

## **Attachment Booklet**

### **COUNCIL MEETING**

**22 November 2011**

#### **ITEM 9.9**

**Dogs on Beaches Northern Region – Research Paper**



Ms Liz Romer

Civic Centre

725 Pittwater Road

Dee Why NSW 2099

**Project No: 11SYDECO-0030**

7 July 2011

Dear Liz,

**Re: Narrabeen Beach Dog Off-leash Exercise Area – Flora and Fauna Assessment**

**Background:**

Eco Logical Australia (ELA) was contracted by Warringah Council to undertake a flora and fauna assessment of a proposed off-leash dog exercise area on Sydney's Northern Beaches at Narrabeen Beach (**Figure 1**). The location of the proposed off-leash area was determined through consultation with Warringah Council officers about social and environmental constraints, such as flagged swimming areas, potentially hazardous locations, unfenced beach front private properties, parking availability and beach access. The proposed off-leash area will be trialled for a period of 12 months.

Previously other beach locations have been considered for off-leash dog exercise areas, including Long Reef Beach, but none have been acceptable to Council and other interest groups. The Long Reef ecological assessment concluded that another site be found that is at least 200m outside of any ecologically sensitive habitat involving migratory shorebirds (Avifauna Research & Services 2005).

This report has concluded that the proposed off-leash dog exercise area is unlikely to significantly impact threatened or migratory shore birds because the site does not contain any rocky shoreline, is not sheltered, is not at the mouth of a coastal lake or lagoon, and foraging habitat for shore birds is likely to be marginal. However, the report has concluded that the proposed off-leash dog exercise area is likely to significantly impact a small endangered plant species, *Chamaesyce psammogeton* (Sand Spurge) which grows within dune vegetation at the site and vulnerable to excessive trampling. Dogs are likely to access the dune vegetation from the beach attracted by the scent of animals, in particular the population of rabbits residing in the area. Over time, the dune vegetation is likely to suffer disturbance from constant dog access and any regenerating Sand Spurge plants trampled before they can flower and replenish the soil seedbank posing a significant threat to the long-term viability of this isolated population.

**Report Objective:**

The objectives of this report are to:

- Summarise the results of the flora and fauna survey which include database searches and a site inspection of the proposed off-leash dog exercise area and immediate surrounds,
- Provide an assessment of significance under Section 5A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) for threatened species and /or habitat for threatened species that known, likely or may potentially occur at the proposed site to determine whether a Species Impact Statement is required,
- Provide a significant impact assessment in accordance with the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for matters of National Environmental Significance (NES) that may be impacted by the proposal to determine whether a referral to the Commonwealth is required, and
- Recommend mitigation measures for the proposal.

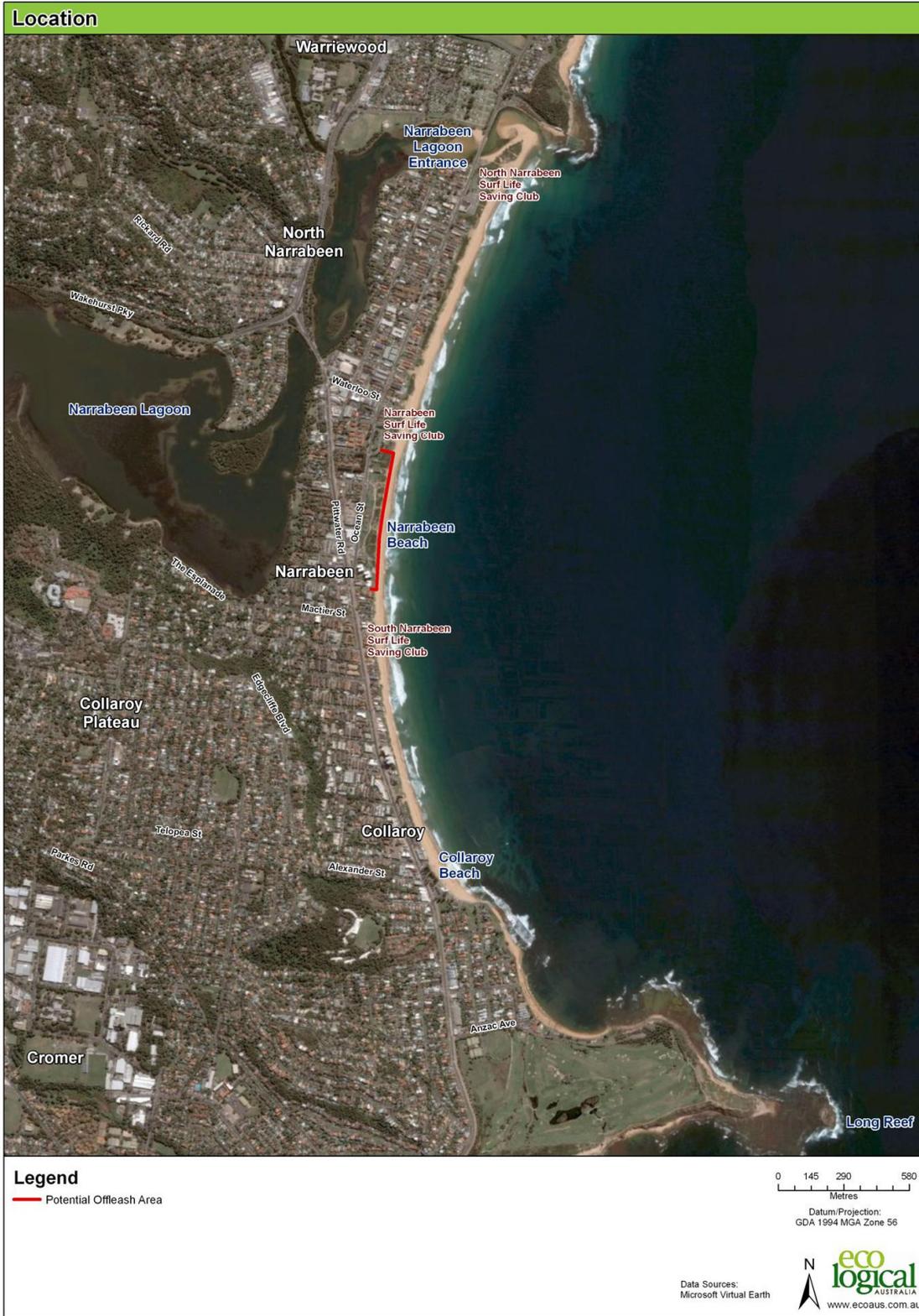


Figure 1: Location of proposed trial off-leash dog exercise area, Narrabeen Beach

## Description of Proposal

The proposal will involve the declaration (through a Council resolution) of an off-leash dog exercise area approximately 830m in length along Narrabeen Beach at Ocean Street between Goodwin Street in the south and King Street in the north, Narrabeen (**Figure 2**). The beach would be accessed from the tracks running between the dune bays at the park on Ocean Street Park. The proposal would be trialled for a period of 12 months and closely monitored by Warringah Council to identify any potential conflicts between recreational users and determine whether dog owners are adhering to the conditions of beach use.

The proposed off-leash location for this flora and fauna assessment was determined by:

- Avoiding sensitive coastal environments such as rocky reefs, wading bird habitat, and the entrance to the coastal lagoons (Curl Curl, Dee Why and Narrabeen),
- Being positioned a reasonable distance from the patrolled flagged swimming areas at Narrabeen and South Narrabeen Beach Surf Life Saving Clubs, and
- Avoiding potentially hazardous beach areas such as the periodically eroded section at the end of Wetherill Street and beach areas that back onto unfenced private property.

## Methodology:

A desk-top search was carried out using the following databases/mapping:

- Atlas of NSW Wildlife
- EPBC Protected Matters Online Search Tool (6 April, 2011)
- Vegetation mapping of Warringah LGA (Smith and Smith 2005a)

A site inspection was undertaken by Jennie Powell, an ecologist from Eco Logical Australia, on Thursday 7<sup>th</sup> April 2011. The aim of the inspection was to undertake targeted searches for threatened species, in particular the endangered dune plant *Chamaesyce psammogeton* (Sand Spurge), and to determine the presence of habitat for other threatened species, such as threatened shorebirds. Jennie Powell returned to the site a week later with a biodiversity officer from Council's Natural Environment Unit to conduct a second search for Sand Spurge.

## Survey Limitations:

Flora and fauna survey was limited by seasonality, with best practice for survey generally being within the spring and summer months. Survey work for this report occurred in mid autumn which is not an optimal time to detect many flora species. However, given the relatively small area of vegetation to be surveyed and the target species, ELA do not consider seasonality to be a big limitation.

No fauna survey was undertaken to determine which threatened species utilise the site. Many of the threatened shorebirds that have been recorded in the region are summer migrants and would be absent at the time of survey. For this report, the likelihood of their occurrence on site was assessed based on the presence of potential habitat and previous records of fauna within the locality.

