Appendix C

Assessments of Significance

Warriewood STP Buffer Area 3
Proposed Residential Development

Powerful Owl (*Ninox strenua*)

1 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

Ninox strenua (Powerful Owl) is found in the coastal areas and adjacent ranges of eastern Australia from South Australia to around Rockhampton in Queensland, generally within 200km from the coast. Within NSW, Powerful Owls are distributed throughout the length of the Great Dividing Range, which is their stronghold, and extend from the coast to the western slopes where they occur in much lower numbers. The Powerful Owl inhabits a wide range of vegetation types from wet Eucalypt forests with a Rainforest understorey to Dry Open Forests and Woodlands (DECC, 2006). The species has been recorded utilising disturbed habitats such as exotic pine plantations and large trees in parks and gardens. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands (DECC, 2006).

The Powerful Owl is the largest predator of nocturnal forest-dwelling animals in Australian forests. Major prey species in NSW forests are the Greater Glider, Common Ringtail Possum, Sugar Glider, Grey-headed Flying-fox, and several species of diurnal birds, including the Pied Currawong, Magpie and Lorikeets. As most prey species require hollows and a shrub layer, these are important habitat components for the owl (DECC, 2006).

It rests during the day amid thick foliage, often grasping food-remains. The male of the species employs a slow, far-carrying ‘whoo-hoo’ call, more deliberate than the females call, which is higher pitched with the second note slightly higher than the first. Powerful Owls nest in a slight depression in the wood-mould on the base of a cavity in a large old tree, sometimes in excess of 25 metres above the ground. The breeding season of the Powerful Owl is highly synchronised, being strictly winter breeders. One or two young are produced, although some pairs do not breed in every year. Pairs appear to mate for life and occupy exclusive territories which range from 400-1450 hectares (DECC, 2006). During the breeding season, the male Powerful Owl roosts in a "grove" of up to 20-30 trees, situated within 100-200 metres of the nest tree where the female shelters.

The Powerful Owl has been recorded in many National Parks and State Forests throughout NSW (DECC, 2006). There have been 25 records of the species occurring within 10 km of the subject site. One individual of this species was recorded on the subject site in the current survey. The individual was observed roosting in the Casuarina trees located adjacent to Boondah Rd. The subject site is considered to have moderate to high foraging habitat, and moderate to high roosting habitat potential.

The areas of habitat within the subject site include the ‘Swamp Sclerophyll Forest’ and some sections of the Poplar Forest and the Cleared and Disturbed areas. While a small section of the ‘Swamp Sclerophyll Forest’ is proposed to be cleared, the majority of the community will be preserved within the buffer areas under the current proposal, as is a section of the Poplar Forest. These areas form the best habitat on-site for this species as they support roosting areas and foraging areas. In particular, the hollows within some of the Poplar trees provide important shelter areas for prey species such as possums.

It is highly unlikely that a “viable local population” inhabits the site on a permanent basis, given the very large home range of this species and availability of suitable habitat in the locality. Also, important aspects of this species biology will not be affected by this proposal including foraging and roosting. A local population of the Powerful Owl is not likely to be significantly or adversely affected by the proposed works, given:

- the species has a very large home range and can utilise the suitable habitat in adjoining areas, and may not inhabit the site on a permanent basis;
- areas of roosting and foraging habitat are to be preserved; and

- the species is highly mobile, which means that the probability of harm to individuals during construction works is negligible.

On the basis of the above factors, the proposed activity is not likely to disrupt the lifecycle, place at risk, or cause the extinction of a "viable local population" of the Powerful Owl.

2 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

The TSC Act defines an "endangered population" as "a population specified in Part 2 of Schedule 1" of the Act. The Powerful Owl is not part of an "endangered population", as defined under the TSC Act.

3 in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

a) 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

b) 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

The TSC Act defines an "endangered ecological community" as "a community specified in Part 3 of Schedule 1" of the Act, and a "critically endangered ecological" as "a community specified in Part 2 of Schedule 1a of the Act. The Powerful Owl does not form part of an "endangered ecological community", as defined under the TSC Act.

4 in relation to the habitat of a threatened species, population or ecological community:

a) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

b) 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

c) 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,

Currently, the majority of potential habitat for the Powerful Owl is restricted to conservation reserves and State forests; although they also occur within large areas of forest on other public lands and on private land, including suburban bushland. The Powerful Owl has been recorded in many national parks and State forests throughout its range in NSW (DEC, 2006).

Aspects of the current proposal which may modify or remove Powerful Owl habitat include loss of potential foraging habitat through removal or modification of native and exotic species. However, areas of potential foraging habitat will also be retained in the current proposal in the riparian buffer areas along the southern and south-western boundaries of the subject site.

Considering the proximity of the proposal to an urban area, the mobility of the species and the relatively small areas of habitat in question, it is considered unlikely that the proposal will result in known or potential habitat becoming isolated from currently interconnecting or proximate areas of habitat. While the proposed development will result in the removal of a very small area of potential foraging habitat for this species, large areas of similar habitat are available within the nearby Garigal National Park, Ku-ring Gai National Park, and the Warriewood Wetlands. The proposed development will not have any impact on the local or regional habitat of the Powerful Owl and the long-term survival of the species will not be impacted.

5 whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The TSC Act defines "critical habitat" as "habitat declared to be critical habitat under Part 3 of the Act. No critical habitat has been listed for the Powerful Owl and there is no critical habitat of relevance to the subject site.

6 whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

There is a Recovery Plan for Large Forest Owls (DECC, 2006) which includes the Powerful Owl. The proposed development is not inconsistent with the objectives of these plans. This Recovery Plan discusses the need to mitigate the effects of development on significant habitat for these owls, and due to the large areas of nearby habitat this objective is not considered relevant to this proposal. Importantly, much of the area in which the individual was located on the subject site is to be preserved under the current proposal, in its current state along the southern and south-western boundary. As such, the proposal has implemented measures in order to reduce adverse affects on the species.

7 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.

A "threatening process" is defined under the TSC Act as "a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities". Further to that, "key threatening processes" are threatening processes specified in Schedule 3 of the Act.

The following Key Threatening Processes are considered relevant to the Powerful Owl:

- Clearing of native vegetation;
- Removal of dead wood and dead trees;
- Loss of hollow bearing trees;
- Competition from feral honeybees;
- Predation by the fox and the feral cat; and
- Ecological consequences of high frequency fires.

Clearing of native vegetation for the purposes of construction will occur as part of the current proposal, as will the removal of dead wood and dead trees, and hollow bearing trees. The Recovery Plan lists vegetation clearing as a threat. However, clearing of vegetation as part of the current proposal will mostly be limited to exotic planted species with a small amount of native vegetation to be removed. Development will be restricted to minimise harm to any hollow bearing trees. The remaining vegetation

within the riparian area will be conserved and may also act as suitable foraging and roosting habitat for this species.

High frequency fire is not part of the proposal for the subject site. Hazard reduction burns and/or bushfires may have occurred in the past in this area, and may have already altered the habitat to varying degrees. Creation of a APZ, as described in the body of the report, will act to mitigate the effect of fire on the vegetation of the site.

Predation and competition will not be increased by the current proposal.

Conclusion

In light of the consideration of the above seven factors (a to g), the proposed activity on the subject site is not "likely" to impose "a significant effect" on the vulnerable species Powerful Owl, as:

- the proposal will not compromise the viability of a "local population" through impact on the species;
- the proposal will not involve the removal or modification, fragmentation or isolation of a "significant area of known habitat" for the species; and
- the proposal will not involve the removal of substantial roosting habitat, and the removal of potential habitat will be limited in the study area or subject site.

Barking Owl (*Ninox connivens*)

1 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

Ninox connivens Barking Owl is listed as a Vulnerable species under Part 1 of Schedule 1 of the *Threatened Species Conservation Act 1995* (TSC Act).

The Barking Owl is sparsely distributed throughout Australia. Its population is concentrated to the north and radically declines to the south. Barking Owls are restricted to coastal plains and woodlands, preferring mature woodland and forests, rich in biodiversity. They are absent within the central arid habitats and in dense wet forests along the coast particularly in South Australia. Barking Owls inhabit dense understorey canopy along creek lines, roosting in Casuarina and Acacia species. Large eucalyptus trees are used as foraging substrata for prey items, gliders & possums, hollows are used for nesting. Prey items may also consist of invertebrates and ground mammals, even pest species such as the rabbit.

Barking Owls have a large territory, ranging from 30 to 200 hectares depending if a pair or sole owl is present. Fauna surveys within Pittwater Council have identified 9 recordings of Barking Owls utilising Coastal Valley Grassy Woodlands dominated by Grey Box, Forest Red Gum and Melaleuca species.

The subject site is considered to have moderate to high foraging capacity for Barking Owls and a moderate to high roosting habitat potential. Under the current proposal 714 trees are designated for removal; 646 form a remnant Poplar plantation, of which, some are labelled as potential hollow bearing trees, a further 43 *Casuarina glauca* beyond the core riparian zone are destined for removal, these contribute towards an EEC, the Swamp Sclerophyll Forest.

The Swamp Sclerophyll Forests is capable of supporting roosting sites for Barking Owls. Poplar tree hollows are an adequate substitute provided the absence of large eucalyptus hollows for nesting. Appropriate nesting locations are available outside the subject site. Garigal and Ku-ring-gai National Parks contain extensive continuous habitats suitable for nesting opportunities for the Barking Owl. The presence of Barking Owls within 5km of the subject site assumes foraging potential within the surrounding urban location.

40 Poplar trees have significant habitat potential these will be marked by fluro tape. A qualified wildlife handler will inspect hollows prior to removal. The removal of such trees is significant for arboreal species, in particular the prey items, gliders and possums.

It is highly unlikely that a “viable local population” inhabits the site on a permanent basis, given the very large home range of this species and availability of suitable habitat in the locality. Also, important aspects of this species biology will not be affected by this proposal including foraging and roosting. A local population of the Barking Owl is not likely to be significantly or adversely affected by the proposed works.

2 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

The TSC Act defines an “endangered population” as “a population specified in Part 2 of Schedule 1” of the Act. The Barking Owl is not part of an “endangered population”, as defined under the TSC Act.

3 in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

a) 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

b) 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

The TSC Act defines an "endangered ecological community" as "a community specified in Part 3 of Schedule 1" of the Act, and a "critically endangered ecological" as "a community specified in Part 2 of Schedule 1a of the Act. The Barking Owl does not form part of an "endangered ecological community", as defined under the TSC Act.

4 in relation to the habitat of a threatened species, population or ecological community:

a) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

b) 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

c) 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 proposed removal of over-mature Poplar trees and selected *Casuarina glauca* from the Swamp Sclerophyll Forest does not amount to significant potential habitat for the Barking Owl. Barking Owls require a large continuous woodland or forest habitat with large eucalyptus species and a dense understorey for roosting. The study area is predominately exotic grasslands and remnant Casuarina species along Boondah Raod and the riparian corridor.

Foraging opportunities in disturbed environments attract predator species such as the Barking Owl. Appropriate habitat is selected on the availability of food items and sheltering opportunities. Common prey identified during the current nocturnal survey include; Common Ringtail and Brushtail Possums and Rabbits. Suitable nesting and sheltering opportunities are located within protected reserves and parks in close proximity to the subject site. The removal of the Casuarina and Poplar trees has potential to reduce foraging opportunities in the area with the displacement of its prey items and foraging substrata. The retention of the core riparian buffer vegetation is significant for foraging opportunities for the Barking Owl.

