5 October 2017 (Final version)

Senior Asset Officer – Parks and Recreation
Northern Beaches Council
725 Pittwater Road
Dee Why NSW 2099

Re: Flora and fauna assessment for the proposed upgrade to the Narrabeen Multi Use Trail alignment
Project no. 24787

Biosis Pty Ltd was commissioned by Northern Beaches Council to undertake a terrestrial flora and fauna assessment to describe the ecological values and constraints associated with the proposed upgrade to the Narrabeen Multi Use Trail (NMUT) alignment.

Biosis understands that Northern Beaches Council is proposing to improve the safety of a small section of the NMUT (the proposed works). This section is located between Bilarong Reserve and the Deep Creek Bridge, and directly to either side of the monument rocks adjacent to Wakehurst Parkway.

The proposed works will result in a re-alignment of a small section of the existing NMUT. This new section will require minor clearing of terrestrial vegetation and habitat where it detours to the south from the current track at the eastern and western end of the proposed works. The central section of the new alignment will be a constructed bridge supported on pylons over Narrabeen Lagoon. The impacts of the proposed works on marine habitats (specifically sea grass) have already been assessed (Marine Pollution Research 2017).

The objective of this flora and fauna assessment is to determine the potential impacts of the proposed works to threatened terrestrial flora, fauna and ecological communities (biota) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or NSW *Threatened Species Conservation Act 1995* (TSC Act). In addition, the flora and fauna assessment assesses potential impacts of the proposed works to non-threatened bird species, and provides recommendations and strategies to minimise impacts to bird populations.

Background

The study area for this flora and fauna assessment is shown in Appendix 1; Figure 1, and includes the footprint of the proposed works as well as adjacent terrestrial and intertidal areas that may be impacted by the proposed works. The study area is within the Northern Beaches Local Government Area (LGA), and is

Biosis Pty Ltd
Sydney Resource Group

Unit 14, 17-27 Power Avenue
Alexandria NSW 2015

Phone: 02 9101 8700

ACN 006 175 097
ABN 65 006 175 097

Email: sydney@biosis.com.au

biosis.com.au

bounded by the existing NMUT to the east and west, Wakehurst Parkway to the north and Narrabeen Lagoon to the south.

Method

Database and literature review

Prior to undertaking the field investigation, information provided by Northern Beaches Council as well as other key information was reviewed, including:

- Commonwealth Department of the Environment and Energy (DoEE) Protected Matters Search Tool for matters protected by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- NSW Office of Environment and Heritage (OEH) BioNet Atlas of NSW Wildlife, for items listed under the *Threatened Species Conservation Act 1995* (TSC Act).
- NSW DPI *Noxious Weeds Act, 1993* (NW Act) listed weeds for the Local Control Authority (LCA) area of Northern Beaches Council.
- The Native Vegetation of the Sydney Metropolitan Area. Volume 1: Technical Report. Version 3.0 (OEH 2016).
- Native Fauna Management Plan for the Pittwater Local Government Area (Pittwater Council 2011).
- Aquatic Ecology Survey for Narrabeen Lagoon Boardwalk (Marine Pollution Research 2017).

The implications for the project were assessed in relation to key biodiversity legislation and policy including:

- *Environment Protection and Biodiversity Conservation Act 1999*.
- *Environmental Planning and Assessment Act 1979* (EP&A Act).
- *Threatened Species Conservation Act 1995*.
- *Native Vegetation Act 2003* (NV Act).
- *National Parks and Wildlife Act 1974* (NPW Act).

Noxious Weeds Act 1993 (NW Act). Field investigation

A field investigation of the study area was undertaken on 30 May 2017 by Carl Corden, Ecologist. Vegetation within the study area was surveyed using the random meander technique (Cropper 1993) over four person hours.

A habitat-based assessment was completed to determine the presence of suitable habitat for threatened species previously recorded (OEH 2017) or predicted to occur (DoEE 2017) within 5 kilometres. This list was filtered according to species descriptions, life history, habitat preference and soil preference to determine those species most likely to be present within the study area.

All flora and fauna species observed or heard during the field investigation were recorded. In addition to threatened species, non-threatened (including locally significant) birds were also recorded.

Results

Landscape context

The study area is situated between Bilarong Reserve to the east and Deep Creek Reserve to the west. Land surrounding the study area primarily consists of foreshore and bushland reserves to the north, south and

west of Wakehurst Parkway and the existing NMUT. Beyond the bushland reserves to the north and east is residential development.

Regional soil landscape mapping indicates that the study area occurs on the Deep Creek soil landscape, characterised by level to gently undulating alluvial floodplain draining the Hawkesbury Sandstone. Soils are deep podzols on well-drained terraces, siliceous sands on current floodplain and humus podzols in low lying areas (Chapman and Murphy 1989). The composition of the soil is highly influential on the vegetation communities observed.

