Title of Proposal - ECU Engineering Annex, Joondalup Campus, WA

Section 1 - Summary of your proposed action

Provide a summary of your proposed action, including any consultations undertaken.

1.1 Project Industry Type

Private

1.2 Provide a detailed description of the proposed action, including all proposed activities.

A portion of Edith Cowan University on Lot 504 and Lot 14593 Joondalup Drive, Joondalup is proposed to be developed for an Environmental Engineering Teaching Laboratory as part of the University. The Site is approximately 0.05 ha in size and located approximately 24 km north of Perth in the Swan Coastal Plain biogeographic region of Western Australia. The project will involve clearing of vegetation to support the construction of the engineering building (Figure 1).

The development is part of a larger project involving the development of Engineering facilities within this area. A Maritime Engineering Teaching Lab and Petroleum Engineering Research facility will also be constructed to the south of the Site. These additional developments will occur on already cleared/developed land and are not included in this referral.

1.3 What is the extent and location of your proposed action? Use the polygon tool on the map below to mark the location of your proposed action.

Area	Point	Latitude	Longitude
ECU Engineering Annex	1	-31.753339873534	115.772510692
ECU Engineering Annex	2	-31.753333031244	115.77281780494
ECU Engineering Annex	3	-31.753500665574	115.77281780494
ECU Engineering Annex	4	-31.753505227046	115.77251471532
ECU Engineering Annex	5	-31.753338733164	115.772510692
ECU Engineering Annex	6	-31.753339873534	115.772510692

1.5 Provide a brief physical description of the property on which the proposed action will take place and the location of the proposed action (e.g. proximity to major towns, or for off-shore actions, shortest distance to mainland).

The Site is a small portion (0.05 ha) of land located on Lot 504 and Lot 14593 Joondalup Drive, Joondalup part of Edith Cowan University in Western Australia. It is located approximately 1.42 km south east of Joondalup City Centre and approxmately 24 km north of Perth's Central Business District (CBD). The Site is proposed to be developed for an Engineering building for educational purposes as part of the University.

1.6 What is the size of the development footprint or work area?

0.05 ha

1.7 Is the proposed action a street address or lot?

Street Address

270 Joondalup Drive
Joondalup WA 6027
Australia

1.8 Primary Jurisdiction.

Western Australia

1.9 Has the person proposing to take the action received any Australian Government grant funding to undertake this project?

No

1.10 Is the proposed action subject to local government planning approval?

Yes

1.10.1 Is there a local government area and council contact for the proposal?

Yes

1.10.1.0 Council contact officer details

1.10.1.1 Name of relevant council contact officer.

Renae Mather

1.10.1.2 E-mail

renae.mather@joondalup.wa.gov.au

1.10.1.3 Telephone Number

(08) 9400 4480

1.11 Provide an estimated start and estimated end date for the proposed action.

Start date 08/2017

End date 09/2018

1.12 Provide details of the context, planning framework and State and/or Local government requirements.

The University is zoned 'Central City Area' under the Perth Metropolitan Region Scheme (MRS) and is zoned 'Centre' under the City of Joondalup's Town Planning Scheme No. 2. The Site is also within the 'Campus District' under the Joondalup City Centre Development Plan.

1.13 Describe any public consultation that has been, is being or will be undertaken, including with Indigenous stakeholders.

N/A

1.14 Describe any environmental impact assessments that have been or will be carried out under Commonwealth, State or Territory legislation including relevant impacts of the project.

N/A

1.15 Is this action part of a staged development (or a component of a larger project)?

Yes

1.15.1 Provide information about the larger action and details of any interdependency between the stages/components and the larger action.

The development is part of a larger project involving the development of a number of Engineering facilities within this area. A Maritime Engineering Teaching Lab and Petroleum Engineering Research facility will also be constructed to the south of the Site. These additional

developments will occur on already cleared/developed land and are not included in this referral.

1.16 Is the proposed action related to other actions or proposals in the region?

No

Section 2 - Matters of National Environmental Significance

Describe the affected area and the likely impacts of the proposal, emphasising the relevant matters protected by the EPBC Act. Refer to relevant maps as appropriate. The interactive map tool can help determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur in your area of interest. Consideration of likely impacts should include both direct and indirect impacts.

Your assessment of likely impacts should consider whether a bioregional plan is relevant to your proposal. The following resources can assist you in your assessment of likely impacts:

• Profiles of relevant species/communities (where available), that will assist in the identification of whether there is likely to be a significant impact on them if the proposal proceeds;

• Significant Impact Guidelines 1.1 – Matters of National Environmental Significance;

• Significant Impact Guideline 1.2 – Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies.

2.1 Is the proposed action likely to impact on the values of any World Heritage properties?

No

2.2 Is the proposed action likely to impact on the values of any National Heritage places?

No

2.3 Is the proposed action likely to impact on the ecological character of a Ramsar wetland?

No

2.4 Is the proposed action likely to impact on the members of any listed threatened species (except a conservation dependent species) or any threatened ecological community, or their habitat?

