Supporting Documentation for Vegetation Clearing Permit Application for 91 Shorehaven Boulevard, Alkimos

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Version 1

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DISCLAIMER

Front cover: Vegetation and fauna habitat is the project area

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1 INTRODUCTION

1.1 Background

This document provides supporting information for a Native Vegetation Clearing Permit application for 91 Shorehaven Boulevard, Alkimos. The Department of Education is proposing to clear approximately 1.72ha of vegetation for the Shorehaven School site which has a total area of 3.5ha (i.e. project area).

Figure 1. Community oval and the project area

This document provides an:

a) overview of the existing environment and values of the project area; and
b) evaluation of the proposed clearing against the '10 Clearing Principles' under Schedule 5 of the *Environment Protection Act*.

The land is zoned Urban Development in the City of Wanneroo's Town Planning Scheme No. 2.

1.1.1 Surrounding development

Skysail Avenue, which is along the southern boundary of the project area, is also the southern boundary for the Shorehaven Estate. The Estate extends from the foredunes near the coast to east of Marmion Ave (Figure 2). The land to the south of the Shorehaven Estate is covered with native vegetation, and the estate is mostly a new residential housing development. Immediately to the west of the project area is a community oval, which presumably will also be used by the school.

Figure 2. Current development showing the location of the project area

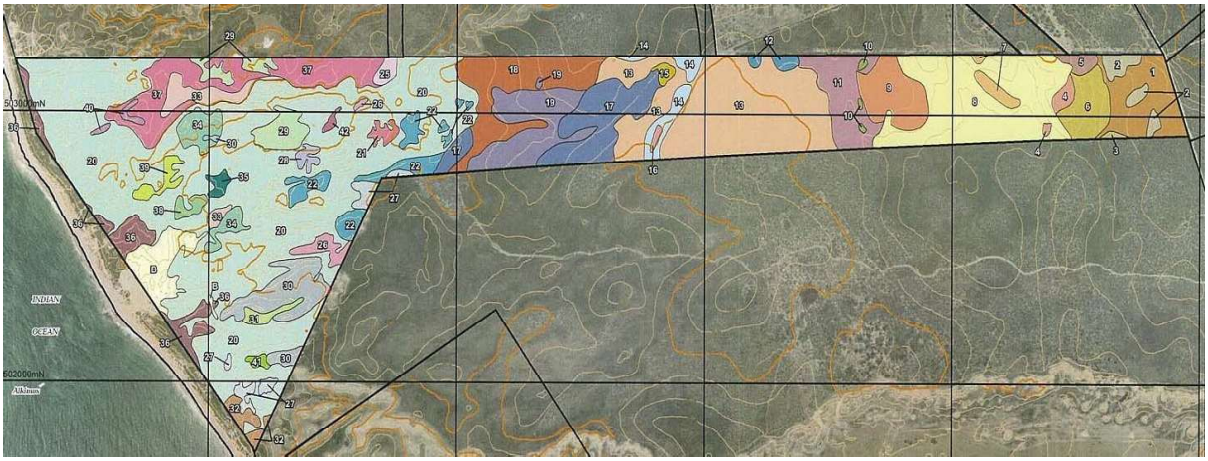

Figure 3. Vegetation communities (taken from ENV Australia 2008; Figure 5)

Figure 4. Significant areas including threatened ecological communities in pink (taken from ENV Australia 2009; Figure 1)

1.1.2 Earlier approvals

The Shorehaven Estate (Lots 1005 and 1006) is zoned as Urban under the Metropolitan Planning Scheme. The rezoning from Rural to Urban, occurred after the Environmental Protection Authority (EPA) and the City of Wanneroo considered amendment 1029/33.

The EPA set out the following seven requirements for the environmental management plan (EMP) for the Shorehaven Estate:

1. A description of existing environmental values, and the identification of the environmental outcome to be achieved through the implementation of the EMP;

2. Clear delineation of boundaries or significant areas to be protected;
3. Management of construction, access and rehabilitation;
4. Vegetation mitigation strategies;
5. Allocation of responsibilities and identification of timing and duration of implementation;
6. Provision for routine monitoring and environmental values; and
7. Provision of details of contingency plans in the event that the monitoring surveys indicate that the development is having or has had an adverse impact on environmental values.

These requirements were addressed in the Shorehaven Environmental Management Plan (ENV Australia 2009).

The Shorehaven Environmental Management Plan (ENV Australia 2009) noted that the eastern section of the estate included plant species of foraging value to Carnaby's Black-Cockatoo, with the consequence areas were set aside for Carnaby's Black-Cockatoo foraging within the estate

1.1.3 Earlier assessments

ENV Australia (2006) undertook a fauna habitat assessment for a larger area to support a residential development for Peet Ltd. This report was used in the *Environment Protection and Biodiversity Conservation Act* (EPBC) referral to the Commonwealth Government (EPBC 2008/4638). This report was based on a two day site survey (8-9 September 2008), and had a particular focus of recording Carnaby's Black-Cockatoo habitat.