Vegetation communities

Prior to the field investigation, Biosis confirmed that various native vegetation communities including two Endangered Ecological Communities (EECs) have been mapped in the broader landscape (OEH 2016), these include:

- *Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions* Swamp Oak Floodplain Forest (Endangered, TSC Act)
- *River-flat Eucalypt Forest* (Endangered, TSC Act)
- *Urban Native and Exotic.*

A key focus of the field investigation was to assess the vegetation of the study area against the final determinations for the above listed EECs to determine presence or absence.

The vegetation of the study area comprises only one community, Estuarine Swamp Oak Forest equivalent to TSC Act listed, Swamp Oak Floodplain Forest EEC (OEH 2016). The structure, floristic composition and condition of this community is described in Table 1. A list of flora and fauna recorded within the study area as well as associated plates are provided in Appendix 2, Appendix 3 and Appendix 4.

Other native vegetation communities in the nearby area to the north and west of the study area include; Coastal Enriched Sandstone Moist Forest (north of Wakehurst Parkway) and Coastal Alluvial Bangalay Forest, equivalent to TSC Act listed, River-flat Eucalypt Forest to the west of the study area, not to be impacted by the proposed works.

Table 1 Ecological Communities within the study area

Community	Description
***Swamp Oak Floodplain Forest EEC* / Estuarine Swamp Oak Forest**	This community is typical of coastal floodplains of NSW below 20 meters elevation on grey-black clay-loams and sandy loams, where the groundwater is saline and features on the lagoon margin associated with coastal floodplains. Within the study area the canopy is dominated by Swamp Oak *Casuarina glauca* as well as intermittent Lilly Pilly *Acmena smithii*, Cabbage Tree Palm *Livistonia australis* and Cheese Tree *Glochidion fernandi.* The understorey was found to be characterised by frequent occurrences of vines, Common Silkpod *Parsonsia straminea*, Scrambling Lily *Geitonoplesium cymosum* and Stephania *Stephania japonica* var. *discolor*. A sparse cover of shrubs, and a continuous groundcover of forbs, sedges, grasses and leaf litter was also present. Ground layer plants include forbs such as; Indian Pennywort *Centella asiatica,* Scurvy Weed *Commelina cyanea*, Warrigal Greens *Tetragonia tetragonoidies* and *Viola banksii,* Tall Sedge *Carex appressa, Gahnia clarkei,* Mat Rush *Lomandra longifolia,* Basket Grass *Oplismenus imbecillis,* Harsh Ground Fern *Hypolepis muelleri*, Knobby Club-sedge *Ficinia*

Community	Description
	nodosa, Bare Twig Rush *Baumea juncea,* Sea Rush *Juncus kraussii, Phragmites australis.* Dominant weeds with the study area include Pennywort *Hydrocotyle bonariensis* and Coastal Morning Glory *Ipomoea cairica.*

Threatened flora

Background searches identified 27 threatened flora species recorded (OEH 2017) or predicted to occur (DEE 2017) within 5 kilometres of the study area. Based on the location of the study area, being on the foreshores of Narrabeen Lagoon, as well as the associated soils present within this location, none of the 27 recorded threatened flora within 5 kilometres is expected to occur within the study area. In addition, survey effort failed to locate any of the aforementioned regionally listed species.

Noxious weeds

Five exotic species recorded within the study area are declared noxious within the LCA area of Northern Beaches Council (DPI 2017). The control class and legal requirements are outlined in Table 2.

Table 2 Noxious weeds within the study area

Scientific name	Common name	Class	Legal requirements
Anredera cordifolia	Madeira Vine	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread.
Ipomoea cairica	Coastal Morning Glory	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold propagated or unknowingly distributed.
Ipomoea indica	Purple Morning Glory	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold propagated or unknowingly distributed.
Lantana camara	Lantana	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread.
Ligustrum lucidum	Broad-leaf Privet	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread.

Fauna habitat

The study area supports approximately 0.21 hectares (ha) of vegetation providing suitable habitat for a range of fauna. Fauna habitats present include forest vegetation as well as dense reeds along the foreshore of Narrabeen Lagoon. The proposed works will require removal of only a very small portion of fauna habitat from the study area, and similar fauna habitats occur to the east and west of the study area that will not be-impacted by the proposed works.

The study area does not support any hollow-bearing trees, active bird nests or possum dreys, freshwater aquatic habitats, caves and culverts or other important habitat features required by most threatened fauna recorded from the locality. The study area provides a small, linear area of suitable habitat for common

fauna, including non-threatened birds. It is also likely that a small number of threatened fauna species would occasionally forage within or adjacent to the study area. However the study area does not provide suitable breeding habitat for these species. Threatened fauna habitat is discussed further below.