This study has not investigated the abundance of invertebrate prey within the beach sand to determine whether there is a high availability of prey for shorebirds at the proposed location.



Figure 2: Ocean Street Park and proposed off leash dog exercise area

## Results:

### **Desk-top Search**

The desk-top database searches identified 36 threatened flora species, 90 threatened fauna species and 43 migratory species recorded within a radius of 10km of the site (**Appendix A**). Many of these species would not utilise habitat along an ocean beach and vegetated dune system. One species, the Beach Stone Curlew was not listed within the database searches, but was recorded on 3<sup>rd</sup> November at the inlet to Dee Why Lagoon on the Birdline NSW online sightings (Birds Australia, 2011).

The vegetation behind the proposed off-leash beach area has been mapped as Spinifex Grassland with small areas of Coastal Wattle Heath (**Figure 3**) (Smith and Smith 2005a).

Spinifex Grassland is an open-grassland of *Spinifex sericeus* (Hairy Spinifex), with scattered low clumps of *Acacia longifolia* subsp. *sophorae* (Coastal Wattle). The most common of the few other species in the community are *Actites megalocarpa* and *Scaevola calendulacea* (Dune Fan-flower). It occurs on the unstable sands on the seaward edge of the foredune behind coastal beaches. In Warringah it has suffered in the past from heavy recreational use of the beaches, but has made a comeback in recent decades as a result of dune rehabilitation and revegetation works (Smith and Smith 2005a).

Coastal Wattle Heath is an open-heath or closed-heath dominated by Coastal Wattle. The most common of the other species in the community are *Banksia integrifolia* (Coastal Banksia), *Carpobrotus glaucescens*, *Correa alba*, *Cynodon dactylon* (possibly introduced), *Hibbertia scandens*, *Isolepis nodosa*, *Leptospermum laevigatum* (Coastal Tea-tree), *Leucopogon parviflorus*, Dune Fan-flower, Hairy Spinifex and *Zoysia macrantha*. It occurs on foredunes behind coastal beaches, on the landward side of the Spinifex Grassland community. It is widespread along the Warringah coastline, but absent from some beaches. Restoration of the community has occurred at many sites in Warringah and elsewhere around Sydney in recent decades through dune rehabilitation and stabilisation programs. The community supports at least one threatened plant species (*Chamaesyce psammogeton*) (Smith and Smith 2005a).

### **Site Inspection**

On April 7<sup>th</sup> 2011 ELA ecologist Jennie Powell met Liz Romer, Projects Coordinator from Warringah Council's Regulatory Compliance section to discuss the scope of the assessment and view the site. Jennie Powell then carried out a targeted survey of the dune vegetation and landscaped area between Narrabeen and Devitt Streets and walked along Narrabeen beach south to Collaroy Surf Club and north to Octavia Street noting the condition of dune vegetation and potential habitat for threatened flora and fauna species.

### Ocean Street Park:

The park at Ocean Street comprised landscaped areas and viewing platforms linked by a formal path running north/south adjacent to the fenced dune bays from the end of Narrabeen Street in the north to Devitt Street in the south.

An ongoing revegetation and restoration program has been carried out within the fenced dune bays and landscaped area between since 2004 and, accordingly, these areas have a good level of native species diversity, vegetation density and structure which has contributed the stability of the dune system. The vegetation in the dune bays was consistent with the Coastal Wattle Heath vegetation community with a shrubby overstorey comprising Coastal Wattle, *Leptospermum laevigatum* (Coastal Tea-tree), Coastal Banksia, *Correa alba* and *Melaleuca armillaris* (Bracelet Honey-myrtle). Groundcover species included *Pelargonium australe* (Wild Geranium), Dune Fan-flower and *Calystegia soldanella* grading into Spinifex Grassland on the seaward edge of the foredune. The restoration program has resulted in the expansion of Coastal Wattle Heath into the Spinifex Grassland community since the area was first mapped by Smith and Smith (2005) (**Figure 2**).

A population of the endangered *Chamaesyce psammogeton* (Sand Spurge) was recorded at this site in 2004 by the bush-regeneration company undertaking the restoration work, however, Sand Spurge was not found during the site inspection. One plant was located in a dune bay approximately one week later when Jennie Powell

returned to the site with a biodiversity officer from Council's Natural Environment Unit who had previously surveyed the population.

A range of weed species such as *Gazania rigens* (Gazania), *Stenotaphrum secundatum* (Buffalo Grass), *Acetosa sagittata* (Turkey Rhubarb), *Cynodon dactylon* (Couch) and *Pennisetum clandestinum* (Kikuyu) were present within both the landscaped area and dune bays indicating the need for ongoing weed control.

A high level of rabbit activity was observed during the site inspection. Rabbits were seen moving within the denser patches of dune vegetation which is likely to provide shelter habitat. The turf and some of the plants in the landscaped areas had been heavily browsed and there were numerous shallow rabbit scrapes, diggings and scats. Within the dune vegetation there were some open bare areas comprising dead Coastal Wattle with no ground cover. While the dune fencing was generally in good condition at the front of the dune bays adjacent to the formal path and along the dune bay tracks, fencing was non-existent or in very poor condition on the seaward side.

Small native birds were active within the dense vegetated areas of the dune bays and Australian Magpies (*Gymnorhina tibicen*) and Banded Lapwings (*Vanellus tricolor*) were observed in the turf of the landscaped areas.

#### North and South of Ocean Street Park:

A band of dune vegetation extended northwards from the park to the entrance of Narrabeen Lagoon. This vegetation was relatively wide and intact in places, however, other sections included dead Coastal Wattle in blown out bare areas and patches of heavy weed invasion. From the south of Goodwin Street to the dune bays of Collaroy Beach there was negligible or no dune vegetation present due to the presence of residential and unit block development located on the highly unstable fore-dune.

#### Beach

Collaroy-Narrabeen Beach is an exposed sandy beach with considerable movement of sand along the shore: it has experienced a long history of storm damage and coastal erosion. Nationally, the beach is ranked third most at risk area from coastal processes (Warringah Council 2011).

During the site inspection two flocks of Silver Gull (*Larus novaehollandiae*) were observed standing on the shoreline. The beach provides potentially suitable foraging habitat for wading birds such as the endangered Pied Oystercatcher (*Haematopus longirostris*) and, to a lesser extent, the vulnerable Sooty Oystercatcher (*Haematopus fuliginosus*) and the vulnerable migratory Sanderling (*Calidris alba*).

Potential breeding habitat for the endangered migratory Little Tern (*Sterna albifrons*), the critically endangered Beach Stone-curlew (*Esacus neglectus*) and roosting habitat for the vulnerable migratory Sanderling may be found in the dune system at Ocean Street Park and northwards to the entrance of Narrabeen Lagoon, however, this habitat is highly unlikely to be utilised due to heavy recreational usage on the beach, particularly during the birds' spring-summer breeding season. It is also noted that a high level of recent unit block development of the surrounding area is likely to result in increased recreational pressure on the beach by local residents.



Figure 3: Vegetation mapping for the site (Warringah Council)

### Impact Assessment

The threatened flora and fauna species recorded in **Appendix A** as occurring within a radius of 10km of the site were assessed against the habitat available on site to determine species that may occur in the locality. **Appendix B** lists these species along with their habitat requirements and likelihood of occurring at the site.

Of the species listed in Appendix B, it was determined that six threatened fauna species are likely to have suitable habitat on site. These species are listed in Table 1. One threatened plant, Sand Spurge, was recorded at the site. No other threatened plants are likely to occur at the site.

An endangered population of Little Penguin (*Eudyptula minor novaehollandiae*) occurs at Manly. Penguins swimming at Narrabeen Beach could be from either the Manly breeding population or from the Lion Island breeding population. The Little Penguin could be feeding in the sea within the off-leash zone, but is unlikely to come ashore unless sick or injured (Avifauna Research & Services, 2005).

**Appendix C** contains the assessments of significance for the seven threatened species below.

**Table 1: Threatened species with potential or known habitat at the proposed site**

Common Name	Species Name	TSC Act	EPBC Act
Sand Spurge*	<i>Chamaesyce psammogeton</i>	E1	-
Little Tern	<i>Sterna albifrons</i>	E1	M
Osprey	<i>Pandion haliaetus</i>	V	-
Pied Oystercatcher	<i>Haematopus longirostris</i>	E1	-
Sanderling	<i>Calidris alba</i>	V	-
Sooty Oystercatcher	<i>Haematopus fuliginosus</i>	V	-
Beach Stone-curlew	<i>Esacus neglectus</i>	E4A	-

\*known to occur at the site

**Threatened Species Conservation Act 1995:** E4A Critically Endangered, E1: Endangered, V: Vulnerable

**Environment Protection and Biodiversity Conservation Act 1999:** M: Migratory

#### Potential Impact on *Chamaesyce psammogeton* (Sand Spurge)

The endangered Sand Spurge is the only threatened species known to occur on the site and is most at risk from the proposal. It is a small prostrate herb which is uncommon on sand dunes near the sea occurring sporadically north from Jervis Bay on unstable sands. Formally regarded as widespread, it was in 1991 noted as being at risk of extinction (Carolin and Clarke 1991). Sand Spurge is threatened by excessive trampling due to its small size and prostrate growth habit.

