LOTS 1005 AND 1006 ALKIMOS
FAUNA HABITAT ASSESSMENT

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STATEMENT OF LIMITATIONS

Scope of Services

This environmental site assessment report ("the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and ENV.Australia Pty Ltd (ENV) ("scope of services"). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

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In preparing the report, ENV has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, ENV has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. ENV will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to ENV.

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ENV will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

1 INTRODUCTION

ENV.Australia Pty Ltd (ENV) was commissioned by Peet Limited to undertake a habitat survey of Lots 1005 and 1006 Alkimos, Western Australia. This work is required to support a referral to the Department of Environment, Water, Heritage and Arts (DEWHA) under the Environmental Protection and Biodiversity Conservation Act (1999). This report presents the results of the fauna habitat assessment and discusses the significance of the site particularly for Carnaby's Cockatoo (*Calyptorhynchus latirostris*).

1.1 OBJECTIVES

The aim of this report is to undertake the following:

- document the potential use of the survey site by Carnaby's Cockatoos as a feeding, roosting and/or breeding location;
- report on the evidence found of feeding and roosting by Carnaby's Cockatoo species within the study area;
- document any opportunistic records of fauna observed whilst on site; and
- for completeness, with regard to the referral, consider the potential for other listed fauna species to be present on the site.

1.2 LOCATION

Lots 1005 and 1006 is located approximately 42km north of Perth (Figure 1). The site is located within the City of Wanneroo and is bound by Eglington to the North, Carabooda to the East, the Indian Ocean to the West and the newly developed suburbs of Jindalee and Butler to the South. The survey area includes the entirety of Lots 1005 and 1006. There is a known breeding population of Carnaby's Cockatoo at Yanchep National Park, where 8-10 pairs are known to breed (Ron Johnstone pers. com.).

2 METHODOLOGY

The survey was undertaken on the 8th and 9th September 2008. A total of approximately 16 person hours was spent traversing the site, surveying for potential habitat for Carnaby's Cockatoo, and opportunistically recording fauna.

There are no published guidelines on the standard methods or guidelines for the surveying of black cockatoos, and accordingly ENV has developed appropriate habitat assessment methods, which are described in part 2.3.

2.1 CLIMATE

The nearest weather data is from Perth (Bureau of Meteorology 2008). Perth has a climate featuring dry hot summers and wet winters (Figure 2) and the mean annual rainfall is 868mm.

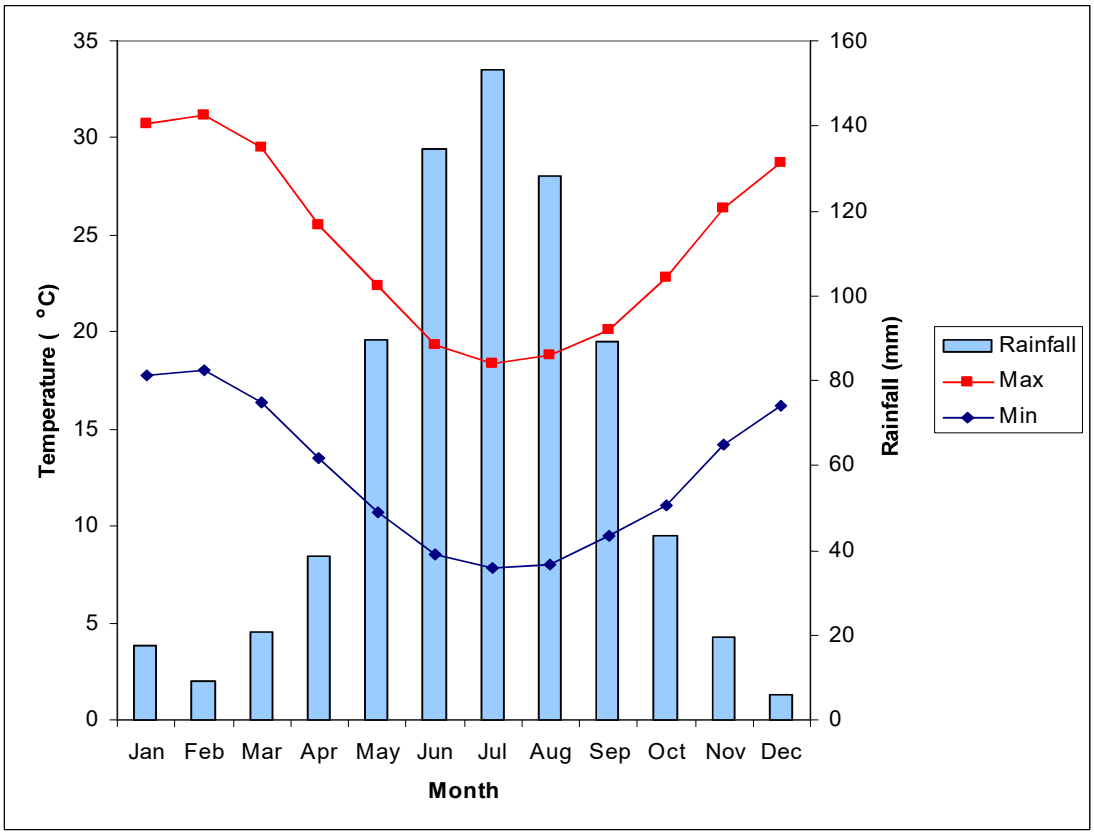

Figure 2. Mean monthly maximum and minimum temperatures and mean monthly rainfall in Perth, WA (Bureau of Meteorology 2008).

2.2 GENERAL FAUNA HABITAT SURVEY

The location of habitat assessment points are given in Table 1 (the positions of which are shown in Figure 3). At each point fauna habitat variables were recorded, with particular attention being paid to potential habitat for Carnaby's Cockatoos.

Table 1. Survey Details and Co-ordinates

Survey #	Type	Date	Zone	Easting	Northing
R1	Bird Roost survey	8/09/2008	50	375113	6502761
H1	Habitat Assessment Point	9/09/2008	50	376585	6503163
H2	Habitat Assessment Point	9/09/2008	50	376284	6503108
H3	Habitat Assessment Point	9/09/2008	50	375552	6503059
H4	Habitat Assessment Point	9/09/2008	50	375113	6502761
H5	Habitat Assessment Point	9/09/2008	50	373953	6503203
H6	Habitat Assessment Point	9/09/2008	50	374386	6503140
H7	Habitat Assessment Point	9/09/2008	50	372269	6503053

There are three main aspects to be considered when assessing a site for its potential use by Carnaby's Cockatoo. These are the foraging potential, roosting potential and nesting potential the vegetation possesses or is likely to possess in the near future. The habitat assessment consisted of recording the vegetation structure to identify potential Carnaby's Cockatoo feeding habitat and significant patches of potential roosting or nesting habitat trees.

2.3 CARNABY'S COCKATOO HABITAT SURVEY

2.3.1 Foraging Habitat

The primary food plants used by Carnaby's Cockatoo are *Banksia*, *Eucalyptus*, *Corymbia* and *Hakea* species, plus introduced *Pinus* species, some *Acacia* species and agricultural plants. The actual use of the food plants varies widely, from eating the flowers and seeds to peeling back the bark to find grubs and larvae (Shah, 2006).

During this survey, potential feeding trees were recorded, and an effort was made to look for signs of feeding, such as chewed *Banksia* fruit, or seeds of other potential food plants.

2.3.2 Roosting Habitat

Roost sites are predominantly large or tall trees with many branches that can support a flock of birds overnight. Potential roosts can be identified by noting the size, type and density of trees in a patch, and by searching under large trees for feathers and droppings.

These locations can then be confirmed through the use of dusk/dawn roost surveys. Around Perth, Pine trees and several *Eucalyptus* appear to be favoured as roost locations. At dawn, birds will gather and take flight in a single group to go and forage (Shah, 2006).

Roost surveys were carried out 30 minutes before and after sunset on the 8th September 2008, at a small patch of *Eucalyptus gomphocephala* (Tuart) trees, immediately adjacent to the site to the south, just east of Marmian Avenue (Figure 3). Field staff conducted the survey by sitting quietly at the potential roost site and observing any birds coming in to roost at the trees.

2.3.3 Breeding Habitat

Tree hollows were considered the main emphasis for assessing the site's potential for breeding activity. Due to safety reasons, potential breeding hollows were surveyed only from the ground. Breeding hollows used by black cockatoos are specific in terms of size and also have related signs of use, such as chewing and staining of the area around the hollow. Hollow suitability was assessed using the techniques described by Gibbons & Lindenmayer (2002). This included assessing the following parameters:

- Minimum entrance width of a hollow;
- Diameter of the branch on which the hollow occurred; and
- Whether the branch was living, part-dead or dead.

Trees are predisposed to developing hollows (provided the branch diameter is sufficient) when they are physiologically weakened. Trees used as nest sites by cockatoos in general are almost always those with crowns containing dead limbs and a sparse canopy. Nests are rarely found in trees with healthy crowns. Dead branches in eucalypts are often caused by fire, meaning this is an important factor in trees developing hollows. Trees that have been fire-scarred are also more likely to contain suitable hollows (Gibbons & Lindenmayer, 2002). Carnaby's Cockatoo prefers hollows with an entrance of at least 15cm diameter and a depth of 25- 250cm, between 2-10m off the ground (Cale 2003, Chapman 2007). When breeding on the Swan Coastal Plain, Carnaby's Cockatoo prefer *Eucalyptus gomphocephala* (Tuart) (Johnstone and Storr 1998).

2.4 SURVEY CONSTRAINTS

It is important to note the specific constraints imposed upon individual surveys. Constraints are often difficult to predict, as is the extent to which they will ultimately influence survey outcomes. Survey constraints for the project are detailed in Table 2.

Table 2: Constraints Associated with the Fauna Survey

Variable	Impact on Survey Outcomes
Experience levels/ Resources	The biologists who executed these surveys are practitioners suitably qualified in their respective fields. Both have undertaken a number of Black Cockatoo surveys and are familiar with the fauna of South-western Western Australia. • Mr Mick Welsh - Senior Zoologist • Mr Dale Broun – Environmental Biologist
Scope: sampling methods and completeness	The survey carried out included a habitat assessment, and opportunistic observations. The field survey was not designed to sample all fauna, and it is likely that many fauna species that occur at the site were not recorded during the survey.
Timing, weather, season.	The survey was undertaken during September 2008 following a typically wet winter (Bureau of Meteorology 2008). The conditions, being early Autumn, were likely to limit the activity of ectothermic animals (such as reptiles).
Disturbances	The site has been recently burnt (in early 2008), which is likely to temporarily reduce the fauna diversity until the vegetation recovers.

3 RESULTS

3.1 FAUNA AND FAUNA HABITAT PRESENT

During the habitat assessment, 36 fauna species were found, including two mammal, 30 bird, and four reptile species, all of which are listed in Appendix A. Carnaby's Cockatoo was observed during the survey, and is known to breed in the region (at Yanchep National Park). While it is possible that another species of white-tailed black cockatoo, Baudin's Cockatoo (*Calyptorhynchus baudinii*) could occasionally occur at the site, this species is rarely observed north of Perth, and it is not considered likely to use the site regularly.

The fauna habitat on the site can be divided into two broad habitat types:

- Low *Banksia* Woodland, and;
- Low Open Shrubland.

Within these broad habitat types are many vegetation communities (Figure 3). Broadly, the forms of low, *Banksia* dominated woodland occur in the eastern half of the study area, while the low open shrubland occur in the western half of the study area (Figure 3).

Habitat variables recorded during the survey are given in Appendix B, while photos of the site are given in Appendix C. The Low *Banksia* Woodland is dominated by a sparse to moderate, 6-8m high overstorey of *Banksia attenuata* and *B. menziesii* and *Allocasuarina fraseriana* with scattered *Eucalptus todtiana* and *Eucalyptus gomphocephala.* There is a sparse to moderate, 0-3m high understorey dominated by *Xanthorrhoea preissii*, *Dryandra sessilis*, as well as various *Hakea* and *Jacksonia* species and other shrubs (Figure 4). The ground cover is dominated by low shrubs and grasses, with some woody debris and bare ground present.

3.2 CARNABY'S COCKATOO

Carnaby's Cockatoos were observed twice during the survey, both on the 9th September 2008. Three birds were temporarily perching in a large *Eucalyptus* (at R1 on Figure 3), and approximately 10 birds were observed approximately 800m to the south-west of the abovementioned point, off the study site, flying south.

3.2.1 Carnaby's Cockatoo Background Information

Carnaby's Cockatoo is listed as Endangered under the EPBC Act and as Schedule 1 (Endangered) under the WC Act. Carnaby's Cockatoo is endemic to south-west Western Australia, and is distributed from the Murchison River to

Esperance and inland to Coorow, Kellerberrin and Lake Cronin (Cale 2003). It is uncommon to common in the subhumid zone and wetter parts of the semiarid zone, scarce and patchily distributed in the drier parts of its range (north of Arrowsmith Lake and east of Marchagee, New Norcia, Toodyay, Tarin Rock and Lake Magenta) and scarce to moderately common in the deep south-west (Johnstone & Johnstone 2008).

The species was once common, but is now in dramatic decline (Shah 2006). In the last 45 years the species has suffered a 50% reduction in its range and abundance, and is now locally extinct in some areas (Shah 2006). The total population of Carnaby's Cockatoo is currently estimated at 40 000 (Johnstone & Johnstone 2008).

This species is a postnuptial nomad, tending to move west with its young after breeding, often to non-breeding areas. In the non-breeding season (late spring to mid-winter), it congregates in large flocks of up to 15, 000 birds (Johnstone & Johnstone 2008). In some areas these flocks forage within 50 km of their breeding areas, whilst in other areas the flocks move to the coast, where heath, *Banksia* woodland and pine plantations are concentrated (Cale 2003). For example, most birds breeding in Three Springs, Carnamah, Coorow, Badgingarra, Dandaragan and Moora regions tend to move west after breeding into higher rainfall areas, especially the near-coastal *Banksia* woodland at Wanagarren Nature Reserve, Nilgen Nature Reserve, the Yanchep area (especially Yanchep National Park), Pinjar, Tamala Park and Gnangara areas, then many of these move further south onto the Swan Coastal Plain, including the southern Perth metropolitan area around Baldivis, Lake Clifton and Myalup (Johnstone & Johnstone 2008).

Carnaby's Cockatoos feed on seeds, nuts and flowers of a variety of native proteaceous species (including *Banksia*, *Dryandra* and *Hakea)*, and *Grevillea*, *Allocasuarina, Eucalyptus* and *Corymbia calophylla* nuts, and seeds from the cones of *Pinus* spp. (Shah 2006). Pine (*Pinus* spp.) plantations in the coastal zone are now important feeding areas in the non-breeding season (Cale 2003).

Breeding has been recorded from early July to mid-December. Breeding occurs in the semi-arid and subhumid interior from the Three Springs district south to the Stirling Range, west to Cockleshell Gully, Cataby, Regan's Ford, Gingin, Yanchep, Serpentine, Mandurah, Lake Clifton, Bunbury, Nannup and Tone River and east to Manmanning, Kellerberrin, Woolundra, Lake Cronin and near Ravensthorpe (Johnstone & Johnstone 2008).

Carnaby's Cockatoos display strong pair bonds, and mate for life. Breeding begins at four years of age. They nest in hollows of smooth-barked eucalypts, especially Salmon Gum (*Eucalyptus salmonophloia)* and Wandoo (*Eucalyptus wandoo),* but nests have also been found in other eucalypts, including York Gum

(*Eucalyptus loxophleba)*, Flooded Gum (*Eucalyptus rudis)*, Tuart (*Eucalyptus gomphocephala)* and the rough-barked Marri (*Corymbia calophylla)*. On the Swan Coastal Plain, most nests are in Tuart (Johnstone & Storr 1998).

In the midlands region of the Wheatbelt and on the northern Swan Coastal Plain, pairs begin to move back to their breeding sites in July-August (some as late as mid-November), and begin renovating or looking for a suitable nest hollow (Johnstone & Johnstone 2008). Eggs are laid on a mat of wood chips at the bottom of a large hollow (mostly top-entry hollows) generally ranging from 1m - 2.5m deep, with a clutch of one to two (mostly two, but only one young is reared). Incubation lasts 29 days, and only the female incubates and broods. The nestling period lasts for approximately 70 days, after which the fledgling is fed by both adults for a further four months (Johnstone & Storr 1998).

Carnaby's Cockatoo forages no more than approximately 20 km from its nesting hollows during the breeding season, so having sufficient foraging resources close to the breeding area is critical to its breeding success (Saunders 1980). In the Gingin and Yanchep areas, where breeding is recorded there are areas of remnant vegetation, National Park, State Forest, roadside verges and pine plantations that contain breeding and foraging habitat for Carnaby's Cockatoos (Johnstone & Johnstone 2008).

Most breeding in the northern and midlands regions of the Wheatbelt (Three Springs, Coorow and Moora districts) is completed by the end of January to early February, and family groups begin to move west towards the coast and amalgamate into larger foraging flocks on the northern section of the Swan Coastal Plain. During February, March and April (and occasionally into May) large transit flocks of up to 7000 forage at major food sources, including *Banksia* or Kwongan heaths and *Pinus* plantations on the Swan Coastal Plain.

There are, however, some exceptions to this westward and southward annual movement. For example, a flock of more than 300 (including adult and juvenile birds) remains during the autumn to winter period in the Eneabba area. These birds roost in tall river gums in and around the township, and forage in remnant native vegetation and in adjacent farmlands. While the region of origin of these birds is unknown, it is noteworthy that they remain here during the autumn to winter period, when virtually all other Carnaby's Cockatoos from the broader region (i.e. Three Springs, Moora and Badgingarra) vacate it after breeding (Johnstone & Johnstone 2008).

3.2.2 Carnaby's Cockatoo Foraging Habitat

The Low *Banksia* Woodland has the highest value in terms of providing a source of food for Carnaby's Cockatoo (see shaded area in Figure 3). The main potential food species here are *Banksia attenuata*, *Banksia menziesii*, *Dryandra sessilis*,

Eucalyptus todtiana, *Hakea trifurcata*, *Hakea ruscifolia*, *Hakea prostrata* and *Hakea lissocarpha*. Although much of this eastern area has been temporarily degraded by a recent fire, regeneration though soil-stored seed combined with re-growth of extant plants will see a recovery in the vegetation over time. While the burnt area may appear to be in very poor condition, this is temporary.

Lot 1482 is approximately 6-8 kilometers from a known Carnaby's Cockatoo breeding population located at Yanchep National Park. This species is understood to forage only up to 10-20 km away from their nesting sites (Saunders 1980), making it feasible that breeding pairs would visit the site to obtain food during the breeding season which occurs from July-November. During other times of the year it is possible that other birds would feed at the site, particularly after the site recovers from the fire disturbance.

3.2.3 Carnaby's Cockatoo Roosting Habitat

The only trees on the site are a few relatively small and senescent Tuart (at H3 on Figure 3). These trees have a sparse canopy, and are few in number, and are exposed, so are unlikely to provide overnight roosting habitat.

3.2.4 Carnaby's Cockatoo Nesting Habitat Potential

Nesting is unlikely to occur on the site. There are several large Tuart (*Eucalyptus* gomphocephala) trees just to the south of the site (H4 on Figure 3), with hollows that match the potential nesting criteria required for Carnaby's Cockatoo's, however, the birds are unlikely to select this area to establish breeding hollows. This is due to the fact that the trees are isolated and exposed, and there are much more suitable locations in close proximity to the site (Yanchep National Park).

3.3 OTHER EPBC LISTED FAUNA

Several other EPBC listed fauna species have been previously recorded in the region. These are listed below and are addressed in relation to the proposed development:

Chuditch (*Dasyurus geoffroii*)

The Chuditch (*Dasyurus geoffroii*) (also known as the Western Quoll) is listed as Vulnerable by the EPBC Act and by the IUCN Red List, and as Schedule 1 by the WC Act. This species once occurred over 70% of Australia, but its distribution has been significantly reduced to the south-west of WA. The Chuditch is now only found in sclerophyll forest, woodland and mallee shrubland (Strahan 1995, Menkhorst & Knight 2002). It is more commonly found in riparian vegetation that contains hollow-bearing trees and logs.

Chuditch still occur in the Darling Range, however none have been recorded on the Swan Coastal Plain for many years (Rick Howe, WA Museum, pers. com.). Coastal *Banksia* woodland and heath at the study location is not considered to be appropriate habitat for this species (Rick Howe pers. com.) It is therefore very unlikely that Chuditch occur in or near the site.

Southern Giant Petrel (*Macronectes giganteus*), Northern Giant Petrel (*Macronectes halli*), Shy Albatross (*Sensu stricto*), Gibson's Albatross (*Diomedea gibsoni*).

These are pelagic marine birds that rarely come close to the land, and generally breed on Southern Ocean islands (Johnstone & Storr 1998). There is no potential habitat for them on the site.

Great Egret (*Ardea alba*)

The Great Egret is listed as Migratory under the EPBC Act. It occurs in the Kimberly, Pilbara, and on the west coast from the Murchison River south, throughout the south-west, and east to Cape Arid. They inhabit mostly shallow fresh lakes, pools in rivers, lagoons, lignum swamps, clay pans and samphire flats, large dams and sewage ponds. They also inhabit shallow saltwater habitat such as mangrove creeks, tidal pools, samphire swamps and salt work ponds. They breed colonially at wooded swamps and river pools, nesting in various riparian trees. This species is considered common to very common in the Kimberly and scarce to moderately common elsewhere (Johnstone & Storr 1998).

While this species might occasionally fly over the site or stop temporarily on the site, the site lacks permanent water or any significant ephemeral water-bodies so the Great Egret is unlikely to occur there regularly.

Cattle Egret (*Ardea ibis*)

The Cattle Egret is listed as Migratory under the EPBC Act. It occurs in the wetter parts of WA, in particular the Kimberly and the south-west. The species inhabits short grass, in particular damp pastures and wetlands, usually in the company of Cattle and occasionally other livestock. In WA they are an irregular visitor, occurring mostly in Autumn, and are not thought to regularly breed in WA (Johnstone & Storr 1998).

While this species might occasionally fly over the site or stop temporarily on the site, the site lacks damp pastures or wetlands (as well as cattle), therefore the Cattle Egret is unlikely to occur there regularly.

Baudin's Cockatoo *(Calyptorhynchus baudinii)*

Baudin's Cockatoo is listed as Vulnerable under the EPBC Act and as Schedule 1 under the WC Act. This species is distributed through the south-western humid and subhumid zones, from the northern Darling Range and adjacent far east of the Swan Coastal Plain (south of the Swan River), south to Bunbury and across to Albany (Johnstone & Storr 1998). Baudin's Cockatoo rarely occur in Perth, or anywhere along the coast south to Perth. Many records of Baudin's Cockatoo from Perth may be incorrect, since the two species are often confused. They usually occur in small flocks of up to 30, or occasionally up to 50, or rarely in aggregations of up to 1200 (Johnstone & Kirkby 2008).

This species forages primarily in eucalypt forest, where it feeds primarily on Marri (*Corymbia calophylla*) seeds, flowers, nectar and buds (Johnstone & Kirkby 2008). They also feed on a wide range of seeds of *Eucalyptus*, *Banksia*, *Hakea* and *Dryandra,* as well as fruiting apples and pears and persimmons, as well as Pines, and beetle larvae from under the bark of trees (Johnstone & Kirkby 2008, Johnstone & Storr 1998). Baudin's Cockatoo nests in tree hollows, in spring in the deep south-west, north to Lowden. Primary nesting trees are Karri (*Eucalyptus diversicolor*), Marri, and Wandoo (*Eucalyptus wandoo*). Baudin's Cockatoo is a postnuptial nomad, moving in March and September to the central and northern Darling Range and adjacent far east of the Swan Coastal Plain (Johnstone & Storr 1998).

This species is not known to occur in the area (Johnstone & Kirkby 2008), and the site lacks the favoured food of this species (Marri). It is therefore considered unlikely to occur at the site.