Barking Owls patrol a large foraging territory of fragmented and continuous habitats. The core buffer zone adjacent to Fern Creek assists in the movement of fauna species between habitats. Removal of the Poplar and Casuarina trees will not impact on this core riparian zone and cause fragmentation of habitats.

The proposed actions will not cause the significant fragmentation of habitats or impact the long-term survival of the Barking Owl.

5 whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The TSC Act defines "critical habitat" as "habitat declared to be critical habitat under Part 3 of the Act. No critical habitat has been listed for the Barking Owl and there is no critical habitat of relevance to the subject site.

6 whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

A Draft Recovery Plan was issued by the NPWS (1993) for the Barking Owl (NPWS, 1993) under the TSC Act 1995. The Recovery Plan was endorsed after the significant reduction in Barking Owls population within NSW (NPWS, 1993). An updated recovery plan was issued in 2006. Priority action plans include the understanding of the ecology, habitat requirements and protection of known or potential habitat, in particular tree hollows in woodland and forest habitat. The construction plans are not consistent with the establishment of habitat and retention of hollow bearing trees. It is not appropriate to consider the poplar trees deemed for removal capable of offering the appropriate habitat requirements for the Barking Owls. The same can be considered for the removal of Casuarina trees with a significant strand to be retained and enhanced for continual riparian corridor establishment throughout the site. As previously mentioned, the habitat requirements for the Barking Owl were not identified within the subject site. Appropriate habitat is located outside the subject site within protected areas.

7 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.

A “threatening process” is defined under the TSC Act as “a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities”. Further to that, “key threatening processes” are threatening processes specified in Schedule 3 of the Act.

The following Key Threatening Processes are considered relevant to the Barking Owl:

- Clearing of native vegetation;
- Removal of dead wood and dead trees;
- Loss of hollow bearing trees;
- Competition from feral honeybees;
- Forest Eucalyptus dieback associated with over abundant psyllids and Bell-miners;
- Predation by the fox and the feral cat; and
- Ecological consequences of high frequency fires.

Clearing of native vegetation for the purposes of construction will occur as part of the current proposal as will the removal of dead wood and dead trees, and hollow bearing trees. The Recovery Plan lists vegetation clearing as a threat. However, clearing of vegetation as part of the current proposal will mostly be limited to exotic planted species with a small amount of native vegetation to be removed. Development will be restricted to minimise harm to any hollow bearing trees. The remaining vegetation within the riparian area will be conserved and may also act as suitable foraging and roosting habitat for this species.

High frequency fire is not part of the proposal for the subject site. Hazard reduction burns and/or bushfires may have occurred in the past in this area, and may have already altered the habitat to varying degrees. Creation of a APZ, as described in the body of the report, will act to mitigate the effect of fire on the vegetation of the site.

Predation and competition will not be increased by the current proposal.

Conclusion

In light of the consideration of the above seven factors (a to g), the proposed activity on the subject site is not “likely” to impose “a significant effect” on the vulnerable species Barking Owl, as:

- the proposal will not compromise the viability of a “local population” through impact on the species;
- the proposal will not involve the removal or modification, fragmentation or isolation of a “significant area of known habitat” for the species; and
- the proposal will not involve the removal of substantial roosting habitat, and the removal of potential habitat will be limited in the study area or subject site.

Swift Parrot (*Lathamus discolor*)

1 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

Lathamus discolour Swift Parrot is listed as an Endangered species under Part 1 of Schedule 1 of the *Threatened Species Conservation Act 1995* (TSC Act) and federally under the EPBC Act.

The Swift Parrot is a migratory bird, commuting between its breeding grounds in Tasmania to its winter feeding locations along the coast of south-eastern Australia. Its mainland distribution has been mapped as a narrow band along coastal Victoria to southern Queensland and an isolated location within eastern South Australia. The Swift Parrot is a resident of the NSW region, preferring the inland slopes of the Great Dividing Range and occasionally occurs in the Sydney region and Wollongong and the northern and southern coasts (Garnett and Crowley 2000, Swift Parrot Recovery Team 2001, DECC 2009).

The Swift Parrots semi-nomadic distribution reflects the flowering patterns of eucalyptus species; *Eucalyptus robusta* Swamp Mahogany, *Corymbia maculata* Spotted Gum, *C. gummifera* Red Bloodwood*, Eucalyptus moluccana* Grey Box and *E. pilularis* Blackbutt (Higgins 1999, Garnett and Crowley 2000, Swift Parrot Recovery Team 2001). Habitat supporting Swift Parrots are described as box-ironbark forest and woodland inland of the Great Dividing Range. Dominant canopy trees *Eucalyptus microcarpa* Grey Box and Mugga Ironbark *Eucalyptus sideroxylon* within these habitats provide essential prolific flowering and lerp (sap-suckers) feeding opportunities. Habitat distributions within lowland coastal environments relies on *Eucalyptus robusta* Swamp Mahogany, *Corymbia maculata* Spotted Gum and *Corymbia gummifera* Red Bloodwood.

Nesting occurs in within 8km of the coast in small hollow bearing eucalyptus species in mature old growth forest dominated by *E. globulus* Tasmanian Blue Gum, although foraging is preferred within grassy/shrubby habitats.

Mainland foraging strategies are consistent with larger eucalyptus trees providing abundant nectar supplies (Swift Parrot Recovery Team 2001). Occasionally the Swift Parrot forages on the ground for fallen seeds and to drink (Higgins 1999). Reliable documentation of routine feeding cycles within Ku-ring-gai and Lane Cove National Park are consistent with flowering availability. Street and trees within privately owned lands are also substituted for the foraging as land clearing practices have impacted on this species.

NPWS records have indicated seven sighting of Swift Parrots within a 5km radius of the Subject Site. The removal of Casuarina and Poplar trees in light of the literature review are not considered significant habitat or foraging trees for the Swift Parrot. The proposed actions for tree removal and development plans are highly unlikely to have an adverse effect on the life cycle of the Swift Parrot such that a viable local population is likely to be placed at risk of extinction.

2 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

The TSC Act defines an “endangered population” as “a population specified in Part 2 of Schedule 1” of the Act. The Swift Parrot is not part of an “endangered population”, as defined under the TSC Act.

3 in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

a) 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

b) 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

The TSC Act defines an "endangered ecological community" as "a community specified in Part 3 of Schedule 1" of the Act, and a "critically endangered ecological" as "a community specified in Part 2 of Schedule 1a of the Act. The Swift Parrot does not form part of an "endangered ecological community", as defined under the TSC Act.

4 in relation to the habitat of a threatened species, population or ecological community:

a) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

b) 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

c) 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 fragmentation and degradation of the riparian habitat adjacent to and at the south-east corner of the subject site contains a medium level of potential habitat or foraging trees suitable for the Swift Parrot. Removal of the native and exotic plantation trees (i.e. Casuarina and Poplar) is highly unlikely to impact the foraging opportunities or sheltering for Swift Parrots. As previously mentioned foraging has been observed within Ku-ring-gai and Lane Cove National Park and in garden eucalyptus trees. Of the three native species recorded on site *Eucalyptus botryoides* Bangalay, *Angophora costata* Sydney Red Gum and *Casuarina glauca* to be removed, none are considered as critical foraging trees. As a result, the long-term survival of the Swift Parrot in the locality is unlikely to be affected as a result of the proposed action.

5 whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The TSC Act defines "critical habitat" as "habitat declared to be critical habitat under Part 3 of the Act. No critical habitat has been listed for the Swift Parrot and there is no critical habitat of relevance to the subject site.

6 whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

The overall objectives of the *Swift Parrot Recovery Plan* (Swift Parrot Recovery Team 2001) are "to change the conservation status of the swift parrot from endangered to vulnerable within 10 years" and "to achieve a demonstrable sustained improvement in the quality of swift parrot habitat to increase carrying capacity".

The removal of the Casuarina and Poplar trees do not comprise a significant area of winter foraging habitat for the species within the locality, and is therefore not inconsistent with the objective of this management plan.

7 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 TSC Act defines a 'key threatening process' as 'a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities'. Schedule 3 of the TSC Act provides a list of the 'key threatening processes' (KTP). Of the KTP's listed in Schedule 3 of the TSC Act the following will occur as a result of the proposed action and may impact the Swift Parrot:

- *Clearing of native vegetation*. The destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation. This may result in habitat degradation of loss, population fragmentation and habitat disturbance facilitating the establishment of weeds. Clearing of native vegetation has been identified as a threat to the Swift Parrot

As mentioned previously, the proposed action includes the removal of native species for the construction of the proposed development is not considered critical feed trees for Swift Parrots. The trees proposed to be removed do not comprise "sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation". The removal of these trees is unlikely to result in the habitat degradation or loss, population fragmentation or habitat disturbance for the Swift Parrot.

Conclusion

In light of the consideration of the above seven factors (1 -7), the proposed activity on the subject site is not likely to have "a significant effect" on the Swift Parrot on the subject site or wider locality as a result of the current proposal, as:

- The proposal will not adversely affect the lifecycle of the species;
- the proposal will not compromise the viability of a "local population" through impact on the species;
- The proposal will not remove, modify or further fragment or isolate a significant area of habitat for the species; and
- The proposal does not significantly contribute to any KTP threatening the species.

Consequently, a Species Impact Statement is not required to be prepared.

Grey-headed Flying-fox (*Pteropus poliocephalus*)

1 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

Pteropus poliocephalus Grey-Headed Flying-Fox is listed as a Vulnerable species under Part 1 of Schedule 2 of the *Threatened Species Conservation Act 1995* (TSC Act) and as Vulnerable at a National level under the EPBC Act.

Pteropus poliocephalus Grey-headed Flying-fox is distributed within 200km from the east Australian coastline, from Bunderberg in Queensland to the north to Melbourne in Victoria to the south. Locations are generally restricted to the eastern slopes of the Great Dividing Range within subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps habitats. In urban areas the Grey-headed Flying-fox regularly utilises cultivated fruit crops and metropolitan gardens.

Grey-headed Flying-foxes form 'bat camps' along gullies in close proximity to creeks and rivers to rear their young and daily roosting. Camps may number up to tens of thousand and are dependent on a reliable source within 20km. However, foraging distances of 50km recorded by individuals in one night.

Diet typically comprises a wide variety of flowering and fruiting plants (Tidemann 1995, Churchill 1998), in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. Non-indigenous and exotic tree species introduced to the urban landscape provide additional foraging habitat for this species within the locality; where previously existed a period of reduced availability of native food resource during the winter months, non-native species now supply food resources throughout the year (Parry-Jones & Augee 2001, Williams et al 2006).

The Grey-Headed Flying Fox occurring within 10km the subject site were obtained from the Department of Environment and Climate Change (DECC) Wildlife Atlas database. This high incidence is most likely due to the close proximity of the nearest known roosting camp to the subject site.