In 2004, a population of greater than 100 individuals was recorded in the dune bays at Ocean Street by a bush-regeneration company undertaking a dune restoration and revegetation program. In 2009, a survey carried out by Warringah Council biodiversity staff in the same area recorded 89 plants and in February 2011, 2 plants. In 2010 Warringah Council consulted Associate Professor Peter Clarke, a plant ecologist with experience in Sand Spurge, about the rapid decline in population numbers. Warringah Council was concerned that the plants were being grazed out by rabbits. Peter advised in an email received October 2010 that due to the plant's poisonous sap it was unlikely to be palatable to rabbits, however: "This [reduction in species numbers] is fairly typical for these foredune herbaceous plants. They are fairly short-lived and probably regenerate from a large seedbank after disturbance. My guess is that [the species] will re-emerge at some stage. The critical issue is to ensure that the site does not overgrow with shrubs or weeds and that the foredune does not end up in the Tasman

Sea". Therefore, populations of Sand Spurge may be dynamic over time, existing as seedbank in the dune system, regenerating in relatively large numbers after disturbance (such as weed control works) with plants dying out over a short period. It is likely that the entire dune bay area of Ocean Street is habitat for Sand Spurge; habitat may also be present, in the form of seedbank in the dune vegetation which extends northwards from the park to the entrance of Narrabeen Lagoon. This is supported by two early records in 1912 and 1942 of Sand Spurge with 100m of the site – although the exact location of these records may be out by as much as 1000m.

The off leash dog exercise proposal at Ocean Street poses a significant threat to the population of Sand Spurge in the dune vegetation at the site. While the dune bays are fenced at the front along the walkway boundary, fencing is in poor repair on the seaward edge. Dogs are likely to access the dune vegetation from the beach attracted by the scent of animals, in particular the significant population of rabbits using the area as shelter habitat. Over time the dune vegetation is likely to suffer disturbance from constant dog access and any regenerating Sand Spurge could be trampled before that can flower and replenish the soil seedbank posing a significant threat to the long-term viability of this population. Because of the known occurrence of Sand Spurge behind the foredune, its fluctuations in population sizes and the presence of potential habitat along the entire dune system of Collaroy Narrabeen Beach, these areas should be avoided, unless they can be securely fenced and rabbits effectively controlled. It is acknowledged that effective rabbit control in a built-up environment is problematic and the dynamic nature of sand movement on the seaward side of the dune bays poses challenges in maintaining a secure dog proof fence.

#### **Summary of Impacts:**

The assessments of significance for the seven subject threatened species concluded the potential impact of the proposed off leash dog exercise area at Ocean Street Park to be:

- Low numbers and isolation of Sand Spurge at the site places the species at high risk of extinction from stochastic events. The main threats to the species are the growth of weeds and native shrubs over crowding and shading the species, and sand erosion and movement removing habitat for dune vegetation. In relation to the proposed off-leash area, dogs are likely to be attracted to the dune vegetation behind the beach due to dogs' instinctive hunting behaviour, especially as the site is frequented by rabbits. In doing so, dogs may disturb habitat for Sand Spurge through digging and trampling. Thus, the proposal has the potential to cause a significant impact to Sand Spurge which occurs in the dune vegetation at the proposed site. A SIS would be required if dog exclusion fences have not been demonstrated as effective in excluding dogs.
- The site is unlikely to provide important habitat for threatened or migratory shore birds, given that the site does not contain any rocky shore, offshore islands, is not sheltered and is not at the mouth of a coastal lake or lagoon and contains a narrow and relatively steep intertidal zone. However, in the unlikely event that breeding occurs in the dune vegetation by Beach Stone-curlew, Little Tern or Pied Oystercatcher, the erection of a dog-exclusion fence will prevent predation of eggs and chicks by dogs and possibly cats and foxes.
- There are no breeding sites for Osprey located close to the proposed site. As Osprey hunt for prey at height and generally perch in a tree to feed on prey items, the proposal is unlikely to impact on Osprey.
- Foraging habitat for shore birds at the site is poor (given the relatively narrow width of the beach and intertidal zone, and wave action). Should shore birds feed at the site, off-leash dogs are likely to scare foraging birds away from the site. This impact is likely to extend 200m north and south of the off-leash area.
- The site is adequately set-back (over 2km) from areas of rocky shore (and Long Reef, which is important foraging and roosting habitat for migratory birds including the Sooty Oystercatcher.

**Recommendations:**

ELA is not aware of whether dog exclusion fences have been demonstrated to be effective in excluding dogs, particularly on sand dunes which actively undergo erosion and accretion of sand. Only mitigation measures that have been demonstrated to be effective can be included Assessments of Significance. As such, investigations into the effectiveness of fences would need to be conducted to determine whether potential impacts from the proposal on Sand Spurge could be mitigated.

If there are no existing examples where fences have been effective in excluding dogs on sand dunes, a SIS would be required.

If dog exclusion fences have been demonstrated to be effective, ELA recommend the following measures be implemented to ensure that the proposal does not have a significant impact on Sand Spurge:

- Erection of a dog-exclusion fence that will prevent dogs from entering the habitat behind the fore dune.
  - The fence must be designed in a way that the height of the fence can be changed in line with the erosion and accretion of sand at the site to ensure dogs cannot crawl under or jump over the fence.
- Ensure that the dog exclusion fence is monitored regularly to maintain the correct height and structural integrity of the fence.
- Undertake ongoing and effective rabbit control.
- Continue ongoing weed control and management of shrubby vegetation at the site.
- Continue monitoring impacts through regular Sand Spurge population surveys.

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Warringah Council 2011 Coastline Management <http://www.warringah.nsw.gov.au/environment/coastline.aspx>  
(accessed July 2011)

**Appendix A: Database search results within a radius of 10km of the site**

**FAUNA**

TSC Act: *Threatened Species Conservation Act 1995*

**E1:** Endangered **V:** Vulnerable **E4A:** Critically Endangered **E2:** Endangered Population

EPBC Act: *Environment Protection and Biodiversity Conservation Act 1999*

**E:** Endangered **V:** Vulnerable **M:** Migratory

**FM Act:** *Fisheries Management Act 1994*

**E4:** Presumed Extinct **CE:** Critically Endangered **E:** Endangered **V:** Vulnerable

Common Name	TSC Act	EPBC Act	FM Act
Amsterdam Albatross		E, M	
Antipodean Albatross	V	E, M	
Australasian Bittern	V		
Australian Grayling		V	
Australian Painted Snipe	E1	V, M	
Barking Owl	V		
Black Bittern	V		
Black-browed Albatross	V	V, M	
Black-faced Monarch		M	
Blue Whale	E	E, M	
Bryde's Whale		M	
Buller's Albatross		V, M	
Bush Stone-curlew	E1		
Campbell Albatross		V, M	
Cattle Egret		M	
Dusky Dolphin		M	
Eastern Bentwing-bat	V		
Eastern Freetail-bat	V		
Flatback Turtle		V, M	
Flesh-footed Shearwater	V		
Fork-tailed Swift		M	
Gang-gang Cockatoo	V		
Giant Burrowing Frog	V	V	
Gibson's Albatross	V	M	

Common Name	TSC Act	EPBC Act	FM Act
Glossy Black-Cockatoo	V		
Gould's Petrel	V	E, M	
Great Egret		M	
Great Knot	V		
Great White Shark		V, M	V
Greater Broad-nosed Bat	V		
Greater Sand-plover	V		
Green and Golden Bell Frog	E1	V	
Green Sawfish		V	E4
Green Turtle	V	V, M	
Grey Nurse Shark		CE	CE
Grey-headed Flying-fox	V	V	
Hawksbill Turtle		V, M	
Humpback Whale	V	V, M	
Kermadec Petrel	V	V	
Killer Whale, Orca		M	
Koala	V		
Koala in the Pittwater LGA	E2		
Large-eared Pied Bat	V	V	
Latham's Snipe	P	M	
Leatherback Turtle	V	E, M	
Lesser Sand-plover	V		
Little Lorikeet	V		
Little Shearwater	V		
Little Tern	E1	M	
Littlejohn's Tree Frog, Heath Frog	V	V	
Loggerhead Turtle	E1	E, M	
Long-nosed Potoroo	V	V	
Macquarie Perch		E	
Masked Owl	V		
New Holland Mouse		V	
Northern Giant-Petrel	V	V, M	
Osprey	V		