Rainbow Bee-eater (*Merops ornatus)*

The Rainbow Bee-eater is a migratory species listed under the EPBC Act, migrating to south-western Australia to breed in spring and summer. The Rainbow Bee-eater is a common and widespread species in Western Australia. It occurs throughout WA except the drier interior of the state and the far south-west (Johnstone & Storr 1998). They occur in lightly wooded often sandy country, preferring areas near water.

The Rainbow Bee-eater feeds on air-borne insects, and nests throughout their range in WA in burrows excavated in sandy ground or banks, often at the margins of roads and tracks (Johnstone & Storr 1998).

While the Rainbow Bee-eater is likely to occur on the site during summer, they are unlikely to be significantly affected by the development. This species forages aerially, and commonly foraging in open areas within suburban areas, so the removal of *Banksia* woodland is unlikely to reduce the amount of foraging space for this species. The Rainbow Bee-eater may breed at the site and the proposed

development is likely to reduce the amount of potential breeding habitat (such as sandy banks and track edges). Considering how common and widespread this species is, any impacts associated with a development of this scale are unlikely to significant for the species.

Fork-tailed Swift (*Apus pacificus*)

The Fork-tailed Swift (*Apus pacificus*) is listed as Migratory under the EPBC Act. It is a summer migrant (October-April) to Australia. This species is an aerial species, which forages high above the tree canopy and rarely lower so is independent of terrestrial habitats. It is there fore unlikely to be affected by the proposed development.

4 DISCUSSION

4.1 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

The proposed development will result in the clearing of native vegetation that is potential foraging habitat for Carnaby's Cockatoo in the eastern half of the study area.. An indirect effect of the proposed development will be an increase in the amount of traffic in the area, which could increase road mortalities of Carnaby's Cockatoo.

Foraging habitat close to breeding Carnaby's Cockatoo populations is known to be important because breeding pairs do not forage far from the nest while they are feeding hatchlings (Saunders 1980). The population of Carnaby's Cockatoo likely to be affected (at least in spring) is likely to be a breeding population from nearby Yanchep National Park. This population however is thought to consist of only about 8-10 pairs (Ron Johnstone pers. com.). There is considerable foraging habitat (*Banksia* woodland and Pine plantations) in close proximity to this population, both within and outside of Yanchep National Park. Considering this, it is unlikely that the site is critical foraging habitat for this population of Carnaby's Cockatoo.

4.2 IMPACTS UPON CARNABY'S COCKATOO

Carnaby's Cockatoo are relatively common in Perth, and appear to be able to adapt to suburban environments. Suburbs often have a wider variety of trees and flowering plants (in gardens and parks) than the surrounding natural bush-land, which provides feeding habitat for a range of birds, including Black Cockatoos. The amount of foraging habitat for Carnaby's Cockatoos will initially be reduced on the site, as a result of clearing for the proposed development.

Large trees are a common feature of northern Perth suburbs, and should be common in the future in the area once it is developed. In the long term, the proposed development will result in a net gain in the number of large trees (and hence potential roosting and possibly nesting habitat) in the area.

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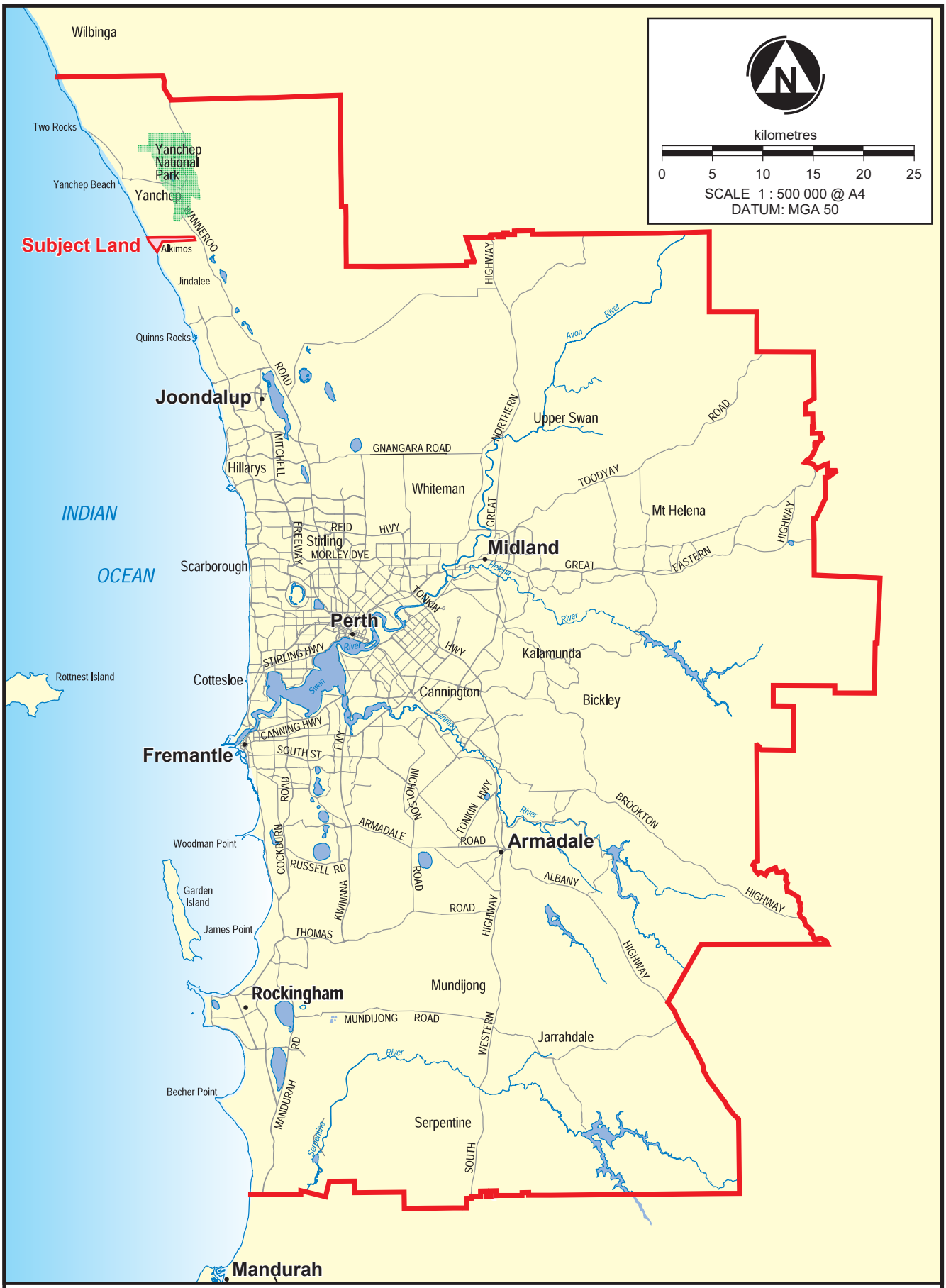
FIGURES



PRINTED: Tue 21 Oct 08

DRAWN: TE 21-10-08 AUTHOR: MW 21-10-08

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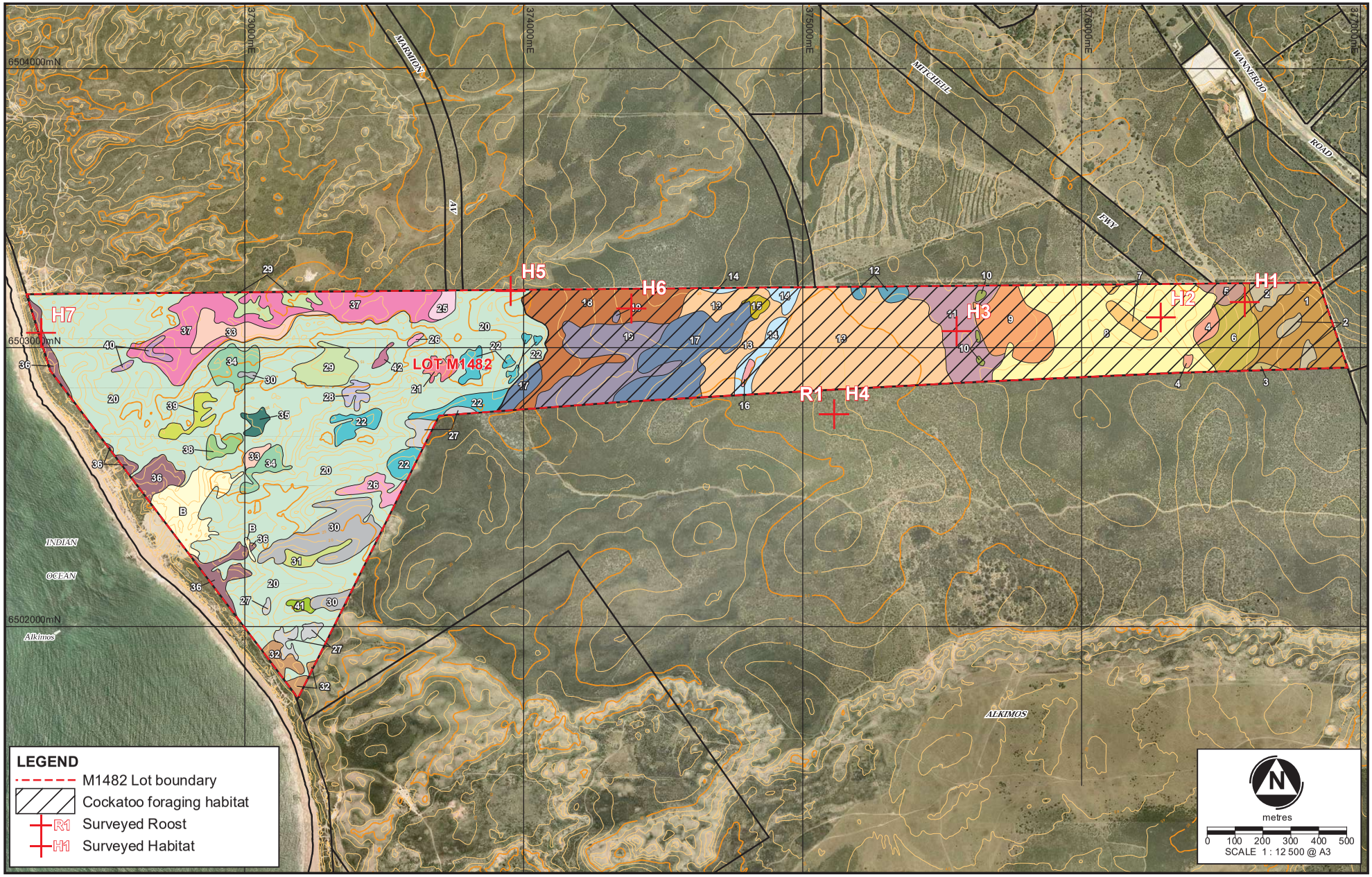
FAUNA ASSESSMENT
REGIONAL LOCATION
FIGURE 1 Australia



PRINTED: Tue 21 Oct 08
AUTHOR: MW 21-10-08
DRAWN: TE 21-10-08
DATUM: MGA50
08-278-1-F3.dgn

SOURCE: Cadastre and Topography: McMullen Nolan and Partners Surveyers Pty Ltd, 6-10-04

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FAUNA ASSESSMENT

CARNABY'S COCKATOO FORAGING HABITAT

FIGURE 3

env Australia

PRINTED: Tue 21 Oct 08

08-278-1-F4.dgn DATUM: MGA50 DRAWN: TE 21-10-08 AUTHOR: MW 21-10-08

COMMUNITY DESCRIPTIONS

BaBmAf - 1
Low Woodland of *Banksia attenuata Banksia menziesii - Allocasuarina fraseriana* over dense understorey of *Xanthorrhoea preissii, Hibbertia hypericoides, Jacksonia stembergiana, Hakea trifurcata, Dryandra sessilis* var. *cygnorum, Allocasuarina humilis, Mesomelaena pseudostygia, Hakea costata* and *Leucopogon polymorphus*.

BaBmEt - 2
Low Open Woodland of *Banksia attenuata Banksia menziesii Eucalyptus todtiana - Nuytsia floribunda* over low dense understorey of *Allocasuarina humilis, Hakea costata, Hibbertia hypericoides, Xanthorrhoea preissii, Leucopogon polymorphus, Hakea ruscifolia* and *Mesomelaena pseudostygia*.

BaBmEtEd - 3
Low Open Woodland of *Banksia attenuata Banksia menziesii Eucalyptus todtiana Eucalyptus decipiens Nuytsia floribunda* over low dense understorey of *Allocasuarina humilis, Hakea costata, Hibbertia hypericoides, Xanthorrhoea preissii, Leucopogon polymorphus, Hakea ruscifolia* and *Mesomelaena pseudostygia*.

AfBaBmEd - 4
Low Woodland of *Allocasuarina fraseriana Banksia attenuata Banksia menziesii Eucalytpus decipiens* over *Dryandra sessilis* var. *cygnorum, Hibbertia hypericoides, Xanthorrhoea preissii* and *Mesomelaena pseudostygia*.

AfBaBmEtEd - 5
Low Woodland of *Allocasuarina fraseriana Banksia attenuata Banksia menziesii Eucalyptus todtiana Eucalyptus decipiens* over *Hibbertia hypericoides, Mesomelaena pseudostygia, Dryandra sessilis* var. *cygnorum, Jacksonia stembergiana, Acacia pulchella, Bossiaea eriocarpa* and *Synaphea spinulosa* subsp. *spinulosa*.

AfBaBmEt - 6
Low Open Woodland of *Allocasuarina fraseriana Banksia attenuata Banksia menziesii Eucalyptus todtiana* over *Hibbertia hypericoides, Xanthorrhoea preissii, Mesomelaena pseudostygia, Macrozamia riedlei, Stirlingia latifolia, Jacksonia sternbergiana,*, and *Hakea ruscifolia*.

BaBmAfDs - 7
Low Woodland of *Banksia attenuata Banksia menziesii - Allocasuarina fraseriana* over tall dense understorey of *Dryandra sessilis* var. *cygnorum, Hakea trifurcata, Xanthorrhoea preissii, Hibbertia hypericoides, Conospermum triplinervium, Calothamnus quadrifidus* and *Jacksonia sternbergiana*.

DsHt - 8
Closed Tall Scrub of *Dryandra sessilis* var. *cygnorum, Hakea trifurcata, Xanthorrhoea preissii, Hibbertia hypericoides, Mesomelaena pseudostygia* with scattered *Eucalyptus todtiana* and various introduced species.

BaBmEtAr - 9
Low Woodland of *Banksia attenuata Banksia menziesii Eucalyptus todtiana Acacia rostellifera* over *Hibbertia hypericoides, Xanthorrhoea preissii, Dryandra sessilis* var. *cygnorum, Mesomelaena pseudostygia, Lepidosperma* sp., *Hakea prostrata, Macrozamia riedlei, Calytrix flavescens* and *Hakea trifurcata*.

BaBmAr - 10
Low Open Woodland of *Banksia attenuata Banksia menziesii Acacia rostellifera* over *Hibbertia hypericoides, Mesomelaena pseudostygia, Dryandra sessilis* var. *cygnorum, Jacksonia calcicola, Hakea trifurcata, Dryandra lindleyana* subsp. *lindleyana* and *Macrozamia riedlei*.

BaBmEg - 11
Low Woodland of *Banksia attenuata Banksia menziesii Eucalyptus gomphocephala* over *Hibbertia hypericoides Xanthorrhoea preissii, Hakea trifurcata, Petrophile macrostachya, Hakea ruscifolia, Macrozamia riedlei, Daviesia divaricata, Acacia cyclops* and *Acacia rostellifera*.

CqDs - 12
Closed Heath of *Calothamnus quadrifidus, Dryandra sessilis* var. *cygnorum, Xanthorrhoea preissii, Hibbertia hypericoides, Petrophile serruriae, Hakea prostrata* and *Jacksonia calcicola*.

EtEgBaBm - 13
Low Woodland of *Eucalyptus todtiana Banksia attenuata Banksia menziesii Eucalyptus gomphocephala* over *Hibbertia hypericoides, Xanthorrhoea preissii, Jacksonia stembergiana, Hakea prostrata, Mesomelaena pseudostygia, Hakea ruscifolia, Xanthorrhoea gracillis, Allocasaurina humilis* and *Macrozamia riedlei*.

DsHtCq - 14
Open Heath of *Dryandra sessilis* var. *cygnorum, Hakea trifurcata, Xanthorrhoea preissii, Calothamnus quadrifidus, Hibbertia hypericoides, Mesomelaena pseudostygia, Waitzia suaveolens* and *Acacia pulchella*.

BaBmEgAh - 15
Low Open Woodland of *Eucalyptus gomphocephala Banksia attenuata Banksia menziesii* over *Hibbertia hypericoides, Allocasuarina humilis, Mesomelaena pseudostygia, Conostephium pendulum, Calothamnus quadrifidus, Hakea trifurcata, Dryandra sessilis* var. *cygnorum* and *Hakea lissocarpha*.

DsMs - 16
Shrubland of *Dryandra sessilis* var. *cygnorum, Xanthorrhoea preissii, Melaleuca systena, Grevillea preissii subsp. preissii, Melaleuca huegelii* subsp. *huegelii, Lomandra maritima, Kennedia prostrata, Desmocladus asper* and *Brachyscome iberidifolia* on limestone outcropping.

DsHtCqCt - 17
Closed Heath of *Dryandra sessilis* var. *cygnorum, Hakea trifurcata, Calothamnus quadrifidus, Hakea prostrata, Xanthorrhoea preissii, Hibbertia hypericoides, Leucopogon polymorphus Jacksonia calcicola Conospermum triplinervum.*
and *Xanthorrhoea gracillis.*

BaBmAh - 18
Low Woodland of *Banksia attenuata Banksia menziesii* over *Allocasuarina humilis, Hibbertia hypericoides, Xanthorrhoea preissii, Lysinema ciliatum, Mesomelaena pseudostygia, Conostephium pendulum, Hakea costata* and *Xanthorrhoea gracillis*.

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*

LmMs20
Low Open Shrubland of *Lomandra maritima, Melaleuca systena, Conostylis pauciflora* subsp. *euryrhipis*/subsp. *pauciflora/candicans, Acanthocarpus preissii, Acacia cochlearis, Desmocladus asper, Leucopogon parviflorus, Hemiandra pungens* and *Acacia lasiocarpa* var. *lasiocarpa*.

LmMsAc - 21
Low Shrubland of *Melaleuca systena, Lomandra maritima, Acacia cochlearis Desmocladus asper, Conostylis pauciflora* subsp. *euryrhipis* /subsp. *pauciflora/ candicans, Leucopogon parviflorus, Acanthocarpus preissii, Hemiandra pungens, Acacia cochlearis* and *Acacia lasiocarpa* var. *lasiocarpa*.

XpLmMs - 22
Open Low Heath of *Xanthorrhoea preissii, Melaleuca systena, Lomandra maritima, Desmocladus asper, Conostylis pauciflora* subsp. *euryrhipis* /subsp. *pauciflora/ candicans, Leucopogon parviflorus, Acanthocarpus preissii, Acacia cochlearis, Hemiandra pungens* and *Acacia lasiocarpa var. lasiocarpa*.

COMMUNITY DESCRIPTIONS

LmApAs - 25
Open shrubland of *Lomandra maritima, Acacia pulchella, Acacia saligna, Melaleuca systena, Hakea prostrata, Lomandra maritima, Xanthorrhoea preissii, Poa porphyroclados, Dryandra lindleyana* var. *lindleyana* and *Desmocladus asper*.

AlMs - 26
Open Shrubland of *Anthocercis littorea, Melaleuca systena, Lomandra maritima, Desmocladus asper, Conostylis pauciflora* subsp. *euryrhipis/* subsp. *pauciflora/ candicans, Leucopogon parviflorus, Acanthocarpus preissii, Acacia cochlearis, Hemiandra pungens* and *Acacia lasiocarpa* var. *lasiocarpa*

StDsAt - 27
Dense Tall Scrub of *Dryandra sessilis* var. *cygnorum* that has been burnt and now consists of Low Open Shrubland of *Scaevola thesioides* subsp. *thesioides, Acacia truncata, Grevillea preissii* subsp. *preissii, Melaleuca systena, Melaleuca huegelii subsp. huegelii, Lomandra maritima, Poa porphyroclados, Leucopogon parviflorus, Xanthorrhoea preissii, Opercularia vaginata* and *Dryandra sessilis* var. *cygnorum* with limestone outcropping.

AlSr - 28
Open Shrubland of *Anthocercis littorea,* , *Scaevola repens* var. *repens, Melaleuca systena, Poa porphyroclados, Rhagodia baccata* subsp. *baccata, Acacia saligna, Desmocladus asper, Conostylis pauciflora* subsp. *euryrhipis/* subsp. *pauciflora/ candicans* and *Acanthocarpus preissii*.

AlLmPp - 29
Low Open Shrubland of *Anthocercis littorea, Lomandra maritima, Poa porphyroclados, Scaevola repens* var. *repens, Melaleuca systena, Acacia cochlearis, Opercularia vaginata, Xanthorrhoea preissii, Rhagodia baccata* subsp. *baccata* and *Tricoryne elatior*.

AcRb - 30
Dense Tall Scrub of *Dryandra sessilis* var. *cygnorum* that has been burnt and now consists of Shrubland of *Acacia cochlearis, Rhagodia baccata* subsp. *baccata, Poa porphyroclados, Dryandra sessilis* var. *cygnum, Hardenbergia comptoniana* and *Senecio pinnatifolius*.

AlLmMs - 31
Low Open Shrubland of *Anthocercis littorea, Lomandra maritima, Melaleuca systena, Scaevola thesioides* subsp. *thesioides, Poa porphyroclados, Acanthocarpus preissii, Hibbertia racemosa* and *Tricoryne elatior*.

LmPp(D) - 32
Degraded Herbland of *Lomandra maritima, Poa porphyroclados, Conostylis pauciflora* subsp. *euryrhipis/* subsp. *pauciflora/ candicans, Lepidosperma* aff. *squamatum, Acanthocarpus preissii, Melaleuca systena, Podotheca gnaphalioides, Hibbertia racemosa* and *Tricoryne elatior*.

SaAl - 33
Shrubland of *Santalum acuminatum, Anthocercis littorea, Melaleuca systena, Poa porphyroclados, Acanthocarpus preissii, Podotheca gnaphalioides, Lepidosperma* aff. *squamatum, Hemiandra pungens, Lomandra maritima* and *Conostylis pauciflora* subsp. *euryrhipis/* subsp. *pauciflora/ candicans*.

LmSa - 34
Low Open Shrubland of *Lomandra maritima, Santalum acuminatum, Melaleuca systena, Poa porphyroclados, Hardenbergia comptoniana* and *Hibbertia racemosa*.

McSn - 35
Closed Heath of *Melaleuca cardiophylla, Scaevola nitida, Melaleuca huegelii* subsp. *huegelii, Acacia truncata, Lepidosperma* aff. *squamatum, Rhagodia baccata* subsp. *baccata* and *Leptomeria gladiatum*.

OaSg - 36
Shrubland of *Olearia axillaris, Lomandra maritima, Spyridium globulosum, Santalum acuminatum, Lepidosperma gladiatum, Poa porphyroclados, Desmocladus asper* and *Vulpia bromoides*.

AsMs - 37
Low Shrubland of *Acacia saligna, Melaleuca systena, Lomandra maritima, Conostylis pauciflora* subsp. *euryrhipis* / subsp. *pauciflora/ candicans, Podotheca gnaphalioides, Opercularia vaginata, Leucopogon parviflorus* and *Hardenbergia comptoniana*.

LmMsAl - 38
Low Open Shrubland of *Melaleuca systena, Lomandra maritima, Desmocladus asper, Conostylis pauciflora* subsp. *euryrhipis/* subsp. *pauciflora/ candicans, Leucopogon parviflorus, Acanthocarpus preissii, Acacia cochlearis, Hemiandra pungens, Anthocercis littorea* and *Acacia lasiocarpa* var. *lasiocarpa*.