The closest known roosting camp to the subject site is located at located at Gordon, approximately 15km to the south-west of the subject site. Other roosting camps are located within the Botanic Gardens at Farm Cove to the south-east, and Cabramatta Creek in Cabramatta to the south-west. Habitat features of the subject site which may support the Grey-Headed Flying-Fox include some potential foraging habitat provided by a number of exotic and native trees located on the subject site. The subject site does not support roosting habitat for this species. The proposed actions include the removal of four possible feed trees *Angophora costata* Sydney Red Gum and *Eucalyptus botryoides* Bangalay.

The trees proposed to be removed however do not comprise a significant area of foraging habitat within the locality for the Grey-Headed Flying Fox. Sheldon Forest, Rofe Park, Lane Cove National Park together with smaller parks and reserves in the locality contain an abundance and diversity of potential foraging habitat for the Grey-Headed Flying-Fox. Street and garden trees in the locality offer further foraging habitat to the species. As a result, the proposed actions are highly unlikely to have an adverse effect on the life cycle of the Grey-Headed Flying-Fox such that a viable local population is likely to be placed at risk of extinction.

2 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

The TSC Act defines an "endangered population" as "a population specified in Part 2 of Schedule 1" of the Act. The Grey-headed Flying-fox is not part of an "endangered population", as defined under the TSC Act.

3 in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

a) 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

b) 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

The TSC Act defines an "endangered ecological community" as "a community specified in Part 3 of Schedule 1" of the Act, and a "critically endangered ecological" as "a community specified in Part 2 of Schedule 1a of the Act. The Grey-headed Flying-fox does not form part of an "endangered ecological community", as defined under the TSC Act.

4 in relation to the habitat of a threatened species, population or ecological community:

a) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

b) 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

c) 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 proposed actions involve large scale removal of exotic poplar plantations and native trees located on the subject site. Four native feed trees are also proposed for removal for the construction actions and five planted *Callistemon viminalis* shrubs.

The Grey-headed Flying-fox is a regular visitor to landscaped gardens to supplement their diet. Foraging in highly fragmented urban environments is an important requirement when native alternatives are not available. Foraging opportunities are available within Sheldon Forest, Rofe Park, Lane Cove National Park and other nature reserves in close proximity to the Gordon colony. The proposed removal of the flower producing trees from the subject site is not likely to further fragment or isolate foraging habitat of this species as such trees do not comprise a significant area of foraging habitat within the locality.

The long-term survival of the Grey-Headed Flying Fox in the locality is unlikely to be affected by the removal of native and exotic trees from the subject site that may offer an occasional foraging resource. The trees proposed to be removed do not comprise a significant area of foraging habitat within the locality.

5 whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The TSC Act defines "critical habitat" as "habitat declared to be critical habitat under Part 3 of the Act.

No area has been designated as 'critical habitat' under Part 3 of the TSC Act 1995 for the Grey-Headed Flying-Fox.

6 whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

There is currently no Recovery Plan in place for the Grey-Headed Flying-Fox. There are no Threat Abatement Plans currently in operation for any Key Threatening Processes threatening the Grey-Headed Flying-Fox.

7 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 TSC Act defines a 'key threatening process' as 'a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities'. Schedule 3 of the TSC Act provides a list of the 'key threatening processes' (KTP). Of the KTP's listed in Schedule 3 of the TSC Act the following will occur as a result of the proposed action and may impact the Grey-Headed Flying-Fox:

- *Clearing of native vegetation*. The destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation. This may result in habitat degradation of loss, population fragmentation and habitat disturbance facilitating the establishment of weeds. Clearing of native vegetation has been identified as a threat to the Grey-Headed Flying-Fox.

As mentioned previously, the proposed action includes the removal of several trees (exotic and native species), some of which may offer an occasional foraging resource to this species. The trees proposed to be removed do not comprise "sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation". The subject site does not support any stand or party or fully structured native vegetation as such. The removal of such trees is unlikely to result in his may result in habitat degradation or loss, population fragmentation or habitat disturbance for the Grey-Headed Flying-Fox.

Conclusion

In light of the consideration of the above seven factors (1 -7), the proposed activity on the subject site is not likely to have "a significant effect" on the Grey-Headed Flying-Fox on the subject site or wider locality as a result of the current proposal, as:

- The proposal will not adversely affect the lifecycle of the species;
- The proposal will not remove, modify or further fragment or isolate a significant area of habitat for the species; and
- The proposal does not significantly contribute to any KTP threatening the species.

Consequently, a Species Impact Statement is not required to be prepared.

Regent Honeyeater (*Xanthomyza phrygia*)

1 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

Xanthomyza phrygia (Regent Honeyeater) is listed as an Endangered species under the *Threatened Species Conservation Act* in NSW and EPBC Act at a National Conservation status.

The distribution of the Regent Honeyeater has declined considerably in the last 30 years. The current distribution of the Regent Honeyeater is contained to the inland slopes of south-east Australia from Kangaroo Island to Rockhampton in Queensland (Slater et al, 1990). Breeding is patchy across Capertee Valley and the Bundarra-Barraba region NSW. The Regent Honeyeaters specific habitat preference for Box-Ironbark species restricts its distribution to temperate woodlands and open forests. Additionally *Casuarina cunninghamiana* dominated riparian forests are also a preferred habitat.

Non-breeding nomadic flocks congregate at coastal woodlands and forests travelling 100km from their nesting locations. Critical habitat occurs along the Central Coast and Hunter Valley regions providing essential food during drought periods (DEWHA, 2009).

Foraging for nectar is generally from eucalyptus and mistletoe species, substituted by lerp and honeydew. Larger eucalyptus trees are selected to yield optimal amounts of flowers. Foraging occurs within the upper branches and a general strategy of selecting one large feed tree over several smaller trees is observed (DEWHA 2009). Preference for abundant mistletoe species limits the distribution of the Regent Honeyeater to mature forests with a high canopy cover and a rich floristic assemblage. Dense undergrowth is considered important for foraging Regent Honeyeaters for additional food resources and shelter.

The Regent Honeyeater nesting preference is partial to fork trees or horizontal branches of mature eucalyptus or Casuarina species. Locations are typically contained within shrubby understorey suitable for protection, nesting material and food availabilities.

The proposed actions include the removal of flowering producing species; five *Callistemon viminalis* species, not considered indigenous to the vegetation community and a single *Eucalyptus botryoides* Bangalay. These species offer limited foraging opportunities to individuals and not considered suitable for a viable local population.

After investigation into the habitat requirements of the Regent Honeyeater and the habitat present within the subject site it is considered that the area does not support a significant area in the life cycle of the species. An absence of eucalyptus trees and mistletoe will not sustain a local viable population or assist in foraging opportunities for populations within the wider region. Alternative food sources such as lerp and honeydew are not present on site given the absence of box eucalyptus species. The proposed actions are highly unlikely to adversely effect the life-cycle of the Regent Honeyeater such that the local viable population leads to extinction.

2 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

The TSC Act defines an “endangered population” as “a population specified in Part 2 of Schedule 1” of the Act. The Regent Honeyeater is not part of an “endangered population”, as defined under the TSC Act.

3 in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

a) 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

b) 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

The TSC Act defines an "endangered ecological community" as "a community specified in Part 3 of Schedule 1" of the Act, and a "critically endangered ecological" as "a community specified in Part 2 of Schedule 1a of the Act. The Regent Honeyeater does not form part of an "endangered ecological community", as defined under the TSC Act.

4 in relation to the habitat of a threatened species, population or ecological community:

a) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

b) 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

c) 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,

As previously mentioned, the proposed actions involves; the removal of a significant number of exotic Poplar trees, native species including *Casuarina glauca*, three *Angophora costata* Sydney Red Gum, one *Eucalyptus botryoides* Bangalay and limited other exotic species. The foraging potential of the subject site is limited; habitat is described as poor, degraded and the majority has been previously cleared. A large percentage of the standing trees were planted and a high level of weed infestation was identified during floristic surveys.

The subject site is currently fragmented from other habitats through current land practices and housing development, although connection with the wetlands, the Fern Creek corridor and the site to the east across Boondah Rd persists. The Warriewood Wetlands located on the adjacent site is considered a regionally significant habitat and remains interlinked with other habitats through Fern Creek. A 20m Core Riparian Zone will be retained along Fern Creek to minimise the risk of fragmentation between habitats and aid in the dispersal of flora and fauna species. The removal of the trees according to the proposal would not impend on these interlinking habitats and cause the fragmentation or the isolation of Regent Honeyeater populations.

5 whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The TSC Act defines "critical habitat" as "habitat declared to be critical habitat under Part 3 of the Act. No critical habitat has been listed for the Regent Honeyeater and there is no critical habitat of relevance to the subject site.

6 whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

A recovery plan for the Regent Honeyeater has priorities 40 strategic action plans for the protection and management of the species. The main objective is to better manage critical habitats and establish

co-operative agreements with land owners. A high priority is an understanding of the species migratory patterns during foraging. Relevant priorities include;

- ensure Regent Honeyeater habitat on Public Land is managed appropriately;
- promote best practise natural resource management throughout the range of the species; and
- protect and enhance habitat containing 'significant habitat'.

The removal of the Casuarina and Poplar trees do not comprise a significant area of winter foraging habitat for the species within the locality, and is not inconsistent with the objective of this management plan.

7 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.

A "threatening process" is defined under the TSC Act as "a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities". Further to that, "key threatening processes" are threatening processes specified in Schedule 3 of the Act.

The following Key Threatening Processes are considered relevant to the Regent Honeyeater:

- Clearing of native vegetation;
- Removal of dead wood and dead trees;
- Loss of hollow bearing trees;
- Competition from feral honeybees;
- Predation by the fox and the feral cat; and
- Ecological consequences of high frequency fires.

The removal and clearing of trees and hollows for the proposed construction footprint occurs beyond the breeding habitats of the Regent Honeyeater. Therefore it does not constitute towards the removal of breeding habitats, a key threatening process on the survival of the Regent Honeyeater. The risk of European Red Fox (*Vulpis vulpis*) predation is not considered to increase with the proposed construction.

Conclusion

In light of the consideration of the above seven factors (1 -7), the proposed activity on the subject site is not likely to have "a significant effect" on the Swift Parrot on the subject site or wider locality as a result of the current proposal, as:

- The proposal will not adversely affect the lifecycle of the species;
- The proposal will not remove, modify or further fragment or isolate a significant area of habitat for the species; and
- The proposal does not significantly contribute to any KTP threatening the species.

Consequently, a Species Impact Statement is not required to be prepared.

Black Bittern (*Ixobrychus flavicollis*)

1 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

Ixobrychus flavicollis Black Bittern is listed as a Vulnerable species under Part 1 of Schedule 2 of the *Threatened Species Conservation Act 1995* (TSC Act).

The Black Bittern inhabits terrestrial wetlands and estuaries from southern NSW to Cape York in the north and north-west across to the Kimberley (Marchant & Higgins, 1990). Sighting of the Black Bittern in Sydney coastal areas are rare, with limited sightings recorded beyond Sydney to the south or inland (DECC 2009). Dense riparian vegetation fringing permanent water-bodies provides opportunistic foraging; they appear to display a distinct avoidance toward open areas. Habitat varies between billabongs, woodland rivers and swamps, grasslands, mangroves and rainforests (Marchant & Higgins, 1990).