Yes

2.4.1 Impact table

Species	Impact
Carnaby's Black Cockatoo (Calyptorhynchus	A Black Cockatoo Habitat Assessment was

Species	Impact
latirostris), Forest Red-tailed Black Cockatoo (Calyptorhynchus banksii naso), Baudin's Black Cockatoo (Calyptorhynchus baudinii).	undertaken on 26 May 2017 to determine the type and extent of habitat suitable for Black Cockatoos within the survey area. During the survey, no Black Cockatoos were heard or observed within or flying over the survey area (360 Environmental, 2017). The survey considered Carnaby's Cockatoo (Calyptorhynchus latirostris), Forest Red-tailed Black Cockatoo (FRTBC [Calyptorhynchus banksii naso]) and Baudin's Black Cockatoo (Calyptorhynchus baudinii) listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Under the Department of the Environment and Energy (DotEE)'s Referral Guidelines for Three Threatened Black Cockatoo Species (DSEWPaC, 2012a), it is recommended a proposal be referred to the DotEE for assessment where there will be clearing or degradation of any part of a vegetation community known to contain a breeding habitat. Black Cockatoos breed in large hollow-bearing trees, generally within woodlands or forests (Johnstone et al. 2013). The size of the tree can be a useful indicator of the hollow-bearing potential of the tree. Trees of suitable Diameter at Breast Height (DBH) are potentially important for maintaining breeding in the long term, through maintaining the integrity of the habitat and allowing trees to provide future nest hollows. Maintaining the long-term supply of trees of a suitable size to provide nest hollows is particularly important in woodland stands that are known to support Black Cockatoo breeding (DSEWPaC, 2012a). The Black Cockatoo Habitat Assessment identified 2 Marri (Corymbia calophylla) trees considered to be potential breeding habitats for Black Cockatoos with a DBH of > 500 mm under the EPBC Act Black Cockatoo referral guidelines. Of the two trees, one had a DBH of 700 mm but did not contain any observable hollows. The second tree had a DBH of 940 mm and contained one observable hollow visible from the ground. The hollow had an entrance of >100 mm diameter, but was located at a height of approximately 5

Species	Impact
	m which is considered too low for Black Cockatoos to breed in. The site is outside, but directly adjacent, to the modelled Breeding Habitat distribution for Carnaby's Cockatoo. The Site also contains two Black Cockatoo foraging species; Marri and Xanthorrhoea preissii. However, as the Site contains less than 0.05 ha of foraging habitat, significantly below the 1 ha threshold, it is unlikely that clearing this area will have a significant impact on Black Cockatoos. The proposed development will require the clearing of the entire 0.05 ha area including the two Black Cockatoo potential breeding trees.

2.4.2 Do you consider this impact to be significant?

No

2.5 Is the proposed action likely to impact on the members of any listed migratory species, or their habitat?

No

2.6 Is the proposed action to be undertaken in a marine environment (outside Commonwealth marine areas)?

No

2.7 Is the proposed action likely to impact on any part of the environment in the Commonwealth land?

No

2.8 Is the proposed action taking place in the Great Barrier Reef Marine Park?

No

2.9 Will there be any impact on a water resource related to coal / gas / mining?

No

2.10 Is the proposed action a nuclear action?

No

2.11 Is the proposed action to be taken by the Commonwealth agency?

No

2.12 Is the proposed action to be undertaken in a Commonwealth Heritage Place Overseas?

No

2.13 Is the proposed action likely to impact on any part of the environment in the Commonwealth marine area?

No

Section 3 - Description of the project area

Provide a description of the project area and the affected area, including information about the following features (where relevant to the project area and/or affected area, and to the extent not otherwise addressed in Section 2).

3.1 Describe the flora and fauna relevant to the project area.

FLORA

Desktop searches of the EPBC Protected Matters Search Tool (PMST), (then) Department of Parks and Wildlife (DPaW) NatureMap and DPaW's Threatened and Priority Flora databases identified 10 conservation significant flora species listed under the EPBC Act as potentially occurring within the vicinity of the Site (DotEE 2017; DPaW 2017b,c). A likelihood assessment was undertaken to determine the species 'Likely', Possible' and 'Unlikely' to occur within the Site. The assessment was carried out through analysis of regional soil characteristics and the nearest record of species from the Site. Of the 10 flora species listed under the EPBC Act, two were considered 'Possible' to occur (King Spider Orchid, *Caladenia huegelii*; and Yanchep Mallee, *Eucalyptus argutifolia)* listed as Critically Endangered and Vulnerable under the EPBC Act respectively. The remaining eight flora species were considered 'Unlikely' to occur within the Site. The likelihood assessment is shown in Table 1 of the attached Supporting Document.

The survey identified that the Site's understorey had been previously cleared and contains weeds, non-endmenic and endemic planted species, incuding Banksia, *Xanthorrhoea preissii* and pine.

FAUNA

Desktop searches of the PMST, NatureMap and DPaW's Threatened and Priority Fauna databases identified conservation significant fauna species potentially occurring within a 5 km radius of the Site (DotEE 2017; DPaW 2017b,d). The likelihood assessment identified 10 fauna species as listed under the EPBC Act as potentially occurring within the vicinity of the Site, of which two are listed as Endangered, three are listed as Vulnerable and five are listed as Marine. The likelihood of each of the fauna species occurring within the Site is shown in Table 3 of the attached Supporting Document. The likelihood assessment identified the Site is likely to offer suitable habitat for:

- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*)

- Baudin's Cockatoo (*Calyptorhynchus baudinii)*

- Carnaby's Cockatoo (*Calyptorhynchus latirostris*)

No Black Cockatoo species were heard calling or observed flying overhead during the survey,

however, Black Cockatoo habitat was identified within the Site (360 Environmental, 2017).

3.2 Describe the hydrology relevant to the project area (including water flows).

The Ramsar Convention on Wetlands (1971) is an intergovernmnetal treaty dedicated to the conservation and use of wetlands listed under the List of Wetlands of International Importance (Ramsar Sites). These sites require management to ensure their ecological values are maintained or improved (CCWA 2005). There are no Ramsar wetlands within the Site. Review of DPaW's Geomorphic Wetlands dataset has identified that there are no geomorphic wetlands within the Site or within the immediate vicinity (DPaW 2017a). The nearest wetland is Lake Joondalup located approxmately 900 m east of the Site (Figure 2).

The Site is located within the Perth and Gwelup Coastal Underground Water Pollution Control Area (UWPCA) and is therefore subject to the provisions of the DoW's Water Quality Protection Note No. 25 *Land use compatabilty tables for public drinking water source areas* (Figure 3) (DoW 2016). The Site is wholly within a Priority 3 area under the Perth and Gwelup UWPCA. Priority 3 (P3) areas are defined and managed to maintain the quality of the drinking water source for as long as possible with the objective of risk management. P3 areas occur within Public Drinking Water Source Areas (PDWSAs) where the land is zoned 'Urban' for commercial or light industry uses (DoW 2016).

