans gibsoni Gibson's Albatross [82271]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Status	Type of Presence
Thalassarche cauta salvini		
Salvin's Albatross [82343]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi		
White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita		
Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris impavida		
Campbell Albatross [82449]	Vulnerable	Species or species habitat may occur within area
Fish		
Epinephelus daemelii		
Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Macquaria australasica		
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Prototroctes maraena		
Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus		
Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
Litoria aurea		
Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat likely to occur within area
Litoria littlejohni		
Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat may occur within area
Mixophyes balbus		
Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isoodon obesulus obesulus		
Southern Brown Bandicoot (Eastern) [68050]	Endangered	Species or species habitat known to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Petrogale penicillata		
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus		
Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Acacia terminalis subsp. terminalis MS		
Sunshine Wattle [64829]	Endangered	Species or species habitat likely to occur within area
Asterolasia elegans		
[56780]	Endangered	Species or species habitat likely to occur within area
Caladenia tessellata		
Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana		
Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus camfieldii		
Camfield's Stringybark [15460]	Vulnerable	Species or species habitat likely to occur within area
Genoplesium baueri		
Yellow Gnat-orchid [7528]	Endangered	Species or species habitat known to occur within area
Grevillea caleyi		
Caley's Grevillea [9683]	Endangered	Species or species habitat likely to occur within area
Haloragodendron lucasii		
Hal [6480]	Endangered	Species or species habitat likely to occur within area
Kunzea rupestris		
[8798]	Vulnerable	Species or species habitat likely to occur within area
Melaleuca biconvexa		
Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area
Melaleuca deanei		
Deane's Melaleuca [5818]	Vulnerable	Species or species habitat may occur within area
Microtis angusii		
Angus's Onion Orchid [64530]	Endangered	Species or species habitat likely to occur within area
Pelargonium sp. Striatellum (G.W.Carr 10345)		
Omeo Stork's-bill [84065]	Endangered	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Persoonia hirsuta Hairy Persoonia [19006]	Endangered	Species or species habitat likely to occur within area
Pimelea curviflora var. curviflora [4182]	Vulnerable	Species or species habitat known to occur within area
Prostanthera marifolia Seaforth Mintbush [7555]	Critically Endangered	Species or species habitat likely to occur within area
Streblus pendulinus Siah's Backbone, Sia's Backbone, Isaac Wood [21618]	Endangered	Species or species habitat likely to occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Pocket-less Brush Cherry, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Triplarina imbricata [64543]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hoplocephalus bungaroides Broad-headed Snake [1182]	Vulnerable	Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Puffinus leucomelas Streaked Shearwater [66541]		Species or species habitat may occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Thalassarche impavida Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Orcinus orca](#) Killer Whale, Orca [46]		Species or species habitat may occur within area
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
[Sousa chinensis](#) Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
[Hirundapus caudacutus](#) White-throated Needletail [682]		Species or species habitat known to occur within area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat known to occur within area
[Monarcha trivirgatus](#) Spectacled Monarch [610]		Species or species habitat may occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat known to occur within area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
[Ardea alba](#) Great Egret, White Egret [59541]		Species or species habitat known to occur within area
[Ardea ibis](#) Cattle Egret [59542]		Species or species habitat likely to occur within area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
[Rostratula benghalensis (sensu lato)](#) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Director of War Service Homes
Defence - DEE WHY DEPOT
Defence - PITTWATER DIVING ANNEX (forms part of "RAN Torpedo Range")