Common Name	TSC Act	EPBC Act	FM Act
Pied Oystercatcher	E1		
Powerful Owl	V		
Pygmy Right Whale		M	
Rainbow Bee-eater		M	
Red-crowned Toadlet	V		
Regent Honeyeater	E1	E, M	
Rosenberg's Goanna	V		
Rufous Fantail		M	
Salvin's Albatross		V, M	
Sanderling	V	M	
Satin Flycatcher		M	
Shy Albatross	V	V, M	
Sooty Oystercatcher	V		
Sooty Tern	V		
Southern Brown Bandicoot (eastern)	E1	E	
Southern Giant Petrel	E1	E, M	
Southern Myotis	V		
Southern Right Whale	V	E, M	
Sperm Whale	V		
Spotted-tailed Quoll	V	E	
Streaked Shearwater (Calonectris leucomelas)		M	
Streaked Shearwater (Puffinus leucomelas)		M	
Stuttering Frog, Southern Barred Frog	E1	V	
Superb Fruit-Dove	V		
Swift Parrot	E1	E	
Tristan Albatross		E, M	
Wandering Albatross	E1	V, M	
Whale Shark		V, M	
White Tern	V		
White-bellied Sea-Eagle		M	
White-capped Albatross		V, M	
White-throated Needletail		M	
Wompoo Fruit-Dove	V		

**FLORA**TSC Act: *Threatened Species Conservation Act 1995***E1:** Endangered **V:** Vulnerable **E4A:** Critically Endangered **E2:** Endangered PopulationEPBC Act: *Environment Protection and Biodiversity Conservation Act 1999***E:** Endangered **V:** Vulnerable

Scientific Name	TSC Act	EPBC Act
<i>Acacia bynoeana</i>	E	V
<i>Acacia notabilis</i>	E1	-
<i>Acacia pubescens</i>	V	V
<i>Acacia terminalis subsp. terminalis</i>	E1	E
<i>Allocasuarina portuensis</i>	E1	-
<i>Caladenia tessellata</i>	E	V
<i>Callistemon linearifolius</i>	V	-
<i>Chamaesyce psammogeton</i>	E1	-
<i>Cryptostylis hunteriana</i>	V	V
<i>Epacris purpurascens var. purpurascens</i>	V	-
<i>Eucalyptus camfieldii</i>	V	V
<i>Eucalyptus nicholii</i>	V	V
<i>Eucalyptus scoparia</i>	E1	-
<i>Genoplesium baueri</i>	V	-
<i>Grammitis stenophylla</i>	E1	-
<i>Grevillea caleyi</i>	E1	-
<i>Lasiopetalum joyceae</i>	V	-
<i>Melaleuca biconvexa</i>	V	V
<i>Melaleuca deani</i>	V	V
<i>Microtis angusii</i>	E	E
<i>Persoonia hirsuta subsp. Hirsuta</i>	E1	E
<i>Persoonia laxa</i>	Extinct	-
<i>Persoonia nutans</i>	E1	E
<i>Pimelea curviflora var. curviflora</i>	V	V
<i>Pimelea spicata</i>	E1	E
<i>Prasophyllum fuscum</i>	E4A	V
<i>Prostanthera askania</i>	E	E

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Scientific Name	TSC Act	EPBC Act
<i>Prostanthera junonis</i>	E	E
<i>Prostanthera marifolia</i>	E4A	extinct
<i>Pultenaea parviflora</i>	E	V
<i>Sarcophilus hartmannii</i>	V	V
<i>Senecio spathulatus</i>	E	-
<i>Syzygium paniculatum</i>	V	V
<i>Tetratheca glandulosa</i>	V	V
<i>Triplarina imbricata</i>	E	E
<i>Zieria granulata</i>	E	-

**Appendix B: Threatened Species Likelihood of Occurrence Table**

Common Name	Species Name	TSC Act	EPBC Act	Habitat Requirements	Likelihood of occurrence
<b>FLORA</b>					
Sand Spurge	<i>Chamaesyce psammogeton</i>	E1	-	<i>C. psammogeton</i> is a prostrate perennial herb, which grows on foredunes and exposed sites on headlands often with Spinifex (DECC 2005). Flowers in Summer.	Confirmed on the site
<b>FAUNA</b>					
Beach Stone-curlew	<i>Esacus neglectus</i>	E4A	-	Beaches, mudflats, reefs and especially islands (Blakers et al. 1984). Open undisturbed beaches, islands, reefs, intertidal sand and mudflats, preferably with estuaries or mangroves nearby (DECC 2005).	Potential
Black Bittern	<i>Ixobrychus flavicollis</i>	V	-	Occurs in both terrestrial and estuarine wetlands generally in areas of permanent water and dense vegetation (DECC 2005). In areas with permanent water it may occur in flooded grassland, forest, woodland, rainforest and mangroves (DECC 2005).	Unlikely
Bush Stone-curlew	<i>Burhinus grallarius</i>	E	-	Associated with dry open woodland with grassy areas, dune scrubs, in savanna areas, the fringes of mangroves, golf courses and open forest / farmland (Pittwater Council 2000; Marchant & Higgins 1993). Forages in areas with fallen timber, leaf litter, little undergrowth and where the grass is short and patchy (Environment Australia 2000; Marchant & Higgins 1993). Is thought to require large tracts of habitat to support breeding, in which there is a preference for relatively undisturbed in lightly disturbed.	Unlikely

Common Name	Species Name	TSC Act	EPBC Act	Habitat Requirements	Likelihood of occurrence
Great Knot	<i>Calidris tenuirostris</i>	V	-	Sheltered coastal habitats containing large intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons (DECC 2005). Often recorded on sandy beaches with mudflats nearby, sandy spits and inlets, or exposed reefs or rock platforms (Morris 1989; Higgins & Davies 1996).	Unlikely
Greater Sand-plover	<i>Charadrius leschenaultii</i>	V	-	Entirely coastal in NSW, foraging on intertidal sand and mudflats in estuaries, roosting during high tide on sandy beaches or rocky shores (DECC 2005)	Unlikely
Grey Ternlet	<i>Procelsterna cerulea</i>	V	-	Widely distributed in the southern Pacific Ocean, breeding on oceanic islands including Lord Howe Island.	Unlikely
Lesser Sand-plover	<i>Charadrius mongolus</i>	V	M	Breeds in central and north eastern Asia, migrating further south for winter. In Australia the species is found around the entire coast but is most common in the Gulf of Carpentaria, and along the east coast of Queensland and northern NSW. Individuals are rarely recorded south of the Shoalhaven estuary, and there are few inland records. Favours the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms. Highly gregarious, frequently seen in flocks exceeding 100 individuals; also often seen foraging and roosting with other wader species. Roosts during high tide on sandy beaches, spits and rocky shores; forage individually or in scattered flocks on wet ground at low tide, usually away from the water's edge (DECC 2005)	Unlikely

Common Name	Species Name	TSC Act	EPBC Act	Habitat Requirements	Likelihood of occurrence
Little Penguin in the Manly Point Area	<i>Eudyptula minor novaehollandiae</i>	E2		A range of nest sites are utilised by the penguins at Manly including under rocks on the foreshore, under seaside houses and structures, such as stairs, in wood piles and under overhanging vegetation including lantana and under coral tree roots (DECC 2005).	Unlikely
Little Tern	<i>Sterna albifrons</i>	E1	M	Almost exclusively coastal, preferring sheltered areas (DECC 2005), however may occur several kilometres inland in harbours, inlets and rivers (Smith 1990). Australian birds breed on sandy beaches and sand spits (Simpson & Day 1999).	Potential
Osprey	<i>Pandion haliaetus</i>	V	-	Associated with waterbodies including coastal waters, inlets, lakes, estuaries, beaches, offshore islands and sometimes along inland rivers (Schodde and Tidemann 1986; Clancy 1991; Olsen 1995). Osprey may nest on the ground on an island or remote coastal cliff (Pizzey and Knight, 2007), or in tall live or dead usually within 1km of the sea (DECC 2005).	Potential
Pied Oystercatcher	<i>Haematopus longirostris</i>	E1	-	Roosts and forages on sandy beaches, sand banks, mudflats and estuaries (Marchant & Higgins 1993, Simpson & Day 1999).	Potential
Sanderling	<i>Calidris alba</i>	V	M	Occur in coastal areas on low beaches, near reefs and inlets along tidal mudflats and bare open coastal lagoons (DECC 2005). Rarely seen in near-coastal wetlands such as lagoons, hypersaline lakes, saltponds and samphire flats (DECC 2005)	Potential
Sooty Oystercatcher	<i>Haematopus fuliginosus</i>	V	-	A coastal species that inhabits rock coastlines, coral cays, reefs and occasionally sandy beaches (Marchant & Higgins 1993; Simpson & Day 1999).	Potential