Depth to groundwater across the Site ranges between 27.5 m to 28.8 m below ground surface level (mbgl) from west to east. Groundwater flows from west to east (Figure 3) (DoW 2017).

3.3 Describe the soil and vegetation characteristics relevant to the project area.

SOIL CHARACTERISTICS

The (then) Department of Agriculture and Food Western Australia (DAFWA) Land System mapping indicates that the Site is within the **Spearwood System:** Sand dunes and plains, yellow deep sands, pale deep sands and yellow/brown shallow sands (DAFWA 2012).

Soil subsystem mapping has identified the Site is within one soil subsystem (Figure 4) (DAFWA 2006):

- Karrakatta Sand Yellow Phase - Low hilly to gently undulating terrain. Yellow sand over liestone at 1- 2 m. *Banksia spp*. woodland with scattered emergent *Eucalyptus gomphocephala, E. marginata* and a dense shrub layer.

Acid Sulfate Soils (ASS) risk mapping by the (then) Department of Environmental Regulation (DER) identified that there is no mapped risk of ASS across the Site (Figure 5) (DER 2014).

A search of the DER's Contaminated Sites Database did not identify any contaminated sites present within the Site (DER 2017). However, a Registered contaminated site is located at Lot 1001 Winton Rd, Joondalup situated approximately 700 m to the north west of the Site. This

contaminated site is classified as 'Contaminated - Remediation Required' and the nature and extent of contamination is described as 'hydrocarbon (such as from diesel) contaminated groundwater is present beneath the site as a plume in groundwater which extends in a westerly direction from the site' (DER 2017).

VEGETATION CHARACTERISTICS

The Site is located within the Swan Coastal Plain bioregion of the Interim Biogeographic Regionalisation of Australia (IBRA) (DSEWPaC 2012b). The Swan Coastal Plain sub-region 2 (SWA02) is a low lying coastal plain composed of colluvial and Aeolian sands, alluvial river flats and coastal limestone rising to duricrusted Mesozoic sediments in the east. Outwash plains are extensively only in the south, while complex series of seasonal wetlands and swamps extends from north to south. Vegetation comprises of heath and/or Tuart woodlands on limestone, Banksia and Jarrah-Banksia woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvial soils, *Casuarina obesa* on out-wash plains and paperbark (*Melaleuca spp*.) in wetland areas (Mitchell et al. 2002).

Vegetation mapping within the Perth region of Western Australia was completed on a broad scale (1:250,000) by Beard (1981). These vegetation units were then reassesed by Shepherd et al. (2001) to account for clearing in the intensive land use zone, dividing some large vegetation units into smaller units. There is one Beard/Shepherd vegetation unit for the Site (Figure 6). The vegetation type, its representation within the State, IBRA region and Local Government area are described below (Government of Western Australia, 2016):

- Spearwood 998: Medium woodland; tuart.

Representation of Spearwood 998 Statewide: 36.31% of pre-European extent remaining

Representation of Spearwood 998 in IBRA Region (Swan Coastal Plain): 36.41% of pre-European extent remaining

Representation of Spearwood 998 in IBRA Sub-region (Swan Coastal Plain 2): 36.41% of pre-European extent remaining

Representation of Spearwood 998 in Local Government area (City of Joondalup): 9.58% of pre-European extent remaining

Mapping by Heddle et al. (1980) is based on the relationship to the landform-soil units determined by Churchward and McArthur (1980). This mapping identified one vegetation complex occurring within the Site (Figure 6):

- Cottesloe Complex - Central and South: Mosaic of woodland of Eucalyptus gomphocephala, E. marginata, E. calophylla; closed heath on limestone outcrops.

3.4 Describe any outstanding natural features and/or any other important or unique values relevant to the project area.

The Site does not contain any outstanding natural features or any other important or unique values relevant to the project area.

3.5 Describe the status of native vegetation relevant to the project area.

The Site is a standalone area of approximately 0.05 ha in size, fragmented from other vegetated areas of the campus.

As evident from historical aerial imagery (Figures 7a-f), the Site has remained vegetated as developments and clearing has been undertaken in the surrounding area. The Black Cockatoo survey identified that most of the understorey had been cleared within this area and contained non-endemic species, weeds and *Xanthorrhoea preissii.* Appoximately 22 Marri trees were identified within the Site (360 Environmental, 2017).

3.6 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.

The topography of the Site can be described as relatively flat varying in elevation between 33 m and 35 m Australian Height Datum (AHD). The Site increases in elevation towards the eastern portion of the Site (Figure 8).

3.7 Describe the current condition of the environment relevant to the project area.

Review of historical aerial imagery between 1965 and 2017 indicates that the Site's remnant native vegetation has remained relatively intact despite clearing of surrounding areas prior to 1974 to 2017 (Figure 7a-f).

A desktop search of the EPBC Protected Matters Search Tool identifed a total of 15 weed species as potentially occurring within a 2 km radius of the Site (DotEE 2017). Of the 15 weed species potentially occurring, seven species are Declared under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) and 11 are listed under the Commonwealth's Weeds of National Significance (WONS). A list of these weed species are produced in Table 2 of the attached Supporting Document.

During the Black Cockatoo Habitat Assessment, it was recorded that the understorey of the Site had been mostly cleared of native vegetation and currently contains non-endemic species, weeds and *Xanthorrhoea preissii.*

3.8 Describe any Commonwealth Heritage Places or other places recognised as having heritage values relevant to the project area.