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Thalassarche impavida Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat may occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Solenostomus paegnius		
Rough-snout Ghost Pipefish [68425]		Species or species habitat may occur within area
Solenostomus paradoxus		
Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Stigmatopora argus		
Spotted Pipefish, Gulf Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra		
Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus		
Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus		
Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Urocampus carinirostris		
Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer		
Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri		
New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus		
Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Dugong dugon		
Dugong [28]		Species or species habitat may occur within area
Reptiles		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus		
Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Deep and Middle Creeks Area	NSW	Indicative Place
Long Reef Aquatic Reserve	NSW	Indicative Place
Angophora Reserve / Hudson Park	NSW	Registered
Dee Why Lagoon Reserve	NSW	Registered
Ku-ring-gai Chase National Park (1980 boundary)	NSW	Registered
Long Reef Barrenjoey Coastal Rocks	NSW	Registered
Tumbledown Dick Road Cutting	NSW	Registered
Indigenous		
Wheeler Heights Area	NSW	Registered
Historic		
Avalon Rock Pool	NSW	Indicative Place
Bilgola Rock Pool	NSW	Indicative Place
Broken Bay Entrance Foreshores	NSW	Indicative Place
Bungan Castle	NSW	Indicative Place
Collaroy Rock Pool	NSW	Indicative Place
Ingleside House Garden	NSW	Indicative Place
Mona Vale Rock Pools	NSW	Indicative Place
Narrabeen Fire Station	NSW	Indicative Place
Narrabeen Lagoon Catchment	NSW	Indicative Place
Newport Rock Pool	NSW	Indicative Place
Old Horden House	NSW	Indicative Place
Palm Beach Rock Pool	NSW	Indicative Place
The Rock Lily	NSW	Indicative Place
Walcott House	NSW	Indicative Place
Wentworth Estate and Blois and Jacaranda Cottages	NSW	Indicative Place
Whale Beach Rock Pool	NSW	Indicative Place
Barrenjoey Lighthouse Group	NSW	Registered
Burley Griffin Lodge	NSW	Registered
Narrabeen Rock Pool	NSW	Registered
Site of the Old Customs House	NSW	Registered

State and Territory Reserves [Resource Information]

Name	State
Garigal	NSW
Ku-ring-gai Chase	NSW

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
[Rattus rattus](#) Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
[Vulpes vulpes](#) Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
[Alternanthera philoxeroides](#) Alligator Weed [11620]		Species or species habitat likely to occur within area
[Anredera cordifolia](#) Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
[Asparagus aethiopicus](#) Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
[Asparagus asparagoides](#) Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
[Asparagus plumosus](#) Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
[Asparagus scandens](#) Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
[Cabomba caroliniana](#) Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
[Chrysanthemoides monilifera](#) Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
[Chrysanthemoides monilifera subsp. monilifera](#) Boneseed [16905]		Species or species habitat likely to occur within area
[Chrysanthemoides monilifera subsp. rotundata](#) Bitou Bush [16332]		Species or species habitat likely to occur within area
[Cytisus scoparius](#) Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
[Dolichandra unguis-cati](#) Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
[Eichhornia crassipes](#) Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
[Genista monspessulana](#) Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
[Genista sp. X Genista monspessulana](#) Broom [67538]		Species or species habitat may occur within area
[Lantana camara](#) Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red		Species or species habitat likely to occur

Name	Status	Type of Presence
Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area

Coordinates

-33.65698 151.30507

Caveat

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

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

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

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

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

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

- migratory and
- marine

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

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

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

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

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

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:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA 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, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-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 5 – Assessments of Significance

Assessment of Significance under the *FM Act* 1994

The *Fisheries Management Act 1994* (*FM Act*) specifies a set of seven factors which must be considered by decision makers in assessing the effect of a proposed development or activity on threatened species, populations or ecological communities, or their habitats. These factors are collectively referred to as the 'seven-part test'.

	Strapweed ***Posidonia australis***	**Black Cod** ***Epinephelus daemelii***
a. In the case of threatened species, whether the action proposed 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 the risk of extinction.	No	No
b. In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.	No	No
c. In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed: **i) Is likely to have an adverse effect on the extent of ecological community such that its local occurrence is likely to be placed at risk of extinction.** **ii) Is likely to substantially and adversely modify the composition of the community such that its local occurrence is likely to be placed at the risk of extinction.**	No	No
d. In relation to the habitat of a threatened species, population or ecological community: **i) The extent to which habitat is likely to be removed or modified as a result of the action proposed.** **ii) Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action.** **iii) The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**	No	No
e. Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).	No	No
f. Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.	Yes	Yes
g. Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.	No	No
Significant Impact Expected to Occur?	**No**	**No**

Assessment of Significance under the *TSC Act* 1995

The *Threatened Species Conservation Act 1995* (*TSC Act*) specifies a set of seven factors which must be considered by decision makers in assessing the effect of a proposed development or activity on threatened species, populations or ecological communities, or their habitats. These factors are collectively referred to as the 'seven-part test'.