Common Name	Species Name	TSC Act	EPBC Act	Habitat Requirements	Likelihood of occurrence
Sooty Tern	<i>Sterna fuscata</i>	V	-	Forages offshore, usually only observed onshore in breeding season or when storms force them to shelter (DECC 2005)	Unlikely
Terek Sandpiper	<i>Xenus cinereus</i>	V	M	A rare migrant to the eastern and southern Australian coasts, being most common in northern Australia, and extending its distribution south to the NSW coast in the east (DECC 2005). The two main sites for the species in NSW are the Richmond River estuary and the Hunter River estuary (DECC 2005). Has been recorded on coastal mudflats, lagoons, creeks and estuaries (DECC 2005). Favours mudbanks and sandbanks located near mangroves, but may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools (DECC 2005). Generally roosts communally amongst mangroves on dead trees, often with related wader species (DECC 2005).	Unlikely
White Tern	<i>Gygis alba</i>	V	-	Subtropical and tropical seas; usually far from land, except in breeding season where it forages over lagoons and reefs around islands (Morcombe 2004).	Unlikely

**Threatened Species Conservation Act 1995:** E1: Endangered V: Vulnerable E4A Critically Endangered E2: Endangered Population

**Environment Protection Act 1999:** E: Endangered V: Vulnerable M: Migratory

## Appendix C Assessment of Significance

### Assessments of Significance under the *NSW Environmental Planning and Assessment Act 1979 (EP&A Act)*

The Assessment of Significance (known as the 7 part test) has been applied to the following threatened species:

1. Sand Spurge (*Chamaesyce psammogeton*)
2. Beach Stone-curlew (*Esacus neglectus*)
3. Little Tern (*Sterna albifrons*)
4. Osprey (*Pandion haliaetus*)
5. Pied Oystercatcher (*Haematopus longirostris*)
6. Sanderling (*Calidris alba*)
7. Sooty Oystercatcher (*Haematopus fuliginosus*)

#### 1. Sand Spurge(*Chamaesyce psammogeton*)

Sand Spurge is a perennial prostrate herb forming mats to 1m across, often from woody rootstock. Leaves are smooth, to 30mm long and 15mm wide with tiny flower heads surrounded by white leaf-like bracts (DECC 2005).

It is uncommon on sand dunes near the sea and is endangered in NSW. It occurs sporadically, north from Jervis Bay on unstable sands and was in 1992 noted as being at risk of extinction (Carolin and Clarke 1991). Flowering occurs in summer and seeds float, so dispersal between beaches may occur. Plant growth occurs in spring and summer and the longevity of individuals is approximately 5-30 years with a primary juvenile period of less than 1 year (DECC 2005).

Populations have been recorded in Wamberal Lagoon Nature Reserve, Myall Lakes and Bundjalung National Parks (DECC 2005). Within Warringah LGA, the species is not known to occur within a reserve (Smith and Smith 2005a).

The species was first recorded at the proposed site by the Bush Regeneration Company Toolijooa in 2004, when a population of more than 100 plants was counted. The most recent study undertaken in April 2011 as part of this impact assessment report only found 1 plant despite an intensive search. Peter Clarke was consulted by Warringah Council regarding the species decline at the site and responded that:

*"This [reduction in species numbers] is fairly typical for these foredune herbaceous plants. They are fairly short-lived and probably regenerate from a large seedbank after disturbance. My guess is that [the species] will re-emerge at some stage. The critical issue is to ensure that the site does not overgrow with shrubs or weeds and that the foredune does not end up in the Tasman Sea".*

Therefore, it appears that weeds, vigorous native shrubs growth along with erosion are the main threats to the species at the site. There is evidence of regular and widespread use of the site by rabbits and while rabbits are

unlikely to eat the plants due to the unpalatable milky latex (Clarke, P. pers. comm. 2011), erosion and soil disturbance by rabbits may also threaten the species at this location.

**a. In the case of a 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 risk of extinction**

There are four records for Sand Spurge within the dune vegetation behind the proposed dog off-leash zone. The species was recorded in 2004 and 2009 east Narrabeen Lagoon near Pittwater Rd. Within Pittwater LGA, the species was recorded at Avalon Beach in 1987 by Peter Clarke and it has also been recorded at Palm Beach (Smith and Smith 2000). Therefore, we can assume that viable local population of the species is restricted to the dune vegetation at the proposed site and is currently present as one individual and likely to be in the seed bank.

The species is threatened by excessive trampling; at present the dune vegetation is fenced to prevent pedestrian access, however, the fencing would not prevent dog access, particularly from the beach side. The proposed dog off-leash area may result in trampling and habitat disturbance by dogs, who may be particularly attracted to the dune vegetation due to the large numbers of rabbits, as evidence by droppings and shallow scrapes. Therefore, the proposed action has the potential cause local extinction of the local population of Sand Spurge through trampling, digging and disturbance caused by dogs.

**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**

Not applicable.

**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, or**
- ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

Not applicable.

**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, and**

As the local occurrence / local viable population of Sand Spurge is relatively isolated from other areas of coastal vegetation containing this species, the proposal has the potential to modify habitat (through disturbance caused by dogs) to the extent that the entire local population will be removed or modified.

- 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, and**

The local occurrence / local viable population of Sand Spurge is already isolated from other areas of coastal vegetation containing this species.

**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**

Sand Spurge is only known from the proposal site in the locality. The proposal is likely to add to existing threats to habitat (natural sand erosion caused by wind and waves and disturbance by rabbits) by increasing activity in potential habitat that may affect recruitment and survival of this species in the locality.

**e. Whether the action proposed is likely to have an adverse effect on critical habitat.**

No critical habitat has been declared for Sand Spurge.

**f. Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.**

No recovery plan or threat abatement plan has been prepared for Sand Spurge. There are nine Priority Actions for the recovery of this species in NSW. The following priority actions should be implemented on the site to ensure the protection of the species on site.

- i. Position beach access tracks away from habitat and fence off if required, excluding both vehicular and pedestrian traffic.
- ii. Undertake bitou bush/boneseed control, giving priority to sites identified in the threat abatement plan (TAP).
- iii. Increase level of legislative protection for sites through land-use planning mechanisms and conservation agreements.
- iv. Ensure that council-managed land on which sites occur are appropriately classified and managed for conservation.
- v. Review classification of Crown land where sites occur to ensure appropriate classification and management for nature conservation.
- vi. Develop and implement site-specific threat management and monitoring plans.

The proposal to create an off-leash dog exercise area is likely to exacerbate threats to this population through disturbance to the sand and trampling of plants. Further, Council-managed land under the proposal would not be managed for conservation unless mitigation measures were introduced. Threats could be reduced through implementation of the measures listed above and, in relation to the proposal, erection of a dog-exclusion fence that will prevent dogs from entering the area. Rabbit and weed control should also be a key priority in the conservation of Sand Spurge at the site.

**g. 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.**

The proposal is not likely to exacerbate any key threatening process relevant to Sand Spurge. However, threats to the population currently exist from weed growth and disturbance to the habitat by rabbit diggings. The site is

managed by bush regeneration on a regular basis, however, management of the site must focus on protection of Sand Spurge through weed removal and removal of shrubby native vegetation.

As such, relevant Key Threatening Processes include:

- i. Competition and grazing by the feral European rabbit (*Oryctolagus cuniculus*)
- ii. Invasion of native plant communities by *Chrysanthemoides monilifera* (bitou bush and boneseed)

Both of these KTP should be considered by Warringah Council for the management of the species.

**Conclusion:** The proposal has the potential to cause a significant impact to Sand Spurge (*Chamaesyce psammogeton*) which occurs in the dune vegetation at the proposed site. Dogs could cause disturbance to habitat through trampling and digging, especially as the site appears to have a high rate of use by rabbits which would attract dogs to the site.

This potential impact could be mitigated through the erection of a dog exclusion fence around the dune vegetation to prevent dogs entering the area. As rabbits are also threatening the local population through soil disturbance, intensive rabbit control could also be considered.

ELA is not aware of whether dog exclusion fences have been demonstrated to be effective. Only mitigation measures that have been demonstrated to be effective can be included Assessments of Significance. As such, unless fences effectively excluded dogs, with fences designed in a way to accommodate changes in the level of dune sand (at this stretch of Narrabeen Beach is actively undergoing erosion and accretion of sand), the proposal could cause a significant impact to Sand Spurge.

A SIS would be required if dog exclusion fences have not been demonstrated as effective in excluding dogs.

## 2. Beach Stone-curlew (*Esacus neglectus*)

The Beach Stone-curlew occurs in the north and east of coastal Australia. In NSW, the species is critically endangered and occurs regularly to about the Manning River, and the small population of north-eastern NSW is at the limit of the normal range of the species in Australia. Surveys in 2000 put the NSW population at a minimum of 13 adult birds (DECC 2005). Beach Stone-curlew are found exclusively along the coast, on open undisturbed beaches (Pizzey and Knight, 2007), islands, reefs and in estuaries, and may often be seen at the edges of or near mangroves (DECC 2005).