The ENV Australia (2006) report indicated that the project area could be divided into two broad fauna habitat types:

- low Banksia woodland; and
- low open shrubland

The ENV Australia (2006) report concluded the low Banksia woodland has the highest value in providing a food resource for Carnaby's Black-Cockatoo, with the main food species being *Banksia attenuata, Banksia menziesii, Dryandra sessilis, Eucalyptus todtiana, Hakea trifurcata, Hakea ruscifolia, Hakea prostrata* and *Hakea lissocarpha*.

1.2 Vegetation and soils

Based on Figures 3 and 5 in the ENV Australia (2008) report, the project area is on Karrakatta Shallow Soils which are bare rock, yellow/brown shallow sands and stony soils. The project area is within the following vegetation community:

> DsAhHc – 19 - Closed Tall Shrub of *Dryandra sessilis* var. *cygnorum*, *Hibbertia hypericoides*, *Hakea costata*, *Xanthorrhoea preissii*, *Allocasuarina humilis*, *Mesomelaena psuedostygia*, *Calothamnus quadrifidus* and *Hakea trifurcata*.

The ENV Australia (2008) report indicated that the Floristic Community Type (FCT) 26a (*Melaleuca huegelii – Melaleuca systena* which is located on the limestone ridges within the Cottesloe South Central Vegetation Complex) was a threatened Ecological Community (TEC) in the Shorehaven Estate, and inferred there were two vegetation communities i.e. – DsM6 – 16 and StDsAt – 27 in the estate that fitted the FCT 26a description, and neither of these are in the project area. The vegetation description for the project area does not include *M. huegelii* or *M. systena.*

The ENV Australia (2008) report indicated that FCT's 29a and 29b were Priority Ecological Communities (PEC) potentially in the Shorehaven Estate and neither of these were recorded in the project area.

When ENV Australia (2008) mapped the vegetation condition in the Shorehaven Estate, it reported the eastern half to be in pristine to very good condition and the western half to be in very good to good condition. Degradation was mostly caused by weeds on the edge of tracks and one area (i.e. LoAv-41) was devoid of native species.

1.3 Vertebrate fauna

1.3.1 Fauna habitat

The 3.5ha project area is highly degraded. Approximately 1.72ha is vegetated with native and introduced species (Plates 1 and 10). The boundary area has been cleared of vegetation (Plates 2-4), and there is spoil pile in the south-western corner (Plates 5-6), presumably created from excess material during the earthworks for the oval to the west of the project area (Figure 1). There are internal tracks cleared through the vegetation (Plates 7-9).

Plate 1. View of the project area from the top of the spoil pile

Plate 2. Boundary of existing vegetation clearing

Plate 3. Boundary of existing vegetation clearing

Plate 4. Boundary of existing vegetation clearing

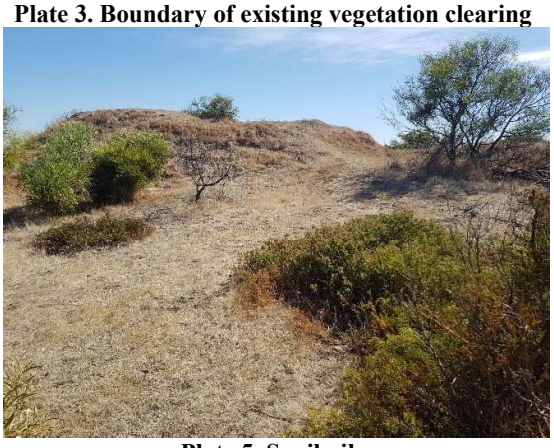

Plate 5. Spoil pile

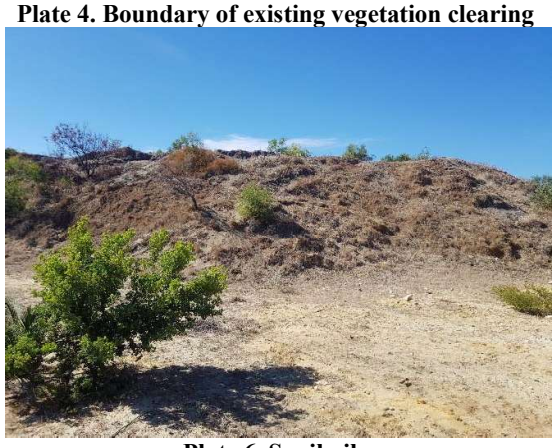

Plate 6. Spoil pile

Plate 7. Internal vegetation clearing for tracks

Plate 8. Internal vegetation clearing for tracks

Plate 9. Internal vegetation clearing for tracks

Plate 10. Relatively undisturbed vegetation

1.3.2 Habitat condition

The cleared or partially cleared areas in the project area provides very poor habitat for vertebrate fauna. The internal tracks are mostly passable by vertebrate fauna living in the area. Parts of the project area are relatively undisturbed, but these are small and often disconnected with other areas of similar quality. Overall, the project area is in poor condition, however, on a more localised scale habitat quality varies from very poor to good.