	Loggerhead Turtle	**Green Turtle**	**Little Penguin**	**Common Dolphin**	**Bottlenose Dolphin**
a. In the case of threatened species, whether the action proposed 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 the risk of extinction.	No	No	No	No	No
b. In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.	No	No	No	No	No
c. In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed: **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.** **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 the risk of extinction.**	No	No	No	No	No
d. In relation to the habitat of a threatened species, population or ecological community: **i) The extent to which habitat is likely to be removed or modified as a result of the action proposed.** **ii) Whether an area of habitat is likely to**	No	No	No	No	No

become fragmented or isolated from other areas of habitat as a result of the proposed action. **iii) The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**					
e. Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).	No	No	No	No	No
f. Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.	Yes	Yes	Yes	Yes	Yes
g. Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.	No	No	No	No	No
Significant Impact Expected to Occur?	**No**	**No**	**No**	**No**	**No**

Assessment of Significance under the *EPBC Act* 1999

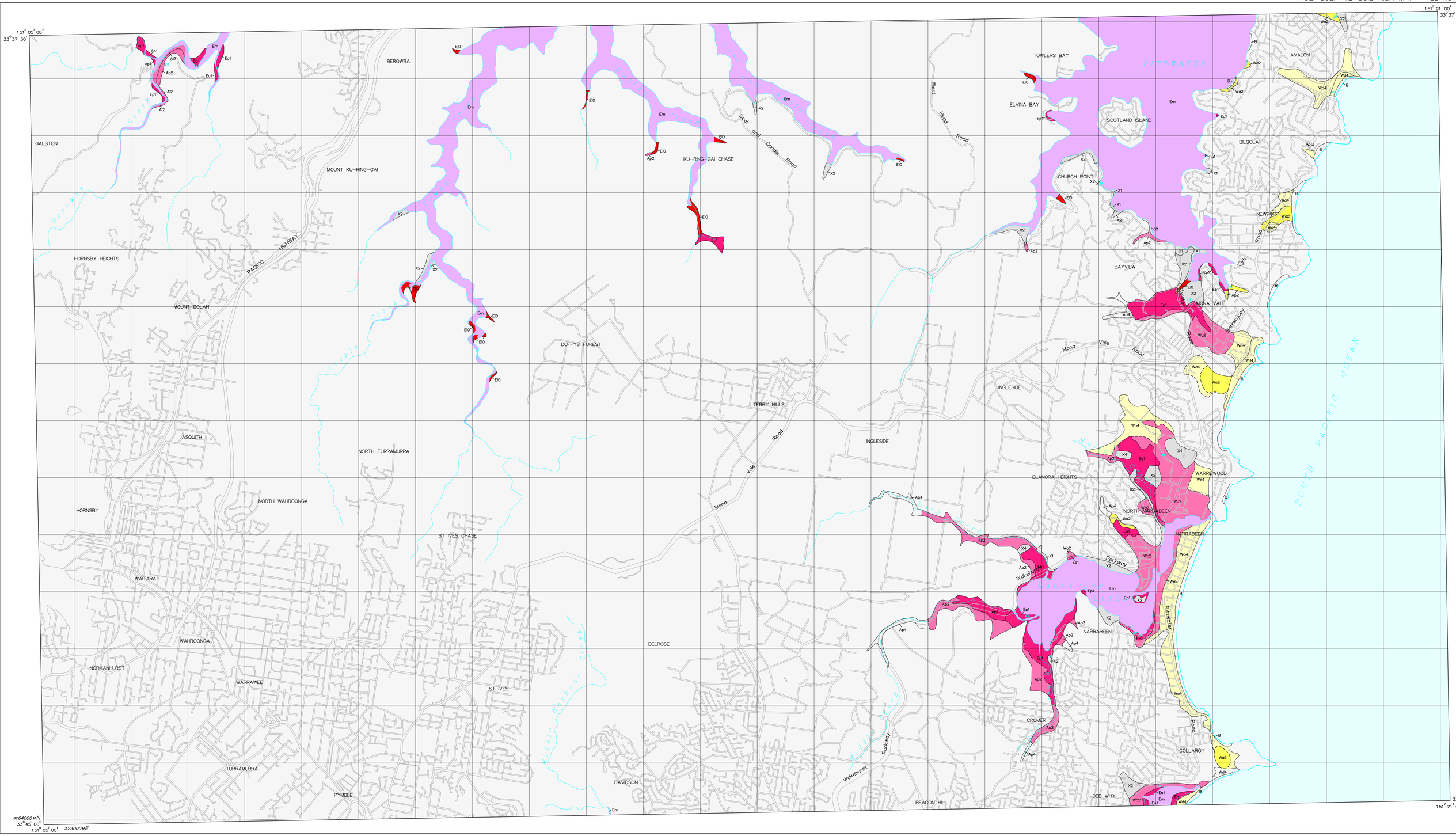
The *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) specifies eight criteria used to determine whether or not an activity has the potential to significantly impact on a threatened (i.e. endangered or vulnerable) species. These criteria are known as the 'Administrative Guidelines on Significance' and are assessed in regards to a proposed activity.