Threatened fauna

Background searches identified 67 threatened fauna species recorded (OEH 2017) or predicted to occur (DEE 2017) within 5 kilometres of the study area. Those species considered most likely to have habitat within the study area based on the background research are as follows:

- Black Bittern *Ixobrychus flavicollis* (Vulnerable, TSC Act).
- White-bellied Sea-eagle *Haliaeetus leucogaster* (Vulnerable, TSC Act).
- Eastern Osprey *Pandion cristatus* (Vulnerable, TSC Act).
- Grey-headed Flying-fox *Pteropus poliocephalus* (Vulnerable, EPBC Act and TSC Act).

An assessment of the habitat values of the study area for threatened fauna species is provided in Table 3.

Table 3 Assessment of habitat for threatened fauna species

Species	Local distribution and habitat requirements	Likelihood of occurrence or impact
Black Bittern	This species is known to occur in the locality of the study area, including records from Deep Creek and Bilarong Reserves. This species typically occurs in dense wetland vegetation and is mainly active at dawn and dusk. It is therefore difficult to detect this species during field investigations.	Given the proximity of records it is likely that this species would occasionally forage and shelter within the study area in the narrow strip of reeds along the foreshore of Narrabeen Lagoon. However, the area of habitat to be impacted by the proposed works represents a very small portion of the much larger area of forage habitat to remain within the study area and in the wider locality. Further, this species has been regularly recorded in Warriewood wetlands despite regular public access via a raised boardwalk similar to the proposed works. It is therefore unlikely that the proposed works will result in any significant impacts to the Black Bittern.

Species	Local distribution and habitat requirements	Likelihood of occurrence or impact
White-bellied Sea-eagle and Eastern Osprey	Both of these raptors are known to occur within the locality of the study area. These species prey on fish or other marine/aquatic fauna. Nesting of both species occurs in very tall trees or artificial structures (e.g. telecommunication towers) and large stick nests, which are easily detected during field investigations.	Both of these species are likely to forage occasionally along the foreshore areas of the study area. However, no active or disused nests, or suitable tall nest trees, were recorded within the study area. Further, the area of habitat to be impacted by the proposed works represents only a very small portion of the much larger area of forage habitat to remain within the study area and in the wider locality. The proposed works are therefore unlikely to significantly impact either the White-bellied Sea-eagle or the Eastern Osprey.
Grey-headed Flying-fox	This species is known to forage throughout the locality of the study area. It feeds on a range of blossom and fruit producing trees and shrubs, including both native and exotic species. Roosting and breeding occurs in large colonies or 'camps' which are easily detected during field investigations.	This species is likely to forage occasionally within the forest vegetation of the study area, particularly when forage tree and shrub species are producing blossom or fruit. However, no flying fox camps were recorded within the study area. Further, the area of habitat to be impacted by the proposed works represents only a very small portion of the much larger area of forage habitat to remain within the study area and in the wider locality. The proposed works are therefore unlikely to significantly impact the Grey-headed Flying-fox.

Based on the size of the study area, the survey effort is considered comprehensive to assess habitat presence for the species outlined in Table 3. Taking all of these factors into consideration, there is a low likelihood of impact for the above listed species.

Wildlife connectivity

The study area lies within a narrow, linear strip of vegetation connecting larger areas of habitat to the east and west. Habitat continues to the west of Deep Creek Reserve, however wildlife connectivity to the east of Bilarong Reserve is limited due to residential development.

Non-threatened birds

The study area supports habitat for a range of non-threatened birds known to occur in the locality. Appendix 4 provides a list of all bird species recorded within the study area during the field investigation.

Bird habitat present within the study area includes:

- Forest vegetation, providing forage, shelter and breeding habitat in the form of dense understorey, mid-storey and canopy vegetation.

- Dense reeds along the foreshore of Narrabeen Lagoon providing forage and shelter habitat for cryptic wetland birds and small passerines.
- Intertidal areas of the foreshore providing forage habitat for resident and migratory wading birds and waterfowl.

The study area lies between similar areas of habitat to the east (Bilarong Reserve) and west (Deep Creek Reserve). Habitat to the north of the study area is also relatively intact forest/woodland vegetation. The impacts of edge effects such as exclusion or predation by more aggressive birds (e.g. Noisy Miner *Manorina melanocephala*) within the study area are therefore relatively low compared to similar habitats within urban surroundings. The assemblage recorded within the study area during the field investigation included a number of small passerines (e.g. Superb Fairy-wren *Malurus cyaneus* and Brown Thornbill *Acanthiza pusilla*) that are often excluded by Noisy Miners.