A search of the (then) State Heritage Office (SHO)'s inHerit database has identified that no culturally significant sites exist within or nearby the Site. There are no World, National or

Commonwealth Heritage Places or Properties within the Site's boundary or within the vicinity of the Site (SHO 2017). The nearest heritage Site is Lake Joondalup Reserve Yallagonga Regional Park (ID: 9486), located approximately 900 m to the east of the Site (DotEE 2017) (Figure 9). The proposed development is not likely to impact on any heritage places.

3.9 Describe any Indigenous heritage values relevant to the project area.

A search of the (then) Department of Aboriginal Affairs (DAA) Aboriginal Heritage Inquiry System did not identify any Registered or Lodged Aboriginal Sites within the Site extent. Two Registered Aboriginal Heritage Sites are located within 1 km radius of the Site(Figure 9) (DAA 2017):

Bonorin Hill (ID: 3533): Registered, Historical, Man-made Structure, located 710 m south west of the Site

Lake Joondalup (ID: 3740): Registered, Mythological/Camp/Hunting Place, located 936 m to the east of the Site

3.10 Describe the tenure of the action area (e.g. freehold, leasehold) relevant to the project area.

The Site is within two lot boundaries:

Lot 504 on Plan 24208 - Freehold

Lot 14593 on Plan 32963 - Crown Reserve, held by Edith Cowan University under a Management Order.

3.11 Describe any existing or any proposed uses relevant to the project area.

The Site is currently unused and contains remnant native vegetation and plantings with most of the understorey previously cleared. The surrounding area contains educational facilities including buildings, a playing oval, paths and landscaped and grassed areas. An area directly south of the Site is cleared and vacant, which will become part of the proposed project of developoing engineering education facilities. The vegetation within the immediate surrounds are fragmented and contain native remnant vegetation as well as planted endemic and non-endemic vegetation. The proposed use of the Site is to become an engineering annexe as part of the larger development project in the immediate area.

Section 4 - Measures to avoid or reduce impacts

Provide a description of measures that will be implemented to avoid, reduce, manage or offset any relevant impacts of the action. Include, if appropriate, any relevant reports or technical advice relating to the feasibility and effectiveness of the proposed measures.

Examples of relevant measures to avoid or reduce impacts may include the timing of works, avoidance of important habitat, specific design measures, or adoption of specific work practices.

4.1 Describe the measures you will undertake to avoid or reduce impact from your proposed action.

The proposed development has been designed to facilitate the expansion and upgrades of the University's engineering educational facilities. The following management measures will be implemented to avoid or reduce impacts:

- Where possible, the clearing will not take place during the typical breeding season for the Black Cockatoo (July to mid-December) to avoid disturbance of species during peak breeding season. If clearing is to occur during the typical breeding season of the Black Cockatoo, a pre-clearing inspection of trees to be cleared will be undertaken to ensure there are no breeding activities present in the trees. If breeding activities are identified in either of the trees proposed to be cleared, appropriate fauna management measured will be implemented by a qualifiied Zoologist;

- All contractors involgved in clearing activities will be inducted on the potential impacts to fauna and advised to stop works in the vicinity of injured or shocked animals that are encountered. They will be instructed to contact the relevant environmental staff in this event;

4.2 For matters protected by the EPBC Act that may be affected by the proposed action, describe the proposed environmental outcomes to be achieved.

Black Cockatoos:

Two potential Black Cockatoo breeding trees are proposed to be cleared (Figure 10). These two Marri trees are considered to be potential Breeding Habitat as they have a DBH greater than 500 mm. One of the trees contains one observable hollow with an entrance diameter of > 100 mm located at a height of approximately 5 m. The hollow is considered to be too low for use by Black Cockatoos for breeding. The clearing of two Black Cockatoo potential breeding trees is not considered to be a significant impact to the environment (360 Environmental, 2017).

Section 5 – Conclusion on the likelihood of significant impacts

A checkbox tick identifies each of the matters of National Environmental Significance you identified in section 2 of this application as likely to be a significant impact.

Review the matters you have identified below. If a matter ticked below has been incorrectly identified you will need to return to Section 2 to edit.

5.1.1 World Heritage Properties

No

5.1.2 National Heritage Places

No

5.1.3 Wetlands of International Importance (declared Ramsar Wetlands)

No

5.1.4 Listed threatened species or any threatened ecological community

No

5.1.5 Listed migratory species

No

5.1.6 Commonwealth marine environment

No

5.1.7 Protection of the environment from actions involving Commonwealth land

No

5.1.8 Great Barrier Reef Marine Park

No

5.1.9 A water resource, in relation to coal/gas/mining

No

5.1.10 Protection of the environment from nuclear actions

No

5.1.11 Protection of the environment from Commonwealth actions

No

5.1.12 Commonwealth Heritage places overseas

No

5.2 If no significant matters are identified, provide the key reasons why you think the proposed action is not likely to have a significant impact on a matter protected under the EPBC Act and therefore not a controlled action.

The key reasons why the proposal is not likely to have significant impacts on a matter protected under the EPBC Act is outlined in the following sections.

Lead to a long term decrease in the size of a population

The Site contains two potential breeding trees (Marri) with a DBH > 500 mm and contains 0.05 ha of foraging habitat for Black Cockatoos. During the survey, a small quanitity of old foraging evidence was recorded. This foraging evidence was in the form of one chewed pine cone that was considered likely to have been dropped from outside the Site.

In addition to the two potential breeding trees, the site contains 0.05 ha of Black Cockatoo foraging habitat, consisting of 20 Marri trees with a DBH of less than 500 mm and *Xanthorrhoea preissii* species (360 Environmental, 2017). Although the site contains foraging habitat suitable for the Black Cockatoo, it is considerably less than the threshold of '1 ha of quality foraging habitat' as under the EPBC Act Referral guidelines for three threatened black cockatoo species (DSEWPaC 2012a). As this foraging habitat area is below the threshold, it is not considered within this referral and only the two potential breeding trees are considered.