	Black Rockcod	**Green Turtle**	**Leatherback Turtle**	**Loggerhead Turtle**	**Flatback Turtle**	**Indian Ocean Bottlenose Dolphin**	**Indo-Pacific Humpback Dolphin**	**Syngnathids**
1. Lead to a long term decrease in the size of a population.	No	No	No	No	No	No	No	No
2. Reduce the area of occupancy of a species.	No	No	No	No	No	No	No	No
3. Fragment an existing population into two or more populations.	No	No	No	No	No	No	No	No
4. Adversely impact habitat critical to the survival of the species.	No	No	No	No	No	No	No	No
5. Disrupt the breeding cycle of the population.	No	No	No	No	No	No	No	No
6. Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that a species is likely to decline.	No	No	No	No	No	No	No	No
7. Result in invasive species that are harmful to an endangered species becoming established in the endangered species habitat.	No	No	No	No	No	No	No	No
8. Interfere with the recovery of a species.	No	No	No	No	No	No	No	No
Significant Impact Expected to Occur?	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**

Appendix 6 – Acid Sulphate Soil Risk Map

HORNSBY/MONA VALE

151° 05' 00" 33° 37' 30" — 151° 21' 00" 33° 37' 30"



KEY

Map Class Description	Depth to Acid Sulfate Soil Materials		Environmental Risk	Typical Landform Types
HIGH PROBABILITY High probability of occurrence of acid sulfate soil materials within the soil profile. The environment of deposition has been suitable for the formation of acid sulfate soil materials. Acid sulfate soil materials are widespread or sporadic and may be buried by alluvium or windblown sediments.	Below water level	Bottom sediments.	Severe environmental risk if bottom sediments are disturbed by activities such as dredging.	Bottom sediments of lakes, lagoons, tidal creeks, rivers and estuaries.
		At or near the ground surface.	Severe environmental risk if acid sulfate soil materials are disturbed by activities such as shallow drainage, excavation or clearing.	Estuarine swamps, intertidal flats and supratidal flats.
		Within 1 metre of the ground surface.	Severe environmental risk if acid sulfate soil materials are disturbed by activities such as shallow drainage, excavation or clearing.	Low alluvial plains, estuarine sandplains, estuarine swamps, backswamps and supratidal flats.
		Between 1 and 3 metres below the ground surface.	Environmental risk if acid sulfate soil materials are disturbed by activities such as deep excavation for pipelines, dams or deep drains.	Alluvial plains, alluvial swamps, alluvial levees and sandplains.
		Greater than 3 metres below the ground surface.*	Environmental risk if acid sulfate soil materials are disturbed by activities such as deep excavations, –e.g., large structure foundations or deep dams.	Elevated levees and sandplains, alluvial plains and alluvial swamps in estuarine reaches of catchments.
LOW PROBABILITY Low probability of occurrence of acid sulfate soil materials within the soil profile. The environment of deposition has generally not been suitable for the formation of acid sulfate soil materials. Soil materials are often Pleistocene in age. Acid sulfate soil materials, if present, are sporadic and may be buried by alluvium or windblown sediments.	Below water level	Bottom sediments.	The majority of these landforms are not expected to contain acid sulfate soil materials. Therefore, land management is generally not affected by acid sulfate soils. However, highly localised occurrences may be found, especially near boundaries with environments with a high probability of occurrence. Disturbance of these soil materials will result in an environmental risk that will vary with elevation and depth of disturbance.	Elevated alluvial plains and levees dominated by fluvial sediments. Plains and dunes dominated by aeolian soils. Pleistocene plains. Lacustrine and alluvial bottom sediments.
		At or near the ground surface.		
		Within 1 metre of the ground surface.		
		Between 1 and 3 metres below the ground surface.		
		Greater than 3 metres below the ground surface.*		
NO KNOWN OCCURRENCE Acid sulfate soils are not known or expected to occur in these environments.		No known occurrences of acid sulfate soil materials.	Land management activities not likely to be affected by acid sulfate soil materials.	Bedrock slopes, elevated Pleistocene and Holocene dunes, and elevated alluvial plains.
DISTURBED TERRAIN		Disturbed terrain may include filled areas, which often occur during reclamation of low lying swamps for urban development. Other disturbed terrain includes areas which have been mined or dredged, or have undergone heavy ground disturbance through general urban development or construction of dams or levees. Soil investigations are required to assess these areas for acid sulfate potential.		