Impact assessment

The proposed works will require removal of 0.02 ha of Swamp Oak Floodplain Forest EEC. An Assessment of Significance (AoS) has been prepared in accordance with Section 5a of the EP&A Act to assess the potential impacts of the proposed works on Swamp Oak Floodplain Forest EEC. The AoS is provided in Appendix 5. The area of Swamp Oak Floodplain Forest EEC to be removed for the proposed works represents only 9.1% of the 0.21 ha of this community present within the study area, and only 0.05% of the total occurrence of Swamp Oak Floodplain Forest EEC within 5km of the study area. The AoS has therefore been determined that the removal of 0.02 ha of Swamp Oak Floodplain Forest EEC for the proposed works will not significantly impact on the occurrence of this community in the locality, and a Species Impact Statement is not required.

The proposed works has the potential to result in the introduction and/or spread of noxious weeds during clearing and construction of the new track section. Recommendations are provided below to minimise the risk of spread or introduction of noxious weeds resulting from the proposed works.

The total area of terrestrial fauna habitat to be removed for the proposed works is 0.02 ha. All remaining habitat within the study area will be retained during the proposed works for aesthetic value, and similar habitat also occurs to the east and west within other Council reserves. It is therefore determined that the removal of habitat for the proposed works will not significantly impact on the Black Bittern, Eastern Osprey, White-bellied Sea-eagle, Grey-headed Flying-fox or any other threatened or non-threatened fauna. Therefore NSW Assessments of Significance and Commonwealth Significant Impact Criteria assessments for potential impacts to threatened fauna are not required.

The proposed works has the potential to result in a minor interruption to east/west movement of fauna during construction. However given the very small, narrow footprint of the proposed works it is highly likely that all fauna species will quickly become accustomed to the presence of the new track section and continue to move east/west post construction and during operation of the track.

Recommendations are provided below to avoid, mitigate or offset any potential impacts that the proposed works may have on the ecological values of the study area.

Recommendations

Given there are requirements for removal of all native vegetation including canopy trees for the project, the focus of the recommendations is to minimise disturbance to any surrounding native vegetation and fauna habitat. These recommendations include:

- Clearing of vegetation for the proposed works should ideally be completed prior to the spring breeding season of most bird species. Alternatively, a suitably qualified ecologist should be engaged to undertake a pre-clearing inspection of the proposed works area immediately prior to vegetation clearing. If breeding/nesting birds are located, an exclusion area should be established around nests at an appropriate distance to avoid impacts during nesting. Clearing should only re-commence within these exclusion areas once nesting has finished, as advised by an ecologist.
- The existing pathway is to be revegetated with appropriate species for Swamp Oak Floodplain Forest, exact species list and number of plants to be revegetated will be decided in conjunction with NECC representative.
- Follow up bush regeneration work ensuring suppression of weed species and survival of revegetated species will need to continue post proposed works for a further five year period.
- To the fullest extent practicable, minimise disturbance to any native vegetation surrounding the proposed works.
- Where possible, any trees to be retained should be protected in accordance with Australian Standard AS4970 – 2009 Protection of trees on development sites, during construction, operation and decommissioning of the site compound.
- In the unlikely event that unexpected threatened species are identified during the project, works should cease and an ecologist contacted.
- Minimise soil transportation within, into or out of the study area to reduce the spread of weeds.
-
- Five noxious weeds within the LCA area of Northern Beaches Council were identified within the study area (Table 2). Appropriate measures should be implemented to minimise the spread of these species.
- Appropriate erosion and sediment control measures should be installed at all sites to avoid sedimentation of receiving water bodies or other indirect impacts to surrounding biodiversity values.

I trust that this advice is of assistance to you however please contact me if you would like to discuss any elements of this ecological advice further.

Yours sincerely

Carl Corden

Zoologist

References

Chapman, GA and Murphy CL 1989. *Soil Landscapes of the Sydney 1:100 000 Sheet*. Soil Conservation Service of NSW, Sydney.

DoEE 2017. Protected Matters Search Tool. Department of the Environment and Energy. Accessed 16/06/2017.

DPI 2017. Noxious Weed Declarations (NSW WeedWise): Local Control Authority area of Northern Beaches Council. Department of Primary Industries. Accessed 16/06/2017.

OEH 2017. BioNet the website for the Atlas of NSW Wildlife. Office of Environment and Heritage. Accessed 16/06/2017.