One of the two potential breeding trees contains one observable hollow located at a height of 5 m with an entrance diameter of > 100 mm. This hollow is considered too low to be utilised by the Black Cockatoos for breeding (360 Environmental, 2017).

The proposed development will result in the clearing of two potential breeding trees, which is not considered significant as they are not currently utilised by the species and no Black Cockatoos were heard or sighted during the survey (360 Environmental, 2017). Mapping shows that there are six Bush Forever Sites and Regional Reserves within a 4 km radius of the Site (DPaW 2014a; DPaW 2016; DoP 2014) to have surveyed or inferred floristic community types that are the same or similar to the breeding or foraging habitat for the Black Cockatoo, these areas would provide more suitable habitat for the species than the Site (Figure 11) (Government of Western Australia, 2000):

Bush Forever Site 299 / Lake Joondalup Nature Reserve

Surveyed

380.9 ha

25 Southern Euclayptus gomphocephala – Agonis flexuosa woodlands

28 Spearwood Banksia attenuata or B. attenuata – Eucalyptus woodlands

>75% very good to excellent condition

Bush Forever Site 407

Surveyed

35.6 ha

28 Spearwood Banksia attenuata or B. attenuata – Eucalyptus woodlands

>80% Very Good condition

Bush Forever Site 303

Surveyed

215.1 ha

24 Northern Spearwood shrublands and woodlands

26b Woodlands and Mallee on limestone

28 Spearwood Banksia attenuata or B. attenuata – Eucalyptus woodlands

29a Coastal shrublands on shallow sands

>70% Excellent to Very Good condition

Bush Forever Site 325

Surveyed/*Inferred

195.3 ha

27 Species-poor Mallees and shrublands on limestone

29a Coastal shrublands on shallow sands

*29b Acacia shrublands on taller dunes

*S11 Northern Acacia rostellifera – Melaleuca acerosa shrublands

*S13 Northern Olearia axillaris – Scaevola crassifolia shrublands

*S14 Spinifex longifolius grasslands and low shrublands

Bush Forever Site 469

Inferred

10.6 ha

28 Spearwood Banksia attenuata or B. attenuata – Eucalyptus woodlands

>60% Excellent to Very Good condition

Bush Forever Site 164

Surveyed

27.2 ha

28 Spearwood Banksia attenuata or B. attenuata – Eucalyptus woodlands

>60% Excellent to Good condition.

These Bush Forever sites range between 10 ha and 380 ha in size and they are in mostly Excellent to Good condition, this suggests that these conservation areas may provide more suitable Black Cockatoo habitat than the subject Site (Government of Western Australia, 2000). A number of the Bush Forever sites are also Reserves including Neerabup National Park, Woodvale Nature Reserve, Lake Joondalup Nature Reserve and Yellagonga National Park. These Reserves are vested with one or more of the following; Conservation Commission of WA, Local Government or the Department of Biodiversity, Conservation and Attractions (DBCA) (DPaW 2014a; DPaW 2016; DoP 2014). These vested reserves ensure the long term protection and conservation of bushland.

The proposal to clear two potential Black Cockatoo breeding trees will not result in significant population impacts to the Black Cockatoo. This is mainly due to the lack of sighted or heard Black Cockatoos during the survey and the unsuitability of the one observable hollow considered too low to be utilised by the species for breeding. In addition, breeding of Carnaby's Cockatoo is generally restricted to Eucalypt woodlands in the Wheatbelt (Johnstone et al. 2011). This suggests the habitat may not be the primary use for breeding and may be utilised occasionally by the Black Cockatoo for foraging.

The Site also contains foraging habitat of approximately 20 Marri trees with a DBH of less than 500 mm and *Xanthorrhoea preissi*, however, this is not considered to be significant as it considerably less than 1 ha of good quality foraging habitat (360 Environmental, 2017) (DSEWPaC 2012a).

Potential impacts on the Black Cockatoo from the proposed development are considered to be negligible, the Site only contained two potential breeding trees, one of which contained a hollow considered too low to be utilised by the species and no Black Cockatoos were heard or observed during the survey. The old evidence of foraging was likely to be dropped in the Site and the lack of recent foraging evidence suggests that the Site is not a primary foraging or breeding habitat (360 Environmental, 2017).

Reduce the area of occupancy of the species

It is unlikely that the proposal will reduce the occupancy of the Black Cockatoo species. Majority of nearby Bush Forever sites and conservation Reserves contain inferred or surveyed vegetation structures considered to be breeding or foraging habitat for the Black Cockatoo, as previously mentioned. It is possible that these surrounding Bush Forever sites and Reserves would provide a larger area of occupancy of the Black Cockatoos. In addition, these areas are managed in conservation programs to ensure the long term protection of the area's environmental values.

The Site is approximately 0.05 ha in size and the nearest Reserve (Yellagonga Regional Park) is located 508 m to the east of the Site with an area of 380.9 ha. It is unlikely that the proposed action will reduce the area of occupancy of the Black Cockatoo as nearby bushland may contain suitable habitat in a larger, non-fragmented area for the Black Cockatoo to utilise.

Fragment an existing population into two or more populations

The proposed clearing within the project will not result in the fragmentation of an existing population into two or more populations. This is due to the Site and surrounding landscape as heavily urbanised and containing little remnant native vegetation. The extent of clearing (being 0.05 ha) of the Site is not considered to be significant to the maintainence of Black Cockatoo species.

The EPBC Act Referral guidelines for the black cockatoos state that creating a gap of greater than 4 km between patches of Black Cockatoo habitat is at a high risk of causing significant impact (DSEWPaC 2012a). Clearing of the Site will not create a gap of more than 4 km between patches of Black Cockatoo Habitat as there are numerous Bush Forever sites and reserves

within a 4 km radius of the Site that may contain more suitable and larger areas of breeding or foraging habitat. The lack of recent evidence of foraging and the unsuitability of a hollow in a potential breeding tree indicates that the site is not currently utilised by the Black Cockatoo and the proposed action is unlikely to fragment a population into two.