1.3.3 Fauna surveys

The following two vertebrate fauna surveys were undertaken by Terrestrial Ecosystems staff in similar habitat near the project area.

Lot 3 Romeo Road

The Lot 3 Romeo Road fauna survey (ATA Environmental 2008) was undertaken to the south of the project area and included a variety of fauna habitat types (e.g. low open heath, shrublands, low open woodlands, forest with a dense understorey and forest with a limited understorey and a wetland), therefore the vertebrate fauna information in this data set will include a lot of species that are not present in the project area.

LWP's Trinity land development

The Terrestrial Ecosystems survey of the LWP's Trinity land development was undertaken in predominantly undisturbed open Banksia woodland on a sandy substrate with limestone outcrops, however, there were patches of Parrot bush bushland that was very similar to that found in the project area. The data from this survey would therefore include many more species than would be found in the project area because the survey area was relatively undisturbed, and it included a variety of fauna habitats.

There are limited data in the Atlas of Living Australia for the project surrounds that were collected from a variety of sources.

The data from these two surveys and the Atlas of Living Australia are provided in Appendix 1.

1.3.4 Conservation significant fauna

A search of the Matters of National Environmental Significance (MNES) online database for conservation significant species potentially occurring in the project area was conducted. The search area was a linear shaped polygon along the coastal strip using the following coordinates 31.5578ºS 115.6372ºE, 31.5578ºS 115.6868ºE, 31.6896ºS 115.7533ºE, 31.3694ºS 115.7105ºE (Appendix A).

Conservation significant fauna are protected by the Commonwealth *EPBC Act 1999*, and this list includes species covered by international treaties such as the Japan-Australia Migratory Bird Agreement (JAMBA) and China-Australia Migratory Bird Agreement (CAMBA) and the Western Australia (WA) *Biodiversity Conservation Act 2016 (BC Act*). The *BC Act* provides for the publishing of the *Wildlife Conservation (Specially Protected Fauna) Notice* that lists species under multiple categories. In addition, the Department of Biodiversity, Conservation and Attractions (DBCA) maintains a list of fauna that require monitoring under four priorities based on the current knowledge of their distribution, abundance and threatening processes. The *EPBC Act 1999* and *BC Act 2016* imply legislative requirements for the management of anthropogenic impacts to minimise the effects of disturbances on species and their habitats. Priority species have no statutory protection, other than the DBCA wishes to monitor potential impacts on these species. Environmental consultants and proponents of developments are encouraged to avoid and minimise impacts on these species.

The fauna species that have special status in either State or Commonwealth government legislation or are on the DBCA Priority species list and are potentially present in the vicinity of the project area are listed in Table 1. Although they were recorded in the search of the MNES online database, migratory species that typically would be found around the edge of salt lakes, clay pans, estuaries and marshes have been excluded from Table 1 as there is no suitable habitat nearby.

Threatened and conservation significant waders and shorebirds that utilise the beaches along the edge of the ocean or are marine migratory species, or marine turtles that were identified in the MNES online search have not been included in this assessment as the project area does not include habitat in which they will forage or nest.

One threatened species of fauna and one migratory species of birds were identified under the *EPBC Act 1999* as potentially occurring in the project area or surrounds. There is one Schedule 7 species as listed under the *BC Act 2016,* and two species listed on the DBCA's Threatened and Priority Fauna List that potentially occur in the project area or surrounds. The following is an assessment of the likelihood of each of the species listed in Table 1 being found in the project area.

Table 1. Assessment of the potential presence of a conservation significant fauna species in the project area

Species	DBCA Schedule / Priority	Status under Commonwealth *EPBC Act*	Comment on the potential presence of a species
Carnaby's Black-Cockatoo *Calyptorhynchus latirostris*	Endangered	Endangered	May forage in *Dryandra* sp., *Hakea* sp. and *Banksia* sp., in the project area, but a lack of suitable roosting and nesting resources means any visits will be for foraging purposes only.
Forest Red-tailed Black-Cockatoo *Calyptorhynchus banksii naso*	Vulnerable	Vulnerable	Probably flies over the project area, but a lack of suitable feeding, roosting and nesting resources means any visits will be infrequent.
Malleefowl *Leipoa ocellata*	Vulnerable	Vulnerable	Locally extinct from this area.
Chuditch *Dasyurus geoffroii*	Vulnerable	Vulnerable	Locally extinct from this area.