LmMsSa - 39
Low Open Shrubland of *Lomandra maritima, Melaleuca systena, Santalum acuminatum, Acanthocarpas preissii, Poa porphyroclados, Scaevola repens* var. *repens, Senecio pinnatifolius* and *Lepidosperma* aff. *squamatum*.

XpAs - 40
Shrubland of *Xanthorrhoea preissii, Acacia saligna, Lomadra maritima, Melaleuca systena, Kennedia prostrata, Hybanthas calycinus, Opercularis vaginata* and *Conostylis pauciflora* subsp. *euryrhipis* / subsp. *pauciflora/ candicans*

LoAv - 41
Grassland of introduced species *Avena barbata, Lagurus ovatus, Trachyandra divaricata,* and *Euphorbia terracina*.

XpAl - 42
Shrubland of *Xanthorrhoea preissii, Anthocercis littorea, Melaleuca systena, Lomandra maritima, Desmocladus asper, Conostylis pauciflora* subsp. *euryrhipis/* subsp. *pauciflora/ candicans, Leucopogon parviflorus, Acanthocarpus preissii, Acacia cochlearis, Hemiandra pungens* and *Acacia lasiocarpa* var. *lasiocarpa*

B
Blowout

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FAUNA ASSESSMENT
VEGETATION LEGEND
FIGURE 4

env Australia

APPENDIX A
FAUNA SPECIES OBSERVED

APPENDIX A

Alkimos Fauna Habitat Assessment

Fauna Species Observed in the Project Area and Vicinity - September 2008

FAMILY GROUPS	SCIENTIFIC NAME	Conservation Codes		
		EPBC	WC	DEC
MAMMALS				
Family MACROPODIDAE				
Macropus fuliginosus	Western Grey Kangaroo			
Family LEPORIDAE				
Oryctolagus cuniculus	Rabbit			
BIRDS				
Family CASUARIIDAE				
Dromaius novaehollandiae	Emu			
Family ACCIPITRIDAE				
Aquila audax	Wedge-tailed Eagle			
Family FALCONIDAE				
Falco berigora	Brown Falcon			
Falco cenchroides	Australian Kestrel	Ma		
Family ALCEDINIDAE				
Columba livia	Domestic Pigeon			
Phaps chalcoptera	Common Bronzewing			
Ocyphaps lophotes	Crested Pigeon			
Family PSITTACIDAE				
Calyptorhynchus latirostris	Carnaby`s Cockatoo	E	S1	
Cacatua roseicapilla	Galah			
Platycercus zonarius	Australian Ringneck			
Family CUCULIDAE				
Chrysococcyx basalis	Horsfield`s Bronze Cuckoo	Ma		
Family HALCYONIDAE				
Dacelo novaeguineae	Laughing Kookaburra			

FAMILY GROUPS	SCIENTIFIC NAME	Conservation Codes		
		EPBC	WC	DEC
Family MALURIDAE				
Malurus splendens	Splendid Fairy-wren			
Family PARDALOTIDAE				
Pardalotus striatus	Striated Pardalote			
Family ACANTHIZIDAE				
Sericornis frontalis	White-browed Scrubwren			
Gerygone fusca	Western Gerygone			
Family MELIPHAGIDAE				
Lichmera indistincta	Brown Honeyeater			
Lichenostomus virescens	Singing Honeyeater			
Phylidonyris novaehollandiae	New Holland Honeyeater			
Anthochaera lunulata	Western Little Wattlebird			
Anthochaera carunculata	Red Wattlebird			
Family PETROICIDAE				
Petroica multicolor	Scarlet Robin			
Family PACHYCEPHALIDAE				
Pachycephala rufiventris	Rufous Whistler			
Family DICRURIDAE				
Rhipidura fuliginosa	Grey Fantail			
Grallina cyanoleuca	Magpie-lark	Ma		
Family CAMPEPHAGIDAE				
Coracina novaehollandiae	Black-faced Cuckoo-shrike	Ma		
Family ARTAMIDAE				
Artamus cinereus	Black-faced Woodswallow			
Family CRACTICIDAE				
Cracticus torquatus	Grey Butcherbird			
Cracticus tibicen	Australian Magpie			
Family CORVIDAE				
Corvus coronoides	Australian Raven			
REPTILES				

FAMILY GROUPS	SCIENTIFIC NAME	Conservation Codes		
		EPBC	WC	DEC
Family AGAMIDAE				
Pogona minor	Bearded Dragon			
Family SCINCIDAE				
Tiliqua occipitalis	Western Blue-tongue			
Tiliqua rugosa	Bobtail			
Family ELAPIDAE				
Pseudonaja affinis	Dugite			

APPENDIX B
FAUNA HABITAT VARIABLE DATA

APPENDIX B
Fauna Habitat Variables

Site #		H1	H2	H3	H4	H5	H6	H7
Overstory	**Species**	Banksia sp.	E. todtiana	Banksia sp.	Banksia sp. Tuart		Banksia sp.	
	Height (m)	6	6	6	8		6	
	Cover	Sparse	Scattered	Moderate	Sparse		Moderate	
Understory	**Species**	Xanthorrhoea, Zamia sp.	Dryandra, Xanthorrhoea	Xanthorrhoea	Xanthorrhoea	Xanthorrhoea	Xanthorrhoea	Acacia, Weeds, Lupins
	Height (m)	2	3	2	3	2	2	0.6
	Cover	Sparse	Moderate	Sparse	Sparse	Scattered	Sparse	Moderate
Groundcover	**Species**	Small Shrubs	Small herbs	Small shrubs, weeds	Grasses, some weeds	Grasses	Small shrubs	Grasses, weeds
	Height (m)	0.3	0.2	0.2	0.3	0.2	0.6	0.2
	Cover	Sparse	Sparse		Moderate	Thick	Moderate	Moderate
# Hollow Bearing Trees/ Ha				4-9	4-9			
Trees with Multiple Hollows/ Ha				4-9	4-9			
Tree Hollow Description				Small to very large, 2-7m in height	Small to very large, 2-7m in height			
Dead Stags/ Ha				1-3	4-9			
Trees with >50% Dead Canopy/ Ha				4-9	4-9			
# Trees with hollow suitable for Carnaby's Cockatoo to nest/ Ha				4-9	4-9			
# Trees as above but with multiple hollows/ Ha				4-9	4-9			
% Cover of Feed Trees for Carnaby's Cockatoo		15-25	25-75	15-25	15		50	5
Fire Age (years)		1-2	1-2	1-2	1-2		1-2	
Miscellaneous Notes		Recent fire appears to have been very intense		1 small stand of Tuarts at this point, emu scats	1 stand of turats at this point of approx 1Ha in size			Degraded dunal system, some Lupins-potential feed for CC's

APPENDIX C
SITE PHOTOS

APPENDIX C
Site Photos

Site H1

Site H2

Site H4

Site H5

Site H6

Site H7

WESTERN AUSTRALIA

REGISTER NUMBER	
608/DP406083	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
N/A	**N/A**

VOLUME **2901** FOLIO **412**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

LAND DESCRIPTION:

LOT 608 ON DEPOSITED PLAN 406083

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

MINISTER FOR EDUCATION OF 151 ROYAL STREET EAST PERTH WA 6004

(T O182468) REGISTERED 27/6/2019

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. *EXCEPT AND RESERVING METALS, MINERALS, GEMS AND MINERAL OIL SPECIFIED IN TRANSFER 7033/1940.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP406083
PREVIOUS TITLE:	2880-290
PROPERTY STREET ADDRESS:	91 SHOREHAVEN BVD, ALKIMOS.
LOCAL GOVERNMENT AUTHORITY:	CITY OF WANNEROO
RESPONSIBLE AGENCY:	DEPARTMENT OF EDUCATION

NOTE 1: DUPLICATE CERTIFICATE OF TITLE NOT ISSUED AS REQUESTED BY DEALING M369687

SHOREHAVEN

ENVIRONMENTAL MANAGEMENT PLAN

Prepared for:

PEET LIMITED

Job No: 09.114

Report No: RP001

env

Australia

SHOREHAVEN

ENVIRONMENTAL MANAGEMENT PLAN

Prepared for:

PEET LIMITED

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Status:	*Final V3*
QA Review:	*Filamena Black*
Technical Review:	*Georgia Scott*
Content Review:	*Brendan Toohey*
Date:	*2 November 2009*

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STATEMENT OF LIMITATIONS

Scope of Services

This environmental site assessment report ("the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and ENV.Australia Pty Ltd (ENV) ("scope of services"). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

Reliance on Data

In preparing the report, ENV has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, ENV has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. ENV will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to ENV.

Environmental Conclusions

In accordance with the scope of services, ENV has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or groundwater conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions. Also it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for Benefit of Client

The report has been prepared for the benefit of the Client and no other party. ENV assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of ENV or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

Other Limitations

ENV will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

1 PURPOSE OF THE REPORT

The purpose of the Environmental Management Plan is to assist the City of Wanneroo and other State Government Agencies in the management of conservation areas and general public open spaces reserved as part of the residential development to ensure the conservation areas maintain their high conservation standard.

Moreover, the Environmental Management Plan:

- Identify priorities;
- Set objectives and targets
- Define performance indicators;
- Document strategies and time frames to achieve targets;
- Allocate responsibilities to enable realisation of the overall plan;
- Establish mechanisms to monitor, evaluate and report progress

2 INTRODUCTION

Alkimos-Eglinton is an area of approximately 2660 ha of coastal land between Butler and Yanchep, 40 km north of Perth. The land is zoned as Urban under the Metropolitan Region Scheme. Peet Limited is developing a portion of this site, namely Lots 1005 and 1006 Marmion Avenue, which have an area of 243ha, or approximately 10% of the larger Alkimos-Eglinton District Structure Plan area.

For planning purposes, the land was divided into three precincts, creating approximately 2315 residential dwellings plus a range of commercial type developments:

- The Coastal Precinct (approximately 1600 residential dwellings);
- The Central Precinct (approximately 330 residential dwellings); and
- The Eastern Precinct (approximately 385 residential dwellings);

A Local Structure Plan (LSP) for Lots 1005 and 1006 Marmion Avenue has been developed to guide the subdivision and development. ENV Australia Pty Ltd (ENV) is undertaking a combined Vegetation and Fauna Management Strategy and Environmental Management Plan called the Environmental Management Plan hence forth.

In the rezoning of the land from Rural to Urban, Metropolitan Scheme Amendment 1029/33 was referred to the Environmental Protection Authority and City of Wanneroo for assessment and an Environmental Review was prepared in 2005. Following the Metropolitan Region Scheme Amendment, the areas of environmental significance identified by the Environmental Protection Authority were reserved for Parks and Recreation and Public Purposes.

The Environmental Protection Authority issued a statement that the scheme may be implemented subject to a number of conditions (referred to as the Minister for the Environment's Statement 722 (24 April 2006), which sets out a list of seven requirements for environmental management plans in Condition 2, developed for the lots in the Alkimos-Eglinton development area. The requirements are:

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.

The comments received by the City of Wanneroo were to combine the Vegetation and Fauna Management Strategy and Environmental Management Plan.

Following the above comments, ENV has drafted up the framework of a combined Vegetation and Fauna Management Strategy and Environmental Management Plan, the Shorehaven Environmental Management Plan.

This report will address the comments of the City of Wanneroo and the Environmental Protection Authority and also provide enough information for clearance of the conditions applied by the Department of Environment, Water, Heritage and Arts with respect to their decision under the *Environmental Protection and Biodiversity Conservation Act 1999*.

The Environmental Management Plan will address:

- The environmental outcome;
- Boundaries of significant areas;
- Flora, vegetation and fauna;
- Fire management;
- Groundwater;
- Aboriginal heritage
- Monitoring; and
- Legislation.

Three additional reports will be prepared to compliment the Environmental Management Plan, these are:

- A Construction Environmental Management Plan (submitted to the City of Wanneroo 7 July 2009)
- A Foreshore Management Plan (currently being prepared);
- A Urban Water Management Plan (currently being prepared); and

3 SITE DESCRIPTION AND BACKGROUND

3.1 LOCATION

The site is located approximately 40 km north-west of the Perth Central Business District and is bounded to the west by the Indian Ocean, to the east by the proposed Mitchell Freeway extension, and to the north and south by other proposed residential developments. The Shorehaven development is approximately 243ha or about 10% of the larger Alkimos-Eglinton Project Area. This new urban area is anticipated to grow to approximately 22,500 homes in the next 10 to 25 years.

The subject land is currently zoned as Urban under the Metropolitan Region Scheme (MRS) following land use changes made under the MRS, Amendment number 1029/33 Alkimos/Eglinton. There are significant areas in the east and the coastal foreshore area. The foreshore area is currently reserved for Parks and Recreation (P&R) in the MRS.

3.2 PREVIOUS STUDIES

Environmental reports which have been prepared over the history of the project and contain relevant background information include the following:

- Construction Environmental Management Plan (ENV, 2009)
- North Alkimos Local Structure Plan (Taylor Burrell Barnett, 2008).
- Alkimos-Eglinton Metropolitan Region Scheme Amendment No. 1029/33. Bulletin 1207 (EPA, 2005).
- Metropolitan Region Scheme Amendment 1029/33, Alkimos-Eglinton Flora, Vegetation and Fauna Baseline Information (ATA Environmental, 2005).
- Alkimos-Eglinton Environmental Review (ATA Environmental, 2003).
- Coastal Planning Strategy (ATA Environmental, 2003).
- Coastal Planning Strategy Update (Alan Tingay & Associates, 1999). Report prepared for LandCorp.
- Alkimos-Eglinton Coastal Engineering Study (MP Rogers & Associates, 1998). Prepared for LandCorp.
- Alkimos-Eglinton Environmental Report (Alan Tingay and Associates, 1997).
- Alkimos-Eglinton Vertebrate Fauna Survey (Alan Tingay & Associates, 1996) Unpublished report for LandCorp.

- Vegetation Condition and Conservation Values Lots 8 and 11 Eglinton, City of Wanneroo (Armstrong, P., 1996) Unpublished report for LandCorp and Alan Tingay & Associates.

- Alkimos-Eglinton Study: Definition of Foreshore Reserve Boundary and Environmental Assessment of Proposed Alignment of Marmion Avenue/Mitchell Freeway (Alan Tingay and Associates, 1993).

- Eglinton Beach Resort: Report and Recommendations of the Environmental Protection Authority, Bulletin 500 (Environmental Protection Authority, 1991).

- A Report on the Flora and Vegetation of the Alkimos Area and Conservation Issues Affecting It (Trudgen, M. and Keighery, B.J., 1990). Unpublished report for LandCorp.

- A Report on the Flora and Vegetation of the Ningana Area and Conservation Issues Affecting It (Trudgen, M. and Keighery. B.J., 1990). Unpublished report for LandCorp.

- Eglinton Beach Resort an appraisal of the vertebrate fauna (Ninox Wildlife Consulting, 1990).

Vegetation and flora surveys were carried out over parts of the Alkimos-Eglinton site in 1990, 1996, 2002 and 2004. Whereas vertebrate fauna surveys were carried out over parts of Alkimos – Eglinton site in 1996, 2005 and 2008.

3.3 CLIMATE AND RAINFALL

The Alkimos-Eglinton area experiences a warm Mediterranean-type climate that produces hot, dry summers and mild, wet winters. The mean daily maximum temperatures are approximately 30°C in summer and 17°C in winter, and mean daily minimum temperatures of approximately 18°C in summer and 9°C in winter. Average annual rainfall is approximately 870 mm, of which most falls in June-September, and the average annual evaporation rate is more than 2000 mm (ATA Environmental 2003).

3.4 FLORA AND VEGETATION

An extensive survey of the bushland on Lots 1005 and 1006 Marmion Avenue by ENV in 2004 resulted in 41 vegetation communities being identified. Many of the vegetation communities are very similar; however possess different tree species combinations and dominant understorey species.

Bush forever sites have been identified through the site and are shown in Figure 1.

3.5 FAUNA HABITAT

Fauna was an environmental factor during the EPA's assessment of MRS Amendment 1029/33. Fauna background studies and habitat mapping (as presented in ATA Environmental, 2005) for the whole site were considered in the assessment. For further details of the management of fauna see Section 6.

4 ENVIRONMENTAL OUTCOME

A number of commitments by Peet Limited for the Alkimos-Eglinton project have been developed to illustrate the key mitigation measures and environmental objectives which achieve an overall environmental outcome:

- Protection of preserved vegetation areas;
- Protection of species diversity in areas of preservation;
- Protection of native fauna habitat in the areas of vegetation preservation;
- Provide linkages through the site to nearby national parks;
- Preventing Dieback from entering the development; and
- Protection of the groundwater resource.

5 BOUNDARIES OF SIGNIFICANT AREAS

Significant areas and their boundaries have been identified within the Shorehaven Development. These areas are as follows:

- Public open space (where remnant vegetation is to be cleared);
- Public open space (where remnant vegetation is to be preserved);
- Parks and Recreation (P&R);
- Foreshore reserve; and
- Threatened Ecological Communities.

Figure 1 details the location of these areas. The foreshore reserve will be utilised for conservation and recreation. Foreshore Management Plans for localised areas of foreshore reserve will be developed separately to address site specific management concerns and measures to be implemented to retain the environmental values of the foreshore reserve while allowing for recreation.

6 LICENCES, APPROVALS AND CONDITIONS

In November 2005, the Environmental Protection Authority (EPA) assessed Metropolitan Region Scheme (MRS) Amendment No. 1029/33. Amendment No. 1029/33 to the MRS was assessed as an Environmental Review under Section 48A of the *Environmental Protection Act 1986* by the Environmental Protection Authority (EPA). Subsequently, in April 2006, the Minister for the Environment released Ministerial Statement No 722 which stated that the proposal may be implemented subject to a number of conditions.

The approved proposal includes the urban development of 243 ha of land near Alkimos approximately 40 km northwest of Perth, Western Australia.

For the conditions of the approval see Appendix A.

7 LAND TO BE SET ASIDE FOR CONSERVATION PURPOSES

The site is partially on the Quindalup Dunes, which are characterised by vegetation of the Quindalup Complex (west portion of the site close to the coast) and the Spearwood Dunes, characterised by Cottesloe Complex-Central-South (east portion of the site). It is the Cottesloe Complex-Central-South that contains plant species of foraging value to Carnaby's Black Cockatoo. Only this area is suitable for the retention of native vegetation and the rehabilitation of land for the purpose of providing foraging habitat for Carnaby's Black Cockatoo.

The eastern part of the site is homogeneously covered with plant communities that are of foraging value to Carnaby's Black Cockatoo. In addition the vegetation condition on the eastern part of the site was mapped in 2004 as Pristine to Very Good almost in its entirety. This same eastern half was severely impacted upon by fire in March 2008 in its entirety.

Accordingly there are no areas in the eastern portion that are considered to have values over and above other areas as foraging habitat for Carnaby's Black Cockatoo. Consistent with this conclusion is that land that is best suited as regional and public open space in the eastern portion of the site can have the use of providing foraging habitat for Carnaby's Black Cockatoo. This approach will not compromise the value of the habitat given the homogeneity of the type and quality of the vegetation.

Three areas of proposed Public Open Space have been identified as being suitable for the provision of foraging habitat for Carnaby's Black Cockatoo. These are shown in the landscape figures located in Appendix A. Each figure shows in detail the following;

- Areas of vegetation to be retained and enhanced;
- Areas to be cleared of vegetation and used for active recreational activities and related infrastructure; and
- The size and species composition of the areas to be retained as foraging habitat for Carnaby's Black Cockatoo.

An exception to the above approach is Bush Forever Site 130 (3.7 ha) which consists of Cottesloe South Central Vegetation Complex, a vegetation complex that has the potential to be utilised by Carnaby's Black Cockatoo. The site is east of the proposed north / south alignment of the Mitchell Freeway. This area has conservation values, other than in relation to Carnaby's Black Cockatoo, that warrants its conservation. It is proposed that this land will be ceded as Regional Open Space back to the Crown as conservation estate and will form part of an

ecological stepping stone link between Yanchep National Park and Neerabup National Park. This area will be preserved in its entirety as shown in the attached plan of the entire development. The species composition of the vegetation communities in this area are described in the flora and vegetation reports that support the referral information of the proposal.
Another exception are examples of the Threatened Ecological Community (TEC) 26a *Melaleuca huegelii – M. systena* Shrublands which occurs on limestone ridges and is located within the Cottesloe South Central Vegetation Complex. These areas will be retained in Public Open Space within the development because of the status of the vegetation complex. The species composition of these vegetation communities are described in the flora and vegetation reports that support the referral information of the proposal.

Generally land to the north and south of the site has not gone through a detailed planning process sufficient for the identification of areas of land for public open space purposes. Regional open space contained in land holdings to the north and south have been identified but these do not abut the site other than in the western most part of the site. Given the above, potential linkages between retained vegetation onsite and vegetation outside the site cannot be identified other than in the western most part of the site and this part does not contain potential foraging habitat for Carnaby's Black Cockatoo.

7.1 PUBLIC OPEN SPACE

Four areas of public open space totalling 1.78 ha are to be retained as native vegetation or rehabilitated with the vegetation communities currently present. These areas are to be retained as they contain species of foraging habitat for Carnaby's Cockatoo. DEWHA have expressed a requirement for these areas to be protected by a mechanism that provides a greater level of conservation certainty than exists for areas of POS under normal arrangements.

Options for such mechanisms have been discussed with the City of Wanneroo. The City has provided the following response:

"The City is planning to incorporate better protection of local bushland reserves within the nest Local Planning Scheme, by either:

- *Expanding the local reserve classifications to include "Conservation and Recreation" which will include an explanation that the recreation element be restricted to passive recreation within a bushland environment. This would allow for better protection than currently afforded by local reserves and provide clear direction as to the use of the reserve.*

- *By including local bushland reserves within a specific "conservation" zone which details the purpose and specific uses within such areas."*

These mechanisms will not be in place in a timeframe suitable for the Peet Ltd Alkimos subdivision and associated DEWHA assessment report and Conditions of Approval. Accordingly, as discussed with DEWHA Peet Ltd proposes the following management response for the areas of POS containing Carnaby's Cockatoo habitat contained within the subdivision. The management measures proposed represent an interim response that provides security of conservation value until the mechanism proposed by the City of Wanneroo are finalised and can be applied to areas in question.

The following management applications have been recommended for the areas of POS where native vegetation is being retained and where native vegetation is to be proposed for rehabilitation:

7.1.1 POS Areas 37, 35 and 36

POS areas 37, 35 and 36 (Appendix A), will include approximately 1.15 ha of retained bush with supplemental planting to provide reinstated habitat and foraging opportunities for Carnaby's Cockatoo's. The bushland areas here will be planted with an average of 3 plants per m² with known foraging plants to provide a minimum of 3 tree stems in an area of 25 m² as considered typical of local vegetation patterns.

The conditions of the approval which apply to POS area's 35, 36 and 37 are:

1. The proponent must retain and protect 1.151 ha of Carnaby's Black Cockatoo foraging habitat, consisting of the following areas in public open space.
    - 0.929 ha retained bushland within POS areas 35 and 36.
    - 0.222 ha retained bushland within POS area 37.
2. The proponent must rehabilitate 0.0935 ha within POS area 37.
3. The proponent must ensure that the areas of Carnaby's Black Cockatoo foraging habitat to be retained and rehabilitated in accordance with Conditions 1 and 2 must be ceded to the Crown as ceded to the Crown to be vested as part of reserves with a formal purpose for conservation at the time of Subdivision.
6. If after three years from the date of the planting, a survival rate of 90% of the habitat rehabilitation areas (as required under condition 2) and the planted street trees (as required under condition 5) is not achieved, all dead trees must be replaced within 12 months and maintained for a minimum of two years.