The Black Bittern is a solitary hunter outside the breeding season. Adult birds will pair during December to March with both parents contributing towards the feeding and nesting responsibilities. Large nests are built from a collection of reeds and sticks on branches over hanging the water-body and typically three to five young are raised. Diet consists primarily of aquatic species; frogs, reptiles, fish and invertebrates. Foraging is usually conducted at dusk and continues into the night, while daylight hours are spent roosting in trees or in reeds.

The distribution of the Black Bittern has significantly declined in the past 50 years. Changes to the natural flow regime and clearing of riparian vegetation are a major contributing factor. The behaviour of this species is still not fully understood with some scientists speculating a possible migratory pattern although most populations display a sedentary lifestyle (Marchant & Higgins, 1990).

Populations have been identified within 10km of the subject site with recordings concentrated around the Warriewood Wetlands, Narrabeen Lagoon and its tributaries, although no formal sightings were within Fern Creek. Degradation and infestation of exotic species within Fern Creeks riparian corridor does not contribute towards a suitable foraging or nesting habitat for the Black Bittern. Preference for dense reeds for foraging and sheltering may deter the Black Bittern from utilising the creek. The proposed clearing of vegetation within the construction footprint will not remove possible roosting trees. If a viable population of the Black Bittern exists within the locality, it is considered that the proposed actions, including vegetation removal and construction will not place the population at risk of extinction. The suitable habitat within the riparian areas adjoining the site will be protected, and mitigation measures include monitoring for the presence of pairs during the breeding season, and the regeneration and reconstruction of buffer areas between the wetland and the development footprint.

2 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

The TSC Act defines an “endangered population” as “a population specified in Part 2 of Schedule 1” of the Act. The Black Bittern is not part of an “endangered population”, as defined under the TSC Act.

3 in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

a) 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

b) 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

The TSC Act defines an "endangered ecological community" as "a community specified in Part 3 of Schedule 1" of the Act, and a "critically endangered ecological" as "a community specified in Part 2 of Schedule 1a of the Act. The Black Bittern does not form part of an "endangered ecological community", as defined under the TSC Act.

4 in relation to the habitat of a threatened species, population or ecological community:

a) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

b) 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

c) 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,

As previously mentioned the habitat criteria for the Black Bittern requires dense reeds and fringing trees adjoining a permanent water-body. Thick bordering vegetation along tidal zones is also considered suitable habitat. Overhanging branches are important for nesting and retreat when startled. Nesting occurs in a secluded location and both parents will roost in nearby trees during the day.

Floristic surveys within the riparian vegetation described the habitat as disturbed with a dominant canopy of *Casuarina glauca* and understorey of exotic species. The presence of *Typha orientalis* provides suitable foraging and sheltering opportunities for the Black Bittern.

The Black Bittern is a known visitor the Warriewood Wetlands. Clearing and development within the subject site may possibly create fragmentation of the riparian corridor for movement of the Black Bittern between habitats. Temporary disturbance from construction noise may occur during nesting opportunities. It is unclear whether the Black Bittern breeds within the wetlands or substitutes its foraging areas with Warriewood Wetlands.

The proposed removal of *Casuarina glauca* will not occur within the core buffer zone. Removal of fringing native vegetation along Fern Creek will not occur as part of the proposed construction. A core wetland buffer zone of 20m, a requirement under the *Water Management Act 2000*, and the Fern Creek Public and Private corridor will assist in protection of more suitable habitat located within the wetlands away from the subject site. Assessment of the 'Swamp Sclerophyll Forest' trees within the subject site confirmed that there is an absence of branches overhanging the wetland, the habitat preferred by the Black Bittern. The long-term survival of the Black Bittern will not be adversely impacted with the selective removal of some trees outside the core riparian zone.

5 whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The TSC Act defines "critical habitat" as "habitat declared to be critical habitat under Part 3 of the Act. No critical habitat has been listed for the Black Bittern and there is no critical habitat of relevance to the subject site.

6 whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

The priority action plan for the Black Bittern recommends that riparian habitat and vegetation should be retained and managed accordingly. The proposed actions will retain a core riparian zone of 20m in the south as requested by Pittwater Council and an additional 10m Buffer zone to protect the riparian vegetation and Fern Creek. No construction or removal of native vegetation is proposed within this location. The monitoring of the 'Swamp Sclerophyll Forest' habitat is recommended during the breeding season (December to March) to survey for the presence of this species.

7 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.

A "threatening process" is defined under the TSC Act as "a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities". Further to that, "key threatening processes" are threatening processes specified in Schedule 3 of the Act.

The following Key Threatening Processes are relevant for the Black Bittern;

- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands
- Clearing of native vegetation;
- Invasion and establishment of exotic vines and scramblers;
- Invasion, establishment and spread of *Lantana camara;*
- Invasion of native plant communities by exotic perennial grasses;
- Predation by *Gambusia holbrooki* Girard, 1859 (plague minnow or mosquito fish); and
- Predation by the European Red Fox (*Vulpes vulpes*).

Changes to riparian corridors are a threat to the Black Bittern population. Human-induced impacts have contributed towards changes in hydrological flow regimes and the establishment of invasive weeds within riparian corridors. Clearing of vegetation for construction and the introduction of pest species are also a key threatening process. Predation by the European Red Fox is a well documented concern for indigenous species. Pittwater Council regularly controls the local fox population through baiting programs and a trapping program held late 2009.

As mentioned previously, the proposed action includes the removal of several trees (exotic and native species), some of which contribute towards the riparian corridor. Removal of the trees is primarily limited to exotic species with some avoidable native species included. A buffer zone of 20m is to be retained for core riparian habitat.

Feral cats are also a threat to this species, and the control of feral cats within the Warriewood area should be part of an overall strategy for the locality.

Conclusion

In light of the consideration of the above seven factors (1 -7), the proposed activity on the subject site is not likely to have “a significant effect” on the Black Bittern on the subject site or wider locality as a result of the current proposal, as:

- The proposal will not adversely affect the lifecycle of the species;
- The proposal will not remove, modify or further fragment or isolate a significant area of habitat for the species; and
- The proposal does not significantly contribute to any KTP threatening the species.

Consequently, a Species Impact Statement is not required to be prepared.

Lesser Sand Plover (*Charadrius mongolus*)

1 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

Charadrius mongolus Lesser Sand Plover is listed as a Vulnerable species under Part 1 of Schedule 2 of the *Threatened Species Conservation Act 1995* (TSC Act).

The Lesser Sand Plover is a coastal migratory species, breeding in central and north east Asia. Arrival to Australia coincides with winter as the plovers traverse the east coast of Australia (Nielsen, 1971) stretching along the southern coastline. Higher densities occur within the Gulf of Carpentaria, Queensland and north NSW (DECC, 2007h). The presence of the Lesser Sand Plover within the southern NSW coast is increasingly rare event (Marchant & Higgins, 1993), with the Shoalhaven estuary the southern extent (DECC, 2007h). Their epic return journey is triggered by the onset of March with records of two waves of departure occurring, the second scheduled for early April (Marchant & Higgins, 1993).

The Lesser Sand Plover forages for molluscs, worms and crustaceans along sheltered beaches, estuaries and harbours with intertidal sand and mudflats (Marchant & Higgins, 1993; DECC, 2007h). Ground roosting above the high tide mark on sandy shores the Lesser Sand Plover is a highly sociable species gathering in excess of 100 individuals although foraging can be a solo event.

The Lesser Sand Plover distribution is restricted to rockplatforms, coral reefs, sandy shores and mudflats. One confirmed sighting of the Lesser Sand Plover within a 10km radius of the study site was located within the Long Reef Marine Reserve (NPWS, 2009). Another possible sighting recently recorded foraging within the Warriewood Wetlands, adjacent to the subject site. Warriewood Wetlands offers suitable foraging opportunities for the Lesser Sand Plover, although habitat within the study site is potentially low.

The proposed removal of exotic and native trees are not likely to have an adverse impact on the population of the Lesser Sand Plover or place the population at risk of extinction. Implementation of appropriate management strategies during the construction works for the proposed development will reduce the likelihood of any adverse impacts from sedimentation within Fern Creek and indirect impact on the population.

2 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

The TSC Act defines an “endangered population” as “a population specified in Part 2 of Schedule 1” of the Act. The Lesser Sand Plover is not part of an “endangered population”, as defined under the TSC Act.

3 in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

a) 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

b) 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

The TSC Act defines an "endangered ecological community" as "a community specified in Part 3 of Schedule 1" of the Act, and a "critically endangered ecological" as "a community specified in Part 2 of Schedule 1a of the Act. The Lesser Sand Plover does not form part of an "endangered ecological community", as defined under the TSC Act.

4 in relation to the habitat of a threatened species, population or ecological community:

a) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

b) 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

c) 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,

As previously mentioned, mapping of the study site did not identify estuarine environments suitable for the Lesser Sand Plover. The removal of 43 Casuarina species within the classified endangered ecological community, poplar plantation and other exotic species does not constitute potential habitat for the Lesser Sand Plover.

Indirect impacts on the Lesser Sand Plover populations through the increase in sedimentation and nutrient input from the proposed construction requires appropriate management strategies. Fern Creek meanders through the study site; it is a major tributary for the Narrabeen Lagoon which in turn is a regionally significant area. No recording of the Lesser Sand Plover have been recorded within the lagoon with issues of water quality, habitat degradation and high level of human traffic an issue for the population.

Implementation of the VMP will address issues of surface water runoff and sedimentation into Fern Creek. The *Water Management Act 2000* addresses the impact of proposed works within 40m of an estuary. The establishment of a 25m Private Buffer Stripe is a requirement of Pittwater 21 Development Control Plan along Fern Creek to reduce long-term impacts on the eec vegetation community and water quality within Fern Creek. Possible indirect impacts from sedimentation and nutrient enrichment from the proposed construction is not likely to adversely impact the habitat or feeding locations of the Lesser Sand Plover.

The proposed construction is not likely to impact the identified habitat of the Lesser Sand Plover, nor will it contribute to fragmentation of potential habitats or remove habitat suitable for the Lesser Sand Plover.

5 whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The TSC Act defines "critical habitat" as "habitat declared to be critical habitat under Part 3 of the Act. No critical habitat has been listed for the Lesser Sand Plover and there is no critical habitat of relevance to the subject site.

6 whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Three strategies have been identified for the Lesser Sand Plover within the PAS, the priority actions are as follows;

- Increase community awareness and understanding of migratory waders via promotion of the DEC threatened species website and other educational materials (e.g.. signage, brochures) and through the use of media. – LOW Priority

- Minimise human disturbance at identified key foraging sites (disturbance from 4WDs, recreational users, dog-walkers, fishermen etc.). – HIGH Priority

- Review survey data to identify key foraging sites for the Lesser Sand-plover along the NSW coast. AND Undertake regular 2-yearly coordinated survey to assess Lesser Sand-plover distribution and population size - MEDIUM Priority.

7 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.

A "threatening process" is defined under the TSC Act as "a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities". Further to that, "key threatening processes" are threatening processes specified in Schedule 3 of the Act.