*Deep occurrences of acid sulfate soil materials not able to be confirmed by field inspection and sampling.

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TRANSVERSE MERCATOR PROJECTION
Numbered grid lines are 1000 metre intervals of the Australian Map Grid, Zone 56.
Grid values are shown in full only at the south-west corner of the map.

Cadastral information based on the Digital Cadastral Data Base courtesy of the Surveyor Generals Department of N.S.W. Waterbody boundaries are dynamic and show slight differences between cadastral and topographic information.

LANDFORM CODES

Landform Process Class	Landform Element		Elevation#
W..... Aeolian	b.....Backplain	t.....Levee Toe	0.....0–1 m
A..... Alluvial	k.....Backswamp	o.....Ox-bow	1.....1–2 m
B..... Beach	m.....Bottom Sediments	p.....Plain	2.....2–4 m
E..... Estuarine	n.....Channel	a.....Sandplain	4.....>4 m
L..... Lacustrine	d.....Dune	s.....Swamp	
S..... Swamp	r.....Interbarrier Swamp	y.....Spivy	Additional Descriptive Codes
	i.....Intertidal Flat	u.....Supratidal Flat	(p).....Pleistocene
X.....Disturbed Terrain*	g.....Lagoon	w.....Sirde	(s).....Acidic Scald
	l.....Levee	c.....Tidal Creek	

*Elevation levels given on the map refer to the elevation of the ground surface at the time of mapping. Depending on the nature of the disturbance, these elevation levels may or may not represent the original ground surface elevation.

Approximate AHD

EDITION TWO
CROWN © DECEMBER 1997

MAP PREPARED BY: C.L. MURPHY REVIEWED BY: C.L. MURPHY

MAP COMPILED BY: G.I.S. OPERATIONS FROM DIGITISED FIELD INFORMATION AND DATA HELD IN THE DEPARTMENT OF LAND AND WATER CONSERVATIONS GEOGRAPHIC INFORMATION SYSTEM.

THIS MAP SHOULD BE USED IN CONJUNCTION WITH THE GUIDELINES FOR THE USE OF ACID SULFATE SOIL RISK MAPS: S.D. NAYLOR et.al. (1995) DEPARTMENT OF LAND AND WATER CONSERVATION

THIS MAP IS PART OF A SERIES OF ACID SULFATE SOIL RISK MAPS ALONG THE ENTIRE NEW SOUTH WALES COAST. THE MAPPING HAS BEEN UNDERTAKEN BY A TEAM OF EXPERIENCED AND QUALIFIED SOIL SURVEYORS. THE MAPPING IS BASED ON THE ASSESSMENT OF GEOMORPHIC PROCESSES AND ENVIRONMENTS. ASSESSMENT METHODS INCLUDE, INTERPRETATION OF AERIAL PHOTOGRAPHY AND SATELLITE IMAGERY, EXTENSIVE FIELD WORK AND LABORATORY SOIL TESTING.

LEGEND

LANDFORM BOUNDARY.....
APPROXIMATE LANDFORM BOUNDARY.....
SOIL PROFILE DESCRIPTION SITE.....27
RIVER or CREEK.....
CADASTRE .....

KEY TO ADJOINING MAPS IN THIS SERIES

WILBERFORCE 9030NW	COWAN 9130NE	BROKEN BAY 9130NE
	HORNSBY/MONA VALE 9130SE	
	PROSPECT/ PARRAMATTA 9130NS	SYDNEY HEADS 9130NE