The long term management of this area will include:

- Maintaining the defined hard edges between amenity grass and bushland management areas;
- Low fence such as Bollard fencing, to manage pedestrian access with interpretive signage in key locations;
- Weed control along hard edges;
- All plantings are to occur in the winter months and maintained for a minimum period of two years; and
- All dead trees must be replaced within twelve months as per Condition 6 listed above and in Appendix A.

7.1.2 POS Area 28

This area is to be rehabilitated. The regenerated bushland is to be planted with 4 plants per m² using known foraging plants. It is estimated that after ten years the established bushland will typically yield two mature shrubs per 25 m² and three stems per 25 m² (Appendix A).

The conditions of the Approval which apply to POS area 28 are as follows:

2. The Proponent must rehabilitate 0.5357 ha within POS area 28.

3. The proponent must ensure that the areas of Carnaby's Black Cockatoo foraging habitat to be retained and rehabilitated in accordance with Conditions 1 and 2 must be ceded to the Crown as ceded to the Crown to be vested as part of reserves with a formal purpose for conservation at the time of Subdivision.

6. If after three years from the date of the planting, a survival rate of 90% of the habitat rehabilitation areas (as required under condition 2) and the planted street trees (as required under condition 5) is not achieved, all dead trees must be replaced within 12 months and maintained for a minimum of two years.

The management of this area will include the following:

- Maintaining the defined hard edges between amenity grass and bushland management areas;
- Low fence such as Bollard fencing, to manage pedestrian access with interpretive signage in key locations;
- Weed control along hard edges;
- All plantings are to occur in the winter months and maintained as per Condition 6; and
- All dead trees must be replaced within twelve months as per Condition 6 listed above and in Appendix B.

7.2 STREET PLANTINGS

70% of street tree plantings in the eastern area (east of Marmion Avenue) are to comprise of Carnaby's Cockatoo foraging plants. In the western area (west of Marmion Avenue) 50% of street tree plantings are to comprise of Carnaby's Cockatoo foraging plants, as per Condition 5 of the Approval (Appendix B).

The management of street plantings is as follows:

- Planted street trees are to maintained for a minimum of two years;
- If after three years from the date of the planting, a survival rate of 90% of the planted trees is not achieved, all dead trees must be replaced within 12 months and maintained for a minimum of a further two years as per Condition 6 of the Approval (Appendix B).

7.3 BUSH FOREVER

Bush Forever is a State Government Policy which aims to identify, preserve and protect representative areas of native vegetation on the Swan Coastal Plain.

Two Bush Forever sites are located within the project area. Parts of Bush Forever site 397 are contained within the area dedicated to the foreshore Parks and Recreation Reserve. The Local Structure Plan shows the interface between

these areas is predominantly defined by roads and/ or paths. Fencing will be used to control and direct access through the foreshore reserve to public facilities and the public beach. Management of this area will be in the addressed in the Foreshore Management Plan which is currently being drafted.

Bush forever site 130 is located to the far east of the site and will be intersected by the proposed alignment of the Mitchell Freeway. There will be no interface with the Alkimos development and hence these boundaries will have a high, secure fence to prevent access and define the conservation area.

Condition 8 of the approval states: The Component of Bush Forever site 130 located adjacent to the northern boundary of the proposal area (as identified in the map at Attachment E) must be retained by the person taking the action, stock fenced and managed for conservation in perpetuity or until such time as it is ceded to the Crown as conservation reserve.

There is no proposed suitable controlled access to Bush Forever site 130 as part of this development. Bush Forever site 130 is considered remote and only a small portion exists within the proponents land holdings. It is logistically impractical to provide controlled access and as such these issues will need to be addressed when the areas are developed.

The greater area of Bush Forever site 130 exists outside the area of the EMP onto other private land. Therefore it would not be viable to provide a management plan for only part of a Bush Forever site.

Both Bush Forever Sites (130 and 397) will be appropriately fenced and have firebreaks installed in keeping with their conservation purpose.

The following broad principles have been established by the District Structure Plan to guide the management of the two areas of Bush Forever site 130:

- Bush Forever sites to be fenced to minimise disturbance to the ecological values;
- Firebreaks are to be installed; and
- Protect the linkage values and biodiversity values of Bush Forever.

7.4 GINGIN OFFSET SITE

The Gingin offset site contains Banksia Woodland that is in pristine condition. The site is located approximately 40 km from the Alkimos site and is to be vested with the Conservation Commission of Western Australia, and managed by the DEC under the Conservation and Land Management Act 1984. The offset

property will form part of a chain of nature reserves and national parks that extends south toward the Shorehaven site at Alkimos.

7.4.1 Management

Disturbance of forest and woodland ecosystems ranges from small random periodic events such as tree fall, to larger events that may have long-term impacts such as insect infestations or a high intensity bushfire. Many of these events can assist the recovery and maintenance of ecosystems, while others, such as weeds, pests and diseases, may impede the recovery, and impact on the health and vitality of ecosystems. Therefore the overall aim of the management plan for the Gingin offset site is sustain the Banksia Woodland's ecosystem health and vitality.

The management of this site will fall to the Department of Environment and Conservation who will ultimately produce a plan for this site which is line with the Departments objectives and targets, performance indicators and responsibilities.

However, before the production of these Management Plans the following management measures should apply:

Fire management

- maintain a competent fire management, suppression and response capability;
- prepare and maintain a fire management plan and smoke management guidelines;
- undertake annual prescribed burning program in a manner that is:
  - in accordance with the fire management plan;
  - in accordance with the smoke management guidelines; and
  - considers any special vulnerability of fauna and flora known to exist in a particular area

Weeds, pests and diseases

- minimise as far as is reasonable and practicable, the impact on the health and vitality of the Banksia Woodland ecosystem of pathogens and their associated diseases;
- protect from infestation those areas currently free from *Phytophthora cinnamomi;* and
- control weeds and pests within the Banksia Woodland.

8 INTRODUCED SPECIES

Of the 169 species recorded on the Shorehaven Residential Development area, 19 were introduced. The dominant weed families were Poaceae (5 taxa), Asteraceae (3 taxa) and Iridaceae (3 taxa).

One of the recorded species, *Moraea flaccida* (P1) is listed as a Declared Plant by the Department of Agriculture and Food WA.

Declared Plants ('DP') are listed with a code definition of the requirements for control (P1, P2, P3, P4 or P5). Details of the standard meaning of these codes are presented in Appendix E.

Moraea flaccida is listed as P1, which means the movement of these plants or their seeds is prohibited within the State, and this includes the movement of contaminated machinery and produce, including livestock and fodder. Landholders with declared plants on their property are obliged to control them.

8.1.1 Weed Control

There is an increased likelihood of weed invasion as a result of clearing and construction activities and a risk of degradation adjacent vegetation. Weeds can spread along access tracks and firebreaks due to soil disturbance and vehicle movement and can also be introduced or spread from contaminated topsoil or fill material. Upon completion of the development ongoing weed control in the areas of POS, P & R and Bush Forever sites will be the responsibility of the Local Authority. Weed control in the areas of POS, P & R and Bush Forever sites will focus on weed species identified as high priority in the Environmental Weed Strategy for Western Australia.

8.1.2 Management

Weed control will be conducted in the areas where the development may introduce weeds or facilitate spread of existing weed infestations in the adjacent bushland. A weed control programme will be implemented as part of the landscaping and rehabilitation works and will continue through the operation of the development. The programme will focus on the control of high priority weed species but will also ensure that weeds do not interfere with success of rehabilitation and do not spread into adjacent bushland due to the construction works. Weed control will be implemented in priority order as follows:

1. Firstly, those populations occurring in Very Good – Excellent condition bushland areas;

2. Secondly, those populations occurring in Degraded – Good condition bushland areas; and

3. Lastly, those populations occurring in Completely Degraded condition bushland.

In addition to the control measures implemented for rehabilitation and landscaping the following specific measures will be implemented during the project:

- maintenance tracks and bordering vegetation will be sprayed with herbicide such as Glyphosate to reduce weed growth;
- soil and plant material cleared for the development will be reused as mulch and topsoil for areas to be rehabilitated both on and off site. Topsoil removed from bushland in Degraded to Completely Degraded condition will be subject to intensive weed control. Stockpiles of this material will be treated with Gylphosate prior to replacement;
- initial weed control will be followed up with annual re-treatment, until such time that the weed species is either eradicated or reduced in area and abundance to the extent that it no longer poses a threat to the ecological integrity of bushland remaining on site;

Records are necessary for any form of weed control but are especially important where herbicides are sprayed. Records will include:

- Time of spraying;
- Areas sprayed;
- Herbicides used and their respective concentrations;
- Weed species targeted;
- Methods used;
- Field operators involved; and
- Any other relevant information, such as rainfall within 8 hours or if marker dye was used.

9 DIEBACK

There is an increased risk of dieback (*Phytophthora* species) introduction or spread as a result of clearing and construction activities. The *Phytophthora* fungi are soil borne organisms which require warmth and moisture to thrive and which can spread through the natural or artificial movement of soil or water. The most likely means of spread of the fungus are through movement of soil during construction and changes to drainage and surface hydrology.

It is important to note Dieback was not reported to be on site, therefore preventative measures must be taken to ensure that it is not brought into the site through both the clearing and construction phases of the development.

9.1.1 Management

The most effective way to manage the spread of *Phytophthora* dieback is to ensure that infested soil or water is not spread into un-infested areas. This can be achieved by appropriate management of equipment and soil movement. In 2000, The Dieback Working Group produced *Managing Phytophthora Dieback - Guidelines for Local Government* (Dieback Working Group, 2000). The guidelines include management procedures for Bushland Reserves. If applied these procedures will ensure the risk of spreading *Phytophthora cinnamomi* to bushland reserves is minimised. However management of bushland reserves will be most effective when the reserve has been surveyed for *Phytophthora cinnamomi* and a management plan has been prepared, that addresses *Phytophthora cinnamomi,* as well as other threats (Dieback Working Group, 2000).

It has been recorded that *Phytophthora cinnamomi* has killed many ornamental and introduced plants, hence it is good practice to implement Phytophthora Dieback Management Procedures when operating in Parks and Gardens.

The following table contains Phytophthora Dieback Management Procedures for Bushland Reserves as set out in the Guidelines for Local Government (Dieback Working Group, 2000).

Table 1: Phytophthora Dieback Management Procedures for Bushland Reserves

Management	If a Phytophthora Dieback Management Plan has been completed for the Bushland reserve, then the recommendations should be implemented.
Timing	Activities such as fire break maintenance, slashing and removal of woody weeds to occur in dry soil conditions i.e. scheduled between November and March and postponed during and following rainfall
Bushland Restoration Activities	Weeding – If weeds are being manually removed, they should be immediately placed in a container, so plant material or soil is not dropped into other parts of the reserve. Revegetation – If weeds and other disturbances are controlled, revegetation in bushland should not be necessary. Revegetation has a high risk of introducing *P. cinnamomi*, and should be avoided in bushland reserves that are free of *P. cinnamomi*. However, if revegetation is required: • Consider direct seeding rather than planting seedlings • Purchase plants from nurseries with Wholesale Accreditation from the Nursery Industry Association, or nurseries with excellent hygiene procedures. Community groups completing revegetation activities to be advised to do the same • If moving from one part of bushland to another, or from infested area to uninfested, ensure all machinery, equipment and tools are free from mud and soil • If using mulch, ensure that it has been well composted (the heating part of composting kills *P. cinnamomi*)
Access	Off-road vehicles, motorcycles and horses to be kept out of bushland reserves. Minimise the number of tracks in Bushland reserves, and ensure that they have hard, dry and well drained surfaces. Avoid entering bushland reserves when soil is wet and muddy, and stay on tracks Visitors to bushland reserves are to ensure that their footwear is free of mud and soil When constructing a track: • Construct in dry soil conditions • Map the location of *P. cinnamomi* if present prior to constructing the track • The location of the proposed track should not cross from infested to uninfested areas • In the uninfested area, the track to be constructed using clean machinery and tools and materials that are free of *P. cinnamomi* to be used • Consider constructing wooden walkways over muddy areas • Materials that can be used to construct tracks included: gravel that is free of *P. cinnamomi*, concrete, limestone or woodchips
Fire Protection Activities	Mow, slash or use herbicide on firebreaks, rather than plough or grade When maintaining breaks by grading, do not grade wider than the existing graded area
Soil Movement	Minimise soil disturbance, mow, slash or use herbicide rather than grade or plough If soil, gravel, sand is to be imported into a bushland reserve, these materials are to be sourced from a supplier who is accredited by the Nursery Industry Association to ensure they are free of *P. cinnamomi* Do not dump plant material or soil in bushland reserves
Vehicles, Machinery and Tools	All machinery and vehicles (including small tractors, ride on mowers, slashers and utes) to be free of mud and soil on tyres, mudflaps, body and under body when entering a bush land reserve, when moved into *P. cinnamomi* free areas, and when moved from one bushland reserve to another All tools and equipment (including shovels, spades, trowels etc) to be free of mud and soil when entering a bushland reserve, when moved into *P. cinnamomi* free areas and when moved from one bushland reserve to another.
Water Management	Any water used in bushland reserves to be from scheme or bore supply, or sterilised Do not discharge drainage water into bushland reserves
Communication	In public reserves, place signs at entrances to recommend avoiding access when the soil is muddy, and that visitors should keep on tracks

Roadsides	Slashers, tractors and other equipment used on roadsides to be washed down daily when operating in bushland areas
Protecting Vegetation	A program of phosphite treatment should be implemented at bushland reserves that contain Phytophthora Dieback, contain threatened species or are likely to have Phytophthora dieback introduced
Staff	Staff and contractors involved in maintenance activities to receive training in Phytophthora Management Procedures for Bushland reserves Contracts for firebreak maintenance to contain the relevant conditions listed above

10 FAUNA

The fauna habitats in the Alkimos-Eglinton Project Area can be broadly separated into three major types that dominate the area. These are based primarily on the broad vegetation units that strongly reflect the underlying soil types and geomorphic features.

The main fauna habitat types comprise:

- Quindalup Heath;
- Limestone Heath; and
- *Banksia* Woodland

Other habitats constituting a minor portion of the area include heath on the younger Quindalup Dunes, Tuart Woodland, and cleared grassland or pasture.

10.1.1 Objectives

North-south and east-west fauna corridors of P&R are provided for by the DSP, and therefore none are incorporated into the design of the LSP. Biodiversity will be encouraged through non-contiguous green linkages between natural areas, achieved through the placement of POS and native species landscaping. There will be opportunities for ground-dwelling fauna to move between the coastal reserve and the east-west P&R linkage via appropriately-designed underpasses.

The retention of Threatened Ecological Communities in P&R and some vegetation following the alignment of the parabolic dune (Viggo Trail) will also provide fauna habitat on the site.

The site supports *Banksia* woodland, which provides potential feeding habitat for Carnaby's Black Cockatoo. Under the EPBC Act any proposal (including a planning proposal) which has potential to have a significant impact on a protected species must be referred to the DEWHA for consideration and possible assessment.

The Local Structure Plan seeks to maintain the integrity of the Coastal Foreshore reserve outside the blowout area and the southern east-west P&R corridor on the site. The following management measures will be undertaken in regards to fauna on site:

- Fauna crossing points (such as appropriately-designed culverts) under the coastal road will be provided to allow the movement of ground-dwelling species between the coastal and east-west P&R reserves.
- Biodiversity will be enhanced through green linkages of POS, augmented by native plantings in street scaping.

11 FIRE MANAGEMENT

The Fire and Emergency Services Authority (FESA) and Department for Planning and Infrastructure (DPI) specify that all rezoning, subdivision or development be accompanied by information on fire protection as specified in the document *Planning for Bushfire Protection* (DPI and FESA 2001).

Planning for Bush Fire Protection is a protection planning tool that has been prepared by the Fire and Emergency Services Authority in close consultation with the Department for Planning and Infrastructure. The main focus of the document is bush fire protection within new land development, but the document also provides the benchmark for bush fire prevention planning within existing communities. It is based on experience and research of fire events from within Western Australia and interstate.

11.1 OBJECTIVES

As the occurrence of bush fires within this locality is inevitable the City of Wanneroo will require a Fire Management Plan, as a condition of any WAPC planning approval. The aim of the plan is to reduce the threat of a bush fire to residents, their guests, adjoining land owners and volunteer fire fighters. A site specific Fire Management Plan is to be developed.

11.2 MANAGEMENT AND MONITORING

All rezoning, subdivision or development applications should be accompanied by information on fire protection. This information should address all performance criteria contained in *Planning for Bush Fire Protection*. Where bush fire protection performance criteria have already been addressed within, for example, a local planning strategy, town planning scheme, structure plan or other strategy adopted by the local government, it will be adequate to refer to such a document.

Planning for Bush Fire Protection (DPI and FESA 2001) specifies performance criteria for rezoning, subdivision and development proposals to ensure fire protection issues are adequately addressed. These criteria are as follows:

11.3 REQUIREMENTS FOR SUBDIVISION DEVELOPMENT DESIGN

The design and layout of subdivisions can reduce the vulnerability of dwellings and residents from the impact of bush fire.

It is the developer's responsibility to ensure that the subdivision and development design meets the performance criteria specified in *Bush Fire Protection* Requirements for Subdivision and Development (DPI and FESA 2001).

Road design should allow for safe access and egress by residents and fire services in an emergency. There are specific requirements for medium and high

bush fire hazard areas but these requirements should also be considered and incorporated in low bush fire hazard areas where possible.

All buildings adjacent to extreme hazard areas should be contained within perimeter roads that separate building and inhabitants from bush fire hazard (DPI and FESA 2001).

The four levels of bush fire hazard are defined as:

11.3.1 Low Bush Fire Hazard

Typically, low bush fire hazard areas include:

- Areas devoid of standing native vegetation;
- Areas which, due to climatic conditions, do not experience bush fires.

Inner urban and suburban areas with maintained gardens would fall into this category, as would pasture and cropping areas. Only very limited native standing vegetation would occur in such areas.

The risk of bush fire attack in these areas would not require special bush fire related planning and building controls. Housekeeping and owner intervention, combined with “standard” planning and building controls would be sufficient to protect both occupants and buildings in the event of a bush fire. These “standard” controls would include adequate fire protection and fire suppression response, available water supply and a fuel reduced building protection zone.

11.3.2 Medium Bush Fire Hazard

Typically, areas of medium bush fire hazard include:

- Areas containing grassland with slopes in excess of 10°, open woodland and open shrubland. Suburban areas with some native tree cover would also fall in this category.
- Areas containing predominantly low shrubs would also be classed as medium fire hazard areas. Slopes within these areas would be flat or moderate (10° or less).

The risk of bush fire attack in these areas is such that protective features are required as part of subdivision and development design to minimise the vulnerability of the development and its residents, as well as to assist with fire control operations. Australian Standard 3959 applies to medium fire hazard areas.

11.3.3 High Bush Fire Hazard

The high bush fire hazard category includes low shrubs on steep slopes (>10°). The risk of bush fire in these areas is significant and it is paramount that subdivision and development design incorporates fire protection features to protect residents, minimise house losses and to assist with fire control operations. Australian Standard 3959 applies to high fire hazard areas.

11.3.4 Extreme Bush Fire Hazard

Generally, areas in this category include:

- Forested areas with a dense understorey;
- Areas of woodland where a hazard reduction program is not in place or implemented;
- Areas containing predominantly tall shrubs.

These areas are not suitable for development as the risk of bush fire attack is likely to be excessive.

11.4 FIRE PROTECTION PERFORMANCE CRITERIA

11.4.1 Fire Suppression Response

To assess the suitability of a parcel of land for a proposed subdivision it is necessary to determine the fire service's ability to provide an adequate level of response to, and within an area. The design and layout of subdivisions can reduce the vulnerability of dwellings and residents from the impact of bush fire (DPI and FESA 2001). A 5 to 10 minute travel time is desirable between the fire station and the furthest part of the subdivision for structural fire risk associated with residential areas. If the response time is greater than 20 minutes for an urban/rural brigade in a nearby townsite the proposal would not meet the minimum requirement (DPI and FESA 2001).

11.4.2 Water Supply

Water supplies need to be easily accessible and located at regular intervals during fire emergencies. Bush fire protection requirements for residential subdivisions with a scheme water supply must include hydrants that are:

- At 200m intervals;
- Have a flow rate of 600L/min for 4 hours;
- Be easily accessible with standard fire services standpipe and key;

- Be identified by standard road and pole markings; and
- Meet any water utility specifications.

Maps showing the location of fire fighting water supplies (including hydrants) must be provided to local government and the local fire service.

11.4.3 Siting of Buildings

The hazard separation zone should ideally be located inside the boundaries of the subdivision and can include public roads and/or hazard reduced zones to separate the extreme bush fire hazard areas from buildings within the subdivision (DPI and FESA 2001).

11.4.4 Local Government Fire Breaks

Local government may require strategic fire access routes in lieu of, or in addition to firebreaks on individual lots in areas of low bush fire hazard (DPI and FESA 2001).

Table 2: Bush Fire Hazard Levels and Performance Criteria

Level of Bush Fire Hazard	Fire Protection Performance Criteria Required
Low	Performance criteria for fire protection: • fire suppression response; • water supply; • siting of buildings; and • requirements under the local government fire break notice.
Medium (bush fire prone area)	Performance criteria for fire protection: • fire suppression response; • subdivision and development design; • access; • water supply; and • siting of buildings.
High (bush fire prone area)	Performance criteria for fire protection: • fire suppression response; • subdivision and development design; • access; • water supply; and • siting of buildings.
Extreme (bush fire prone area)	Subdivision, development and habitual buildings should generally not be permitted.

Based on the above table it would appear that the project area is rated at a Medium level of bush fire hazard. The risk of bush fire attack in these areas is such that protective features are required as part of subdivision and development design to minimise the vulnerability of the development and its residents, as well as to assist with fire control operations as is discussed in Australian Standard 3959.

The current Australian Standard AS 3959 is referenced in the Building Code of Australia and the Standard is intended to afford the occupants a degree of safety until the bushfire front passes. In so doing, there is also a component of property protection built in to the Standard. However, the Standard carries a warning to the effect that there can be no guarantees that a building will survive a bushfire event on every occasion due to the unpredictable nature and behaviour of fire and the difficulties associated with extreme weather conditions. For a summary of Australian Standard 3959 see Appendix C.

12 GROUNDWATER

The Groundwater Atlas (WRD, 1997) indicates the regional groundwater flow direction is south-west toward the Indian Ocean at a gradient of 0.001m. The Groundwater Atlas (WRC, 1997) indicates that the maximum groundwater levels beneath the site range from 0 m AHD at the Ocean's edge to 3 m AHD approximately 3 km inland. Depth to groundwater over the site is highly variable due to uneven topography associated with the dune formations. The Groundwater Atlas (WRC, 1997) shows the base of the superficial aquifer occurs between -30 and -35 m AHD.

Because of the significant depth to groundwater over the site, depth to groundwater is not considered to be a significant constraint on this site. Subsoil drainage is not proposed on this site.

An application for groundwater allocation has been made to the Department of Water for the use in dust suppression and irrigation of Public Open Space.

Groundwater for use on site during the construction phase will need to be discussed with the superintendent to determine quantity and availability.

12.1 MONITORING

12.1.1 Groundwater Level Monitoring

Groundwater level monitoring will provide a documented record of water levels. This record can be used to:

- Ensure the pumps are operating in optimal conditions (not dry);
- Provide records for auditing; and
- reinforce to the regulators that the allocation is not being exceed.

All bores around the development associated with the Department of Water Allocation, supplying ground water for dust suppression and POS irrigation should be monitored for water levels.

12.1.2 Groundwater Quality Monitoring

Groundwater quality monitoring will document the quality of groundwater post development. This information will be used to:

- Ensure the quality of water meets the requirements of its use (irrigation water not exceeding salinity levels for grass growth);
- Demonstrate water quality has not been impacted by the development; and

- Determine if there are water quality impacts resulting from the drawdown in the aquifer.