They forage in the intertidal zone of beaches and estuaries, on islands, flats, banks and spits of sand, mud, gravel or rock, and among mangroves. They are mainly active at dawn, dusk and at night, but birds are often seen when they shift or move about sedately during the day (DECC 2005). Beach Stone-curlews are usually seen alone or in pairs, but sometimes occur in small groups. They forage by stalking slowly like a heron or with quicker dashes after prey and their diet consists of crabs and other marine invertebrates (DECC 2005).

Beach Stone-curlews breed above the littoral zone, at the backs of beaches, or on sandbanks and islands, among low vegetation of grass, scattered shrubs or low trees; also among open mangroves (DECC 2005). One egg is laid usually just above the high tide mark and is vulnerable to predation (Pizzey and Knight, 2007).

- a. In the case of a 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 risk of extinction**

No. The Beach Stone-curlew is very rare in Australia and while it has been recorded recently within Sydney at Towra Point, Dee Why and Maianbar (Birds Australia 2010), the species does not regularly occupy these areas. The species may occur at the proposed off-leash dog exercise area sporadically, but most likely at night when the beach is quieter so that the species can forage along the sand for crabs and invertebrates. The species is unlikely to breed at the site given the number of people frequenting the site .

Impacts to the species lifecycle would include potential disturbance to foraging habitat, but given that this habitat is marginal, this impact will not place the species at risk of extinction.

- 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**

Not applicable.

- 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, or**
- ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

Not applicable.

- 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, and**

Potential habitat will be modified through the regular occurrence of off-leash dogs occupying an area of potential foraging habitat. This habitat is considered to be marginal, especially as the species prefers undisturbed beaches, of which there are vast areas of foraging habitat outside of populated areas like Sydney.

- 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, and**

The Beach Stone-curlew is a highly mobile species and the 833m length of Narrabeen Beach proposed to be a dog off-leash area would not isolate or fragment areas of habitat.

- 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**

The potential habitat at Narrabeen beach is not considered to be important to the long-term survival of the species given that the beach is surrounded by dense human population and the species prefers undisturbed beaches.

- e. Whether the action proposed is likely to have an adverse effect on critical habitat.**

No critical habitat has been declared for the Beach Stone-curlew.

**f. Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.**

No recovery plan has been prepared for the Beach Stone-curlew. There are 21 Priority Actions for the recovery of this species in NSW. This proposal does not conflict with these actions as the site at Narrabeen is not a known foraging or nesting site for the species.

Threats to the species include 4WD vehicles on beaches, boating and walking of dogs. Such activities can result in significant disturbance to the species, including desertion of nests (DECC 2005). Egg predation from the nest and predation of chicks or even adults, particularly when nesting occurs from feral or introduced predators, especially Foxes (*Vulpes vulpes*) and feral Pigs (*Sus scrofa*) and feral or uncontrolled domestic dogs and, possibly cats (DECC 2005).

Despite the low probability of the species nesting at the site, predation and trampling of nest sites by dogs and people is a risk at the site. To reduce this threat, ELA recommend that the dune vegetation behind the beach be fenced to a standard that would prevent dogs entering the area.

**g. 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 key threatening processes are of relevance to the proposal and its potential impact to Beach Stone-curlew include.

**Conclusion:** The proposal is unlikely to significantly impact the Beach Stone-curlew and a species impact statement is not required.

### 3. Little Tern (*Sterna albifrons*)

The Little Tern is an endangered species in NSW. Migrating from eastern Asia, the Little Tern is found on the north, east and south-east Australian coasts, from Shark Bay in Western Australia to the Gulf of St Vincent in South Australia. In NSW, it arrives from September to November, occurring mainly north of Sydney, with smaller numbers found south to Victoria. It breeds in spring and summer along the entire east coast from Tasmania to northern Queensland, and is seen until May, with only occasional birds seen in winter months (DECC 2005).

The species is mostly coastal, preferring sheltered environments but may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records). The species nests in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands. They are often seen feeding in flocks, foraging for small fish, crustaceans, insects, annelids and molluscs by plunging in the shallow water of channels and estuaries, and in the surf on beaches, or skipping over the water surface with a swallow-like flight (DECC 2005).

Little Terns in southeast and eastern Australia have suffered serious decline caused by beachgoers, dogs and vehicles intruding on beach nest sites (Pizzey and Knight 2007).

**a. In the case of a 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 risk of extinction**

There are 3 records of Little Tern within 10km from the site at Narrabeen. The closest record is over 3km from the site at Long Reef. Within Warringah LGA, the species is uncommon and may have potentially bred in Warringah in the past but is unlikely to breed there now (Smith and Smith, 2005b). As the species prefers sheltered coastal locations, the open beach environment at Narrabeen is unlikely to be a preferred site for the species, which may use the site infrequently for foraging.

Therefore, impacts to the species lifecycle that could result from the proposed off-leash dog exercise area include a reduction in potential foraging habitat through dogs scaring the birds away from this section of the beach. Given that the habitat is marginal and small in relation to other potential foraging habitat in the locality, this impact is unlikely to place the species at risk of extinction.

**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**

Not applicable.

**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, or**
- ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

Not applicable.

**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, and**

Potential foraging habitat for Little Tern will be modified through the regular occurrence of off-leash dogs, which will effectively exclude this section of the beach from Little Tern foraging through scaring the birds away.

**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, and**

A reduction in potential foraging habitat along Narrabeen Beach will result along the proposed 833m section of off-leash area and up to 200m north and south of this area, based on the 200m buffer distance requirement between wading birds and a disturbance (ie. dogs) (Avifauna Research & Services, 2005). The Little Tern is a highly mobile species and ranges from southeast Asia to Shark Bay in Western Australia and the York Peninsula in South Australia (Pizzey and Knight, 2007). The presence of dogs along a section of Narrabeen Beach will not fragment or isolate areas of habitat given the mobility of the species.

**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**

The potential habitat at Narrabeen beach is not considered to be important to the long-term survival of the species given that the species prefers sheltered beaches and is unlikely to breed at the site (Smith and Smith 2005b).

**e. Whether the action proposed is likely to have an adverse effect on critical habitat.**

No critical habitat has been declared for the Little Tern.

**f. Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.**

No recovery plan has been prepared for the Little Tern. There are 22 Priority Actions for the recovery of this species in NSW. This proposal does not conflict with these actions as the site at Narrabeen is not a known nesting, resting or fledgling feeding site.

Threats to Little Tern include predation of eggs and chicks by foxes, dogs, cats, black rats, silver gulls, ravens and raptors; and disturbance to coastal feeding, nesting and roosting areas through beach-combing, fishing, dog-walking, horse-riding and 4WD vehicles (DECC 2005). Parents often leave the nest when approached, resulting in exposure of chicks or eggs and the eggs are well camouflaged leaving them vulnerable to trampling (DECC 2005).

Despite the low probability of the species nesting at the site, predation by dogs and trampling of nest sites by dogs and people is a risk at the site. To reduce this threat, ELA recommend that the dune vegetation behind the beach be fenced off to a standard that would prevent dogs entering the area.

**g. 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 key threatening processes are of relevance to the proposal and its potential impact to Little Tern.

**Conclusion:** The proposal is unlikely to significantly impact the Little Tern, therefore, a species impact statement is not required.

**4. Osprey (*Pandion haliaetus*)**

The Osprey is a large, water-dependent bird of prey, and is vulnerable within NSW. It occurs along the coastal waters of Australia (except for Victoria and Tasmania), including inlets, lakes, estuaries, beaches, offshore islands and sometimes along inland rivers (Schodde and Tidemann 1986; Clancy 1991; Olsen 1995). They are common around the northern coast, but uncommon to rare or absent from closely settled parts of south-eastern Australia (DECC 2005).

Favour coastal areas, especially the mouths of large rivers, lagoons and lakes where they feed on fish over clear, open water. In NSW, they breed from July to September in nests made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea (DECC 2005).

**a. In the case of a 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 risk of extinction**

There are 11 records of Osprey within 10km from the site at Narrabeen. The closest record is 1.5km from the site at the entrance to Narrabeen Lagoon. Within Warringah LGA, the Osprey is uncommon but is likely to breed in the LGA (Smith and Smith, 2005b). Between 1990-2000, one or two Ospreys were regularly recorded about Narrabeen Lagoon (Smith and Smith, 2000). A breeding pair have previously utilised a nest located west of the Ocean Street Bridge, near the southern Lagoon foreshore. However, recent observations by Warringah Council staff suggest that the birds no longer nest in the area, but have been observed around the lagoon (Cardno 2011).

The site of the proposed off-leash area may impact the Osprey through disturbance to potential foraging habitat. The presence of dogs along the proposed section of Narrabeen Beach may discourage Osprey from foraging over the sea in the vicinity. This potential impact is minor given the large areas of foraging habitat over coastal lagoons and beaches in the locality and will not place the Osprey at risk of extinction.