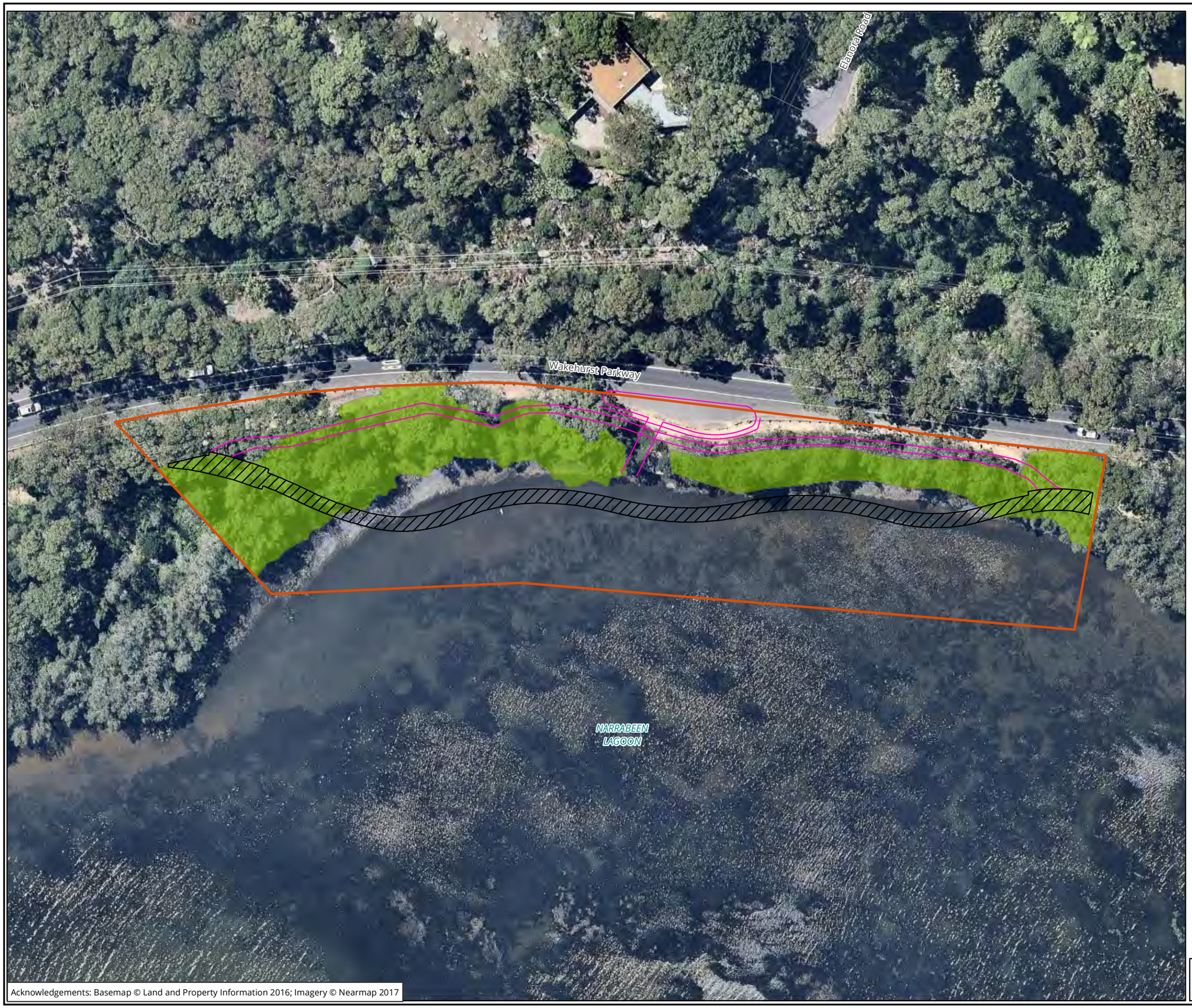
OEH 2016. The Native Vegetation of the Sydney Metropolitan Area. Volume 1: Technical Report. Version 3.0. Office of Environment and Heritage.

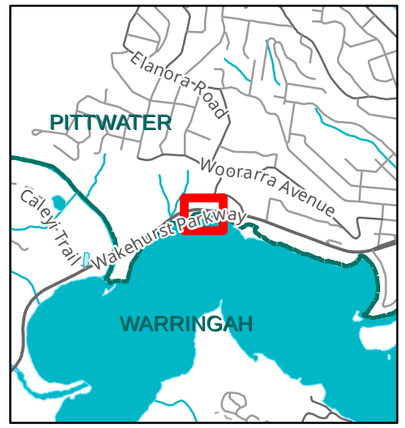
Marine Pollution Research 2017. *Aquatic Ecology Survey for Narrabeen Lagoon Boardwalk*. Report prepared for Northern Beaches Council.

Pittwater Council 2011. Native Fauna Management Plan for the Pittwater Local Government Area. Pittwater Council.