The following Key Threatening Processes are considered relevant to the Lesser Sand Plover:

- Clearing of native vegetation;
- Predation by the fox and the feral cat;
- Anthropogenic climate change; and

Particularly relevant is the loss of habitat from foreshore development and hydrological changed to estuaries as identified by the DECC (2009).

Conclusion

In light of the consideration of the above seven factors (a to g), the proposed activity on the subject site is not "likely" to impose "a significant effect" on the vulnerable species Lesser Sand Plover, as:

- The proposal will not adversely affect the lifecycle of the species;
- The proposal will not remove, modify or further fragment or isolate a significant area of habitat for the species; and
- The proposal does not significantly contribute to any KTP threatening the species.

Consequently, a Species Impact Statement is not required to be prepared.

Swamp Sclerophyll Forest (SSF) on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions

1 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

The TSC Act defines a "threatened species" as "a species specified in Part 1 or 4 of Schedule 1 or in Schedule 2" of the Act. Swamp Sclerophyll Forest is not a "threatened species", as defined under the TSC Act.

2 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

The TSC Act defines an "endangered population" as "a population specified in Part 2 of Schedule 1" of the Act. Swamp Sclerophyll Forest is not an "endangered population", as defined under the TSC Act.

3 in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

a) 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

b) 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

The majority of the construction works to occur during the development of the proposed housing will affect the Cleared and Disturbed and the Poplar Forest plant communities. The current development footprint will encroach on the northern extent of the SSF with the construction of dwellings and roads.

The total area of SSF present on the site has been mapped as 6023 m² with 2003m² (approximately 33%) to be removed as a direct result of the proposed development footprint. This area of native vegetation to be removed will be on the northern edge of the current extent of SSF on the site. This area of SSF on the site forms a broken corridor with a larger patch of SSF on the Warriewood Sewage Treatment Plant to property to the east. This current connectivity is broken by the double lane Boondah road that separates the subject site and the Sewage Treatment Plant. The proposed development will remove all SSF from that part of the site that abuts the Boondah Road boundary apart from a small area south or Road 01, setting back further the break of connectivity currently formed by Boondah Road.

Some structural modification of the SSF will occur on site as a result of the establishment and long term maintenance of SSF within the Asset Protection Zone (APZ). The area of SSF within the proposed APZ is 1237m². This area of SSF will be maintained at a more open structure so as to not create a fire path. The APZ will be composed of an inner protection zone of 647m² of SSF where tree canopy cover will be maintained at less than 15% and a buffer zone of 590m² of SSF where tree canopy cover will be maintained at less than 30%. Both areas within the APZ will be maintained with a low understorey and/or groundcover only. This total area of SSF that will be modified due to it being part of the APZ will be 1237m², or approximately 20% of the total SSF currently on site.

Areas of SSF on site that are proposed to be regenerated are the Core Riparian Zone (CRZ) occupying 1762m² of SSF, and the area of SSF outside the CRZ and the APZ that is proposed to be retained which occupies 1017m² of SSF. These totals of SSF that will be maintained or improved by regeneration are 2779m², or approximately 46% of the total SSF on the site.

It has been recommended by this report that the native vegetation present in this area be preserved as much as possible so that the proposed development will minimise the impacts. It is recommended that native canopy be retained where practicable and that only genetically integral plantings of species diagnostic of the community be used in landscaping in the area beside the roads and dwellings.

In order to mitigate negative impacts to the community from the proposal it has also been recommended that fencing be installed along the boundary of the areas of this community that are to be retained prior to construction to preserve the vegetation and control potential erosion and sedimentation. The compilation of a management plan has been recommended in order to properly manage this high conservation area including provisions for the careful management of the vegetation in relation to APZ works, and revegetation to improve the corridor values present. The northern edge and a narrow strip through the middle of this community will be directly impacted on by construction; however with revegetation of the southern portion of the community the overall extent of the community should not be significantly impacted.

The local occurrence of the community within the subject site is already at risk of extinction due to its isolated nature and location near such an urbanised centre. Any indirect impacts of the proposal will not be significant to the extent that the local occurrence of the community is likely to be placed at greater risk of extinction than is already apparent.

The proposed development is unlikely to have a substantial or adverse effect on the composition of the community such that its local occurrence is likely to be placed at risk of extinction. The construction works will not result in any significant indirect impacts. It has been recommended this area be revegetated with species diagnostic of this community. Fauna species that may currently utilise the area for foraging and feeding, such as birds, will be able to continue to utilise the area of vegetation within Warriewood Wetland and on the opposite side of Boondah Rd within the STP.

4 in relation to the habitat of a threatened species, population or ecological community:

a) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

b) 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

c) 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,

It is estimated that Coastal Floodplain Wetlands (which include Swamp Oak Floodplain Forest and Swamp Sclerophyll Forest) currently cover less than 30% of its original distribution. As these two subunits are a small component of Coastal Floodplain Wetlands it can be assumed that these communities currently occupy an even smaller area of land (NSW Scientific Committee, 2004a and b).

A strip of SSF present towards the eastern boundary of the site adjacent to Boondah Rd is to be directly impacted on through clearing for the construction of an entranceway, roads, and dwellings. This area occupies 2003m² or 33% of total SSF on the site. The remainder of this community is to be maintained in a structurally modified form occupying 1237m² or 20% of the total SSF on the study site, or maintained or improved through bush regeneration occupying 2779m² or 46% of the total SSF on site. It has been recommended that the removal of 'SSF be minimised as much as practicable as part of the development and that the areas that are to be retained be fenced off for the duration of construction. The area to be impacted is minimal, and with the implementation of various

management measures, the impacts to this community on site will be minimised. In addition, no indirect impacts on the endangered community within the subject site, or the surrounding locality, are expected with the implementation of appropriate mitigation measures and proposed buffer widths.

The existing cover of the community will be altered due to the removal of vegetation in the area of the development footprint. The majority of the vegetation to be cleared is within the Cleared and Disturbed and Poplar Forest communities, with only a small proportion of the SSF proposed for removal. The nature of the development footprint is such that there will be some fragmentation of the current SSF community and consequently some level of isolation of habitats on site. The width of the proposed roadways is 14 -20 metres which means that canopy connectivity will be fragmented. At a locality scale there will only be slight increases in the fragmentation or isolation of this particular stand of 'Swamp Sclerophyll Forest' as it currently exists in a relatively fragmented landscape.

The stand of 'Swamp Sclerophyll Forest' proposed for clearing located adjacent to Boondah Rd is highly disturbed due to previous clearing that has reduced the size of the stand allowing for the recruitment of exotic woody weeds. Due to the heavy invasion of exotic species such as *Lantana camara*, and the low numbers of native understorey species, the viability of this community can be considered moderate to low. It has been recommended that the areas not marked for removal are regenerated and/or revegetated in order to increase the native species present, and strengthen corridor values. As such, the long term survival of this community in the locality will be increased as a result of recommended management actions.

While this community has a highly fragmented nature on the NSW floodplain, the proposed development will not increase the fragmentation beyond what has already occurred due to past urbanisation. The fragmentation that will occur will only be minor, and the effects of which will not be a new occurrence on site as the area has already been subject to fragmentation in the past. No new detrimental effects are likely to be seen on the bushland as it is already heavily impacted by 'edge effects' and other effects of fragmentation. The isolation of sections of this stand of 'Swamp Sclerophyll Forest' is not likely to be important to the long term survival of this ecological community in the locality, as larger relatively undisturbed stands exist nearby.

Remnant vegetation, particularly of SSF, within the Warriewood Valley forms a cohesive remnant naturally isolated from other areas of SSF in the wider locality. This isolated remnant of SSF within Warriewood Valley occupies the catchment of Narrabeen Ck, which is a sub-catchment of Narrabeen Lagoon. All patches of SSF mapped by SMCMA as part of this remnant occur within a 1.4 km radius of the subject site. The total area of SSF mapped by SMCMA within this remnant is 306, 752.4 m². The area proposed for removal for the current development proposal is 2003m² or approximately 0.65% of the total area of SSF mapped by SMCMA within the Warriewood Valley locality. Outside of this Warriewood Valley remnant there are remnants of SSF mapped by SMCMA occurring along the Deep Creek, Middle Creek and South Creek sub-catchments of Narrabeen Lagoon to the south of the subject site.

5 whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

No area has been designated as 'critical habitat' under Part 3 of the TSC Act 1995 for Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions.

6 whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

There was no Threat Abatement Plan or Recovery Plan created by the DECC for Swamp Sclerophyll Forest to assist in the recovery of this community before amendments to the TSC Act removed the mandatory requirements for their preparation. There are however 12 strategies identified by the DECC in their Priorities Action Statement for Swamp Sclerophyll Forest to help in the recovery of this

community and in threat abatement to abate Key Threatening Processes. The proposed development is not inconsistent with the strategies and actions listed in the Priority Action Statement.

7 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 TSC Act defines "threatening process" as "a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities". Schedule 3 of the TSC Act provides a list of the "key threatening processes" (KTP). Of the KTP's listed in Schedule 3 of the TSC Act and in the context of the current and continuing land use, it is considered that the following KTP's are relevant to Swamp Sclerophyll Floodplain Forest :Invasion and spread of *Lantana camara*;

- Clearing of native vegetation;
- Alteration to the natural flow regime of rivers, streams, floodplains and wetlands; and
- Ecological consequences of high frequency fire.

Clearing of native vegetation for the purposes of construction will occur as part of the current proposal. However, clearing of vegetation as part of the current proposal will be limited mainly to exotic planted species and will only involve the removal of a small section of degraded 'Swamp Sclerophyll Forest'. The remaining vegetation within the riparian area will be conserved and enhanced under the recommendations of this report. Such management will lead to the control of *Lantana camara* present on-site, and as such, will not increase the threat of this process. Other recommendations in relation to fencing and erosion control will aid to mitigate any effects to the natural flow regimes of the site.

The creekline that feeds into Fern Creek nearby is proposed to be realigned as part of the proposal but revegetation and natural resilience should by result in no net loss or negative impact upon the occurrence and natural processes of this community.

High frequency fire is not part of the proposal for the subject site. Hazard reduction burns and/or bushfires may have occurred in the past in this area, and may have already altered the habitat to varying degrees. Creation of an APZ, as described in the body of the report, will act to mitigate the effect of fire on the vegetation of the site.

Conclusion

In light of the consideration of the above seven factors (a to g), the proposed activity on the subject site is not "likely" to impose "a significant effect" on the ecological communities, as:

- the proposal is not likely to compromise the extent of the local occurrence such that it is likely to be placed at the risk of extinction;
- the proposal is not likely to substantially and adversely modify the composition of the community such that its local occurrence is likely to be placed at the risk of extinction;
- the proposal will only involve the removal of a small portion of habitat, and will result in the minor fragmentation and isolation of an already fragmented and isolated stand of the community not considered critical to its long term survival in the locality;
- the proposal will result in the enhancement of retained areas of 'Swamp Sclerophyll Forest' adjacent to the development footprint;
- The proposal is not inconsistent with the objectives of the Priorities Action Statement for the community; and
- the proposal will not substantially increase the operation of key threatening processes occurring at the subject site.

Freshwater Wetlands (FW) on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions

1 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

The TSC Act defines a "threatened species" as "a species specified in Part 1 or 4 of Schedule 1 or in Schedule 2" of the Act. Freshwater Wetlands (FW) is not a "threatened species", as defined under the TSC Act.