**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**

Not applicable.

**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, or**
- ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

Not applicable.

**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, and**

Potential foraging habitat for Osprey may be modified through the regular occurrence of off-leash dogs, which may deter Osprey from foraging along a section of the beach. However, as the birds search for prey over water and at height, this impact will be relatively insignificant.

**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, and**

A reduction in potential foraging habitat along Narrabeen Beach will result along the proposed 833m section of off-leash area. However, the Osprey is a highly mobile species and the presence of dogs along a section of Narrabeen Beach will not fragment or isolate areas of habitat given the mobility of the species.

**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**

The potential habitat at Narrabeen beach is not considered important to the long-term survival of the Osprey in the locality given that the species is not known to breed at the site and foraging occurs from height over the sea.

**e. Whether the action proposed is likely to have an adverse effect on critical habitat.**

No critical habitat has been declared for the Osprey.

**f. Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.**

No recovery plan has been prepared for the Osprey. There are 9 Priority Actions for the recovery of this species in NSW. This proposal does not conflict with these actions as there are no known roost sites near the site (known roost sites should have a 100m buffer surrounding them).

Threats to Osprey include removal of large trees near the coast that could be used as nest sites; disturbances to water quality, such as from the disposal of treated effluent or stormwater runoff that increases turbidity in feeding areas; and ingestion of fish containing discarded fishing tackle (DECC 2005). The proposed off-leash area will not exacerbate these threats.

**g. 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 key threatening processes are of relevance to the proposal and its potential impact to Ospreys.

**Conclusion:** The proposal is unlikely to significantly impact the Osprey, therefore, a species impact statement is not required.

**5. Pied Oystercatcher (*Haematopus longirostris*)**

The species is distributed around the entire Australian coastline, although it is most common in coastal Tasmania and parts of Victoria, such as Corner Inlet. In NSW the species is listed as endangered and is thinly scattered along the entire coast, with fewer than 200 breeding pairs estimated to occur in the State (DECC 2005). The species favours undisturbed sandy, shellgrit or pebble beaches; sandspits and sandbars, tidal mudflats and estuaries, and coastal islands. It may occasionally occur on rocky reefs, shores, rock stacks, brackish or saline wetlands, and grassy paddocks or golfcourses near the coast (Pizzey and Knight, 2007). It forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. The chisel-like bill is used to pry open or break into shells of oysters and other shellfish (DECC 2005).

Pied Oystercatcher nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and

small stones. Two to three eggs are laid between August and January. The female is the primary incubator and the young leave the nest within several days (DECC 2005).

**a. In the case of a 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 risk of extinction**

There are 12 records of Pied Oystercatcher within 10km of the site at Narrabeen. The closest record is over 3km from the site at Long Reef (Avifauna Research and Services, 2005). Within Warringah LGA, Pied Oystercatcher is uncommon and may occur as an irregular visitor (Smith and Smith, 2005b). The species may have bred in Warringah in the past but is no longer likely to breed in the locality (Smith and Smith, 2005b). Likewise within Pittwater LGA, the Pied Oystercatcher was originally a resident breeding species, but the high levels of human disturbance on the local beaches and mudflats have since rendered them uninhabitable for this species. It now only occurs as a very rare and unusual visitor to the area (Smith and Smith, 2000).

The site of the proposed off-leash area is unlikely to be regularly used by the Pied Oystercatcher due to the high level of disturbance to the foreshore and regular human recreational use. The presence of dogs along the proposed section of Narrabeen Beach may further discourage Pied Oystercatcher from foraging along the beach. This potential impact is minor given the species is only an irregular visitor to Warringah LGA and the site is only marginal foraging habitat. The proposed off-leash dog exercise area is unlikely to place the Pied Oystercatcher at risk of extinction.

**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**

Not applicable.

**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, or**
- ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

Not applicable.

**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, and**

Potential foraging habitat for Pied Oystercatcher at the site may be modified through the regular occurrence of off-leash dogs, which may deter them from foraging along this section of the beach. However, as the bird is an irregular visitor to the area and the beach is already highly disturbed by human activity this impact will be relatively insignificant.

- 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, and**

A reduction in potential foraging habitat along Narrabeen Beach will result along the proposed 833m section of off-leash area and up to 200m north and south of the off-leash area. However, the

Pied Oystercatcher is a highly mobile species and the presence of dogs along a section of Narrabeen Beach will not fragment or isolate areas of habitat given the mobility of the species.

**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**

The potential habitat at Narrabeen beach is not considered to be important to the long-term survival of the Pied Oystercatcher in the locality given that the species is unlikely to breed at the site and foraging habitat is marginal given the current level of disturbance.

**e. Whether the action proposed is likely to have an adverse effect on critical habitat.**

No critical habitat has been declared for the Pied Oystercatcher.

**f. Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.**

No recovery plan has been prepared for the Pied Oystercatcher. There are 13 Priority Actions for the recovery of this species in NSW. The proposal does not conflict with these actions as there are no known foraging or roosting sites near the proposed off-leash area.

Threats to Pied Oystercatcher include:

- disturbance to coastal feeding, nesting and roosting areas through beach-combing, fishing, dog-walking, horse-riding and 4WD vehicles;
- predation of eggs and chicks by foxes, dogs, cats, Australian Ravens, raptors and artificially high populations of Silver Gulls;
- habitat destruction as a result of residential, agricultural and tourism developments;
- hydrological changes to estuaries and similar water bodies causing modification or removal of important areas of suitable habitat.
- over-harvesting of pipi's, a key food source which has undergone long-term decline (DECC 2005).

The proposed off-leash area has the potential to exacerbate the threat of disturbance and predation by dogs. However, given the high level of disturbance that already exists at the site, the species is unlikely to occur at the site and would only occur as an irregular visitor (Smith and Smith 2005) to rest between more favourable areas of habitat.

**g. 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 key threatening processes are of relevance to the proposal and its potential impact to Pied Oystercatchers.

**Conclusion:** The proposal is unlikely to significantly impact the Pied Oystercatcher, therefore, a species impact statement is not required.

**6. Sanderling (*Calidris alba*)**

The Sanderling is a small wading bird that occurs on broad open beaches of firm sand where waves ebb and flow, often near river mouths, also inlets, tidal mudflats, coastal lagoons (Pizzey and Knight, 2007). They generally occur in small flocks, however, may associate freely with other waders. Individuals run behind receding waves, darting after insects, larvae and other small invertebrates in the sand, then dart back up the

beach as each wave breaks. They also feed on plants, seeds, worms, crustaceans, spiders, jellyfish and fish, foraging around rotting heaps of kelp, at the edges of shallow pools on sandspits and on nearby mudflats (DECC 2005). They roost on bare sand, behind clumps of beach-cast kelp or in coastal dunes (DECC 2005).

Sanderlings are summer migrants to coastal Australia from September to May and breed in the arctic (Pizzey and Knight, 2007). They are listed as a vulnerable species in NSW.

**a. In the case of a 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 risk of extinction**

There are 6 records of Sanderling within 10km of the site at Narrabeen, the most recent record being in 1991 (Cardno 2011). The closest record is over 3km from the site at Long Reef (Avifauna Research and Services, 2005). Within Warringah LGA, the Sanderling is uncommon and may occur as a summer migrant (Smith and Smith, 2005b) with breeding occurring in the Arctic (Pizzey and Knight, 2007).

The proposed off-leash area may be used by the Sanderling for roosting and foraging, however, the abundance of invertebrates and, therefore, quality of foraging habitat along Narrabeen Beach is unknown. The presence of off-leash dogs at the proposed location would deter feeding and roosting in this location forcing the species to move to another location. Disturbance to wading birds from dogs can have a major impact on wading birds by reducing the time devoted to feeding, due to fleeing an area or keeping watch of predators (Avifauna Research & Services, 2005). Reduced feeding means that fat reserves may not be enough for birds to complete the migration to breeding grounds in the Arctic, which will reduce recruitment causing population decline (Avifauna Research & Services, 2005).

The existing level of disturbance of the beach at Narrabeen is high due to the presence of dense urban development, with further low-rise developments likely within the next few years. Therefore, the foraging and roosting habitat for Sanderling at the proposed location would already be relatively poor given that the site is regular visited for recreation, with even higher numbers in the summer (up to 70,000 people at North Narrabeen beach in peak times (Lifeguard pers. comm. ) coinciding with the arrival of this summer migrant.

The presence of dogs within the designated off-leash will deter Sanderling from foraging at this location, but dogs are just an additional disturbance to a beach heavily used for recreation, particularly during the summer time and this additional disturbance is unlikely to place a local occurrence of the species at risk of extinction. The Sanderling is more likely to forage along more broad open beaches adjacent to near river mouths and inlets.

**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**

Not applicable.

**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, or**
- ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

Not applicable.