Appendices

Appendix 1 Figure 1





Legend

- Study area
- Proposed works footprint
- Existing trail

Vegetation communities

- *Swamp Oak Floodplain Forest EEC* / Estuarine Swamp Oak Forest

Figure 1: Ecological values

0 6 12 18 24 30

Metres

Scale: 1:700 @ A3

Coordinate System: GDA 1994 MGA Zone 56

Biosis Pty Ltd

Albury, Ballarat, Melbourne,
Newcastle, Sydney, Wangaratta & Wollongong

Matter: 24787
Date: 16 June 2017,
Checked by: CAC, Drawn by: LH, Last edited by: lharley
Location:P:\24700s\24787\Mapping
24787_F1_EcologicalFeatures

Appendix 2 Plates

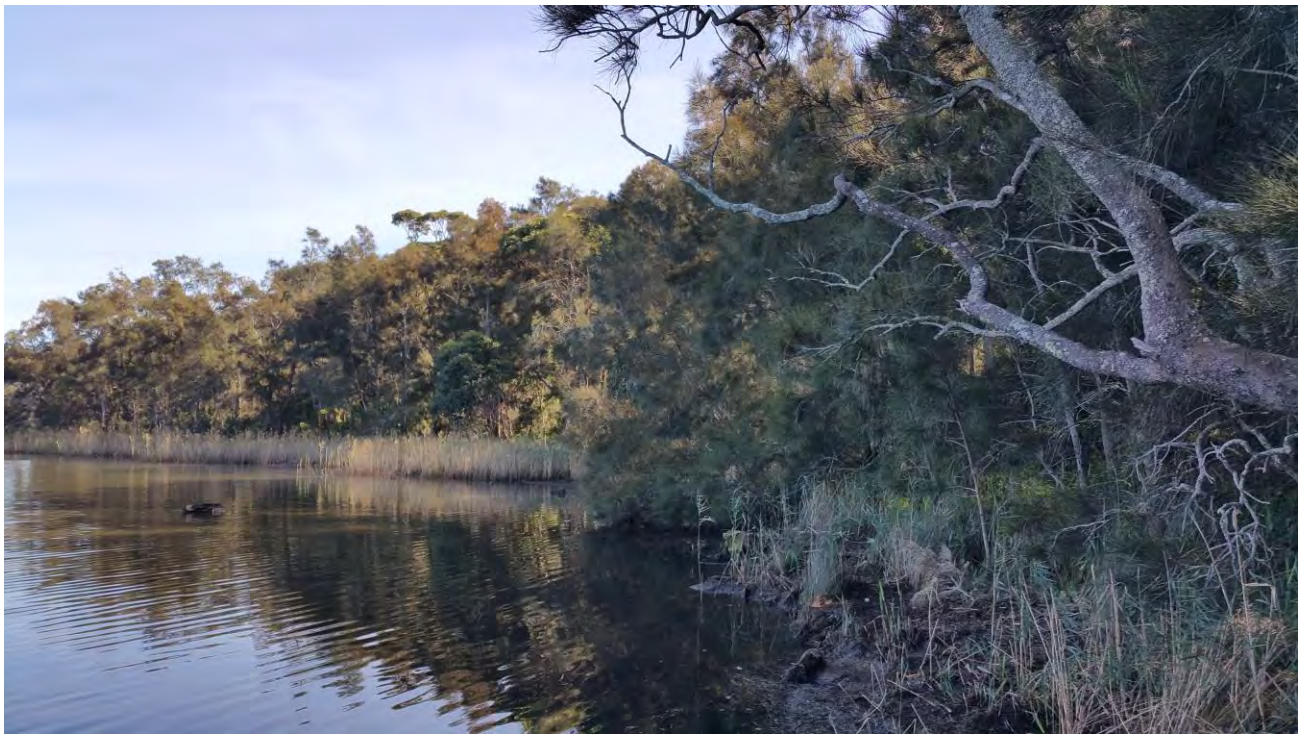


Plate 1 Looking west along the foreshore of Narrabeen Lagoon.