Species	DBCA Schedule / Priority	Status under Commonwealth *EPBC Act*	Comment on the potential presence of a species
Fork-tailed Swift *Apus pacificus*	Migratory	Marine Migratory	May very infrequently be seen flying in the region.
Grey Wagtail *Motacilla cinerea*	Migratory	Migratory	Highly unlikely to be seen in the project area.
Osprey *Pandion haliaetus*	Migratory	Wetland Migratory	Infrequently seen this far from the ocean, unlikely to be seen flying over the project area.
Quenda *Isoodon fusciventer*	P4		Potentially in the project area in very low density.
Black-striped Snake *Neelaps calonotos*	P4		Potentially in the project area.
Peregrine Falcon *Falco peregrinus*	OS		May very infrequently be seen in the project area.

Results of the Commonwealth *EPBC Act 1999* protected matters database search are provided in Appendix A.

Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*) - Endangered under the *BC Act* 2016 and *EPBC Act 1999*

Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*) is a large, pied, cockatoo. Garnett *et al*. (2011) and the DSEWPaC (2011) reported that Carnaby's Black-Cockatoo inhabits the south-west of Western Australia, from Kalbarri to include much of the south-west of the State and along south coast to Esperance. It breeds inland and moves to the coastal areas when chicks have fledged (Saunders *et al*. 1985). Carnaby's Black-Cockatoos are highly gregarious, usually seen in trios, small parties or large flocks (up to 5000 birds)(Perry 1948). These flocks usually contain males, females and immature birds.

Carnaby's Black-Cockatoos are partly migratory and partly sedentary (Higgins 1999). In the drier regions of their geographic range where most of the native vegetation has been cleared (e.g. wheatbelt), Carnaby's Black-Cockatoos are postnuptial migrants (Saunders 1980, Saunders and Ingram 1995). After breeding, individuals in these areas migrate to feed in higher rainfall areas including the Swan Coastal Plain, and to a lesser extent, forests dominated by *E. marginata* (Jarrah), *C. calophylla* (Marri) and *E. diversicolor* (Karri; Saunders 1980). On the Swan Coastal Plain, Carnaby's Black-Cockatoos have been recorded foraging in most suburbs and in pine plantations within the greater Perth metropolitan area (Perry 1948). Vagrants have been recorded on Rottnest Island (Winnett 1989) and Garden Island (Wykes *et al*. 1999). These later two sightings clearly indicate that Carnaby's Black-Cockatoo will fly considerable distances over non-vegetated areas to forage.

Garnett *et al*. (2011) estimated there were between 10,000 and 60,000 birds in the population.

Saunders (1980) recorded non-breeding cockatoos at Coomallo Creek foraging within a 50km radius of their breeding area, whereas, cockatoos at Manmanning moved a much greater distance to the coastal plain during their non-breeding season. These data suggest that Carnaby's Black-Cockatoo move from areas where there is little food to southern and western coastal areas where food is presumably more plentiful during summer and autumn (Davies 1966, Saunders 1980).

Carnaby's Black-Cockatoo breed between July and November mostly in eucalypt woodland (Saunders 1980, 1986). Carnaby's Black-Cockatoo nest in tree hollows that are created by fire, fungi, termites or old age, with hollows between 2.5 and 12m above the ground (Saunders 1979, Higgins 1999). Hollows are large, ranging from 10 to over 250cm in depth (Higgins 1999). These hollows are usually in live or dead smooth-barked *Eucalyptus salmonophloia* (Salmon Gum) or *Eucalyptus wandoo* (Wandoo). However, Carnaby's Black-Cockatoo will also nest in *E. longicornis* (Red Morrell)*, E. loxophleba* (York Gum)*, E. gomphocephala* (Tuart), *E. rudis* (Flooded Gum)*, E. salubris* (Gimlet)*, E. occidentalis* (Swamp Yate) and *C. calophylla* (Higgins 1999, Cale 2003). When breeding, they most often forage in the surrounding shrubland and kwongan heath (Higgins 1999). On the Swan Coastal Plain, breeding could occur in *E. gomphocephala*, *E. rudis*, *E. occidentalis* and *C. calophylla*. Adults return to the same breeding area each year (Saunders 1977) and some use the same tree hollow for many years

in succession to raise their chicks, others shift their nests among a number of trees in the same area (Saunders and Ingram 1998).

At Coomallo Creek, Carnaby's Black-Cockatoo travelled on average 1.4km from their nests to forage, whereas at Manmanning they foraged more widely and travelled an average of 2.5km from their nest to forage (Saunders 1980). At Manmanning, road and railway reserves were extensively used for foraging, presumably as this was the closest food source to their nests. The availability of food near the nest influenced the time spent incubating eggs and fledging body mass (Saunders 1980). At Manmanning, Carnaby's Black-Cockatoo traversed agricultural land to forage in remnant plots of uncleared land.