**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, and**

Potential foraging and roosting habitat for Sanderling at the site is relatively marginal due the existing heavy use of the beach, particular during the warmer months, coinciding with the arrival of the Sanderling to Australian coastlines. The presence of unleashed dogs along would deter the Sanderling from foraging or roosting along this section of the beach. However, as the bird is uncommon to the area and the beach is already highly disturbed by human activity this impact will be relatively insignificant.

**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, and**

A reduction in potential foraging/roosting habitat along Narrabeen Beach will result along the proposed 833m section of off-leash area and up to 200m north and south of the off-leash area. However, the Sanderling is a highly mobile species and the presence of dogs along a section of Narrabeen Beach will not fragment or isolate areas of habitat given the mobility of the species.

**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**

The potential habitat at Narrabeen beach is not considered to be important to the long-term survival of the Sanderling in the locality given that the species is does not breed at the site and foraging/roosting habitat is marginal given the current level of disturbance.

**e. Whether the action proposed is likely to have an adverse effect on critical habitat.**

No critical habitat has been declared for the Sanderling.

**f. Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.**

No recovery plan has been prepared for the Sanderling. There are 5 Priority Actions for the recovery of this species in NSW. Of relevance to this proposal is the action:

*“Minimise human disturbance at identified key foraging sites (disturbance from 4WDs, recreational users, dog-walkers, fishermen etc.)”*

The proposal does not conflict with these actions, as the proposed site is not a known key foraging or roosting site for the Sanderling.

Threats to Sanderling include:

- Hydrological changes to estuaries and waterbodies may modify or remove important areas of suitable habitat.
- Disturbance to feeding and roosting sites.
- Pollution of estuaries and coastal areas.
- Tourism or agricultural developments reducing coastal and inland habitat areas (DECC 2005).

The proposal will result in disturbance to a section of Narrabeen Beach from off-leash dogs, but this site is not a known feeding or roosting site.

- g. 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 key threatening processes are of relevance to the proposal and its potential impact to Sanderlings.

**Conclusion:** The proposal is unlikely to significantly impact the Sanderling, therefore, a species impact statement is not required.

## **7. Sooty Oystercatcher (*Haematopus fuliginosus*)**

The Sooty Oystercatcher occurs on intertidal rocky and coral reefs, mostly on ocean shores, but occasionally frequents sandspits and tidal mudflats, mostly when not breeding. The species favours more rocky habitats than the Pied Oystercatcher (Pizzey and Knight, 2007) and forages on exposed rock or coral at low tide for foods such as limpets and mussels (DECC 2005). They are found around the entire Australian coast, including offshore islands, being most common in Bass Strait. Small numbers of the species are evenly distributed along the NSW coast. The availability of suitable nesting sites may limit populations (DECC 2005).

Long Reef, located over 3km south of the proposed site provides an important feeding and roosting area for the Sooty Oystercatcher. The species is regularly observed on the rock platforms in groups of up to 25 birds, making Long Reef one of the main feeding sites for this species in the Sydney area (Avifauna Research and Services, 2005). The Sooty Oystercatcher feeds at Long Reef, but does not breed there. It breeds only on offshore islands including Five Islands off Wollongong (Avifauna Research and Services, 2005).

- a. In the case of a 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 risk of extinction**

There are 70 records of Sooty Oystercatcher within 10km of the proposed site at Narrabeen. The closest record is over 2.25km from the site at Long Reef, which has been identified as the most important feeding and roosting site for the Sooty Oystercatcher within Sydney (Avifauna Research and Services, 2005). Within Warringah LGA, the Sooty Oystercatcher is uncommon and present year-round (Smith and Smith, 2005b). The species breeds on offshore islands and the numbers visiting Long Reef tend to the greater from January to May, after the breeding season (Avifauna Research and Services, 2005).

The site of the proposed off-leash area is unlikely to be regularly used by Sooty Oystercatcher, which prefer rocky habitats over open sandy beaches. Therefore, the presence of dogs along the proposed section of Narrabeen Beach is unlikely to impact the lifecycle of this species such that the local population would be placed at risk of extinction. The proposed off-leash area is 2km from rocky shore habitat at North Narrabeen or Collaroy and assuming people restrict their dogs to within the designated area, disturbance to feeding and roosting habitat for the Sooty Oystercatcher should not occur.

- 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**

Not applicable.

- 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, or**

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

Not applicable.

**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, and**

Potential foraging habitat for Sooty Oystercatcher at the site may be modified through the regular occurrence of off-leash dogs, which may deter Sooty Oystercatcher from foraging along this section of the beach. However, as the bird prefers foraging over rocky this impact will be relatively minor.

- 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, and**

A reduction in potential foraging habitat along Narrabeen Beach will result along the proposed 833m section of off-leash area and up to 200m north and south of the off-leash area. However, the Sooty Oystercatcher is a highly mobile species and the presence of dogs along a section of Narrabeen Beach will not fragment or isolate areas of habitat given the mobility of the species.

- 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**

The potential habitat at Narrabeen beach is not considered to be important to the long-term survival of the Sooty Oystercatcher in the locality given that the species does not breed at the site, prefers to forage on rocky shores and the proposed off-leash area is adequately set-back from the important feeding habitat at Long Reef.

**e. Whether the action proposed is likely to have an adverse effect on critical habitat.**

No critical habitat has been declared for the Sooty Oystercatcher.

**f. Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.**

No recovery plan has been prepared for the Sooty Oystercatcher. There are 7 Priority Actions for the recovery of this species in NSW. The proposal does not conflict with these actions.

Threats to Sooty Oystercatcher include:

- Disturbance to coastal feeding, nesting and roosting areas through beach-combing, fishing, dog-walking, horse-riding and 4WD vehicles.
- Predation of eggs and chicks by foxes, dogs, cats, rats and raptors.
- Habitat destruction as a result of residential, agricultural and tourism developments.
- Hydrological changes to estuaries and similar water bodies causing modification or removal of important areas of suitable habitat. (DECC 2005).

The proposed off-leash area has the potential to exacerbate the threat of disturbance to coastal feeding by dogs. However, given this impact is unlikely to be significant, given the species prefers to forage on rocky

shores, so is unlikely to regularly forage along the proposed site at Narrabeen Beach. Especially given the proximity to high quality foraging habitat at Long Reef.

**g. 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 key threatening processes are of relevance to the proposal and its potential impact to Sooty Oystercatchers.

**Conclusion:** The proposal is unlikely to significantly impact the Sooty Oystercatcher and a species impact statement is not required.

## EPBC Assessment of Significance

The proposal has the potential to impact on two migratory species, the Little Tern and the Sanderling. Under the EPBC Act, an action will require approval if the action has, will have, or is likely to have a significant impact on a listed migratory species.

### Listed Migratory Species - Significant impact criteria

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- **substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species**

The habitat for Little Tern at the proposal site at Narrabeen Beach is unlikely to be important Little Tern habitat for a number of reasons:

- i. the species hasn't been recorded at this location before,
- ii. there are three records of Little Tern within 10km of the site, the closest being 3km of the site at Long Reef,
- iii. It breeds in spring and summer – which coincides with existing periods of high recreational use at Narrabeen Beach,
- iv. Little Tern prefers sheltered coastal environments (DECC 2005) – the proposed site at Narrabeen is an open beach and not sheltered,
- v. It nests in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands – the site at Narrabeen is not near the mouth of Narrabeen Lagoon or a coastal lake or island
- vi. Within Warringah LGA, the species is uncommon and may have potentially bred in Warringah in the past but is unlikely to breed now (Smith and Smith, 2005b).

Therefore, the proposed site is not considered to be important habitat for Little Tern.

The habitat at the proposed site is unlikely to be important habitat for Sanderling because:

- i. Potential foraging and roosting habitat for Sanderling at the site is relatively marginal due the existing high recreational use of the beach, particular during the warmer months, coinciding with the arrival of the Sanderling to Australian coastlines.
  - ii. Sanderling is uncommon in the locality and was last recorded in 1991 (Cardno 2011).
  - iii. The Sanderling is more likely to forage along more broad open beaches adjacent to near river mouths and inlets.
- **result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or**

No. The proposed off-leash area will not result in an invasive species that is harmful to the migratory species becoming established.

- **seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.**

The proposed off-leash area will cause disturbance to Little Tern and Sanderling that forage in the area by dogs chasing the birds away. However, the site would be rarely visited by Little Tern and Sanderling for feeding and does not support an ecologically significant proportion of the population.

This report recommends that a dog-exclusion fence be erected to prevent trampling of the dune vegetation (in particular the endangered Coastal Spurge) by dogs. In the unlikely event that Little Tern nest in this location, the dog exclusion fence will have the benefit of preventing predators such as dogs and potentially cats and foxes from entering the area.

**Conclusion:** The proposal is unlikely to significantly impact the Little Tern and Sanderling and a referral to the Commonwealth under the EPBC Act is not required.