2 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

The TSC Act defines an "endangered population" as "a population specified in Part 2 of Schedule 1" of the Act. Freshwater Wetlands is not an "endangered population", as defined under the TSC Act.

3 in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

a) 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

b) 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

The majority of the construction works to occur during the development of the proposed housing will affect the Cleared and Disturbed and the Poplar Forest plant communities and a smaller area of Swamp Sclerophyll Forest which is an EEC. The current development footprint will not directly encroach on the FW.

The total area of FW present on the site has been mapped as approximately 900 m² with 545m² (approximately 60%) to be retained within the Core Riparian Zone. The condition of this EEC will be maintained or improved by bush regeneration techniques. Some structural modification of the FW will occur on site as a result of the establishment and long term maintenance of FW within the VB section of the Asset Protection Zone (APZ). The area of FW within the proposed VB is 353m² or approximately 40% of the total FW on the site. All of this 353m² area of FW occurs within the Vegetated Buffer area of the APZ which requires that tree canopy coverage is maintained at below 30% to prevent a fire path. The structural condition of the FW is currently much less than 30% canopy cover and is unlikely, from comparative assessment of neighbouring occurrences of this EEC in Warriewood Wetlands, to naturally achieve a canopy cover approaching this density in the short-term. This would mean that management techniques would have a minimal change to the structural and floristic integrity of this particular area of FW.

It has been recommended by this report that the native vegetation present in this area be preserved as much as possible so that the proposed development will minimise the impacts. It is recommended that native species be retained where practicable and that only genetically integral plantings of species diagnostic of the community be used in landscaping in the area beside the roads and dwellings.

In order to mitigate negative impacts to the community from the proposal it has also been recommended that fencing be installed along the boundary of the areas of this community that are to be retained prior to construction to preserve the vegetation and control potential erosion and sedimentation. The compilation of a vegetation management plan has been recommended in order to properly manage this high conservation area including provisions for the careful management of the vegetation in relation to APZ works, and revegetation to improve the corridor values present.

The local occurrence of the community within the subject site is already at risk of extinction due to its isolated nature and location near such an urbanised centre. Any indirect impacts of the proposal will not be significant to the extent that the local occurrence of the community is likely to be placed at greater risk of extinction than is already apparent.

The proposed development is unlikely to have a substantial or adverse effect on the composition of the community such that its local occurrence is likely to be placed at risk of extinction. The construction works will not result in any significant indirect impacts. It has been recommended this area be regenerated and that any supplementary planting occur with species diagnostic of this community. Fauna species that may currently utilise the area for foraging and feeding, such as birds, will be able to continue to utilise the area of vegetation within Warriewood Wetland.

4 in relation to the habitat of a threatened species, population or ecological community:

a) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

b) 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

c) 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,

A strip of FW occurs towards the south-west boundary of the site adjacent Warriewood Wetlands. It will not be directly impacted by the development footprint and although approximately 40% of its area will be within the APZ, the constraints of vegetation structure and density of the APZ will not alter the natural structure of this community being a tall grassland dominated vegetation community with a very open tree cover.

The stand of FW on the site is highly disturbed with weed invasion, particularly Kikyu *Pennisetum clandestinu* , but should respond well to regeneration. The poor species richness of the FW on site is commensurate with the community often having low species diversity. While this community has a highly fragmented nature on the NSW floodplain, the proposed development will not increase the fragmentation beyond what has already occurred due to past urbanisation. No new detrimental effects are likely to be seen on the bushland as it is already heavily impacted by 'edge effects' and other effects of fragmentation. The isolation of sections of this stand of FW is not likely to be important to the long term survival of this ecological community in the locality, as larger relatively undisturbed stands exist nearby. This remnant of FW on site will be restored through bush regeneration, leading to a net improvement of condition of all FW on the site.

5 whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

No area has been designated as 'critical habitat' under Part 3 of the TSC Act 1995 for Freshwater Wetlands on Coastal Floodplains.

6 whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

There was no Threat Abatement Plan or Recovery Plan created by the DECC for FW to assist in the recovery of this community before amendments to the TSC Act removed the mandatory requirements for their preparation. There are however 13 strategies identified by the DECC in their Priorities Action Statement for Freshwater Wetlands to help in the recovery of this community and in threat abatement to abate Key Threatening Processes. The proposed development is not inconsistent with the strategies and actions listed in the Priority Action Statement.

7 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 TSC Act defines "threatening process" as "a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities". Schedule 3 of the TSC Act provides a list of the "key threatening processes" (KTP). Of the KTP's listed in Schedule 3 of the TSC Act and in the context of the current and continuing land use, it is considered that the following KTP's are relevant to Freshwater Wetlands:

- Clearing of native vegetation;
- Alteration to the natural flow regime of rivers, streams, floodplains and wetlands; and
- Ecological consequences of high frequency fire.

Clearing of native vegetation for the purposes of construction will occur as part of the current proposal in areas near to the area mapped as FW on site, which is potential habitat for this EEC.

The creekline that feeds into Fern Creek nearby is proposed to be realigned as part of the proposal but revegetation and natural resilience should by result in no net loss or negative impact upon the occurrence and natural processes of this community.

High frequency fire is not part of the proposal for the subject site. Hazard reduction burns and/or bushfires may have occurred in the past in this area, and may have already altered the habitat to varying degrees. Creation of an APZ, as described in the body of the report, will act to mitigate the effect of fire on the vegetation of the site.

Conclusion

In light of the consideration of the above seven factors (a to g), the proposed activity on the subject site is not "likely" to impose "a significant effect" on the ecological communities, as:

- the proposal is not likely to compromise the extent of the local occurrence such that it is likely to be placed at the risk of extinction;
- the proposal is not likely to substantially and adversely modify the composition of the community such that its local occurrence is likely to be placed at the risk of extinction;
- the proposal will not involve the removal of any active habitat, and will not result in the fragmentation and isolation of any of this EEC in the locality;
- the proposal will result in the enhancement of all areas of 'Freshwater Wetlands' adjacent to the development footprint;
- The proposal is not inconsistent with the objectives of the Priorities Action Statement for the community; and
- the proposal will not substantially increase the operation of key threatening processes occurring at the subject site.

Appendix D

Nationally Listed Species

Warriewood STP Buffer Area 3
Proposed Residential Development

EPBC Significant Impact Assessment
Lathamus discolour - Swift Parrot

1 EPBC Significant Impact Assessment – *Lathamus discolor*

An action has, will have, or is likely to have a significant impact on an Endangered species if it does, will, or is likely to:

(a) lead to a long-term decrease in the size of a population

The Swift Parrot is a migratory species; commuting to Tasmania to breed and returning in winter to the east coast of Australia. Migration along the mainland coast coincides with the prolific flowering of eucalyptus species, namely; *Eucalyptus robusta* Swamp Mahogany, *Corymbia maculata* Spotted Gum, *C. gummifera* Red Bloodwood*, Eucalyptus moluccana* Grey Box and *E. pilularis* Blackbutt (Higgins 1999, Garnett and Crowley 2000, Swift Parrot Recovery Team 2001). Foraging within Sheldon Forest, Rofe Park, Lane Cove National Park has sustained a viable food supply within the northern Sydney district. Swift Parrots have been observed utilising street and urban planted trees within metropolitan areas.

Clearing of native vegetation is a key threatening process to the survival of the Swift Parrot. Removal of exotic and native species for the proposed construction does not contribute towards the decline of significant foraging trees. Limited foraging opportunities are present within the site. One preferred feed tree *Eucalyptus robusta* Swamp Mahogany set for removal may offer some nectar opportunities. Other flowering trees for removal include *Angophora costata* (3), *Eucalyptus botryoides* (1) and a *Callistemon viminalis* (1). The foraging capacity of the subject site does not support a viable population. Removal of the identified feed species does not significantly contribute towards the decline in the species or adversely impact on the available food availabilities within the study area.

(b) reduce the area of occupancy of the species

Winter foraging habitat within the locality may be offered by flowering eucalypts contained within Ku-ring-gai and Lane Cove National Park and smaller parks and reserves in the locality. Preferred feed trees that occur as street and garden trees within the locality offer further foraging habitat. The only available feed tree, *E. robusta,* within the subject site occurs within the construction footprint. Given the insignificance of this isolated tree the impact of its removal on the foraging capacity for the area would not amount to much. The Swift Parrots main foraging locations are protected and their semi-nomadic pattern along the coast provides suitable foraging trees.

(c) fragment an existing population into two or more populations

The subject site and the wider locality are not known to support an important population of Swift Parrot. Migration of Swift Parrots along the coastline corresponds with eucalyptus flowering patterns. Flocks are highly mobile travelling long distances to new foraging locations. Removal of the *Eucalyptus robusta* Swamp Mahogany from the local area will not fragment the population into two.

(d) adversely affect habitat critical to the survival of a species

Winter foraging habitat within the locality may be offered by flowering eucalypts contained within Ku-ring-gai and Lane Cove National Park and smaller parks and reserves in the locality. Preferred feed trees that occur as street and garden trees within the locality offer further foraging habitat to the species. The single preferred feed trees proposed to be removed from the subject site do not comprise habitat critical to the survival of the Swift Parrot. As such a significant area of foraging habitat will not be adversely affected by the action.

(e) disrupt the breeding cycle of a population

The Swift Parrot breeds exclusively in Tasmania, migrating to NSW in winter in order to forage on flowering eucalypts. The action will not disrupt the lifecycle of an important population of the Swift Parrot.

(f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The subject site provides some winter foraging foraging habitat by means of a single preferred feed trees located on the site. Foraging habitat of the Swift Parrot is already highly fragmented and modified across the urban landscape of the locality. The removal of the tree from the subject site will not further modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the Swift Parrot is likely to decline.

(g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat

The action will not lead to an increase in invasive species harmful to the Swift Parrot on the site, within the local or wider area.

(h) introduce disease that may cause the species to decline

Psittacine beak and feather disease (PBFD) is a significant threat to the survival of the Swift Parrot population. Contraction of PBFD is through direct contact from feeding surfaces and faecal material, inhalation or ingestion or aerosols (Avian Biotech International, 2009).

The spread of PBFD is attributed to unclean surfaces in locations of high concentrations of artificial feeding areas, such as at veterinarian clinic or captive species. The introduction of PBFD is highly unlikely during the proposed development. Inspection of tree hollows prior to the removal of trees within the construction footprint will be conducted by an experienced wildlife handler. As a precaution strict hygiene protocols will be implemented within the VMP.

(i) interfere with the recovery of the species

The overall objectives of the *Swift Parrot Recovery Plan* (Swift Parrot Recovery Team 2001) are “to change the conservation status of the swift parrot from endangered to vulnerable within 10 years” and “to achieve a demonstrable sustained improvement in the quality of swift parrot habitat to increase carrying capacity”.

The removal of the single preferred feed tree does not comprise a significant area of winter foraging habitat for the species within the locality, is not inconsistent with the objectives of this management plan. The removal of the single tree will therefore not interfere substantially with the recovery of the species.