Saunders (1980) reported Carnaby's Black-Cockatoo at Coomallo Creek (breeding area) foraged mostly on native plants, with the only exception being *Erodium* sp.. Higgins (1999) reported the habitat of Carnaby's Black-Cockatoo was uncleared or remnant woodlands dominated by *Eucalyptus*, particularly *E. wandoo* and *E. salmonophloia* and often in shrubland or kwongan heathland dominated by *Hakea*, *Dryandra*, *Banksia* and *Grevillea* and seasonally in *Pinus* plantations and less often in *C. calophylla*, *E. diversicolor* or *E. marginata*.

The ENV Australia (2006) report indicated that the project area is within the foraging area for Carnaby's Black-Cockatoo. The potential impact on Carnaby's Black-Cockatoo in clearing and removing foraging habitat resulted in a Controlled Action under the *EPBC Act*, which resulted in conditions being placed on developments in the assessed area.

Carnaby's Black-Cockatoo is likely to occasionally forage in the *Dryandra* sp., *Hakea* sp. and *Banksia* sp. in the project area but a lack of tall trees means that it will not roost or nest in this area.

Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) - Vulnerable under the *BC Act* 2016 and *EPBC Act 1999*

The Forest Red-tailed Black-Cockatoo is one of three large black-cockatoos found in Western Australia. *Calyptorhynchus banksii naso* frequents the humid to sub-humid south-west of Western Australia from Gingin in the north, to Albany in the south and west to Cape Leeuwin and Bunbury (Department of Sustainability Environment Water Population and Communities 2011). It was mostly seen in the hills, but small numbers of birds were seen at Mundijong, Baldivis, Karnup, Stakehill, Pinjarra, Coolup and in the Lake Clifton area (Johnstone *et al*. 2011). In 2011, there was an increase in the number of Forest Red-tailed Black-Cockatoo on the coastal strip north from Rockingham to the northern metropolitan suburbs. The reason for the recent increase in abundance is unknown.

Forest Red-tailed Black-Cockatoo nest hollows have been recorded between 6.5 and 33m above the ground, with entrance sizes ranging from 10 x 12cm to 44 x 150cm and a depth of 0.3-8.2m (Johnstone *et al*. 2013a, b). Breeding occurs in all months, but peaks in April-June and August-October with an incubation period of 29-31 days. A female broods her hatchling for the first 3-10 days after hatching and then leaves the nest each day at dawn and returns to feed the chick at dusk. Hatchlings are fully feathered at about 48 days. The majority of nests are in Marri, but they have also been recorded in Jarrah, Blackbutt, Bullich and Wandoo. Nest sites are often clustered in an area.

Johnstone and Kirkby (2011) reported the Forest Red-tailed Black-Cockatoo to feed mostly on seeds from *C. calophylla*, *E. marginata*, but also on *Allocasuarina fraseriana* (Sheoak), *Persoonia longifolia* (Snottygobble), *Eucalyptus patens* (Blackbutt) and introduced species such as *M. azedarach* (Cape Lilac) and *Corymbia citriodora* (Lemon-scented Gum).

Loss of breeding habitat in the form of suitable hollows and adequate feeding resources in the vicinity of nesting hollows to enable adults to feed chicks is a primary threat. Abbott (1998) reported that trees within its known breeding distribution was not a factor in limiting breeding. He estimated there were about 15,000 birds and Garnett *et al*. (2011) thought about 10% of these birds bred each year. Competition for nesting hollows by other cockatoos, Wood Ducks, Galahs and feral Honey Bees appears to also be a significant threat (Garnett *et al*. 2011).

The Forest Red-tailed Black-Cockatoo is unlikely to forage in the project area due to a lack of suitable feeding resources and the lack of tall trees means it will not roost or nest in this area.

Malleefowl (*Leipoa ocellata)* – Vulnerable under the *BC Act* 2016 and *EPBC Act 1999*

Malleefowl are large, ground-dwelling birds that rarely fly unless alarmed or are perching for the night. Historically, Malleefowl have been found in the mallee regions of southern Australia from approximately the 26th parallel of latitude southwards. Prior to vegetation clearing for agriculture, Malleefowl were abundant in the WA Wheatbelt. Vegetation clearing for agriculture also opened adjacent bushland to predators, and in the south-west of WA, Malleefowl often only persist in isolated remnant patches of native vegetation. Sheep and other herbivores (e.g. goats, kangaroos) grazing in remnant vegetation removes or thins the undergrowth, and they also compete with Malleefowl for herbaceous foods and can cause changes to the structure and floristic diversity of foraging habitats (Benshemesh 2007).

Malleefowl and their eggs are vulnerable to predation by foxes, and newly hatched chicks are vulnerable to foxes, cats and raptors (Priddel and Wheeler 1990, 1997, Benshemesh and Burton 1999, Benshemesh 2007, Lewis and Hines 2014). Their abundance in the Goldfields is low and they are sparsely distributed, favouring those areas that are more densely vegetated. Malleefowl build distinctive nests that comprise a large mound of soil/rock covering a central core of leaf litter. These nest mounds range in diameter but can span more than five metres and may be up to one metre high. Malleefowl are generally monogamous and once breeding commences, they pair for life. The presence of nest mounds provides an indication of the presence of Malleefowl in the area.