There are many parameters that could be sampled depending on the information needed. An indication of the potential parameters that would be useful for the assessment of groundwater quality, taken from Water quality monitoring program design (Department of Water, 2009) are:

- Conductivity (in milliSiemens per centimetre);
- Dissolved Oxygen;
- Biochemical oxygen demand (BOD);
- Nutrients (total Nitrogen and Total Phosphorous);
- Pesticides (organochlorides, organophosphates); and
- Heavy metals (Aluminium, Arsenic, Cadmium, Copper, Iron and Mercury)

However, the costs associated with sampling for these parameters would not be feasible. A selection of key parameters should be made prior to the development taking into account the land uses that are likely to impact on the groundwater quality.

The Alkimos development will be predominantly residential uses and therefore the likely impacts on the groundwater are going to be in the form of increased nutrient loadings from gardens and public open space and increased use of pesticides.

Another factor that could impact groundwater initially is the clearing process. The clearing of land can affect groundwater levels due to increased recharge of groundwater. The increasing of the groundwater levels can potentially increase the salinity through diluting salts in the soil column.

The recommended sampling parameters for the bores in the development are:

- Conductivity,
- Nutrients, and
- Pesticides.

13 MONITORING AND REPORTING

Prior to the commencement of clearing for each stage relevant Officers from the City of Wanneroo will be invited to attend the Shorehaven development and inspect the area proposed to be cleared prior to works commencing.

Furthermore, with each application submitted to the City requesting clearing of Subdivision Conditions a brief letter report will be submitted outlining compliance with the objectives and specific details of the Shorehaven EMP. In particular the reports will address

Monitoring programmes will be developed by the manager of the development. These programmes are designed to detail the outcomes of the environmental objectives set in the Construction Environmental Management Plan (CEMP). All activities on site shall be undertaken as per the CEMP, particularly Table 1 – Construction Environmental Management Plan.

The monitoring will address the areas detailed in Table 1 below.

Table 3: Monitoring of Environmental Outcomes

Environmental Outcome	Monitoring Procedure Following Clearing
To preserve significant trees, flagged to the east of Marmion Avenue, while clearing the understorey in the POS.	Visual inspection of all identified significant trees, noting condition
To preserve the vegetation in the POS.	Visual inspection of vegetation in the POS, taking note of any unauthorised clearing or movement through the designated area
To preserve the Parks & Recreation (P&R) and surrounding buffer.	Visual inspection of the fencing established around the P&R noting any unauthorised movement through the area
To preserve the foreshore reserve.	Visual inspection of the fencing established around the foreshore reserve noting any unauthorised movement through the area
To preserve the Threatened Ecological Communities (TEC).	Visual inspection of vegetation in the TEC, taking note of any unauthorised clearing or movement through the designated area
To preserve identified significant trees.	Visual inspection of all identified significant trees, noting condition

Environmental Outcome	Monitoring Procedure Following Clearing
To protect fauna during the clearing process.	Visual inspection of development area for any signs of fauna and checking the incident register to establish fauna movements out of the area
To protect the groundwater resource.	Groundwater Monitoring as per section 9 of the Environmental Management Plan

Monitoring of the planted native vegetation and flora relocations in areas of Public Open Space will be undertaken. Particular attention will be paid to the re-establishment of foraging plants for Carnaby's Cockatoo.

- The planting and flora relocation will be monitored bi-annually over a period of three years, by a suitably qualified person.
- The objective of the rehabilitation work will be to achieve a vegetation cover of at least 30% after 3 years, of Carnaby's Cockatoo primary feed plants in the designated areas within areas of Public Open Space.
- To measure the success of plantings and relocations the number of surviving plants will be recorded. The number of plants that have survived will be recorded, along with indicators of plant health.

If, after 3 years the rehabilitation program is deemed to be successful in establishing 30% feed plant cover for Carnaby's Cockatoo, then monitoring will cease. Further rehabilitation and replanting work will be undertaken should 30% feed plant cover for Carnaby's Cockatoo not be achieved. Monitoring will continue from that point until 12 months of monitoring demonstrates that 30% feed plant cover for Carnaby's Cockatoo has been achieved

Reporting

In context of the flora and fauna management monitoring, reporting and review will include the following:

- The management of clearing and impacts on fauna
- pre-clearance inspections;
- Outcome of regular audits of clearing practices to ensure procedures are being correctly followed;
- Oversee any animal relocation program;
- Undertake regular inspections of fencing and initiate repair when required;

- Coordinate wildlife monitoring as required;
- Implement the Plan of Management for the Conservation Area; and
- Undertake reporting for the submission with the Request for Clearance of subdivision conditions.

14 LEGISLATION

The following table lists the legal and other requirements, their associated application and responsible administrator relevant to the project.

Table 4: Legislation

Legislation	Application	Responsible Department / Administrator
Acts and Regulations		
Aboriginal Heritage Act 1972	Protection of Aboriginal sites from disturbance	Department of Indigenous Affairs
Agriculture and Related Resources Protection Act 1976	Management of weeds and pests	Agriculture Western Australia
Bush Fires Act 1974	Manages fire safety	Bush Fires Board
Clean Air Regulations 1967	Regulates air borne emissions	Department of Environment and Conservation, (DEC)
Dangerous Goods Regulations	Regulations for the management and handling of dangerous goods	Department of Minerals and Petroleum Resources (DMPR)
Environment Protection Act 1986	Provides a framework for environmental protection in WA	DEC
Environment Protection (Noise) Regulations 1997	Noise Limits, methods for noise assessment and control	DEC
Environment Protection (Controlled Waste) Regulations 2001	Control and Abatement of waste	DEC
Explosives and Dangerous Goods Act 1961	Regulates the use and storage of explosives and dangerous goods	DMPR
Health Act 1911	Provides regulation for health protection	Department of Health

Legislation	Application	Responsible Department / Administrator
Heritage of Western Australia Act 1980	Identify, conserve and where appropriate enhance those places within Western Australia which are of significance to the culture	Heritage Council of WA
Pollution of Waters by Oil and Noxious Substances Act 1987	Protection of sea and certain waters from pollution by oil and other pollutants	DEC
Rights in Water and Irrigation Act 1914	Requirement for licence where water is taken from streams, bores or wells for commercial purposes	Waters and Rivers Commission
Soil and Land Conservation Act 1976	Prevents disturbance to soil without authority	Agriculture of Western Australia
Wildlife Conservation Act 1950	Protection of rare and endangered flora and fauna	Department of Environment and Conservation

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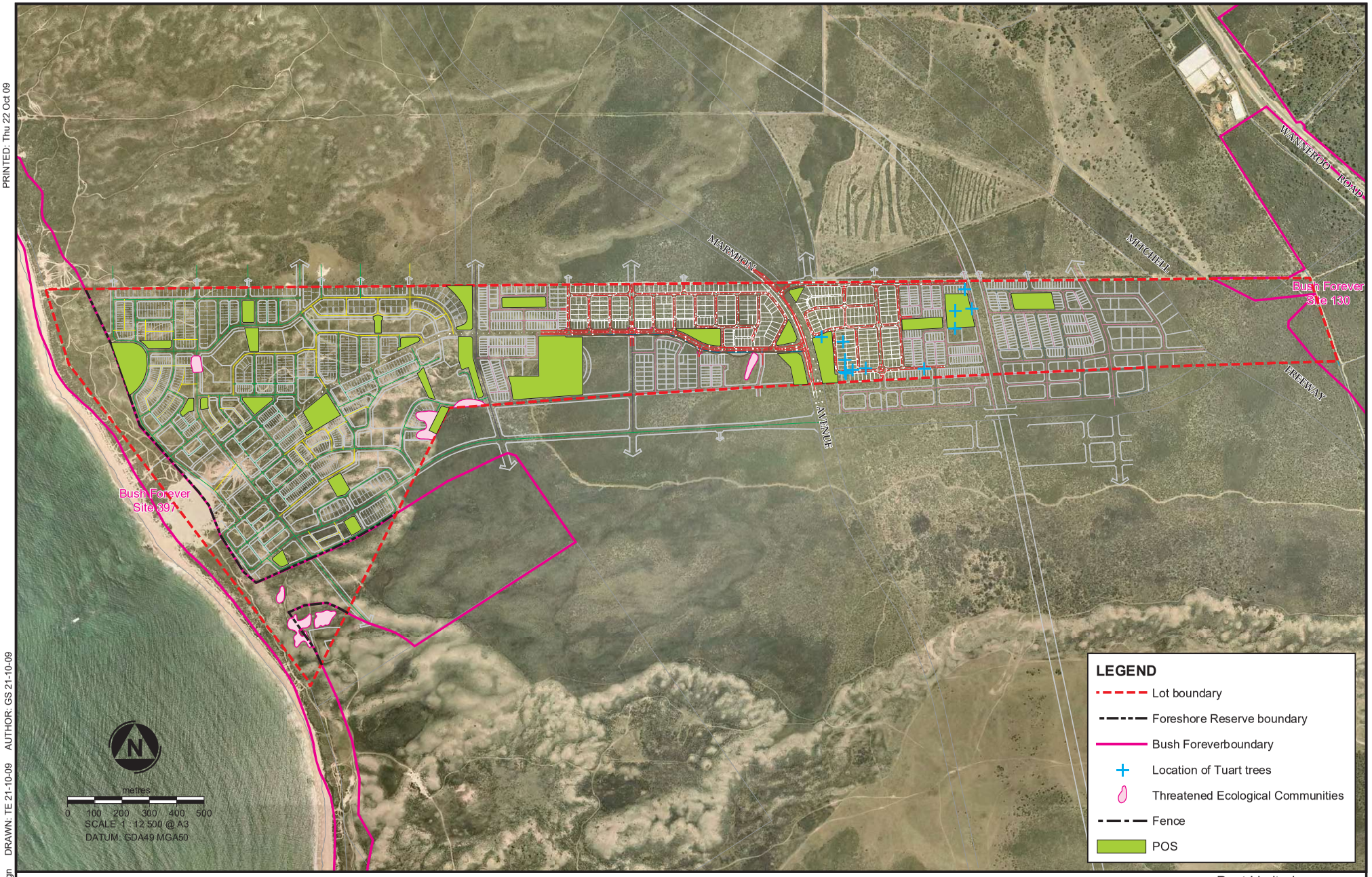
FIGURES



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SOURCE: EPCAD

Peet Limited
LOT 1005 and 1006 MARMION AVENUE, ALKIMOS
ENVIRONMENTAL MANAGEMENT PLAN
SIGNIFICANT AREAS
FIGURE 1

env Australia

APPENDIX A

EPCAD FIGURES – POS AREAS 28, 35, 36 AND 37

RETAINED BUSH WITH SUPPLEMENTAL PLANTING TO PROVIDE REINSTATED HABITAT AND FORAGING OPPORTUNITIES FOR CARNABY'S BLACK-COCKATOO. AREA PLANTED WITH AVERAGE OF 3 PLANTS PER m² DRAWN FROM PLANT LIST OF COCKATOO FEEDING PLANTS TO PROVIDE A MINIMUM OF 3 TREE STEMS IN AN AREA OF 25m² AS CONSIDERED TYPICAL OF LOCAL VEGETATION PATTERNS

INFORMAL VERGE PLANTING OF SPECIES LISTED AS "STREET TREES"

DEFINED AND WAY MARKED PATH WITH ASSOCIATED INTERPRETIVE SIGNAGE

REGENERATED BUSHLAND PLANTED AT 4 PLANTS PER m² USING THE ADJACENT SPECIES LIST. AFTER 10 YEARS ESTABLISHED BUSHLAND WILL TYPICALLY YIELD 2 MATURE SHRUBS PER 25m² AND 3 TREE STEMS PER 25m²

REGENERATED BUSHLAND PLANTED AT 4 PLANTS PER m² USING THE ADJACENT SPECIES LIST. AFTER 10 YEARS ESTABLISHED BUSHLAND WILL TYPICALLY YIELD 2 MATURE SHRUBS PER 25m² AND 3 TREE STEMS PER 25m²

LOW FENCE TO MANAGE PEDESTRIAN ACCESS WITH INTERPRETIVE SIGNAGE IN KEY LOCATIONS

REGENERATED BUSHLAND PLANTED AT 4 PLANTS PER m² USING THE ADJACENT SPECIES LIST. AFTER 10 YEARS ESTABLISHED BUSHLAND WILL TYPICALLY YIELD 2 MATURE SHRUBS PER 25m² AND 3 TREE STEMS PER 25m²

DRAINAGE BASIN BUSHLAND PLANTED AT 4 PLANTS PER m² USING THE ADJACENT SPECIES LIST AND SUPPLIMENTED WITH DAMPLAND SPECIES. AFTER 10 YEARS ESTABLISHED BUSHLAND WILL TYPICALLY YIELD 2 MATURE SHRUBS PER 25m² AND 1 TREE STEMS PER 25m²

TIMBER BOARDWALK OVER DRAINAGE BASIN

REGENERATED BUSHLAND PLANTED AT 4 PLANTS PER m² USING THE ADJACENT SPECIES LIST. AFTER 10 YEARS ESTABLISHED BUSHLAND WILL TYPICALLY YIELD 2 MATURE SHRUBS PER 25m² AND 3 TREE STEMS PER 25m²

NEW SHADE TREE PLANTING, SPECIES SELECTED TO ENHANCE FORAGING OPPORTUNITIES FOR CARNABY'S BLACK-COCKATOO. INDIVIDUAL SPECIMENS PROVIDED WITH TREE PROTECTION/ GUARDS WITHIN MORE ACTIVE PUBLIC AREAS

DEFINED MAINTENANCE EDGE BETWEEN AMENITY GRASS AND BUSHLAND MANAGEMENT AREAS

RETAINED BUSH WITH SUPPLEMENTAL PLANTING TO PROVIDE REINSTATED HABITAT AND FORAGING OPPORTUNITIES FOR CARNABY'S BLACK-COCKATOO. AREA PLANTED WITH AVERAGE OF 3 PLANTS PER m² DRAWN FROM PLANT LIST OF COCKATOO FEEDING PLANTS TO PROVIDE A MINIMUM OF 3 TREE STEMS IN AN AREA OF 25m² AS CONSIDERED TYPICAL OF LOCAL VEGETATION PATTERNS

LOW FENCE TO MANAGE PEDESTRIAN ACCESS WITH INTERPRETIVE SIGNAGE IN KEY LOCATIONS

INFORMAL VERGE PLANTING OF SPECIES LISTED AS "STREET TREES"

1 POS 37
DETAIL PLAN 1:500

RETAINED BUSH WITH SUPPLEMENTAL PLANTING TO PROVIDE REINSTATED HABITAT AND FORAGING OPPORTUNITIES FOR CARNABY'S BLACK-COCKATOO. AREA PLANTED WITH AVERAGE OF 3 PLANTS PER m² DRAWN FROM PLANT LIST OF COCKATOO FEEDING PLANTS TO PROVIDE A MINIMUM OF 3 TREE STEMS IN AN AREA OF 25m² AS CONSIDERED TYPICAL OF LOCAL VEGETATION PATTERNS

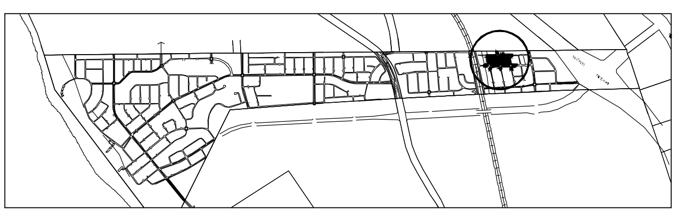
FOOTPATH NETWORK PROVIDES PUBLIC ACCESS AROUND PUBLIC OPEN SPACE

REGENERATED BUSHLAND PLANTED AT 4 PLANTS PER m² USING THE ADJACENT SPECIES LIST. AFTER 10 YEARS ESTABLISHED BUSHLAND WILL TYPICALLY YIELD 2 MATURE SHRUBS PER 25m² AND 3 TREE STEMS PER 25m²

LAWN AREAS TO PROVIDE PUBLIC AMMENITY

INFORMAL VERGE PLANTING OF SPECIES LISTED AS "STREET TREES"

2 KEY PLAN
NTS



LEGEND

- PROPOSED TREE PLANTING
- PROPOSED DRAINAGE BASIN PLANTING
- PROPOSED NATIVE PLANTING
- PROPOSED ROLL-ON TURF
- AREAS OF EXISTING VEGETATION TO BE RETAINED
- PROPOSED FOOTPATH WITH GRADE
- PROPOSED FENCING

PLANT LIST

C= Cockatoo Feeding Plants
e= Locally Native Species

TREES		
	e	Acacia rostellifera
C	e	Allocasuarina fraseriana
C		Banksia ashbyii
C	e	Banksia attenuata
C		Banksia ericifolia
C		Banksia grandis
C		Banksia ilicifolia
C		Banksia littoralis
C	e	Banksia menziesii
C		Banksia prionotes
C		Corymbia marginata
C		Eucalyptus citriodora*
C	e	Eucalyptus decipiens
C	e	Eucalyptus gomphocephala
C		Eucalyptus salmonophloia*
C	e	Eucalyptus todtiana
	e	Melaleuca huegelii subs. huegelii
	e	Nuytsia floribunda
STREET TREES		
C		Agonis flexuosa
C	e	Allocasuarina fraseriana
C		Callistemon salignus
C		Callistemon viminalis
C		Corymbia calophylla
C	e	Eucalyptus gomphocephala
EXOTIC TREES*		
C		Ficus macrocarpa*
C		Hibiscus spp.*
C		Jacaranda mimisifolia*
		* limited use
SHRUBS		
	e	Acacia cyclops
	e	Acacia pulchella
C		Acacia saligna
C	e	Allocasuarina humilis
	e	Bossiaea eriocarpa
	e	Brachyscome iberidifolia
	e	Calothamnus quadrifidus
	e	Calytrix flavescens
	e	Conospermum triplinervium
	e	Conostephium pendulum
	e	Daviesia divaricarta
	e	Desmocladus asper
C	e	Dryandra lindleyana subs. lindleyana
C		Dryandra nivea
C	e	Dryandra sessilis
C	e	Dryandra sessilis var. cygnorum
C		Grevillea crithmifolia
C		Grevillea obtusifolia
C		Grevillea olivacea
C	e	Grevillea preissii (thelmanniana)
C	e	Grevillea preissii subs. preissii
C		Grevillea thelmanniana
C	e	Hakea costata
C		Hakea laurina
C	e	Hakea lissocarpa
C	e	Hakea prostrata
C	e	Hakea ruscifolia
C	e	Hakea trifurcata
	e	Hibbertia hypericoides
	e	Jacksonia calcicola
	e	Jacksonia sternbergiana
	e	Kennedia prostrata
	e	Lepidosperma sp.
	e	Leucopogon polymorphus
	e	Lomandra maritima
	e	Macrozamia reidlei
	e	Mesmelaena pseudostygia
	e	Petrophile macrostachya
	e	Petrophile serruriae
	e	Stirlingia latifolia
	e	Synaphea spinulosa subs. spinulosa
	e	Waltsia suaveolens
C	e	Xanthorrhoea gracilis
C	e	Xanthorrhoea preissii
DAMPLAND & DRAINAGE PLANTS		
C		Banksia littoralis
	e	Baumea preissii
		Isolepsis nodosa
		Isolepsis cernua
		Juncus krausii
		Juncus pallidus
	e	Lepidosperma costale
	e	Lepidosperma gladiatum
	e	Lepidosperma longitudinale
	e	Lepidosperma squamatum
		Lomandra longifolia
		Melaleuca raphiophylla
C		Corymbia calophylla

No.	REVISION	BY	DATE

Title
POS 37
LANDSCAPE COMMITMENT DRAWING

Project
ALKIMOS
COCKATOO MITIGATION

Client
PEET

E P C A D

EPCAD Pty Ltd
25-33 Mayfair Street West Perth Western Australia 6005
PO Box 1233 West Perth WA 6872 Tel 08 9481 4400 Fax 08 9481 5900
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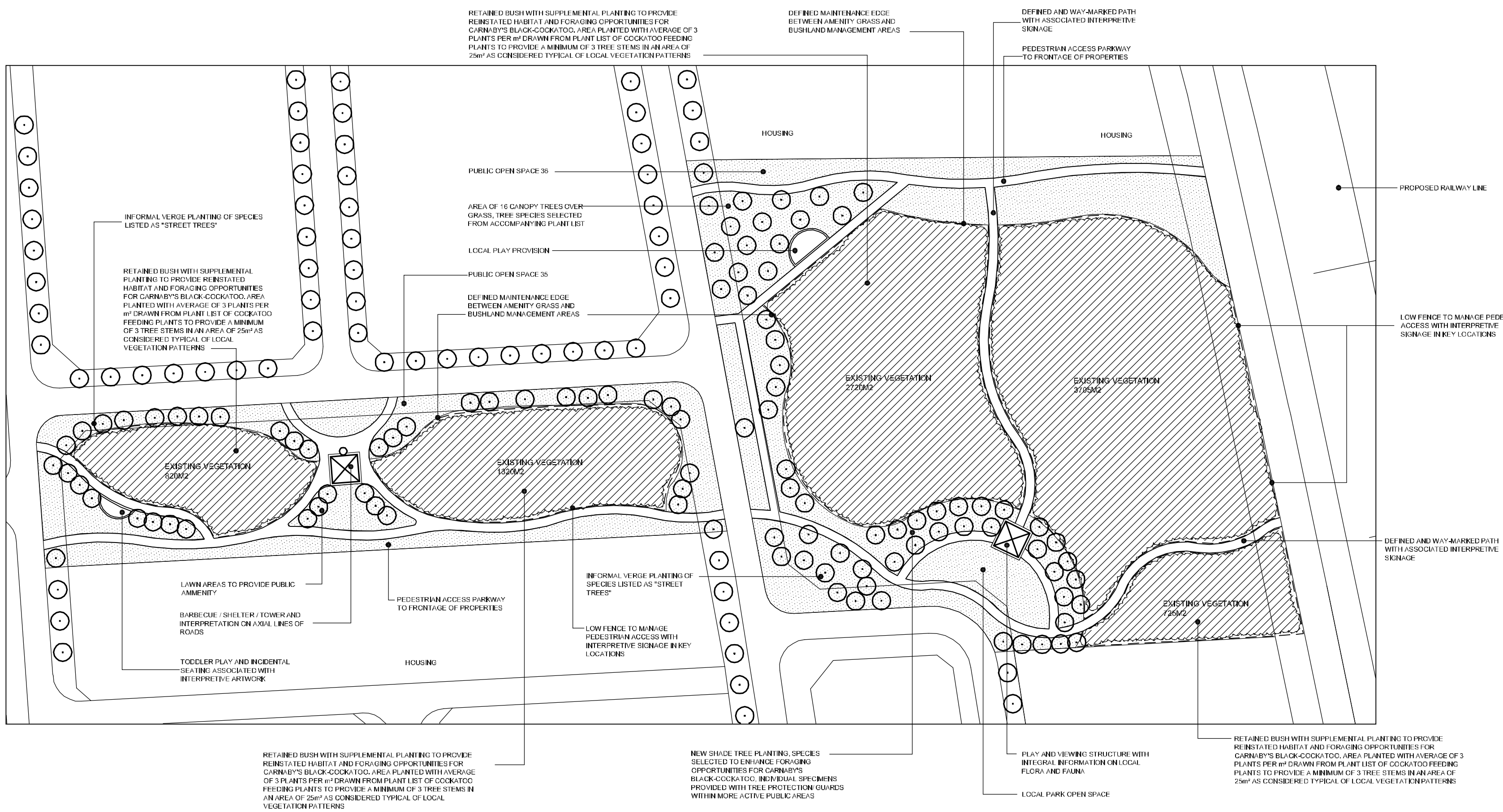
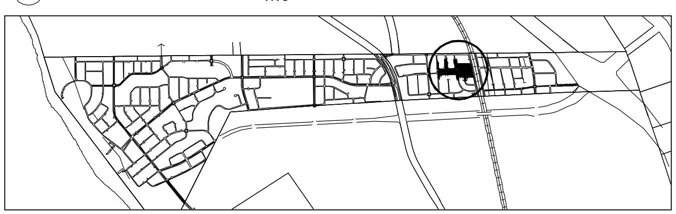
Project No. Category Drawing No.
B0692/CLCM/L103