Conclusion

Under the EPBC Act an action requires approval from the Australian Government Minister for the Environment, Water, Heritage and the Arts (the Minister) if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance such as the Swift Parrot. The assessment above concludes that the action will not have a significant impact on the Swift Parrot and as such the action does not require referral to the DEWHA for a decision by the Minister on whether further assessment and approval is required under the EPBC Act.

EPBC Significant Impact Assessment
Pteropus poliocephalus Grey-headed Flying-fox – vulnerable

1 EPBC Significant Impact Assessment – Pteropus poliocephalus

An action has, will have, or is likely to have a significant impact on a vulnerable species if it does, will, or is likely to:

(a) lead to a long-term decrease in the size of an important population of the species

The *Pteropus poliocephalus* (Grey-headed Flying-fox) is a highly sociable mammal roosting in bat 'camps' of 100 to 10,000 individuals. The largest permanent camp is located at Gordon, within 15km from the subject site. Roosting sights are established along a creek line and within 20km of reliable food sources. Individuals will source alternative fruit or nectar travelling 50km a night.

Thousands of Grey-headed Flying-foxes depart their daytime roosts at dusk to forage. Opportunistic feeding and an acute sense of smell attract the Grey-headed Flying-fox to urban and street trees surrounding their urban roosting location. Preferred and idealistic foraging is contained within Sheldon Forest, Rofe Park and Lane Cove National Park.

Four possible feed trees *Angophora costata* Sydney Red Gum (3) and *Eucalyptus botryoides* Bangalay (1) currently stand within the proposed construction zone. Foraging within these trees is not considered a critical habitat for the Grey-headed Flying-fox. The subject site is not suitable for permanent roosting or as a maternity camp. It is highly unlikely that the removal of these trees would reduce the population size from displacement and a reduction in the availability of food.

(b) reduce the area of occupancy of an important population

Three important roosting camps for the Grey-headed Flying-fox are located within a 40km radius of the subject site. Foraging behaviour by the Grey-headed Flying-fox can accommodate individuals from any of these bat camps. The greater the foraging opportunities the higher the significance and more individuals gather to the feeding trees. Of the canopy trees located within the construction footprint 714 are exotic Poplar species and 43 are Casuarina. Foraging opportunities are therefore restricted to four trees within the construction footprint. Therefore the removal of native and exotic species from the subject site will not reduce the area of occupancy available for an important population of the species.

(c) fragment an existing important population into two or more populations

The nearest important population of the Grey-headed Flying-fox is located at Gordon, 12km from the subject site with two other important roosting camps within a 40km radius of the subject site. The Grey-headed Flying-fox is capable of distances of 20 – 50km in search of suitable foraging locations and movement between populations. The construction proposal will not contribute to the fragmentation of the populations into smaller populations.

(d) adversely affect habitat critical to the survival of a species

Clearing and degradation of critical habitat for the Grey-headed Flying-fox has been identified as a key threatening process. Large riparian trees and flowering eucalyptus and fruiting trees provide critical habitats for the Grey-headed Flying-fox. Roosting camps within the Sydney region are protected as Botanic Gardens or National Parks and Reserves. Critical foraging locations are contained within Lane Cove and Ku-ring-gai National Parks and surrounding nature reserves and council parks. Alternative exotic and native fruiting and flowering species are available on private land or street trees. The later are not considered critical habitat given the limited foraging opportunities they provide.

Removal of four feed trees are not considered critical habitat. The removal of these trees and the non-feed trees, Poplar and Casuarina species does not adversely impact the survival of the Grey-headed Flying-fox.

(e) disrupt the breeding cycle of an important population

The nearest known maternity colony of the species is 12km away at Gordon. The NPWS (2001) has stated that *Pteropus poliocephalus* (Grey-headed Flying-fox) camps are usually located in close proximity to a regular food source (20 km or less) and are often in stands of riparian rainforest or commonly in gullies, close to water, in vegetation with a dense canopy. The Grey-Headed Flying-Fox most likely utilises the site on occasion during foraging activities and there is no preferred permanent roosting camp habitat on the subject site. The removal of trees from the subject site will not disrupt the breeding cycle of a local, regional or other population by impacts on potential roosting and maternity camp habitat or foraging habitat.

(f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Quality habitat for the Grey-headed Flying-fox is located within the maternity bat camps and foraging within the National Parks and reserves. Urban and remnant habitats are highly fragmented outside these protected reserves and contribute towards foraging opportunities.

Removal of trees for the proposed development will not impend on the species ability to move between habitats or located food sources. The removal of the trees within the subject site will not further modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the Grey-Headed Flying-Fox is likely to decline.

(g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The action will not lead to an increase in invasive species harmful to the Grey-headed Flying-fox on the site, within the local or wider area.

(h) introduce disease that may cause the species to decline

The proposed construction does not directly come into contact with individual Grey-headed Flying-foxes, their roosting camps or feeding grounds. Removal of preferred feed trees will not contaminate remaining feed trees and indirectly introduce disease into the population. As a protocol strict hygiene protocols will be implemented for the construction and development of the proposed action.

(i) interferes substantially with the recovery of the species

No federal or state recovery plan is currently in place for the Grey-headed Flying-fox. However the DECC (2008b) have identified at total of 10 recovery strategies accompanied by 31 priority actions to assist in the recovery of the species in NSW. The proposed action is not inconsistent with relevant recovery strategies and priority actions identified by the DECC (2009b). The removal of over 700 trees (exotic and native species) do not comprise a significant area of foraging habitat for this species and will therefore not interfere substantially with the recovery of the species.

Conclusion

Under the EPBC Act an action requires approval from the Australian Government Minister for the Environment, Water, Heritage and the Arts (the Minister) if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance such as the Grey-headed

Flying-fox. The assessment above concludes that the action will not have a significant impact on the Grey-headed Flying-fox and as such the action does not require referral to the DEWHA for a decision by the Minister on whether further assessment and approval is required under the EPBC Act.

EPBC Significant Impact Assessment

Xanthomyza Phrygia - Regent Honeyeater

An action has, will have, or is likely to have a significant impact on an Endangered species if it does, will, or is likely to:

(a) lead to a long-term decrease in the size of a population

The Regent Honeyeater is a migratory species, with three known breeding regions within Australia (DEWHA, 2009);

Capertee Valley, NSW;
The Bundarra-Barraba area, NSW; and
Around Chiltern, Victoria

Non-breeding flocks migrating 100km east to coastal woodlands to forage for nectar from eucalyptus species and mistletoe. Newport and Narrabeen, adjacent to the study area, previously recorded the Regent Honeyeater as a regular visitor; today sporadic sightings occur in the area. Three records are documented as reliable within 10km of the subject site (DECC 2007f). It is thought that movement to coastal habitats is a necessity when food sources are scare in breeding locations and not an annual cycle migration (DEWHA, 2009). Supplement food is obtained through lerp exudates and invertebrates.

Habitats vary from dry iron-bark eucalyptus woodland and dry sclerophyll forests in the western breeding grounds to wet lowland coastal forest dominated by *Eucalyptus robusta* Swamp Mahogany or *Corymbia maculata* Spotted Gum (DEWHA, 2009). Riparian habitats with *Casuarina cunninghamiana* River Sheoak species also provide suitable foraging inland.

The proposed activities are not contained within breeding locations or known critical foraging habitats. The development is highly unlikely to impact the Regent Honeyeaters ability to migrate between habitats and utilise optimal feed trees. In essence the proposal will not adversely impact on the biology of the Regent Honeyeater and directly or indirectly impact the size of the population.

(b) reduce the area of occupancy of the species

No permanent occupancy for Regent Honeyeaters occurs in a given location. Rare occasions have located individuals prolonging their temporary residency at breeding grounds when food availability is sustainable. A general pattern of eastward migration outside the breeding season distributes the population into small nomadic flocks along the coastline. Coastal woodlands dominated by *E. robusta* or *C. maculata* species are preferred foraging habitats, although no formal foraging pattern has been observed between habitat migration.

According to mapping conducted by the Birdlife International GIS the Regent Honeyeaters occupancy has declined with an estimated current range of 300 000 km^2 (DEWHA, 2009). Regular migrations of individuals disperse throughout Canberra, the Central Coast, Hunter Valley and Warrumbungle National Park. Dispersal along the coast is also scattered from Moruya to Nowra and the Illawarra and to the north to the Northern Rivers and Mid-north Coastal Regions. Regent Honeyeaters are assumed extinct in South Australia and western Victoria (DEWHA, 2009).

An overall description of the study area was mapped as disturbed and fragmented. The current degradation of the study area does not provide suitable coastal woodland habitat or feed trees to attract or sustain individuals in the area. Irregular observations of Regent Honeyeaters adjacent to the subject site are presumably foraging while utilising the available habitat within Bouddi and Ku-ring-gai National Parks and vegetation adjoining Middle and Deep Creek tributaries.

The proposed development involves the removal of exotic and native species. The habitat contained within the subject site does not support primary foraging habitat for Regent Honeyeaters due to the

absence of food trees. In effect the removal of exotic and native trees does not have the capacity to reduce the area of occupancy for the Regent Honeyeater.

(c) fragment an existing population into two or more populations

As previously mentioned the current subject site is described as highly fragmented and disturbed vegetation community, dominated by a mature Poplar plantation. No current Regent Honeyeater population occurs within the location or permanent residency. Large populations gather at their breeding locations in Capertee Valley and Bundarra-Barraba NSW annually during May (DEWHA, 2009). Small nomadic flocks will then disperse in March travelling over 100km to foraging in coastal woodlands.

It is highly unlikely that the proposed actions will fragment the populations into two or more populations. The removal of 714 poplar trees and 43 Casuarina trees is either habitat or foraging species required by the Regent Honeyeater. Potential foraging opportunities are available within Bouddi and Ku-ring-gai National Park in close proximity to the study area. Further secondary habitats within the Warringah LGA contain suitable coastal vegetation adjacent to Middle and Deep Creek tributaries into Narrabeen Lagoon.

(d) adversely affect habitat critical to the survival of a species

Critical habitat for the Regent Honeyeater is essentially large eucalyptus species dominated by *Eucalyptus robusta* and *Corymbia maculata* within coastal woodland. Major tributaries within the Narrabeen Catchment, Deep and Middle Creek in Warringah LGA and the surrounding vegetation within Bouddi and Ku-ring-gai National Parks are examples of critical habitat for the Regent Honeyeater. Abundant feed trees are available and sheltering opportunities for the species.

The proposed actions are not considered within habitat critical for the survival of the Regent Honeyeater. Irregular sighing of the Regent Honeyeater during drought and low food availabilities has force species to utilise urban trees to supplement their diet. Available feed trees are protected within adjacent National Parks and reserves and utilised by the Regent Honeyeater. The proposed removal of the exotic and native trees are not considered feed trees or habitat for the Regent Honeyeater.

(e) disrupt the breeding cycle of a population

Breeding occurs annually during the months of May to March, flocks converge to the western slopes of NSW and Victoria. Three locations are identified as primary breeding locations with large communal roosting observed during the initial phase. Two locations within NSW are at Capertee Valley, outside Mudgee and around the Bundarra-Barraba area. Nesting patterns are highly dependant on the availability of tree hollows and food supplies. Recent studies using colour banding located breeding Regent Honeyeater's utilising nests up to 45km from previous years nesting locations (DEWHA, 2009).