Adversely affect the habitat critical to the survival of a species

The seasonal movements of Black Cockatoos mean they require large areas of habitat for breeding, roosting and foraging, as well as connectivity between habitats to assist their movement through the landscape (DSEWPaC 2012a). Based on the EPBC Act Referral Guidelines for three threatened Black Cockatoo species, critical habitat for the Black Cockatoos is defined as providing breeding, roosting and foraging habitat which also provides connectivity between the habitats. Habitat that accommodates all three Black Cockatoo species would be defined as most critical (DSEWPaC 2012a). It is not considered that the proposed clearing will adversely affect the habitat critical to the survival of Black Cockatoos as only two potential breeding trees are present within the Site with one containing a hollow considered unsuitable for breeding by the Black Cockatoo (360 Environmental, 2017). It is unlikely that the Site is used for breeding by the Black Cockatoos. Surrounding Bush Forever, DBCA Managed Lands and Regional Park areas within a 4 km radius of the Site are likely to contain more suitable breeding and foraging habitat. In addition, several of these conservation areas are managed by agencies such as DPaW and Local Governments to preserve and enhance the associated conservation values with long term protection. Therefore, it is unlikely that the proposed clearing will adversely impact the survival of the Black Cockatoos.

Disrupt the breeding cycle of a population

Traditionally, Carnaby's Black Cockatoo breed in the Wheatbelt region of Western Australia (Saunders 1982) and it is therefore less likely for Carnaby's Black Cockatoo to breed in large numbers within the site. The Site is also outside but adjacent to the modelled Breeding Habitat for Carnaby's Cockatoo. However, due to the presence of only two potential breeding trees and one containing a hollow considered unsuitable for Black Cockatoo breeding, it is unlikely that the Site is used for breeding. A number of Bush Forever and Regional Reserves within a 4 km radius of the Site are likely to provide more suitable breeding habitat in a better condition over a considerably larger area than the Site.

Therefore, it is not likely that the proposed action will disrupt the breeding cycle of a Black Cockatoo population.

Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Within a 4 km radius of the project area, there are other patches of remnant vegetation within several Bush Forever sites and managed areas that may contain more suitable and connected habitat for the Black Cockatoos. Most of these sites are within DBCA managed lands which ensures long term conservation.The clearing of two potential breeding trees, that are currently unsuitable for Black Cockatoo breeding and the clearing of 0.05 ha of foraging habitat is not considered to modify, destroy, remove, isolate or decrease the availability or quantity of habitat

to the extent that the species is likely to decline. The surrounding environment within a 4 km radius of the Site contains several Bush Forever sites, DBCA Managed Lands and Yellagonga Regional Park areas that contain suitable foraging and possible breeding habitats with considerably larger areas than the Site (Government of Western Australia, 2000). These areas are linked through several ecological corridors which do not overlap with the subject Site, ensuring the connection between these landscapes for conservation significant fauna species (PBP 2008).

In addition, the Site is already within a highly fragmented and urbanised landscape containing very minimal remnant native vegetation. In addition, the lack of current breeding hollows/trees or recent evidence of foraging suggests that the Site is not a primary breeding or foraging habitat for the Black Cockatoo.

The removal of two potential breeding trees is therefore not likely to cause a decline of the species within the region.

Result in invasive species that are harmful to a Critically Endangered or Endangered species becoming established in the Endangered or Critically Endangered Species' habitat

The proposed action alone is unlikely to introduce or spread invasive species that are harmful to Black Cockatoos. The Site is already in a heavily urbanised landscape and as such, clearing of the entire Site is unlikely to introduce or spread invasive species. The clearing of the Site may ameliorate any weed species.

Introduce disease that may cause the species to decline

The proposed action to clear and develop an Engineering Building is unlikely to introduce disease that may cause the Black Cockatoo to decline.

The Site is a stand alone area within a highly urbanised landscape, it is unlikely that the proposed action will introduce disease that may cause the Black Cockatoo to decline. The only possible disease and parasite vector associated with the Site would be the attraction of cats and foxes which are known to favour 'edge' effects created from fragmented habitats. The proposed development is unlikely to be an ideal habitat for foxes or cats due to the presence of humans and traffic within the Site and surrounding urban areas. As the entire Site will be cleared, it is not likely that an introduction of feral species would impact upon the Black Cockatoos. Clearing of the land and construction can result in the spread of dieback, however, there is minimal native vegetation remaining within the vicinity of the Site.

Therefore, the proposed clearing of the Site is unlikely to introduce disease that may cause the ecological community to decline.

Interfere with the recovery of the species

The proposed action is unlikely to interfere with the recovery of the Black Cockatoo species. Although one of the two potential breeding trees contain a hollow, it is considered to be at a

height too low to be utilised by the Black Cockatoo species. In addition, the lack of recent foraging evidence by the species using the Site and no Black Cockatoos were heard or observed flying overhead during the survey, suggests that the Site is not a primary habitat for the Black Cockatoos. The two potential breeding trees are not considered to be significant in the recovery of the species.

Section 6 – Environmental record of the person proposing to take the action

Provide details of any proceedings under Commonwealth, State or Territory law against the person proposing to take the action that pertain to the protection of the environment or the conservation and sustainable use of natural resources.

6.1 Does the person taking the action have a satisfactory record of responsible environmental management? Please explain in further detail.

All projects undertaken have received full statutory approvals to the satisfaction of the relevant environmental agencies.

6.2 Provide details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against either (a) the person proposing to take the action or, (b) if a permit has been applied for in relation to the action – the person making the application.

Not applicable.

6.3 Will the action be taken in accordance with the corporation's environmental policy and planning framework?

No

6.4 Has the person taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?

No

Section 7 – Information sources

You are required to provide the references used in preparing the referral including the reliability of the source.