Date FEB Revision
Scale 1:500@A1
Issue INFORMATION
Drawn RB Checked HM



2 KEY PLAN

NTS



LEGEND

- PROPOSED TREE PLANTING
- PROPOSED ROLL-ON TURF
- AREAS OF EXISTING VEGETATION TO BE RETAINED
- PROPOSED FOOTPATH WITH GRADE
- PROPOSED FENCING

PLANT LIST

C= Cockatoo Feeding Plants
e= Locally Native Species

TREES

	e	Acacia rostellifera
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C		Banksia ilicifolia
C		Banksia littoralis
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C		Banksia prionotes
C		Corymbia marginata
C		Eucalyptus citriodora*
C	e	Eucalyptus decipiens
C	e	Eucalyptus gomphocephala
C		Eucalyptus salmonophloia*
C	e	Eucalyptus todtiana
	e	Melaleuca huegelii subs. huegelii
	e	Nuytsia floribunda

STREET TREES

C		Agonis flexuosa
C	e	Allocasuarina fraseriana
C		Callistemon salignus
C		Callistemon viminalis
C		Corymbia calophylla
C	e	Eucalyptus gomphocephala

EXOTIC TREES*

C		Ficus macrocarpa*
C		Hibiscus spp.*
C		Jacaranda mimisifolia*

* limited use

SHRUBS

	e	Acacia cyclops
	e	Acacia pulchella
C		Acacia saligna
C	e	Allocasuarina humilis
	e	Bossiaea eriocarpa
	e	Brachyscome iberidifolia
	e	Calothamnus quadrifidus
	e	Calytrix flavescens
	e	Conospermum triplinervium
	e	Conostephium pendulum
	e	Daviesia divaricarta
	e	Desmocladus asper
C	e	Dryandra lindleyana subs. lindleyana
C		Dryandra nivea
C	e	Dryandra sessilis
C	e	Dryandra sessilis var. cygnorum
C		Grevillea crithmifolia
C		Grevillea obtusifolia
C		Grevillea olivacea
C	e	Grevillea preissii (thelmanniana)
C	e	Grevillea preissii subs. preissii
C		Grevillea thelmanniana
C	e	Hakea costata
C		Hakea laurina
C	e	Hakea lissocarpa
C	e	Hakea prostrata
C	e	Hakea ruscifolia
C	e	Hakea trifurcata
	e	Hibbertia hypericoides
	e	Jacksonia calcicola
	e	Jacksonia sternbergiana
	e	Kennedia prostrata
	e	Lepidosperma sp.
	e	Leucopogon polymorphus
	e	Lomandra maritima
	e	Macrozamia reidlei
	e	Mesmelaena pseudostygia
	e	Petrophile macrostachya
	e	Petrophile serruriae
	e	Stirlingia latifolia
	e	Synaphea spinulosa subs. spinulosa
	e	Waitsia suaveolens
C	e	Xanthorrhoea gracilis
C	e	Xanthorrhoea preissii

DAMPLAND & DRAINAGE PLANTS

C		Banksia littoralis
	e	Baumea preissii
		Isolepsis nodosa
		Isolepsis cernua
		Juncus krausii
		Juncus pallidus
	e	Lepidosperma costale
	e	Lepidosperma gladiatum
	e	Lepidosperma longitudinale
	e	Lepidosperma squamatum
		Lomandra longifolia
		Melaleuca raphiophylla
C		Corymbia calophylla

No.	REVISION	BY	DATE

Title
POS 35 & 36
LANDSCAPE COMMITMENT DRAWING

Project
ALKIMOS
COCKATOO MITIGATION

Client
PEET

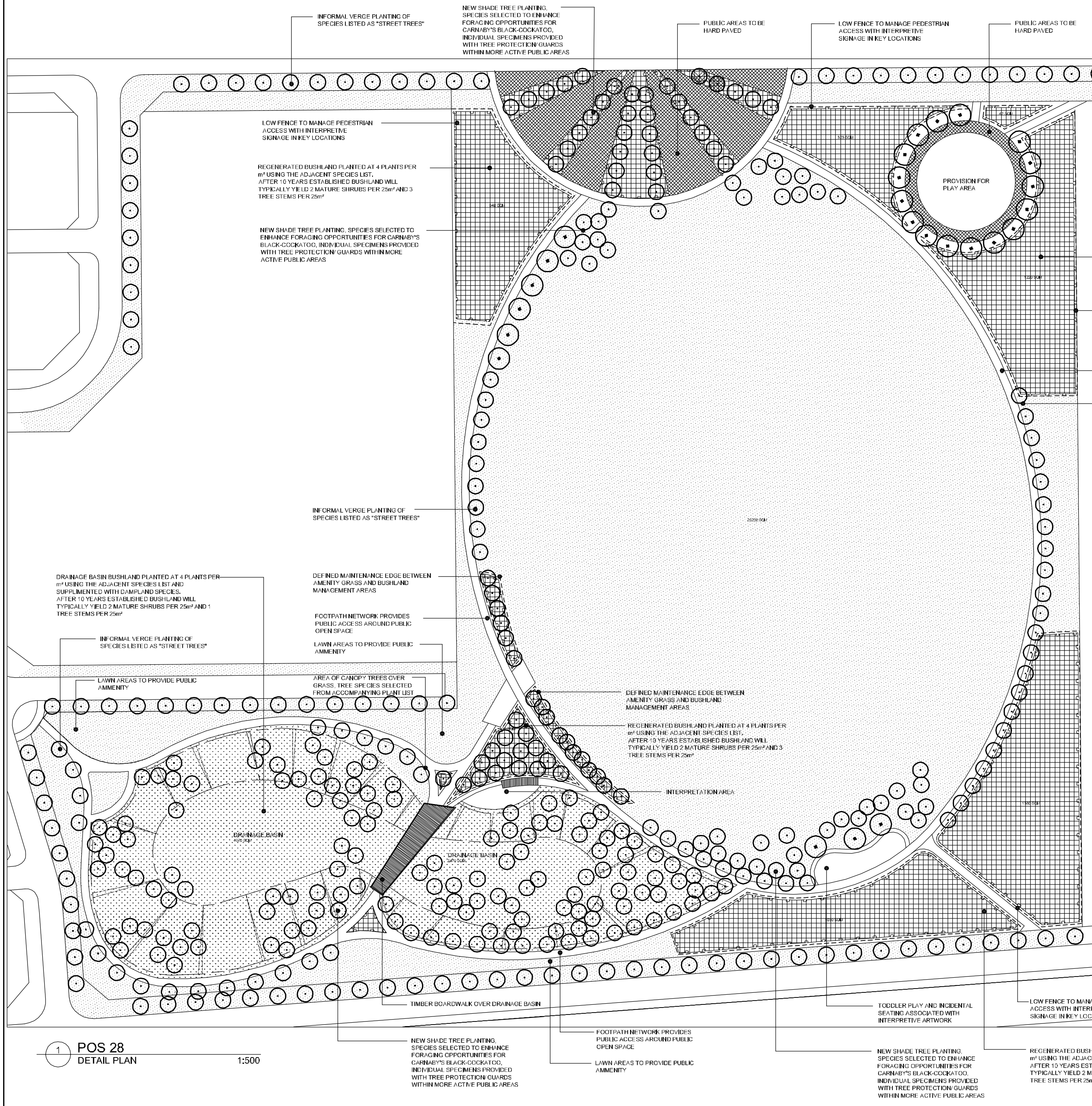
E P C A D

EPCAD Pty Ltd
28-30 Mayfair Street West Perth Western Australia 6005
PO Box 1233 West Perth WA 6872 Tel 08 94814410 Fax 08 94816903
email@epcad.com.au

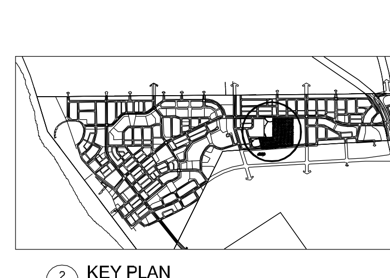
Project No. Category Drawing No.

B0692/CLCM/L102

Date FEBRUARY 2009 Revision
Scale 1:500 @ A1
Issue INFORMATION
Drawn KJD Checked RB



1 POS 28
DETAIL PLAN 1:500



2 KEY PLAN
NTS

PLANT LIST

C= Cockatoo Feeding Plants
e= Locally Native Species

TREES

	e	Acacia rostellifera
C	e	Allocasuarina fraseriana
C		Banksia ashbyii
C	e	Banksia attenuata
C		Banksia ericifolia
C		Banksia grandis
C		Banksia ilicifolia
C		Banksia littoralis
C	e	Banksia menziesii
C		Banksia prionotes
C		Corymbia marginata
C		Eucalyptus citriodora*
C	e	Eucalyptus decipiens
C	e	Eucalyptus gomphocephala
C		Eucalyptus salmonophloia*
C	e	Eucalyptus todtiana
	e	Melaleuca huegelii subs. huegelii
	e	Nuytsia floribunda

STREET TREES

C		Agonis flexuosa
C	e	Allocasuarina fraseriana
C		Callistemon salignus
C		Callistemon viminalis
C		Corymbia calophylla
C	e	Eucalyptus gomphocephala

EXOTIC TREES*

C		Ficus macrocarpa*
C		Hibiscus spp.*
C		Jacaranda mimisifolia*

* limited use

SHRUBS

	e	Acacia cyclops
	e	Acacia pulchella
C		Acacia saligna
C	e	Allocasuarina humilis
	e	Bossiaea eriocarpa
	e	Brachyscome iberidifolia
	e	Calothamnus quadrifidus
	e	Calytrix flavescens
	e	Conospermum triplinervium
	e	Conostephium pendulum
	e	Daviesia divaricarta
	e	Desmocladus asper
C	e	Dryandra lindleyana subs. lindleyana
C		Dryandra nivea
C	e	Dryandra sessilis
C	e	Dryandra sessilis var. cygnorum
C		Grevillea crithmifolia
C		Grevillea obtusifolia
C		Grevillea olivacea
C	e	Grevillea preissii (thelmanniana)
C	e	Grevillea preissii subs. preissii
C		Grevillea thelmanniana
C	e	Hakea costata
C		Hakea laurina
C	e	Hakea lissocarpa
C	e	Hakea prostrata
C	e	Hakea ruscifolia
C	e	Hakea trifurcata
	e	Hibbertia hypericoides
	e	Jacksonia calcicola
	e	Jacksonia sternbergiana
	e	Kennedia prostrata
	e	Lepidosperma sp.
	e	Leucopogon polymorphus
	e	Lomandra maritima
	e	Macrozamia reidlei
	e	Mesmelaena pseudostygia
	e	Petrophile macrostachya
	e	Petrophile serruriae
	e	Stirlingia latifolia
	e	Synaphea spinulosa subs. spinulosa
	e	Waitsia suaveolens
C	e	Xanthorrhoea gracilis
C	e	Xanthorrhoea preissii

DAMPLAND & DRAINAGE PLANTS

C		Banksia littoralis
	e	Baumea preissii
		Isolepsis nodosa
		Isolepsis cernua
		Juncus kraussii
		Juncus pallidus
	e	Lepidosperma costale
	e	Lepidosperma gladiatum
	e	Lepidosperma longitudinale
	e	Lepidosperma squamatum
		Lomandra longifolia
		Melaleuca raphiophylla
C		Corymbia calophylla

LEGEND

- PROPOSED TREE PLANTING
- PROPOSED DRAINAGE BASIN PLANTING
- PROPOSED NATIVE PLANTING
- PROPOSED ROLL-ON TURF
- AREAS OF EXISTING VEGETATION TO BE RETAINED
- PROPOSED FOOTPATH WITH GRADE
- PROPOSED FENCING

No.	REVISION	BY	DATE

Title
POS 28
LANDSCAPE COMMITMENT DRAWING

Project
ALKIMOS
COCKATOO MITIGATION

Client
PEET

E P C A D

EPCAD Pty Ltd
28-30 Mayfair Street West Perth Western Australia 6005
PO Box 1233 West Perth WA 6872 Tel 08 94814410 Fax 08 94816903
email@epcad.com.au

Project No. Category Drawing No.
B0692/CLCM/L101

Date FEB 2009 Revision
Scale 1:500@A1
Issue APPROVAL
Drawn CB Checked HM

APPENDIX B
CONDITIONS OF THE APPROVAL

Australian Government

Department of the Environment, Water, Heritage and the Arts

Craig Graham
Development Manager
Peet Limited
Level 7, 200 St Georges Terrace
PERTH WA 6000

EPBC Ref: 2008/4638
EPBC contact: Heath Synnott
(02) 6275 9790
heath.synnott@environment.gov.au

Dear Mr Graham

Decision on approval
Residential Development, Lots 1005 & 1006, Alkimos WA (EPBC 2008/4638

I refer to your proposal to construct urban development on Lots 1005 and 1006 at Alkimos, approximately 40km northwest of Perth, Western Australia.

I have considered the proposal in accordance with Part 9 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and have decided to grant an approval to Peet Limited. The details of my decision are attached. The proposal must be undertaken in accordance with the conditions specified in the approval.

I would appreciate your assistance by informing me when you provide the information specified in the conditions and who will be the contact person responsible for the administration of the approval decision.

You should also note that this EPBC Act approval does not affect obligations to comply with any other laws of the Commonwealth, state or territory that are applicable to the action. Neither does this approval confer any right, title or interest that may be required to access land or waters to take the action.

The Department has an active audit program for proposals that have been referred or approved under the EPBC Act. The audit program aims to ensure that proposals are implemented as planned and that there is a high degree of compliance with any associated conditions. You should be aware that your project may be selected for audit by the Department at any time and all related records and documents may be subject to scrutiny. Information about the Department's audit strategy is enclosed.

I have also written to the following parties to advise them of this decision:

West Australian Department of Environment and Conservation	David Mitchell
City of Wanneroo	Mark Dickson

If you have any questions about this decision, please contact the project manager and quote the EPBC reference number shown at the beginning of this letter.

Yours sincerely

Vicki Middleton

Ms Vicki Middleton
Assistant Secretary
Environment Assessment Branch
11 June 2009

Australian Government

Department of the Environment, Water, Heritage and the Arts

APPROVAL

Residential Development, Lots 1005 & 1006, Alkimos, WA (EPBC 2008/4638)

This decision is made under (sections 130(1) and 133) of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Proposed action

person to whom the approval is granted	Peet Limited ACN: 008 665 834
proposed action	The urban development of 243 ha of land near Alkimos, approximately 40km northwest of Perth, Western Australia, as described in the referral received on 9 December 2008, the preliminary documentation received on 18 February 2009 and the summary report received on 24 April 2009.

Approval

relevant controlling provisions	The decision to approve has effect for: • Listed threatened species and communities (sections 18 & 18A)
conditions of approval	This approval is subject to the conditions specified below.
expiry date of approval	This approval has effect until 30 June 2034.

Person authorised to make decision

name and position	Vicki Middleton Assistant Secretary Environment Assessment Branch
signature	Vicki Middleton
date of decision	11 June 2009

Conditions attached to the approval

On-site measures to mitigate the impacts of the action

1. The person taking the action must retain and protect 1.151 ha of Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) foraging habitat, consisting of the following areas in public open space (POS)[5]:
   0.929 ha within POS areas 35 and 36 (retained habitat on map at Attachment A);
   0.222 ha within POS area 37 (retained habitat on map at Attachment B);

2. The person taking the action must rehabilitate 0.6292 ha to provide foraging habitat for Carnaby's Black Cockatoo, of the following areas in public open space:
0.0935 ha within POS area 37 (habitat rehabilitation area on map at Attachment B);
0.5357 ha within POS area 28 (habitat rehabilitation area on map at Attachment C);

3. Prior to the sale of any lots within the development, the person taking the action must provide documentary evidence to the satisfaction of the Department showing that the areas of Carnaby's Black Cockatoo foraging habitat to be retained and rehabilitated in accordance with Conditions 1 and 2 (as identified as retained habitat and habitat rehabilitation areas in maps at Attachments A, B and C) have been included in the areas required to be ceded as public open space for the purpose of conservation within the statutory component of Structure Plan No. 73.

4. The person taking the action must plant a total of 2800 native yard plants[9] within residential lots across the development, in the first spring season after each dwelling is complete.

5. The person taking the action must ensure that street tree plantings within the development has the following composition:

Area of site	Percentage of native street trees[8]
Western area (west of Marmion Avenue)	50%
Eastern area (east of Marmion Avenue)	100%

Maps showing these areas are at Attachment D.

6. If after three years from the date of the planting, a survival rate of 90% of the habitat rehabilitation areas (as required under Condition 2) and the planted street trees (as required under Condition 5) is not achieved, all dead trees must be replaced within 12 months and maintained for a minimum of two years.

7. Prior to the sale of any lots within the development the person taking the action must provide documentary evidence to the satisfaction of the Department showing that the component of Bush Forever site 130 that is located in the far south-eastern corner of the proposal area (as identified in the map at Attachment E) has been included in the areas required to be ceded as public open space for the purpose of conservation within the statutory component of Structure Plan No. 73.

8. The component of Bush Forever site 130 located adjacent to the northern boundary of the proposal area (as identified in the map at Attachment E) must be retained by the person taking the action, stock-fenced and managed for conservation in perpetuity or until such time as it is ceded to the Crown as conservation reserve.

Off-site measures to offset the impact of the action

9. Prior to construction commencing, the person taking the action must provide documentary evidence to the Department showing that $350,000 has been provided to WA DEC to acquire the offset property[10].

10. The person taking the action must, in liaison with WA DEC, ensure that the seed harvested and the topsoil removed as part of the clearance of the site is relocated and distributed at locations and in a method determined by WA DEC, for the purpose of rehabilitating cleared and degraded parts of nearby reserves with a conservation purpose.

General

11. If, at any time after 5 years from the date of this approval, the Minister notifies, in writing, the person taking the action that the Minister is not satisfied that there has been substantial commencement of the action, the action must not thereafter be commenced without the written agreement of the Minister.

12. The person taking the action must maintain accurate records of all activities associated with or relevant to the above conditions of the approval, and make them available on request by the Department. Such documents may be subject to audit by the Department and used to verify compliance with the conditions of approval.

Definitions

1. The EPBC Act is the *Environment Protection and Biodiversity Conservation Act 1999*.
2. The Minister means the Minister responsible for the administration of the EPBC Act.
3. The Department means the Commonwealth department responsible for administering the EPBC Act.
4. WA DEC means the Western Australian Department of Environment and Conservation.
5. Public Open Space is the areas of public open space designated in the Peet Alkimos Local Structure Plan (Figure 3 to the referral document) and shown in the Public Open Space Provision (Figure 1 to the Revised On-site Mitigation Plan that formed the preliminary documentation).
6. Habitat rehabilitation area means the planting of species native to the site, at a species composition resembling that which naturally occurs on the site.
7. Construction includes any preparatory works required to be undertaken including clearing vegetation, the erection of any on-site temporary structures and/or the use of construction or excavation equipment on site for the purposes of breaking the ground for buildings or infrastructure.
8. Native street trees means a tree of one of the following species: *Agonis flexuosa*, *Corymbia calophylla*, *Corymbia ficifolia*, *Eucalyptus marginata*, *Eucalyptus gomphocephala*, *Eucalyptus todtiana*, *Allocasuarina fraseriana*, *Allocasuarina humilis*, *Callistemon salignus*, *Callistemon viminalis* or *Xanthorrhoea preissii*.
9. Native yard plants means plants of the native street tree species included in definition 8 and plants of the following genera: *Banksia* (including *Dryandra*), *Hakea*, *Grevillea* or *Acacia*.
10. The offset property, as required by Condition 8, is the property identified in the 'Summary Report, Carnaby's Black Cockatoo, Lots 1005 and 1006 Alkimos' provided to the Department on 24 April 2009.

Attachments

A – POS areas 35 & 36
B – POS areas 37
C – POS area 28
D – Eastern and western areas of the site
E – Bush Forever site 130

ATTACHMENT A

P.O.S. AREAS 35 & 36

PLANT LIST

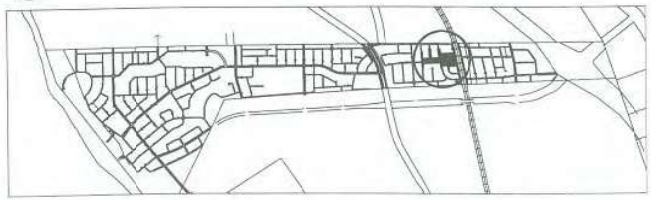
C= Cockatoo Feeding Plants
e= Locally Native Species

TREES			
		e	Acacia rostellifera
C		e	Allocasuarina fraseriana
C			Banksia ashbyi
C		s	Banksia attenuata
C			Banksia ericifolia
C			Banksia grandis
C			Banksia ilicifolia
C			Banksia littoralis
C		e	Banksia menziesii
C			Banksia prionotes
C			Corymbia ficifolia
C			Eucalyptus diptodonta*
C		e	Eucalyptus decipiens
C		e	Eucalyptus gomphocephala
C			Eucalyptus salmonophloia*
C		e	Eucalyptus loxiliana
		e	Melaleuca huegelii subs. huegelii
		e	Nuytsia floribunda
STREET TREES			
C			Agonis flexuosa
C		e	Allocasuarina fraseriana
C			Callistemon salignus
C			Callistemon viminalis
C			Corymbia calophylla
C		e	Eucalyptus gomphocephala
EXOTIC TREES*			
C			Ficus macrocarpa*
C			Hibiscus spp.*
C			Jacaranda mimosifolia*
			* limited use
SHRUBS			
		e	Acacia cyclops
		e	Acacia pulchella
C			Acacia saligna
C		e	Allocasuarina humilis
		e	Bossiaea eriocarpa
		e	Brachysema benthiniia
		e	Calothamnus quadrifidus
		e	Calytrix flavescens
		e	Conospermum triplinervium
		e	Conostephium pendulum
		e	Daviesia divaricata
		e	Desmocladus asper
C		e	Dryandra lindleyana subs. lindleyana
C			Dryandra nivea
C		e	Dryandra sessilis
C		e	Dryandra sessilis var. ogivalis
C			Grevillea crithmifolia
C			Grevillea obtusiloba
C			Grevillea olivacea
C		e	Grevillea preissii (hermiensis)
C		e	Grevillea preissii subs. preissii
C			Grevillea thelemanniana
C		e	Hakea costata
C			Hakea lissiana
C		e	Hakea lissocarpa
C		e	Hakea prostrata
C		e	Hakea ruschiana
C		e	Hakea trifurcata
		e	Hibbertia hypericoidea
		e	Jacksonia calcicola
		e	Jacksonia stembergiana
		e	Kennedia prostrata
		e	Lepidosperma sp.
		e	Leucopogon polymorphus
		e	Lomandra maritima
		e	Macrozamia reidlei
		e	Mesomelaena pseudostygia
		e	Petrophile macrostachya
		e	Petrophile serruriae
		e	Stirlingia latifolia
		e	Synaphea spinulosa subs. spinulosa
		e	Wahlia suaveolens
C		e	Xanthorrhoea gracilis
C		e	Xanthorrhoea preissii
DAMPLAND & DRAINAGE PLANTS			
C			Banksia littoralis
		e	Baumea preissii
			Isolepsis nodosa
			Isolepsis cernua
			Juncus krausii
			Juncus pallidus
		e	Lepidosperma costale
		e	Lepidosperma gladiatum
		e	Lepidosperma longitudinale
		e	Lepidosperma squamatum
			Lomandra longifolia
			Melaleuca raphiophylla
C			Corymbia calophylla

RETAINED HABITAT (9290m²)

2 KEY PLAN

NTS



LEGEND

- PROPOSED TREE PLANTING
- PROPOSED ROLL-ON TURF
- AREAS OF EXISTING VEGETATION TO BE RETAINED
- PROPOSED FOOTPATH WITH GRADE
- PROPOSED FENCING

No.	REVISION	BY	DATE

Title
POS 35 & 36
LANDSCAPE COMMITMENT DRAWING

Project
ALKIMOS
COCKATOO MITIGATION

Client
PEET

EPCAD

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28-30 Meylist Street West Perth Western Australia 6005
PO Box 1235 West Perth WA 6872 Tel 08 9481 4413 Fax 08 9481 6903
email@epcad.com.au

Project No. | Category | Drawing No.