The proposed development is locality outside the critical habitat breeding locations. Disruption to the breeding cycle also includes the migration patterns and non-breeding feeding locations. The proposed site is not located within significant feeding locations for the Regent Honeyeaters. It is assumed that the proposed development actions will not adversely disrupt the breeding cycle of the Regent Honeyeaters.

(f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The current subject site is located within a highly fragmented habitat dominated by an exotic Poplar plantation and an understorey of weed species. The proposed removal of these species and an additional strand of Swamp Sclerophyll Forest Casuarina species have not been identified as critical

habitat during fauna surveys or desktop review. Mapping by Benson and Howell (1994) described the subject site as disturbed habitat.

The site does not hold foraging potential for the Regent Honeyeater. A total of 714 exotic Poplar planted trees contribute towards the available habitat within the site and have been identified within the proposed removal. A further 43 *Casuarina glauca*, 3 *Angophora costata* and 1 *Eucalyptus botryoides* are also proposed. A buffer riparian zone adjacent to Fern Creek to the east of the subject site will be retained for the dispersal requirements of flora and fauna species. This vegetation will aid in threatened and common species to utilise favourable habitats and reduce the level of fragmentation. From the understanding of the ecological requirements of the Regent Honeyeater it is highly unlikely that the removal of these trees and the construction of the new development will adversely impact the Regent Honeyeater and directly cause the species to decline.

(g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat

The action will not lead to an increase in invasive species harmful to the Regent Honeyeater on the site, within the local or wider area.

(h) introduce disease that may cause the species to decline

The action will not lead to the introduction of disease that has the potential to cause a decline in the current population on the site or within the local or wider area.

(i) interferes substantially with the recovery of the species

The overall objectives of the *Regent Honeyeaters Recovery Plan 1999 – 2003* (DNRE 1999) are "to ensure that the species persists in the wild" and "achieve a down-listing from nationally endangered to vulnerable by stabilising the population and securing habitat extent and quality in the main areas of occupancy".

The removal of the Poplar and Casuarina strands and a small number of other exotic and native trees does not comprise a significant area of foraging habitat for the species within the locality. The proposed actions are not inconsistent with the objectives of this Recovery Management plan for the Regent Honeyeater. However, the removal of the trees within the subject site is not considered habitat or breeding areas for the Regent Honeyeater. Therefore the proposed actions do not interfere substantially with the recovery of the species.

Conclusion

Under the EPBC Act an action requires approval from the Australian Government Minister for the Environment, Water, Heritage and the Arts (the Minister) if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance such as the Regent Honeyeater. The assessment above concludes that the action will not have a significant impact on the Regent Honeyeater and as such the action does not require referral to the DEWHA for a decision by the Minister on whether further assessment and approval is required under the EPBC Act.

Migratory Impact Assessment Criteria

I. **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 Regent Honeyeater migrates from foraging along the coastline in winter 100km to the western slopes of NSW and Victoria to breed. The Regent Honeyeater is known to inhabit National Parks

within the Wollemi, Hunter Valley and Central Coast regions during its semi-nomadic foraging cycle. The subject site is not considered potential habitat for the Regent Honeyeater and no records of the species foraging or sheltering within the site has been obtained.

Warriewood Valley is a subject to periodic flooding. The Hydrologeogical Report by the Geotechnications measured the ground water within the subject site as 'high' and consequential development must consider the implications of the groundwater (Jerrery and Katauskas, 2010). Pittwater Council requires all construction within the Warriewood Valley to implement flood mitigation measures and submit a flood management plan for the proposed development. The proposed actions include the redirection of surface and ground water and the establishment of a sediment basin within the subject site prior to diversion to the Warriewood Wetlands. The VMP will offer more information as to the management practices regarding groundwater and flood mitigation measures.

Fire regimes within the Warriewood Valley have significantly altered since European establishment within the subject area. The proposed development will not alter the current fire management practices.

The impact of the development on fragmentation and the retained Core Riparian Zones has been discussed thoroughly above.

The proposed actions are likely to impact on the hydrological flow over the subject site but will not impact the flow into Warriewood Wetlands a regionally significant area. The changes to the subject site is not considered to adversely impact the migration of the Regent Honeyeater.

II. 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

The subject area or the wider locality is not considered important habitat for the Regent Honeyeater. The proposed actions will not result in the invasion of species that may potentially impact on the Regent Honeyeaters ability to establish within their important habitat.

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

As the previous assessment has identified, the Regent Honeyeaters breeding occurs within western NSW and Victoria. Foraging occurs within mature coastal woodland with abundant eucalyptus flowering trees. The subject site does not offer potential foraging opportunities for the Regent Honeyeater and as such the proposed development is highly unlikely to seriously disrupt aspects of its lifecycle.

1 EPBC Significant Impact Assessment

Charadrius mongolus - Lesser Sand Plover

An action has, will have, or is likely to have a significant impact on a Vulnerable species if it does, will, or is likely to:

(a) lead to a long-term decrease in the size of an important population of a species

The Lesser Sand Plover is a vulnerable, migratory species. Offshore breeding occurs annually in remote north east Asia. Two large flocks depart the Queensland coastline in March and early April. The return trip coincides with the Australian winter where flocks disperse along the eastern Australian coastline. The Lesser Sand Plover, like many migratory birds, must increase their body weight by up to 70% to sustain their long distance commutes (DEH 2004). This requires a habitat rich in food resources to provide for the high energy demands.

The Lesser Sand Plover typically forages for invertebrates along estuaries and intertidal sand and mudflats. Nocturnal roosting takes place between small rock crevices within rockplatforms or sandy shorelines. The Lesser Sand Plover habitat is restricted to the coastline.

The proposed actions do not directly impact the habitat required by the Lesser Sand Plover. The proposed construction is not directly linked to breeding grounds near Asia or intertidal foraging and roosting habitats. Fern Creek located within the western and southern boundaries in the subject site is subject to tidal changes. The portion of Fern Creek that dissects the subject site supports a degraded riparian vegetated habitat, not suitable as a mud or sandy foraging habitat required by the Lesser Sand Plover.

After an extensive investigation of the habitat requirements of the Lesser Sand Plover and the actions proposed within the proposed construction it is highly unlikely the development and the removal of native and exotic trees will impact on the Lesser Sand Plover and decrease the size of the population in light of the following;

- breeding occurs in the south east of Asia
- no current population resides within 10km of the subject site
- the site does not support roosting or foraging habitats for the Lesser Sand Plover
- the Lesser Sand Plover does not utilise trees for sheltering, foraging or protection
- the construction will be monitored and protected against an increase in sediment and runoff

The proposed action is highly unlikely to adversely impact the population of Lesser Sand Plovers.

(b) reduce the area of occupancy of an important population

The subject site does not provide foraging or sheltering habitat opportunities for the Lesser Sand Plover. Suitable habitat is available to the along the sandy coastline and within the Narrabeen, Dee Why and Long Reef lagoons within 10km of the study area. According to the NSW NPWS Wildlife Atlas only one reliable sighting of the Lesser Sand Plover occurs within 10km of the study site at Long Reef Marine Reserve (DECC, 2007f). On a wider scale sightings are limited within the northern Sydney region; to the north an isolated record was obtained at Davidstown on the Central Coast and in the south regular sightings are concentrated within Botany Bay inlet.

The subject site does not assume that the proposed development will reduce the area of occupancy for the Lesser Sand Plover.

(c) fragment an existing important population into two or more populations

The subject site and the wider locality are not known to support an important population of Lesser Sand Plovers. Migration of Lesser Sand Plovers along the coastline corresponds with the Australian winter and dispersal to suitable foraging habitat. Removal of the Poplar and native trees within the study area is not considered an adverse impact likely to directly fragment an existing population into two or more populations.

(d) adversely affect habitat critical to the survival of a species

The subject site is not considered habitat critical for the Lesser Sand Plover. Suitable habitat requirements are protected within the Long Reef Marine Reserve and within three Lagoon systems in the adjacent Warringah LGA. The proposed actions will not adversely remove or impact on habitat considered critical to the survival of the Lesser Sand Plover.

(e) disrupt the breeding cycle of an important population

The Lesser Sand Plover is a migratory species, choosing to winter in Australia. Breeding occurs within remote locations to the south east of Asia. The proposed actions are not considered significant to impact the Lesser Sand Plover during its foraging within Australia and result in a disruption to the breeding cycle.

(f) modify, destroy, remove or isolate or decrease the available or quality of habitat to the extent that the species is likely to decline

As previously mentioned the subject site is not considered valuable foraging habitat for the Lesser Sand Plover. Suitable foraging is available within 10km of the site within a protected Marine Reserve at Long Reef. To date, only one record of the Lesser Sand Plover utilising this habitat has been recorded within the NPWS Wildlife Atlas.

(g) results in invasion species that are harmful to a vulnerable species becoming established in the vulnerable species habitat

The action will not lead to an increase in invasive species harmful to the Swift Parrot on the site, within the local or wider area.

(h) introduce disease that may cause the species to decline

Strict hygiene protocols will be implemented within all aspects of construction and development as a precautionary against the introduction of diseases.

(i) interfere substantially with the recovery of the species

The "*Wildlife Conservation Plan for Migratory Shorebirds*" is an international partnership as part of the *Asia Pacific Migratory Waterbird Conservation Strategy* to protect a defined flyway for migratory shorebirds such as the Lesser Sand Plover. The strategy includes the possible rehabilitation of degraded wetlands and the creation of new artificial sites to replace those lost during development. Additionally four priority actions are described under the Recovery Plan for the Lesser Sand Plover;

- increase community awareness of the significance of migratory waders
- minimise human disturbance to key foraging locations
- management of habitat through the use of fencing and signage

- survey/mapping and habitat assessment of key foraging sites for the Lesser Sand Plover along the NSW coast (DECC, 2007h).

The proposed actions are not likely to increase the level of disturbance to foraging locations for the Lesser Sand Plover. The proposed actions are therefore not interfering substantially within the recovery of the species.

Conclusion

Under the EPBC Act an action requires approval from the Australian Government Minister for the Environment, Water, Heritage and the Arts (the Minister) if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance such as the Lesser Sand Plover. The assessment above concludes that the action will not have a significant impact on the Lesser Sand Plover and as such the action does not require referral to the DEWHA for a decision by the Minister on whether further assessment and approval is required under the EPBC Act.

Migratory Impact Assessment Criteria

I. 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 Lesser Sand Plover is protected under the migratory agreement between Australia and China and Japan. Migration to their remote breeding locations within south east China is triggered by the onset of the Australian Winter. Dispersal of the Lesser Sand Plover is concentrated to the north and south of Sydney. One recording within the Long Reef Marine Reserve has occurred within 10km of the subject site. The habitat requirements for the Lesser Sand Plover are not contained within the subject site.

Possible changes to the habitat through the redirection of flood and ground waters are sustained by the implementation of redirection structures during construction. These will reduce impact hydrological alteration and possible nutrient and sediment on the Warriewood Wetlands and the Narrabeen Lagoon tributaries.

The proposed development will not cause substantial modification to a important habitat for the Lesser Sand Plover.

II. 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

The proposal will not result in the establishment of invasive species within important habitat for the Lesser Sand Plover.

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

The proposed actions will not seriously disrupt the lifecycle of the Lesser Sand Plover.