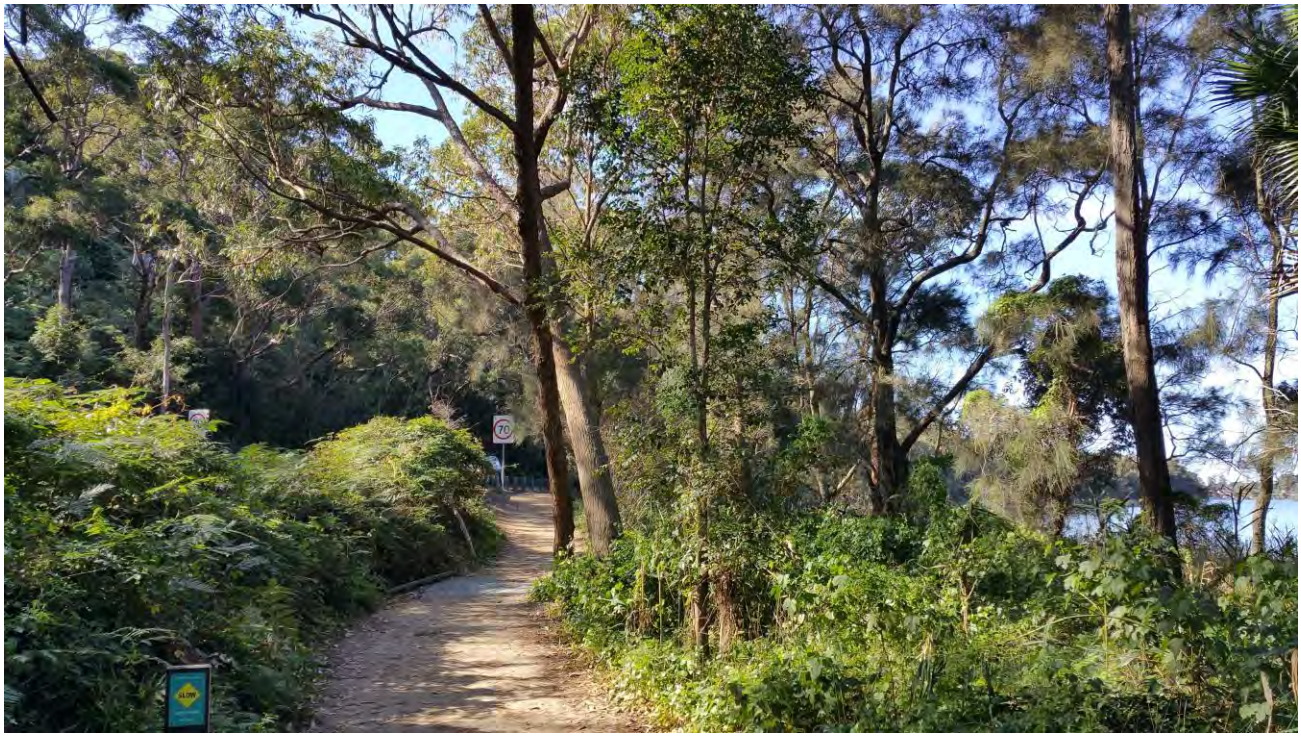


Plate 2 Looking east along the existing trail along the northern boundary of the study area.

Plate 3 Swamp Oak Floodplain Forest along the foreshore of Narrabeen Lagoon.

Appendix 3 Flora

Flora species recorded from the study area

Flora species recorded by Biosis, 30/05/2017

Status	Scientific name	Common name
Native species		
	Acmena smithii	Lilly Pilly
	Angophora costata	Sydney Red Gum
	Baumea juncea	Bare Twig Rush
	Carex appressa	Tall Sedge
	Casuarina glauca	Swamp Oak
	Centella asiatica	Indian Pennywort
	Commelina cyanea	Scurvy Weed
	Eucalyptus robusta	Swamp Mahogany
	Ficinia nodosa	Knobby Club-sedge
	Gahnia clarkei	Gahnia
	Geitonoplesium cymosum	Scrambling Lily
	Glochidion ferdinandi	Cheese Tree
	Hypolepis muelleri	Harsh Ground Fern
	Juncus kraussii	Sea Rush
	Livistonia australis	Cabbage Tree Palm
	Lomandra longifolia	Mat Rush
	Oplismenus imbecillis	Basket Grass
	Parsonsia straminea	Common Silkpod
	Phragmites australis	Common Reed
	Stephania japonica var. *discolor*	Stephania
	Tetragonia tetragonoidies	Warrigal Greens
	Viola banksii	Viola
Exotic species		
N4	*Anredera cordifolia*	Madeira Vine
N4	*Asparagus* sp.	Asparagus Weeds
	Erythrina sp.	Coral Tree
	Hydrocotyle bonariensis	Pennywort

N4	*Ipomoea cairica*	Coastal Morning Glory
N4	*Ipomoea indica*	Purple Morning Glory
N4	*Lantana camara*	Lantana
	Ligustrum lucidum	Broad-leaf Privet
	Stenotaphrum seccundatum	Buffalo Grass

Appendix 4 Fauna

Fauna species recorded from the study area

Fauna species recorded by Biosis, 30/05/2017

Habitat	Scientific name	Common name
Birds		
F	*Acanthiza pusilla*	Brown Thornbill
I	*Anas castanea*	Chestnut Teal
I	*Ardea alba*	Great Egret
I	*Cygnus atratus*	Black Swan
R	*Malurus cyaneus*	Superb Fairy-wren
F	*Meliphaga lewinii*	Lewin's Honeyeater
F	*Lichenostomus chrysops*	Yellow-faced Honeyeater
F	*Pachycephala rufiventris*	Rufous Whistler
F	*Spilopelia chinensis**	Spotted Dove*
F	*Trichoglossus moluccanus*	Rainbow Lorikeet
F	*Zosterops lateralis*	Silvereye

F = forest, R = reeds, I = intertidal.

** Introduced species*

Appendix 5 Assessments of Significance

The following section provides an Assessment of Significance (AoS) according to the factors outlined under the *Threatened Species Assessment Guidelines – The assessment of significance* (DECC, 2007) for all species listed as requiring assessment based on potential impact to habitat or connectivity. One AoS has been prepared as a matter of ecological due diligence for the NSW TSC Act listed Endangered Ecological Community (EEC) *Swamp Oak Floodplain Forest on the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*.