B0692/CLCM/L102

Date FEBRUARY 2009 Revision
Scale 1:500 @ A1
Issue INFORMATION
Drawn KJD Checked RS

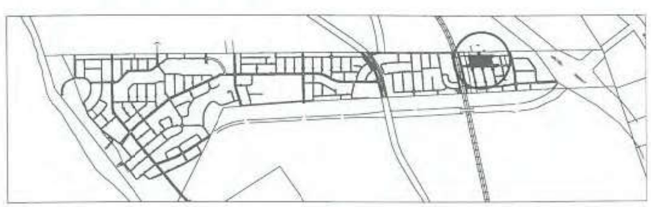
ATTACHMENT B

P.O.S. AREA 37

1 POS 37 DETAIL PLAN 1:500

HABITAT REHABILITATION AREA(935m²)

RETAINED HABITAT (2220m²)



2 KEY PLAN NTS

LEGEND

- PROPOSED TREE PLANTING
- PROPOSED DRAINAGE BASIN PLANTING
- PROPOSED NATIVE PLANTING
- PROPOSED ROLL-ON TURF
- AREAS OF EXISTING VEGETATION TO BE RETAINED
- PROPOSED FOOTPATH WITH GRADE
- PROPOSED FENCING

PLANT LIST

C= Cockatoo Feeding Plants
e= Locally Native Species

TREES

	e	Acacia rostellifera
C	e	Allocasuarina fraseriana
C		Banksia ashbyi
C	e	Banksia attenuata
C		Banksia ericifolia
C		Banksia grandis
C		Banksia ilicifolia
C		Banksia littoralis
C	e	Banksia menziesii
C		Banksia prionotes
C		Corymbia marginata
C		Eucalyptus citriodora*
C	e	Eucalyptus decipiens
C	e	Eucalyptus gomphocephala
C		Eucalyptus salmonophloia*
C	e	Eucalyptus todtiana
	e	Melaleuca huegelii subs. huegelii
	e	Nuytsia floribunda

STREET TREES

C		Agonis flexuosa
C	e	Allocasuarina fraseriana
C		Callistemon salignus
C		Callistemon viminalis
C		Corymbia calophylla
C	e	Eucalyptus gomphocephala

EXOTIC TREES*

C		Ficus macrocarpa*
C		Hibiscus spp.*
C		Jacaranda mimosifolia*

* limited use

SHRUBS

	e	Acacia cyclops
	e	Acacia pulchella
C		Acacia saligna
C	e	Allocasuarina humilis
	e	Bossiaea eriocarpa
	e	Brachyscome iberidifolia
	e	Calothamnus quadrifidus
	e	Calytrix flavescens
	e	Conospermum triplinervium
	e	Conostephium pendulum
	e	Daviesia divaricata
	e	Desmocladus asper
C	e	Dryandra lindleyana subs. lindleyana
C		Dryandra nivea
C	e	Dryandra sessilis
C	e	Dryandra sessilis var. cygnorum
C		Grevillea crithmifolia
C		Grevillea obtusifolia
C		Grevillea olivacea
C	e	Grevillea preissii (thelmanniana)
C	e	Grevillea preissii subs. preissii
C		Grevillea thelmanniana
C	e	Hakea costata
C		Hakea laurina
C	e	Hakea lissocarpha
C	e	Hakea prostrata
C	e	Hakea ruscifolia
C	e	Hakea trifurcata
	e	Hibbertia hypericoides
	e	Jacksonia calcicola
	e	Jacksonia sternbergiana
	e	Kennedia prostrata
	e	Lepidosperma sp.
	e	Leucopogon polymorphus
	e	Lomandra maritima
	e	Macrozamia reidlei
	e	Mesomelaena pseudostygia
	e	Petrophile macrostachya
	e	Petrophile serruriae
	e	Stirlingia latifolia
	e	Synaphea spinulosa subs. spinulosa
	e	Waitzia suaveolens
C	e	Xanthorrhoea gracilis
C	e	Xanthorrhoea preissii

DAMPLAND & DRAINAGE PLANTS

C		Banksia littoralis
	e	Baumea preissii
		Isolepsis nodosa
		Isolepsis cernua
		Juncus kraussii
		Juncus pallidus
	e	Lepidosperma costale
	e	Lepidosperma gladiatum
	e	Lepidosperma longitudinale
	e	Lepidosperma squamatum
		Lomandra longifolia
		Melaleuca rhaphiophylla
C		Corymbia calophylla

No.	REVISION	BY	DATE

Title: POS 37 LANDSCAPE COMMITMENT DRAWING
Project: ALKIMOS COCKATOO MITIGATION
Client: PEET

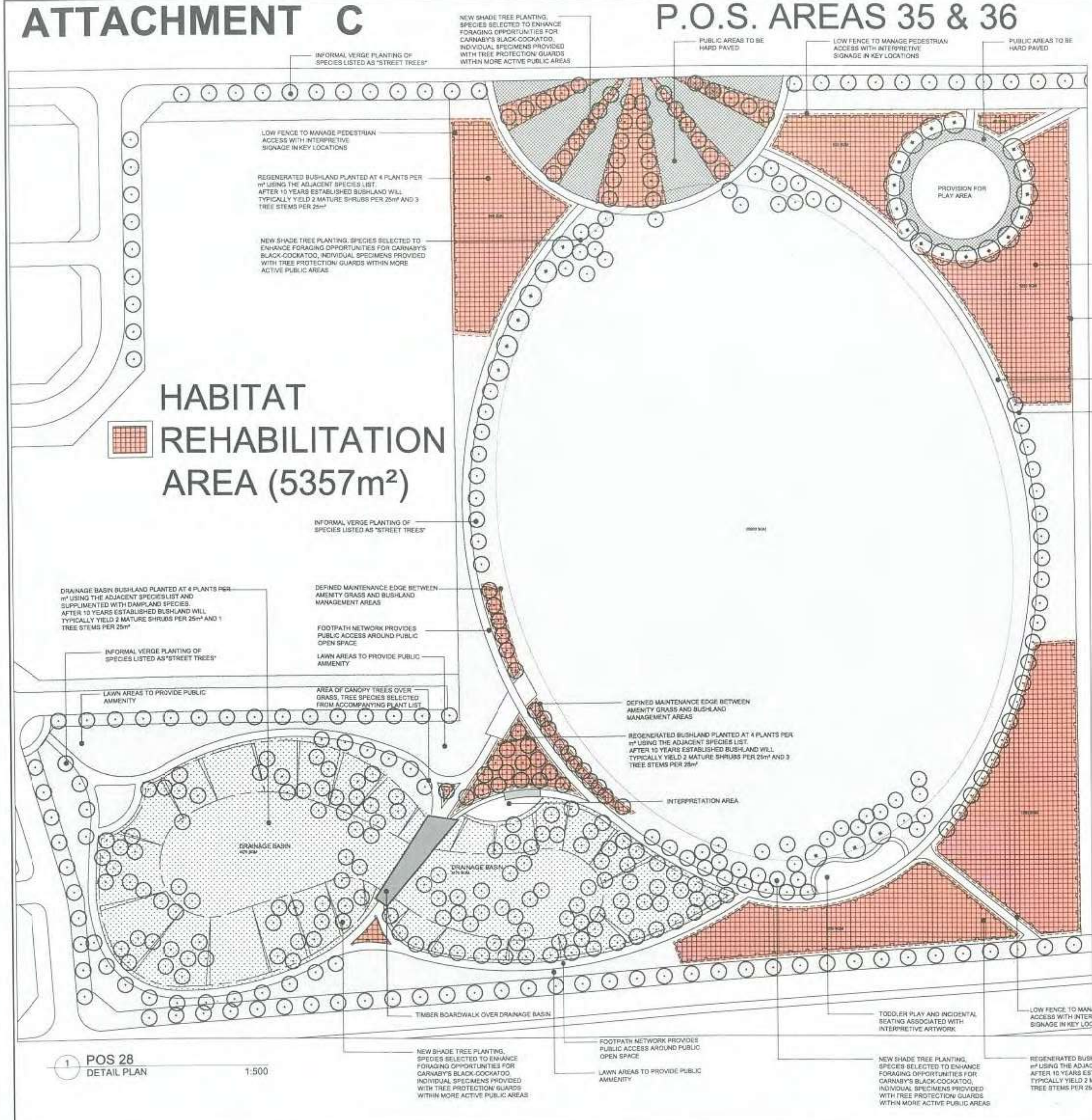
EPCAD

EPCAD Pty Ltd

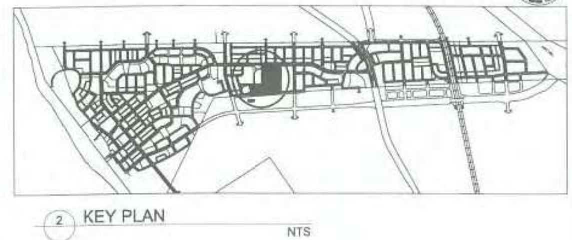
Project No. Category Drawing No.
B0692/CLCM/L103
Date FEB Revision
Scale 1:500@A1
Issue INFORMATION
Drawn RB Checked HM

ATTACHMENT C

P.O.S. AREAS 35 & 36



1 POS 28
DETAIL PLAN 1:500



2 KEY PLAN
NTS

PLANT LIST

C= Cockatoo Feeding Plants
e= Locally Native Species

TREES

	e	Acacia rostellifera
C	e	Allocasuarina fraseriana
C		Banksia ashbyii
C	e	Banksia attenuata
C		Banksia ericifolia
C		Banksia grandis
C		Banksia ilicifolia
C		Banksia littoralis
C	e	Banksia menziesii
C		Banksia prionotes
C		Corymbia marginata
C		Eucalyptus citriodora*
C	e	Eucalyptus decipiens
C	e	Eucalyptus gomphocephala
C		Eucalyptus salmonophloia*
C	e	Eucalyptus todtiana
	e	Melaleuca huegelii subs. huegelii
	e	Nuytsia floribunda

STREET TREES

C		Agonis flexuosa
C	e	Allocasuarina fraseriana
C		Callistemon salignus
C		Callistemon viminalis
C		Corymbia calophylla
C	e	Eucalyptus gomphocephala

EXOTIC TREES*

C		Ficus macrocarpa*
C		Hibiscus spp.*
C		Jacaranda mimiisifolia*

*limited use

SHRUBS

	e	Acacia cyclops
	e	Acacia pulchella
C		Acacia saligna
C	e	Allocasuarina humilis
	e	Bossiaea eriocarpa
	e	Brachyscome iberidifolia
	e	Calothamnus quadrifidus
	e	Calytrix flavescens
	e	Conospermum triplinervium
	e	Conostephium pendulum
	e	Daviesia divaricata
	e	Desmocladus asper
C	e	Dryandra lindleyana subs. lindleyana
C		Dryandra nivea
C	e	Dryandra sessilis
C	e	Dryandra sessilis var. cygnorum
C		Grevillea crithmifolia
C		Grevillea obtusifolia
C		Grevillea olivacea
C	e	Grevillea preissii (thelmanniana)
C	e	Grevillea preissii subs. preissii
C		Grevillea thelmanniana
C	e	Hakea costata
C		Hakea laurina
C	e	Hakea lissocarpa
C	e	Hakea prostrata
C	e	Hakea ruscifolia
C	e	Hakea trifurcata
	e	Hibbertia hypericoides
	e	Jacksonia calcicola
	e	Jacksonia sternbergiana
	e	Kennedia prostrata
	e	Lepidosperma sp.
	e	Leucopogon polymorphus
	e	Lomandra maritima
	e	Macrozamia riedlei
	e	Mesomelaena pseudostygia
	e	Petrophile macrostachya
	e	Petrophile serruriae
	e	Stirlingia latifolia
	e	Synaphea spinulosa subs. spinulosa
	e	Waitzia suaveolens
C	e	Xanthorrhoea gracilis
C	e	Xanthorrhoea preissii

DAMPLAND & DRAINAGE PLANTS

C		Banksia littoralis
	e	Baumea preissii
		Isolepsis nodosa
		Isolepsis cernua
		Juncus kraussii
		Juncus pallidus
	e	Lepidosperma coastale
	e	Lepidosperma gladiatum
	e	Lepidosperma longitudinale
	e	Lepidosperma squamatum
		Lomandra longifolia
		Melaleuca rhaphiophylla
C		Corymbia calophylla

LEGEND

- PROPOSED TREE PLANTING
- PROPOSED DRAINAGE BASIN PLANTING
- PROPOSED NATIVE PLANTING
- PROPOSED ROLL-ON TURF
- AREAS OF EXISTING VEGETATION TO BE RETAINED
- PROPOSED FOOTPATH WITH GRADE
- PROPOSED FENCING

No.	REVISION	BY	DATE

Title
POS 28
LANDSCAPE COMMITMENT DRAWING

Project
ALKIMOS
COCKATOO MITIGATION

Client
PEET

EPCAD

EPCAD Pty Ltd
28-30 Mayfair Street West Perth Western Australia 6005
PO Box 1255 West Perth WA 6872 Tel 08 9481 4410 Fax 08 9481 6903
email@epcad.com.au

Project No. Category Drawing No.
B0692/CLCM/L101

Date FEB 2009 Revision
Scale 1:500@A1
Issue APPROVAL
Drawn CB Checked HM

ATTACHMENT D

PUBLIC OPEN SPACE PROVISION

PEET ALKIMOS LOCAL STRUCTURE PLAN | LOTS 1005 & 1006 MARMION AVENUE, ALKIMOS

FIGURE 22b

PEET

ATTACHMENT E

PUBLIC OPEN SPACE PROVISION

PEET ALKIMOS LOCAL STRUCTURE PLAN | LOTS 1005 & 1006 MARMION AVENUE, ALKIMOS

FIGURE 22b

PEET

APPENDIX C

SUMMARY OF AUSTRALIAN STANDARD 3959

Australian Standard: 3959

This is an abridged version of *Australian Standard 3959: Construction of Buildings in Bush F Prone Areas* and provides some detail for developments proposed in high risk zone

Please do not use the abridged version alone. The full version can be purchased from Standards Australia at www.standards.org.au.

Flooring

Level 1
Concrete slab on ground. Suspended floor· concrete floorframed floor, underside bearer to be greater than 600mm above finished ground level. Under space whe unenclosed all timber flooring, bearers and joists to be fire retardant treated timber.

Level 2
As per Level 1.

Level 3
As per Level 1 except where framed floors have a greater clearance than 600mm above finished ground level and are not fully enclosed – all flooring components are to be fire retardant treated timber.

External Walls

Level 1
Masonry, concrete, pise, rammed earth, stabilised earth or;Framed walls have n restriction to cladding materials but must incorporated breather-type sarking having appropriate flammability index or an insulating material confirming to the appropriate Australian Standard.

Where combustible sheeting is less than 400mm from ground, cladding shall be protected with a non-combustible material for no less than 400mm.

Level 2
As per Level 1 except PVC claddings not permitted and all external timber wall cladding shall be fire retardant treated timber.

Level 3
As per Level 2.

Windows

Level 1
All openable windows shall be fitted with screens.

Level 2
As per Level 1 and in addition – timber windows shall be fire retardant treated timber except where protected by non-combustible shutters. Leadlight windows shall be protected by a shutter constructed of non-combustible material or toughened glass.

Level 3
As per Level 2 except windows are to be protected by non-combustible shutters toughened glass.

External Doors

Level 1
Weather strips or draft excluders to be fitted. Tight fitting door screens to be fitted.

Level 2
As per Level 1 except aluminium mesh shall not be used. Leadlight glassing shal be protected by shutters constructed of non-combustible material or toughened glass.

Level 3
As per Level 2 except that timber doors shall be fire retardant treated or coverec with non-combustible material on the exterior or doors shall be protected by shutters of non-combustible material or Doors shall be solid core having a thickness of not less than 35mm.

Roofs

Level 1
Timber shakes or shingles are not permitted.Tiled roofs shall be fully sarked. Sarking shall have a flammability index of no more than 5.

Sheeted roofs shall be fibre cement or metal and all gaps under corrugations or ribs where it meets the fascia/wall shall be sealed or protected by either (a) fully sarking roof or (b) corrosion resistant steel, bronze mess, profiled metal sheet, neoprene seal, compressed mineral wool or similar material.

The use of (b) cannot be used on roofs with valleys.Rib caps and ridge capping shall be sealed using either rib caps, ridge capping or as per prior clause.

Roof wall junctions shall be sealed by the use of fascias and eaves linings or with non-combustible materials.

Level 2
As per Level 1 except that all roofing shall be non-combustible and sarked.

Level 3

As per Level 2 except that no fibre-reinforced cement or aluminium sheet shall b used.

Rooflights

Level 1
All rooflights and associated shafts shall be sealed with a non-combustible sleeve or lining.

A rooflight can be constructed from thermoplastic sheet in a metal frame, but diffuser installed at ceiling level shall be wired or toughened glass in a metal frame.

Vented rooflights shall have corrosion resistant steel or bronze mesh.

Level 2
As per Level 1 except rooflight glazing shall be wired glass.

Level 3
As per Level 2.

Eaves

Level 1
Eaves shall be enclosed with all fascia or gaps between rafters being sealed.

Level 2
As per Level 1 except all timber eaves lining and joining strips shall be fire retardant-treated timber.

Level 3
As per Level 2 except that aluminium shall not be used.

Fascias

Level 1
No special requirement.

Level 2
All material must be either non-combustible or fire-retardant treated timber.

Level 3
As per Level 2 except that no fibre-reinforced cement or aluminium sheet shall b used.

Gutters and Downpipes

Level 1
All leaf guards must have a flammability index no greater than 5 (AS1503.2).

Level 2
As per Level 1.

Level 3
As per Level 1.

Verandas and Decks

Level 1
Slab-reinforced concrete suspended slab floor, supported by posts or columns. Slab on ground.

Sheeted or tongued and grooved solid flooring having:
- where clearance between under side of flooring to ground level is not greater than 400mm, all joints in the flooring shall be covered or sealed
- decking timbers shall have no less than 5m clearance
- posts and columns shall be non-combustible, fire retardant for a minimum of 400mm above finished ground level or mounted on galvanised metal shoes wit a clearance of not less than 75mm
- the external perimeter beneath the decking shall not be enclosed nor have access restricted
- decking timbers shall not connect with the remainder of the building unless measures are used to prevent the spread of fire into the building.

Level 2
As per Level 1 except spaced timber decking shall be fire retardant treated.

Level 3
As per Level 2 except all materials shall be non-combustible or where timber is used it all will be fire retardant treated including balustrades.

The construction standards to which a development must comply are determinec by the category of bushfire attack for an area.

Australian Government

Department of the Environment, Water, Heritage and the Arts

APPROVAL

Residential Development, Lots 1005 & 1006, Alkimos, WA (EPBC 2008/4638)

This decision is made under (sections 130(1) and 133) of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Proposed action

person to whom the approval is granted	Peet Limited ACN: 008 665 834
proposed action	The urban development of 243 ha of land near Alkimos, approximately 40km northwest of Perth, Western Australia, as described in the referral received on 9 December 2008, the preliminary documentation received on 18 February 2009 and the summary report received on 24 April 2009.

Approval

relevant controlling provisions	The decision to approve has effect for: • Listed threatened species and communities (sections 18 & 18A)
conditions of approval	This approval is subject to the conditions specified below.
expiry date of approval	This approval has effect until 30 June 2034.

Person authorised to make decision

name and position	Vicki Middleton Assistant Secretary Environment Assessment Branch
signature	Vicki Middleton
date of decision	11 June 2009

Conditions attached to the approval

On-site measures to mitigate the impacts of the action

1. The person taking the action must retain and protect 1.151 ha of Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) foraging habitat, consisting of the following areas in public open space (POS)[5]:
   0.929 ha within POS areas 35 and 36 (retained habitat on map at Attachment A);
   0.222 ha within POS area 37 (retained habitat on map at Attachment B);

2. The person taking the action must rehabilitate 0.6292 ha to provide foraging habitat for Carnaby's Black Cockatoo, of the following areas in public open space:
0.0935 ha within POS area 37 (habitat rehabilitation area on map at Attachment B);
0.5357 ha within POS area 28 (habitat rehabilitation area on map at Attachment C);

3. Prior to the sale of any lots within the development, the person taking the action must provide documentary evidence to the satisfaction of the Department showing that the areas of Carnaby's Black Cockatoo foraging habitat to be retained and rehabilitated in accordance with Conditions 1 and 2 (as identified as retained habitat and habitat rehabilitation areas in maps at Attachments A, B and C) have been included in the areas required to be ceded as public open space for the purpose of conservation within the statutory component of Structure Plan No. 73.

4. The person taking the action must plant a total of 2800 native yard plants[9] within residential lots across the development, in the first spring season after each dwelling is complete.

5. The person taking the action must ensure that street tree plantings within the development has the following composition:

Area of site	Percentage of native street trees[8]
Western area (west of Marmion Avenue)	50%
Eastern area (east of Marmion Avenue)	100%

Maps showing these areas are at Attachment D.

6. If after three years from the date of the planting, a survival rate of 90% of the habitat rehabilitation areas (as required under Condition 2) and the planted street trees (as required under Condition 5) is not achieved, all dead trees must be replaced within 12 months and maintained for a minimum of two years.

7. Prior to the sale of any lots within the development the person taking the action must provide documentary evidence to the satisfaction of the Department showing that the component of Bush Forever site 130 that is located in the far south-eastern corner of the proposal area (as identified in the map at Attachment E) has been included in the areas required to be ceded as public open space for the purpose of conservation within the statutory component of Structure Plan No. 73.

8. The component of Bush Forever site 130 located adjacent to the northern boundary of the proposal area (as identified in the map at Attachment E) must be retained by the person taking the action, stock-fenced and managed for conservation in perpetuity or until such time as it is ceded to the Crown as conservation reserve.

Off-site measures to offset the impact of the action

9. Prior to construction commencing, the person taking the action must provide documentary evidence to the Department showing that $350,000 has been provided to WA DEC to acquire the offset property[10].

10. The person taking the action must, in liaison with WA DEC, ensure that the seed harvested and the topsoil removed as part of the clearance of the site is relocated and distributed at locations and in a method determined by WA DEC, for the purpose of rehabilitating cleared and degraded parts of nearby reserves with a conservation purpose.

General

11. If, at any time after 5 years from the date of this approval, the Minister notifies, in writing, the person taking the action that the Minister is not satisfied that there has been substantial commencement of the action, the action must not thereafter be commenced without the written agreement of the Minister.

12. The person taking the action must maintain accurate records of all activities associated with or relevant to the above conditions of the approval, and make them available on request by the Department. Such documents may be subject to audit by the Department and used to verify compliance with the conditions of approval.