7.1 List references used in preparing the referral (please provide the reference source reliability and any uncertainties of source).

Reference Source	Reliability	Uncertainties
Beard, J.S. 1981. Vegetation Survey of Western Australia. Swan 1:1,100,000 Vegetation Series. Explanatory Notes to Sheet 7. Vegetation of the Swan Area. University of Western Australia Press, Perth.	Peer reviewed article.	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Department of Aboriginal Affairs (DAA), 2017. Aboriginal Heritage Inquiry System. Accessed from http://maps.dia.wa.gov.au/AHIS2/, Government of Western Australia.	Government website/data.	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Department of Agriculture and Food WA (DAFWA), 2006. Soil Subsystems GIS Dataset, Government of Western Australia.	Government website/data.	None. All references are peer reviewed articles in reputable papers or are Government publications or data.
Department of the Environment and Energy (DotEE), 2017. Protected Matters Search Tool. Accessed from http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf. Commonwealth of Australia.	Government website/data.	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Department of Environment Regulation (DER), 2014. Acid Sulfate Soils Risk GIS Dataset, Government of Western Australia.	Government website/data.	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Department of Parks and Wildlife (DPaW), 2017a. Geomorphic Wetlands, GIS Database, Government of Western Australia.	Government website/data	None. All references are peer reviewed papers in reputable journals or are Government publications or data.

Reference Source	Reliability	Uncertainties
Department of Parks and Wildlife (DPaW), 2017b. NatureMap Tool Search Report, Government of Western Australia.	Government website/data	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Department of Sustainability, Environment, Water, Populations and Communities (DSEWPaC), 2012a. EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species, Government of Western Australia.	Government Publication.	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Heddle, E.M., Loneragan, O.W. and Havel, J.J., 1980. Vegetation of the Darling System, Department of Environment and Conservation (south of Moore River), Department of Environment and Conservation.	Peer Reviewed Article/Government Publication	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Johnstone, R. E., Kirkby, T., and Sarti, K., 2013. The breeding biology of the Forest Red-tailed Black Cockatoo Calyptorhynchus banksii naso Gould in south-western Australia. I. Characteristics of nest trees and nest hollows. Pacific Conservation Biology 19, 121-142.	Peer Reviewed Article	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Johnstone, R. E, & Kirkby, T. (2011). Carnaby's Black Cockatoo (Calyptorhynchus latirostris), Baudin's Black Cockatoo (Calyptorhynchus baudinii) and the Forest Redtailed Black Cockatoo (Calyptorhynchus banksii naso) on the Swan Coastal Plain (Lancelin–Dunsborough), Western Australia. Studies on distribution, status, breeding, food, movements and historical changes. Perth: Department of Planning.	Peer Reviewed Article/Government Publication	None. All references are peer reviewed papers in reputable journals or are Government publications or data.

Reference Source	Reliability	Uncertainties
Department of Parks and Wildlife (DPaW), 2017c. Threatened and Priority Flora database, requested 19 June 2017. Government of Western Australia.	Government website/data	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Perth Biodiversity Project (PBP) 2008. Perth Regional Ecological Linkages, GIS Dataset, Western Australia	Peer Reviewed Article/Government Publication	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Shepherd, D. P., Beeston, G. R., and Hopkins, A. J. M. 2001. Native Vegetation in Western Australia (Technical Report 249). Perth: Department of Agriculture.	Peer Reviewed Article/Government Publication	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
State Heritage Office (SHO), 2017, Heritage Places Search, accessed 1 March 2017 from ht tp://inherit.stateheritage.wa.gov .au/public, Government of Western Australia.	Government website/data	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
360 Environmental , 2017. Black Cockatoo Habitat Assessment. Prepared for NS Projects. West Leederville, Western Australia.	Environmental survey undertaken using the current guideline specifications.	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Department of Parks and Wildlife (DPaW) 2014a, Regional Parks Mapping, GIS Dataset. Government of Western Australia.	Government website/data	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Department of Planning (DoP) 2014. Bush Forever Sites, GIS Dataset. Government of Western Australia.	Government website/data	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Government of Western Australia, 2016. 2016 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of May 2016. WA Department of Parks and Wildlife, Perth.	Government Publication	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Mitchell, D., Williams, K., Desmond, A. 2002. Swan	Peer reviewed article/Government Publication	None. All references are peer reviewed papers in reputable

Reference Source	Reliability	Uncertainties
Coastal Plain 2 (SWA2 – Swan Coastal Plain subregion) in A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002. Department of Parks and Wildlife (DPaW), Government of Western Australia.		journals or are Government publications or data.
Saunders, D.A. 1982. The breeding behaviours and biology of the short-billed form of the White-tailed Black Cockatoo Calyptorhynchus funereus latirostris Carnaby. Ibis. 124:422-55.	Peer reviewed article	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Department of Parks and Wildlife (DPaW), 2014b. Regional Parks. GIS dataset. Government of Western Australia.	Government data	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Department of Parks and Wildlife (DPaW), 2016. DPaW Managed Lands. GIS Dataset. Government of Western Australia.	Government data	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Government of Western Australia, 2000. Bush Forever Volume 2 – Directory of Bush Forever Sites. Department of Environment Protection. Perth, Western Australia.	Government Publication	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Department of Parks and Wildlife (DPaW), 2017d. Threatened and Priority Fauna database. Requested 19 June 2017. Government of Western Australia.	Government data	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Ramsar, Iran, 1971. A Guide to the Convention on Wetlands. 6th edition Ramsar Convention Secretariat.	Convention	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Department of Water (DoW), 2017. Perth Groundwater Map. Accessed 19 June 2017 from ht tps://maps.water.wa.gov.au/#/w ebmap/gwm. Government of	Government website/data	None. All references are peer reviewed papers in reputable journals or are Government publications or data.