Malleefowl has not been observed in the bioregion for many decades and it is not present in or near the project area.

Chuditch (*Dasyurus geoffroii*) – Vulnerable under the *BC Act 2016* and *EPBC Act 1999*.

The Chuditch is the largest extant carnivorous marsupial in WA. It is usually active from dusk to dawn. Formally known from over 70% of Australia, the Chuditch now has a patchy distribution throughout the Jarrah forest and mixed Karri/Marri/Jarrah forest of south-west WA and other isolated areas. Chuditch are solitary animals for most of their life and den in hollow logs, burrows, culverts, etc. and have also been recorded in tree hollows and rock cavities. Chuditch are opportunistic feeders, and forage primarily on the ground at night. Their diet can include other mammals, birds, lizards, bird and reptile eggs but the majority is a mixture of large invertebrates (e.g. spiders, scorpions and crickets).

Chuditch have not been recorded in or near the project area for many years, so it is highly unlikely to be present.

Fork-tailed Swift (*Apus pacificus*) – Marine migratory species under the *EPBC Act 1999* and *BC Act 2016*

This species breeds in the northeast and mid-east Asia and winters in Australia and southern New Guinea. It is a visitor to most parts of WA, beginning to arrive in the Kimberley in late September, in the Pilbara in November and in the southwest land division in mid-December, and leaving by late April. The Fork-tailed Swift is an almost exclusively aerial species, foraging and sleeping on the wing. It rarely comes to ground, usually only for breeding. It is common in the Kimberley, uncommon to moderately common near northwest, west and southeast coasts and rare to scarce elsewhere. It is rarely seen in the Goldfields.

Terrestrial Ecosystems' assessment is that the Fork-tailed Swift may very infrequently be seen flying over the project area, however, the Fork-tailed Swift is essentially an aerial species and would be highly unlikely to land in the project area.

Grey Wagtail (*Motacilla cinerea*) - Migratory species under the *EPBC Act 1999* and *BC Act 2016*

The Grey Wagtail is a small yellow breasted bird with a grey back and head. Johnstone and Storr (2004) reported this migratory species as breeding in Palearctic from western Europe and north-west Africa to eastern Asia and wintering in Africa, south-east Asia, Indonesia, the Philippines, New Guinea and Australia. Its preferred habitat in Australia is banks and rocks in fast-running fresh water including rivers, streams and creeks where it feeds on insects. The Atlas of Living Australia records two sightings on the south-coast of WA and none around the project area.

It is highly unlikely to be seen in the project area due to a lack of records and suitable habitat.

Osprey (*Pandion haliaetus*) – Migratory under the *EPBC Act 1999*

The Osprey is a large raptor that is mostly found in coastal areas, offshore islands and the lower sections of rivers. It mainly feeds on fish, sea-snakes and large lizards. This species is a regular coastal visitor and likely to be recorded flying over the project area; however, due to a lack of trees is unlikely to roost on site.

The Osprey is seen along the coastal area searching for food in the shallow water. It nests on tall structures, rock outcrops and large trees, none of which are in the project area.

Quenda (*Isoodon fusciventer*) – Priority 4 species with the DBCA

Quenda prefer dense scrub (up to one metre high), with swampy vegetation but are found in a variety of other habitats. They will often feed in adjacent forest and woodland that is open grassland, pasture and crop land lying close to dense cover.

Quenda have been recorded as far north as Two Rocks in the DBCA threatened species database, and Terrestrial Ecosystems has caught them near the old Club Capricorn Resort. It is possible that Quenda are present in very low densities in areas that provide suitable habitat.

Black-striped Snake (*Neelaps calonotus*) – Priority 3 with DBCA

This species occurs on dunes and sandplains vegetated with heaths and eucalypt/banksia woodlands. It feeds largely on skinks and its distribution is restricted and threatened by urban development. In its natural undisturbed state, the project area would provide habitat for the Black-striped Snake. The DBCA threatened species database has records of this snake around Mindarie, and the Atlas of Living Australia records one south of Lancelin, so it is feasible that they are in the project area. However, the sand substrate is generally very shallow over limestone outcropping, so this fossorial snake may not have a preference for the substrate in the project area.

Peregrine Falcon (*Falco peregrinus*) – Other specially protected fauna under the *BC Act 2016*

The Peregrine Falcon is uncommon, although widespread throughout much of Australia excluding the extremely dry areas and has a wide and patchy distribution. It favours hilly or mountainous country and open woodlands and may be an occasional visitor to the project area. Nesting sites include ledges along cliffs, granite outcrops and quarries, hollow trees near wetlands and old nests of other large bird species. There is no evidence to suggest any change in status in the last 50 years.

The Atlas of Living Australia contains records of this species around Joondalup and Lancelin, so it is possible that they are infrequently seen in the project area, however, the habitat in the project area is atypical for this species. The Peregrine Falcon will not rely on this site for continued survival in the region.