Swamp Oak Floodplain Forest on the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

Swamp Oak Floodplain Forest (SOFF) is listed is an endangered ecological community (EEC) on Schedule 1 (Part 3) of the TSC Act.

SOFF is typically associated with grey-black clay loams and sandy loams on coastal floodplains of NSW. The community generally occurs below 20 m elevation and structurally varies from open forests to low woodlands, scrubs or reedlands with scattered trees. The dominant canopy species is Swamp Oak *Casuarina glauca* with Lilly Pilly *Acmena smithii, Glochidion* spp. and *Melaleuca* spp. occasionally occurring as subordinate species. Generally, tree diversity decreases with latitude. The understorey is characterised by vines and a continuous groundcover of forbs, sedges, grasses and leaf litter with a sparse shrub cover. Generally, the composition of the ground stratum depends on salinity levels in the groundwater. The extent of the SOFF prior to European settlement is unknown however it is predicted that the remaining area today represents less than 30% of its original range.

The study area currently supports 0.21 ha of SOFF. The proposed works will require the removal of 0.02 ha of this community. The community as a whole was in moderate condition with moderate species diversity within the canopy and understorey. Recruitment of exotic species was apparent in the shrub strata with Lantana recorded.

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.

Not applicable.

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 a critically endangered or 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.

SOFF is known to occur in the North Coast, Sydney Basin and South East Corner bioregions. The SOFF in the study area is therefore not at the limit of known occurrence of the EEC. The proposed works will require the removal of 0.02 ha of SOFF from the eastern and western portions of the study area. This represents 9.1% of its extent within the study area and only 0.05% of its extent within the local area. The removal of 0.02 ha of SOFF from the study area is not 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.

The SOFF within the study area is in moderate condition as it had been affected by disturbances such as weed invasion, fragmentation and edge effects resulting from previous land uses. Clearance of a very small area of SOFF from the study area as a result of the proposed works is unlikely to further degrade the composition of SOFF or result in any increasing in edge effects or invasion of exotic species. It is therefore considered that the proposed works will not place the EEC at further risk of extinction.

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

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

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.

SMCMA mapping (OEH, 2016) indicates that approximately 42.22 ha of SOFF occurs within a 5 km radius of the study area. The study area supports 0.21 ha of SOFF in the study area, which equates to 0.5% of similar habitat types in the local area (5 km radius). Approximately 0.02 ha of this will be removed which equates to only 0.05% of its occurrence within the local area.

Remnant vegetation within the study area has been historically degraded and isolated by previous land uses. The highest quality vegetation occurs along the south-western boundary, which becomes more edge affected to the east. The study area provides a narrow strip of habitat connectivity between Wakehurst Parkway and the foreshore of Narrabeen Lagoon, linking larger patches of similar vegetation the east and west. Given the existing edge effects and fragmentation occurring within the study area it is not anticipated that the clearing of 1.6 ha of SOFF for the proposed works will further isolate or fragment this community.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

A register of critical habitat declarations is maintained under the TSC Act. To date, no critical habitat has been declared for SOFF.

The proposed works will not have an adverse effect on critical habitat (directly or indirectly).

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

To date there is no recovery plan or threat abatement plans identified by NSW OEH for SOFF.

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.

The proposed works within the study area are likely to result in the operation of two Key Threatening Processes listed on Schedule 3 of the TSC Act:

- Clearing of native vegetation – approximately 0.02 ha of SOFF would be cleared within the study area. This represent 9.1% of the occurrence of SOFF within the study area, and only 0.05% of the occurrence of SOFF in the locality. Clearing of native vegetation for the proposed works is not therefore considered likely to result in a significant reduction of SOFF within the study area or in locality.
- Invasion, establishment and spread of lantana – *Lantana camara* is already established in the more disturbed areas of SOFF in the study area. The clearing of the very small area of vegetation required for the proposed works is not considered likely to result in lantana further invading the patches of existing remnant vegetation.

Conclusion

The removal of the SOFF from within the study area is considered unlikely to result in a significant impact on the local occurrence of the EEC as:

- The 0.02 ha SOFF to be removed from the study area for the proposed works represents 9.1% of the total occurrence within the study area, and only 0.05% of the total occurrence in the locality.
- The SOFF within the study area forms a narrow corridor connecting larger patches of remnant vegetation to the east and west. The proposed works will requires the removal of only a very small portion of the community, with much of the vegetation within the study area to be retained. The proposed works will not therefore result in any further reduction in existing habitat connectivity in the locality.
- Although a number of KTP's have the potential to be triggered by the proposed development, it is unlikely that these will have a significant impact on SOFF.

A Species Impact Statement is therefore not required.