Reference Source	Reliability	Uncertainties
Western Australia.		
Department of Water (DoW), 2016. Water Quality Note No. 25. Land use compatibility tables for public drinking water source areas. Government of Western Australia	Government Publication	None. All references are peer reviewed papers in reputable journals or are Government publications or data..
Department of Food and Agriculture WA (DAFWA), 2012. Land System Mapping. GIS Dataset. Government of Western Australia.	Government data	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Department of Environment Regulation (DER), 2017. Contaminated Sites Database. Accessed 20 June 2017 from ht tps://secure.dec.wa.gov.au/idel ve/css/. Government of Western Australia.	Government website/data	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC), 2012b. IBRA7 Subregions. GIS dataset. Commonwealth of Australia.	Government data	None. All references are peer reviewed papers in reputable journals or are Government publications or data.
Saunders, D. A., 1982. The breeding behaviour and biologyof the short-billed form of the White-tailed BlackCockatoo Calyptorhynchus funereus latirostris Carnaby. Ibis124: 422–55.	Peer reviewed article	None. All references are peer reviewed articles in reputable papers or are Government publications or data.

Section 8 – Proposed alternatives

You are required to complete this section if you have any feasible alternatives to taking the proposed action (including not taking the action) that were considered but not proposed.

8.0 Provide a description of the feasible alternative?

N/A

8.1 Select the relevant alternatives related to your proposed action.

8.27 Do you have another alternative?

No

Section 9 – Contacts, signatures and declarations

Where applicable, you must provide the contact details of each of the following entities: Person Proposing the Action; Proposed Designated Proponent and; Person Preparing the Referral. You will also be required to provide signed declarations from each of the identified entities.

9.0 Is the person proposing to take the action an Organisation or an Individual?

Organisation

9.2 Organisation

9.2.1 Job Title

Project Manager

9.2.2 First Name

Avril

9.2.3 Last Name

O'Leary

9.2.4 E-mail

a.oleary@ecu.edu.au

9.2.5 Postal Address

270 Joondalup Drive
Joondalup WA 6027
Australia

9.2.6 ABN/ACN

ABN

54361485361 - EDITH COWAN UNIVERSITY

9.2.7 Organisation Telephone

(08) 6304 2031

9.2.8 Organisation E-mail

a.oleary@ecu.edu.au

9.2.9 I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:

Not applicable

Small Business Declaration

I have read the Department of the Environment and Energy's guidance in the online form concerning the definition of a small a business entity and confirm that I qualify for a small business exemption.

Signature:..... Date: .....01/08/17.....

9.2.9.2 I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations

No

9.2.9.3 Under sub regulation 5.21A(5), you must include information about the applicant (if not you) the grounds on which the waiver is sought and the reasons why it should be made

Person proposing the action - Declaration

I, Avril O'Leary, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.

Signature:..... Date: 01/08/2017

I, Avril O'Leary, the person proposing the action, consent to the designation of Jeff Gidman as the proponent of the purposes of the action describe in this EPBC Act Referral.

Signature:..... Date: 01/08/2017

9.3 Is the Proposed Designated Proponent an Organisation or Individual?

Organisation

9.5 Organisation

9.5.1 Job Title

Senior Project Manager

9.5.2 First Name

Jeff

9.5.3 Last Name

Gidman

9.5.4 E-mail

j.gidman@nspm.com.au

9.5.5 Postal Address

437 Roberts Road
Subiaco WA 6008
Australia

9.5.6 ABN/ACN

ABN

21105375184 - NS PROJECTS PTY LTD

9.5.7 Organisation Telephone

(08) 6363 0800

9.5.8 Organisation E-mail

nspm@nspm.com.au

Proposed designated proponent - Declaration

I, Jeff Gidman, the proposed designated proponent, consent to the designation of myself as the proponent for the purposes of the action described in this EPBC Act Referral.

Signature:..... Date: 01/08/2017

9.6 Is the Referring Party an Organisation or Individual?

Organisation

9.8 Organisation

9.8.1 Job Title

Principal Environmental Scientist

9.8.2 First Name

Kathy

9.8.3 Last Name

Choo

9.8.4 E-mail

kathychoo@360environmental.com.au

9.8.5 Postal Address

PO Box 14
West Perth WA 6872
Australia

9.8.6 ABN/ACN

ABN

50109499041 - 360 Environmental Pty Ltd

9.8.7 Organisation Telephone

(08) 9388 8360

9.8.8 Organisation E-mail

admin@360environmental.com.au

Referring Party - Declaration

I, KATHERINE CHOO, I declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence.

Signature:..... Date: 25/07/17

Appendix A - Attachments

The following attachments have been supplied with this EPBC Act Referral:

1. 2262_ecu_black_cockatoo_habitat_assessment_report_final_reduced.pdf
2. 2300_epbc_figure_1_site_location.pdf
3. 2300_epbc_figure_2_wetlands.pdf
4. 2300_epbc_figure_3_hydrology.pdf
5. 2300_epbc_figure_4_soil_subsystems.pdf
6. 2300_epbc_figure_5_ass_risk.pdf
7. 2300_epbc_figure_6_vegetation_complexes.pdf
8. 2300_epbc_figure_7a_historic_aerials_1965.pdf
9. 2300_epbc_figure_7b_historic_aerials_1974.pdf
10. 2300_epbc_figure_7c_historic_aerials_1985.pdf
11. 2300_epbc_figure_7d_historic_aerials_1995.pdf
12. 2300_epbc_figure_7e_historic_aerials_2006.pdf
13. 2300_epbc_figure_7f_historic_aerials_2017.pdf
14. 2300_epbc_figure_8_topography.pdf
15. 2300_epbc_figure_9_conservation_areas_and_heritage.pdf
16. 2300_epbc_figure_10_black_cockatoo_habitat.pdf
17. 2300_epbc_figure_11_surrounding_conservation_areas_4km_radius.pdf
18. ecu_referral_supporting_document_final_reduced.pdf
19. site_boundary.zip