1.4 Native vegetation clearing principles as they pertain to flora, vegetation and vertebrate fauna

The *Environmental Protection Act (1986)* outlines 10 principles that are to be used in the assessment of native vegetation clearing permit applications (Table 2). Where possible, native vegetation should not be cleared if any of the following principles are comprised.

Table 2. Assessment of impact using the native vegetation clearing principles

Relevant information and assessment of potential impacts	Assessment of variance with the principle
Vegetation should not be cleared if it comprises a high level of biological diversity.	
According to the ENV Australia (2008) report the project area is in DsAhHc – 19 - Closed Tall Shrub of *Dryandra sessilis* var. *cygnorum*, *Hibbertia hypericoides*, *Hakea costata*, *Xanthorrhoea preissii*, *Allocasuarina humilis*, *Mesomelaena psuedostygia*, *Calothamnus quadrifidus* and *Hakea trifurcata*. This vegetation community and its constituent plant species are present in adjacent relatively undisturbed areas to the north and south of the project area. The project area is small (~ 1.72ha) and does not support a high level of biodiversity.	Not at variance with this principle.
Vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	
The project area has a limited vertebrate fauna assemblage, and its component species will also be present in other coastal areas. Clearing the vegetation will not result in the loss of habitat that is necessary for the maintenance of a significant habitat for fauna indigenous to Western Australia. However, there will be a cumulative impact of the progressive clearing of coastal areas.	Not at variance with this principle.
Vegetation should not be cleared if it includes or is necessary for the continued existence of rare flora.	
According to the ENV Australia (2008) report the project area is in DsAhHc – 19 - Closed Tall Shrub of *Dryandra sessilis* var. *cygnorum*, *Hibbertia hypericoides*, *Hakea costata*, *Xanthorrhoea preissii*, *Allocasuarina humilis*, *Mesomelaena psuedostygia*, *Calothamnus quadrifidus* and *Hakea trifurcata* and it does not contain rare flora.	Not at variance with this principle.
Vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.	
According to the ENV Australia (2008) report the project area is DsAhHc – 19 - Closed Tall Shrub of *Dryandra sessilis* var. *cygnorum*, *Hibbertia hypericoides*, *Hakea costata*, *Xanthorrhoea preissii*, *Allocasuarina humilis*, *Mesomelaena psuedostygia*, *Calothamnus quadrifidus* and *Hakea trifurcata* and it does not contain TECs or PECs.	Not at variance with this principle.
Vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	
There are two remaining patches of native vegetation along the south side of Shorehaven Boulevard and the north side of Skysail Ave, Alkimos (Figure 2); the project area is one of those. There is a substantial quantity of similar vegetation to the south of the project area and north to the Shorehaven Estate. Given the size of the project area and extent of degradation, clearing will not result in the loss of a significant area of remnant native vegetation.	Not at variance with this principle.
Vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	
The project area is not part of or near a watercourse or wetland	Not at variance with this principle.
Vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	
The project area is surrounded by residential housing development and immediately to the west is a community/school grassed oval. Clearing of the vegetation is unlikely to result in appreciable land degradation other than the loss of existing vegetation, a levelling of the site and the removal of the large spoil pile which almost certainly came from the levelling of the adjacent oval.	Not at variance with this principle.
Vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	

The project falls within an ´Environmentally Sensitive Area' which was probably created because of the foraging potential for Carnaby's Black-Cockatoo. Foraging areas have been set aside for Carnaby's Black-Cockatoo as part of the subdivision approval, and there is a large area to the south and north of the Shorehaven Estate that provides similar foraging plants species for Carnaby's Black-Cockatoos.	Not at variance with this principle.
Vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	
There is no documentation to suggest that clearing vegetation in the project area will potentially cause a deterioration in the quality of surface or ground water.	Not at variance with this principle.
Vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.	
The project area is unlikely to experience flooding, nor is the clearing of vegetation likely to exacerbate flooding	Not at variance with this principle.

1.5 Conclusion

Based on the above assessment, there was no reason to suggest that clearing the vegetation in the project area will be at variance with any of the principles.