Definitions

1. The EPBC Act is the *Environment Protection and Biodiversity Conservation Act 1999*.
2. The Minister means the Minister responsible for the administration of the EPBC Act.
3. The Department means the Commonwealth department responsible for administering the EPBC Act.
4. WA DEC means the Western Australian Department of Environment and Conservation.
5. Public Open Space is the areas of public open space designated in the Peet Alkimos Local Structure Plan (Figure 3 to the referral document) and shown in the Public Open Space Provision (Figure 1 to the Revised On-site Mitigation Plan that formed the preliminary documentation).
6. Habitat rehabilitation area means the planting of species native to the site, at a species composition resembling that which naturally occurs on the site.
7. Construction includes any preparatory works required to be undertaken including clearing vegetation, the erection of any on-site temporary structures and/or the use of construction or excavation equipment on site for the purposes of breaking the ground for buildings or infrastructure.
8. Native street trees means a tree of one of the following species: *Agonis flexuosa*, *Corymbia calophylla*, *Corymbia ficifolia*, *Eucalyptus marginata*, *Eucalyptus gomphocephala*, *Eucalyptus todtiana*, *Allocasuarina fraseriana*, *Allocasuarina humilis*, *Callistemon salignus*, *Callistemon viminalis* or *Xanthorrhoea preissii*.
9. Native yard plants means plants of the native street tree species included in definition 8 and plants of the following genera: *Banksia* (including *Dryandra*), *Hakea*, *Grevillea* or *Acacia*.
10. The offset property, as required by Condition 8, is the property identified in the 'Summary Report, Carnaby's Black Cockatoo, Lots 1005 and 1006 Alkimos' provided to the Department on 24 April 2009.

Attachments

A – POS areas 35 & 36
B – POS areas 37
C – POS area 28
D – Eastern and western areas of the site
E – Bush Forever site 130

ATTACHMENT A

P.O.S. AREAS 35 & 36

PLANT LIST

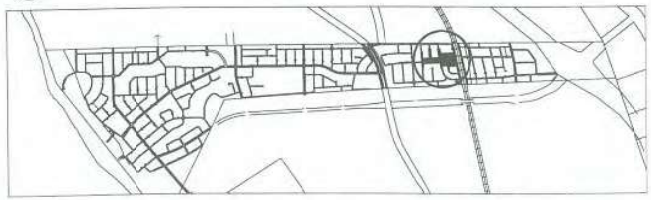
C= Cockatoo Feeding Plants
e= Locally Native Species

TREES			
		e	Acacia rostellifera
C		e	Allocasuarina fraseriana
C			Banksia ashbyi
C		s	Banksia attenuata
C			Banksia ericifolia
C			Banksia grandis
C			Banksia ilicifolia
C			Banksia littoralis
C		e	Banksia menziesii
C			Banksia prionotes
C			Corymbia ficifolia
C			Eucalyptus diptodonta*
C		e	Eucalyptus decipiens
C		e	Eucalyptus gomphocephala
C			Eucalyptus salmonophloia*
C		e	Eucalyptus loxiliana
		e	Melaleuca huegelii subs. huegelii
		e	Nuytsia floribunda
STREET TREES			
C			Agonis flexuosa
C		e	Allocasuarina fraseriana
C			Callistemon salignus
C			Callistemon viminalis
C			Corymbia calophylla
C		e	Eucalyptus gomphocephala
EXOTIC TREES*			
C			Ficus macrocarpa*
C			Hibiscus spp.*
C			Jacaranda mimosifolia*
			* limited use
SHRUBS			
		e	Acacia cyclops
		e	Acacia pulchella
C			Acacia saligna
C		e	Allocasuarina humilis
		e	Bossiaea eriocarpa
		e	Brachysema benthiniia
		e	Calothamnus quadrifidus
		e	Calytrix flavescens
		e	Conospermum triplinervium
		e	Conostephium pendulum
		e	Daviesia divaricata
		e	Desmocladus asper
C		e	Dryandra lindleyana subs. lindleyana
C			Dryandra nivea
C		e	Dryandra sessilis
C		e	Dryandra sessilis var. ogivalis
C			Grevillea crithmifolia
C			Grevillea obtusiloba
C			Grevillea olivacea
C		e	Grevillea preissii (hermiensis)
C		e	Grevillea preissii subs. preissii
C			Grevillea thelemanniana
C		e	Hakea costata
C			Hakea lissiana
C		e	Hakea lissocarpa
C		e	Hakea prostrata
C		e	Hakea ruschiana
C		e	Hakea trifurcata
		e	Hibbertia hypericoidea
		e	Jacksonia calcicola
		e	Jacksonia stembergiana
		e	Kennedia prostrata
		e	Lepidosperma sp.
		e	Leucopogon polymorphus
		e	Lomandra maritima
		e	Macrozamia reidlei
		e	Mesomelaena pseudostygia
		e	Petrophile macrostachya
		e	Petrophile serruriae
		e	Stirlingia latifolia
		e	Synaphea spinulosa subs. spinulosa
		e	Wahlia suaveolens
C		e	Xanthorrhoea gracilis
C		e	Xanthorrhoea preissii
DAMPLAND & DRAINAGE PLANTS			
C			Banksia littoralis
		e	Baumea preissii
			Isolepsis nodosa
			Isolepsis cernua
			Juncus krausii
			Juncus pallidus
		e	Lepidosperma costale
		e	Lepidosperma gladiatum
		e	Lepidosperma longitudinale
		e	Lepidosperma squamatum
			Lomandra longifolia
			Melaleuca raphiophylla
C			Corymbia calophylla

RETAINED HABITAT (9290m²)

2 KEY PLAN

NTS



LEGEND

- PROPOSED TREE PLANTING
- PROPOSED ROLL-ON TURF
- AREAS OF EXISTING VEGETATION TO BE RETAINED
- PROPOSED FOOTPATH WITH GRADE
- PROPOSED FENCING

No.	REVISION	BY	DATE

Title
POS 35 & 36
LANDSCAPE COMMITMENT DRAWING

Project
ALKIMOS
COCKATOO MITIGATION

Client
PEET

EPCAD

EPCAD Pty Ltd
28-30 Meylist Street West Perth Western Australia 6005
PO Box 1235 West Perth WA 6872 Tel 08 9481 4413 Fax 08 9481 6903
email@epcad.com.au

Project No. | Category | Drawing No.

B0692/CLCM/L102

Date FEBRUARY 2009 Revision
Scale 1:500 @ A1
Issue INFORMATION
Drawn KJD Checked RS

ATTACHMENT B

P.O.S. AREA 37

REGENERATED BUSHLAND PLANTED AT 4 PLANTS PER m² USING THE ADJACENT SPECIES LIST. AFTER 10 YEARS ESTABLISHED BUSHLAND WILL TYPICALLY YIELD 2 MATURE SHRUBS PER 25m² AND 3 TREE STEMS PER 25m²

LOW FENCE TO MANAGE PEDESTRIAN ACCESS WITH INTERPRETIVE SIGNAGE IN KEY LOCATIONS

REGENERATED BUSHLAND PLANTED AT 4 PLANTS PER m² USING THE ADJACENT SPECIES LIST. AFTER 10 YEARS ESTABLISHED BUSHLAND WILL TYPICALLY YIELD 2 MATURE SHRUBS PER 25m² AND 3 TREE STEMS PER 25m²

RETAINED BUSH WITH SUPPLEMENTAL PLANTING TO PROVIDE REINSTATED HABITAT AND FORAGING OPPORTUNITIES FOR CARNABY'S BLACK-COCKATOO. AREA PLANTED WITH AVERAGE OF 3 PLANTS PER m² DRAWN FROM PLANT LIST OF COCKATOO FEEDING PLANTS TO PROVIDE A MINIMUM OF 3 TREE STEMS IN AN AREA OF 25m² AS CONSIDERED TYPICAL OF LOCAL VEGETATION PATTERNS

INFORMAL VERGE PLANTING OF SPECIES LISTED AS "STREET TREES"

DEFINED AND WAY MARKED PATH WITH ASSOCIATED INTERPRETIVE SIGNAGE

REGENERATED BUSHLAND PLANTED AT 4 PLANTS PER m² USING THE ADJACENT SPECIES LIST. AFTER 10 YEARS ESTABLISHED BUSHLAND WILL TYPICALLY YIELD 2 MATURE SHRUBS PER 25m² AND 3 TREE STEMS PER 25m²

DRAINAGE BASIN BUSHLAND PLANTED AT 4 PLANTS PER m² USING THE ADJACENT SPECIES LIST AND SUPPLIMENTED WITH DAMPLAND SPECIES. AFTER 10 YEARS ESTABLISHED BUSHLAND WILL TYPICALLY YIELD 2 MATURE SHRUBS PER 25m² AND 1 TREE STEMS PER 25m²

TIMBER BOARDWALK OVER DRAINAGE BASIN

REGENERATED BUSHLAND PLANTED AT 4 PLANTS PER m² USING THE ADJACENT SPECIES LIST. AFTER 10 YEARS ESTABLISHED BUSHLAND WILL TYPICALLY YIELD 2 MATURE SHRUBS PER 25m² AND 3 TREE STEMS PER 25m²

NEW SHADE TREE PLANTING, SPECIES SELECTED TO ENHANCE FORAGING OPPORTUNITIES FOR CARNABY'S BLACK-COCKATOO. INDIVIDUAL SPECIMENS PROVIDED WITH TREE PROTECTION/ GUARDS WITHIN MORE ACTIVE PUBLIC AREAS

DEFINED MAINTENANCE EDGE BETWEEN AMENITY GRASS AND BUSHLAND MANAGEMENT AREAS

RETAINED BUSH WITH SUPPLEMENTAL PLANTING TO PROVIDE REINSTATED HABITAT AND FORAGING OPPORTUNITIES FOR CARNABY'S BLACK-COCKATOO. AREA PLANTED WITH AVERAGE OF 3 PLANTS PER m² DRAWN FROM PLANT LIST OF COCKATOO FEEDING PLANTS TO PROVIDE A MINIMUM OF 3 TREE STEMS IN AN AREA OF 25m² AS CONSIDERED TYPICAL OF LOCAL VEGETATION PATTERNS

LOW FENCE TO MANAGE PEDESTRIAN ACCESS WITH INTERPRETIVE SIGNAGE IN KEY LOCATIONS

INFORMAL VERGE PLANTING OF SPECIES LISTED AS "STREET TREES"

1 POS 37 DETAIL PLAN 1:500

FOOTPATH NETWORK PROVIDES PUBLIC ACCESS AROUND PUBLIC OPEN SPACE

LAWN AREAS TO PROVIDE PUBLIC AMMENITY

RETAINED BUSH WITH SUPPLEMENTAL PLANTING TO PROVIDE REINSTATED HABITAT AND FORAGING OPPORTUNITIES FOR CARNABY'S BLACK-COCKATOO. AREA PLANTED WITH AVERAGE OF 3 PLANTS PER m² DRAWN FROM PLANT LIST OF COCKATOO FEEDING PLANTS TO PROVIDE A MINIMUM OF 3 TREE STEMS IN AN AREA OF 25m² AS CONSIDERED TYPICAL OF LOCAL VEGETATION PATTERNS

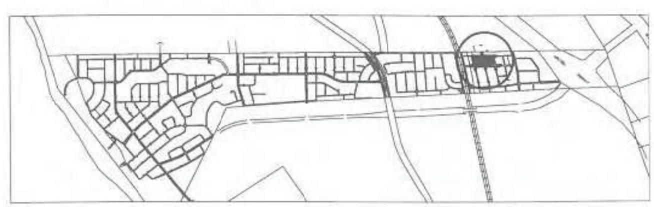
REGENERATED BUSHLAND PLANTED AT 4 PLANTS PER m² USING THE ADJACENT SPECIES LIST. AFTER 10 YEARS ESTABLISHED BUSHLAND WILL TYPICALLY YIELD 2 MATURE SHRUBS PER 25m² AND 3 TREE STEMS PER 25m²

INFORMAL VERGE PLANTING OF SPECIES LISTED AS "STREET TREES"

HABITAT REHABILITATION AREA($935m^2$)

RETAINED HABITAT ($2220m^2$)

2 KEY PLAN NTS



LEGEND

- PROPOSED TREE PLANTING
- PROPOSED DRAINAGE BASIN PLANTING
- PROPOSED NATIVE PLANTING
- PROPOSED ROLL-ON TURF
- AREAS OF EXISTING VEGETATION TO BE RETAINED
- PROPOSED FOOTPATH WITH GRADE
- PROPOSED FENCING

PLANT LIST

C= Cockatoo Feeding Plants
e= Locally Native Species

TREES		
	e	Acacia rostellifera
C	e	Allocasuarina fraseriana
C		Banksia ashbyi
C	e	Banksia attenuata
C		Banksia ericifolia
C		Banksia grandis
C		Banksia ilicifolia
C		Banksia littoralis
C	e	Banksia menziesii
C		Banksia prionotes
C		Corymbia marginata
C		Eucalyptus citriodora*
C	e	Eucalyptus decipiens
C	e	Eucalyptus gomphocephala
C		Eucalyptus salmonophloia*
C	e	Eucalyptus todtiana
	e	Melaleuca huegelii subs. huegelii
	e	Nuytsia floribunda
STREET TREES		
C		Agonis flexuosa
C	e	Allocasuarina fraseriana
C		Callistemon salignus
C		Callistemon viminalis
C		Corymbia calophylla
C	e	Eucalyptus gomphocephala
EXOTIC TREES*		
C		Ficus macrocarpa*
C		Hibiscus spp.*
C		Jacaranda mimisifolia*
		* limited use
SHRUBS		
	e	Acacia cyclops
	e	Acacia pulchella
C		Acacia saligna
C	e	Allocasuarina humilis
	e	Bossiaea eriocarpa
	e	Brachyscome iberidifolia
	e	Calothamnus quadrifidus
	e	Calytrix flavescens
	e	Conospermum triplinervium
	e	Conostephium pendulum
	e	Daviesia divaricata
	e	Desmocladus asper
C	e	Dryandra lindleyana subs. lindleyana
C		Dryandra nivea
C	e	Dryandra sessilis
C	e	Dryandra sessilis var. cygnorum
C		Grevillea crithmifolia
C		Grevillea obtusifolia
C		Grevillea olivacea
C	e	Grevillea preissii (thelmanniana)
C	e	Grevillea preissii subs. preissii
C		Grevillea thelmanniana
C	e	Hakea costata
C		Hakea laurina
C	e	Hakea lissocarpa
C	e	Hakea prostrata
C	e	Hakea ruscifolia
C	e	Hakea trifurcata
	e	Hibbertia hypericoides
	e	Jacksonia calcicola
	e	Jacksonia sternbergiana
	e	Kennedia prostrata
	e	Lepidosperma sp.
	e	Leucopogon polymorphus
	e	Lomandra maritima
	e	Macrozamia reidlei
	e	Mesomelaena pseudostygia
	e	Petrophile macrostachya
	e	Petrophile serruriae
	e	Stirlingia latifolia
	e	Synaphea spinulosa subs. spinulosa
	e	Waitzia suaveolens
C	e	Xanthorrhoea gracilis
C	e	Xanthorrhoea preissii
DAMPLAND & DRAINAGE PLANTS		
C		Banksia littoralis
	e	Baumea preissii
		Isolepsis nodosa
		Isolepsis cernua
		Juncus kraussii
		Juncus pallidus
	e	Lepidosperma costale
	e	Lepidosperma gladiatum
	e	Lepidosperma longitudinale
	e	Lepidosperma squamatum
		Lomandra longifolia
		Melaleuca rhaphiophylla
C		Corymbia calophylla

No.	REVISION	BY	DATE

Title
POS 37
LANDSCAPE COMMITMENT DRAWING

Project
ALKIMOS
COCKATOO MITIGATION

Client
PEET

EPCAD

EPCAD Pty Ltd
58-60 Mayfair Street West Perth Western Australia 6005
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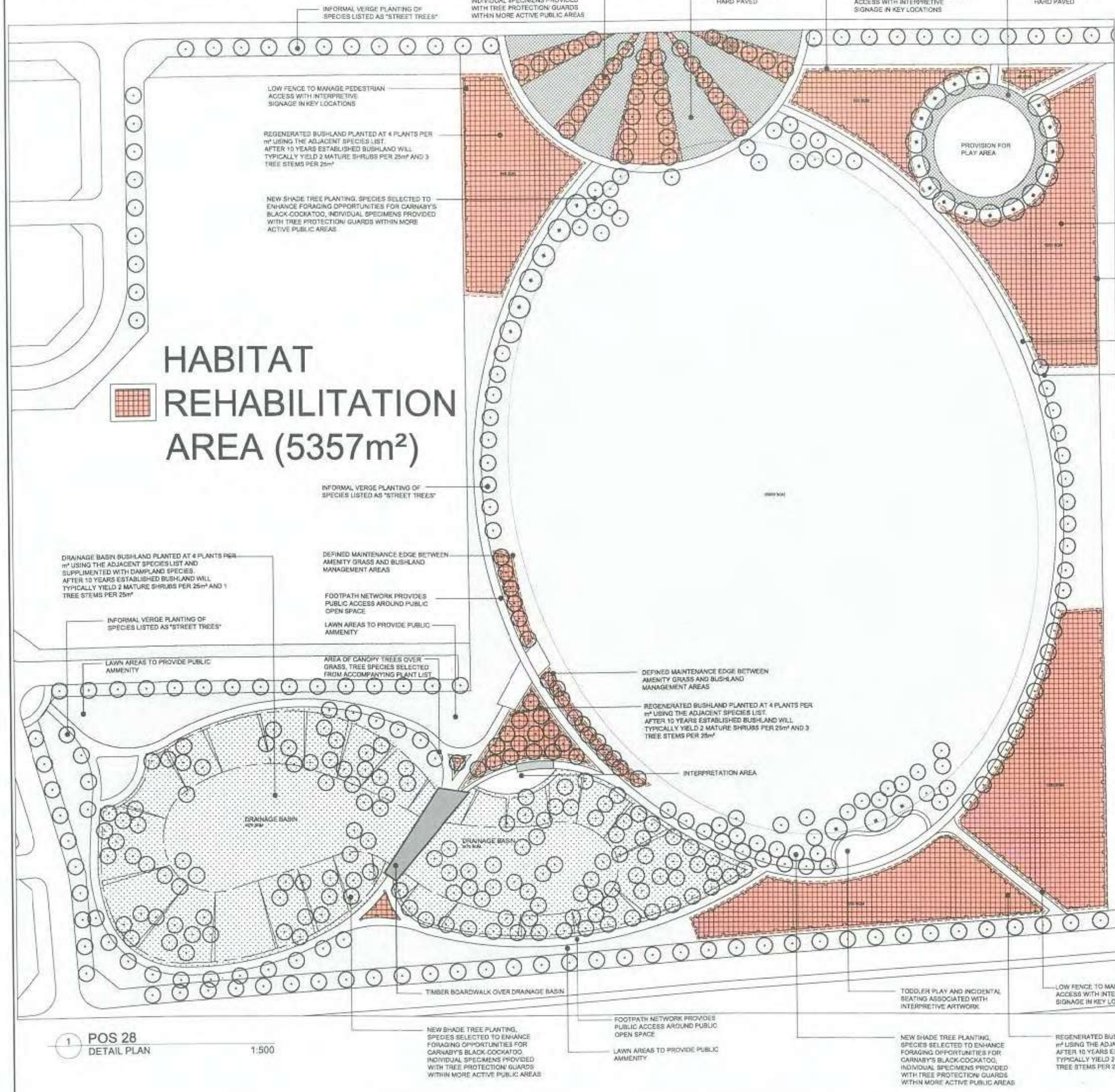
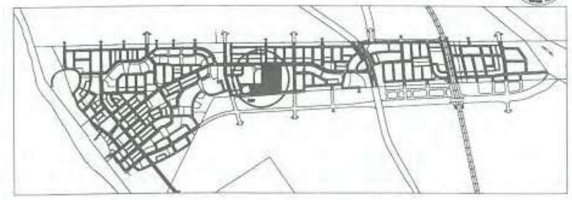
Project No. Category Drawing No.
B0692/CLCM/L103

Date FEB Revision
Scale 1:500@A1
Issue INFORMATION
Drawn RB Checked HM

ATTACHMENT C

P.O.S. AREAS 35 & 36





2 KEY PLAN NTS

1 POS 28 DETAIL PLAN 1:500

PLANT LIST

C= Cockatoo Feeding Plants
e= Locally Native Species

TREES

	e	Acacia rostellifera
C	e	Allocasuarina fraseriana
C		Banksia ashbyii
C	e	Banksia attenuata
C		Banksia ericifolia
C		Banksia grandis
C		Banksia ilicifolia
C		Banksia littoralis
C	e	Banksia menziesii
C		Banksia prionotes
C		Corymbia marginata
C		Eucalyptus citriodora*
C	e	Eucalyptus decipiens
C	e	Eucalyptus gomphocephala
C		Eucalyptus salmonophloia*
C	e	Eucalyptus todtiana
	e	Melaleuca huegelii subs. huegelii
	e	Nuytsia floribunda

STREET TREES

C		Agonis flexuosa
C	e	Allocasuarina fraseriana
C		Callistemon salignus
C		Callistemon viminalis
C		Corymbia calophylla
C	e	Eucalyptus gomphocephala

EXOTIC TREES*

C		Ficus macrocarpa*
C		Hibiscus spp.*
C		Jacaranda mimisifolia*

* limited use

SHRUBS

	e	Acacia cyclops
	e	Acacia pulchella
C		Acacia saligna
C	e	Allocasuarina humilis
	e	Bossiaea eriocarpa
	e	Brachyscome iberidifolia
	e	Calothamnus quadrifidus
	e	Calytrix flavescens
	e	Conospermum triplinervium
	e	Conostephium pendulum
	e	Daviesia divaricata
	e	Desmocladus asper
C	e	Dryandra lindleyana subs. lindleyana
C		Dryandra nivea
C	e	Dryandra sessilis
C	e	Dryandra sessilis var. cygnorum
C		Grevillea crithmifolia
C		Grevillea obtusifolia
C		Grevillea olivacea
C	e	Grevillea preissii (thelemanniana)
C	e	Grevillea preissii subs. preissii
C		Grevillea thelmanniana
C	e	Hakea costata
C		Hakea laurina
C	e	Hakea lissocarpa
C	e	Hakea prostrata
C	e	Hakea ruscifolia
C	e	Hakea trifurcata
	e	Hibbertia hypericoides
	e	Jacksonia calcicola
	e	Jacksonia sternbergiana
	e	Kennedia prostrata
	e	Lepidosperma sp
	e	Leucopogon polymorphus
	e	Lomandra maritima
	e	Macrozamia reidlei
	e	Mesomelaena pseudostygia
	e	Petrophile macrostachya
	e	Petrophile serruriae
	e	Stirlingia latifolia
	e	Synaphea spinulosa subs. spinulosa
	e	Waitzia suaveolens
C	e	Xanthorrhoea gracilis
C	e	Xanthorrhoea preissii

DAMPLAND & DRAINAGE PLANTS

C		Banksia littoralis
	e	Baumea preissii
		Isolepsis nodosa
		Isolepsis cernua
		Juncus kraussii
		Juncus pallidus
	e	Lepidosperma costale
	e	Lepidosperma gladiatum
	e	Lepidosperma longitudinale
	e	Lepidosperma squamatum
		Lomandra longifolia
		Melaleuca rhaphiophylla
C		Corymbia calophylla

LEGEND

- PROPOSED TREE PLANTING
- PROPOSED DRAINAGE BASIN PLANTING
- PROPOSED NATIVE PLANTING
- PROPOSED ROLL-ON TURF
- AREAS OF EXISTING VEGETATION TO BE RETAINED
- PROPOSED FOOTPATH WITH GRADE
- PROPOSED FENCING

No.	REVISION	BY	DATE

Title
POS 28
LANDSCAPE COMMITMENT DRAWING

Project
ALKIMOS
COCKATOO MITIGATION

Client
PEET

E P C A D

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Project No. Category Drawing No.

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Date FEB 2009 Revision
Scale 1:500@A1
Issue APPROVAL
Drawn CB Checked HM

ATTACHMENT D

PUBLIC OPEN SPACE PROVISION

PEET ALKIMOS LOCAL STRUCTURE PLAN | LOTS 1005 & 1006 MARMION AVENUE, ALKIMOS

FIGURE 22b

PEET

ATTACHMENT E

PUBLIC OPEN SPACE PROVISION

PEET ALKIMOS LOCAL STRUCTURE PLAN | LOTS 1005 & 1006 MARMION AVENUE, ALKIMOS

FIGURE 22b

PEET