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APPENDIX 1. Vertebrate fauna data for the adjacent areas

		Surveys	A	B	C
Family	**Species**	**Common Name**			
Amphibians					
Limnodynastidae	*Heleioporus eyrei*	Moaning Frog			1
	Limnodynastes dorsalis	Western Banjo Frog	4		
Birds					
Accipitridae	*Accipiter fasciatus*	Brown Goshawk	1		
	Elanus axillaris	Black-shouldered Kite	1		
	Haliastur sphenurus	Whistling Kite	1		
Columbidae	*Ocyphaps lophotes*	Crested Pigeon	3		
	Phaps elegans	Brush Bronzewing			75
	Spilopelia senegalensis	Laughing Turtle-dove	6		
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo	1		
Acanthizidae	*Acanthiza apicalis*			X	
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill		X	
	Acanthiza inornata	Western Thornbill	7		
	Gerygone fusca	Western Gerygone	1		
	Sericornis frontalis	White-browed Scrubwren		X	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		X	
	Cracticus torquatus	Grey Butcherbird	2	X	
	Gymnorhina tibicen	Australian Magpie	1	X	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	1		
Corvidae	*Corvus coronoides*	Australian Raven	2	X	
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow		X	
	Hirundo neoxena	Welcome Swallow	4	X	
Maluridae	*Malurus lamberti*	Variegated Fairy-wren		X	
	Malurus splendens	Splendid Fairy-wren	12		
Megaluridae	*Cincloramphus mathewsi*	Rufous Songlark		X	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird	1		
	Anthochaera lunulata	Western Little Wattlebird		X	
	Epthianura albifrons	White-fronted Chat		X	
	Gavicalis virescens	Singing Honeyeater	7		
Meliphagidae	*Gliciphila melanops*	Tawny-crowned Honeyeater		X	
	Lichmera indistincta	Brown Honeyeater	3	X	

		Surveys	A	B	C
Family	**Species**	**Common Name**			
	Phylidonyris niger	White-cheeked Honeyeater	30	X	
	Phylidonyris novaehollandiae	New Holland Honeyeater		X	
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit	2		
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush		X	
	Pachycephala rufiventris	Rufous Whistler		X	
Petroicidae	*Petroica boodang*	Scarlet Robin		X	
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail		X	
	Rhipidura leucophrys	Willie Wagtail		X	
Timaliidae	*Zosterops lateralis*	Silvereye	62		
Cacatuidae	*Cacatua sanguinea*	Little Corella	2		
Mammals					
Canidae	*Vulpes vulpes*	Red Fox			1
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo	6		
Peramelidae	*Isoodon obesulus*	Quenda			1
Muridae	*Mus musculus*	House Mouse	13		98
	Rattus fuscipes	Bush Rat			6
	Rattus rattus	Black Rat			2
Reptiles					
Agamidae	*Pogona minor*	Western Bearded Dragon	2		35
Diplodactylidae	*Strophurus elderi*	Jewelled Gecko	1		
	Strophurus spinigerus	South-western Spiny-tailed Gecko	8		81
Elapidae	*Brachyurophis semifasciata*	Half-girdled Snake			12
	Demansia psammophis	Yellow-faced Whipsnake	7		15
	Echiopsis curta	Bardick	1		8
	Neelaps bimaculatus	Black-naped Burrowing Snake			3
	Parasuta gouldii	Gould's Snake	1	X	12
	Pseudonaja affinis	Dugite			9
	Pseudonaja mengdeni	Western Brown Snake			1
	Simoselaps bertholdi	Jan's Banded Snake	2		38
Gekkonidae	*Christinus marmoratus*	Marbled Gecko			10
Pygopodidae	*Aprasia repens*	Southwest Sandplain Worm Lizard		X	
	Delma concinna	Javelin Lizard			6
	Delma fraseri	Fraser's Delma			7
	Delma grayii	Side-barred Delma			22

		Surveys	A	B	C
Family	**Species**	**Common Name**			
	Lialis burtonis	Burton's Legless Lizard			57
	Pletholax gracilis	Keeled Legless Lizard			6
	Pygopus lepidopodus	Common Scaly-foot			22
Scincidae	*Cryptoblepharus buchananii*	Buchanan's Snake-eyed Skink			19
	Ctenotus australis	Western Limestone Ctenotus	3		73
	Ctenotus fallens	West-coast Laterite Ctenotus	6		57
	Egernia napoleonis	Southwestern Crevice Skink			20
	Hemiergis quadrilineatum	Two-toed Earless Skink	18		12
	Lerista distinguenda	South-western Orange-tailed Slider			1
	Lerista lineopunctulata	Dotted-line Robust Slider			2
	Lerista praepedita	Blunt-tailed West-coast Slider			11
	Menetia greyii	Common Dwarf Skink	2		17
	Morethia lineoocellata	Pale-flecked Morethia			8
	Morethia obscura	Shrubland Pale-flecked Morethia			40
	Tiliqua occipitalis	Western Blue-tongued Lizard			7
	Tiliqua rugosa	Bobtail	2		46
Typhlopidae	*Anilios australis*	Austral Blind Snake			4
	Anilios pinguis	Rotund Blind Snake			2
Varanidae	*Varanus gouldii*	Gould's Goanna			1
	Varanus tristis	Black-headed Monitor			1

A ATA Environment (2008)*Vertebrate Fauna Assessment Lot 3 Romeo Road, Alkimos*, Unpublished report for Northern Corridor Developments Limited
B Atlas of Living Australia
C Terrestrial Ecosystems (2012) Unpublished letter report for LWP, Perth.
X Present only