Australian Government
Department of the Environment

Referral of Proposed Action: Urban Development of Lots 9049 and 9063 - *The Glades*, Byford

Referral documentation prepared by Emerge Associates on behalf of LWP Byford Syndicate Pty Ltd

emerge ASSOCIATES
Integrated Science & Design

Referral of proposed action

Project title: Urban Development of Lots 9049 and 9063 - *The Glades*, Byford

1 Summary of proposed action

1.1 **Short description**

LWP Byford Syndicate Pty Ltd (the Proponent) proposes to develop Lots 9049 and 9063 adjacent to Warrington Road, Byford, Western Australia for urban uses (the Proposed Action).

1.2 **Latitude and longitude**

The Proposed Action incorporates an area of 3.74 hectares (ha), with a central coordinate of **32° 13' 35.347" S**, **115° 59' 42.391" E** (Geocentric Datum of Australia 1994). **Attachment A** contains the digital spatial information relating to the location of the Proposed Action and recent aerial photography of the area.

1.3 **Locality and property description**

The area subject to this referral and herein referred to as 'the site' incorporates Lots 9049 and 9063, located on the western side of Warrington Road, near the intersection of Mead Street in the locality of Byford, Western Australia. The cadastral details of the landholdings incorporating the site are outlined in **Section 1.6**.

The site is located approximately 32 kilometres (km) south-east of the Perth Central Business District and approximately 1.2 km south-west of the Byford town centre. The site is approximately 3.74 hectares (ha) in area and is bound by freehold land to the north, Warrington Road to the east, rural-residential landholdings to the south and existing residential dwellings and areas of Public Open Space (POS) to the west. The location of the site is shown in **Figure 1**.

The site is not currently used for any specific purpose and is characterised by scattered vegetation cover, a constructed drain in the north and an ephemeral creek abutting the south-western boundary. Vegetation within the site represents a 'Parkland Cleared' community structure in 'Completely Degraded' condition, and is dominated by endemic, non-endemic and exotic overstorey tree species, with no intact native midstorey or understorey. The majority of the non-endemic and exotic trees identified within the site were historically planted in windrow formations between 1980 and 1990 to support historical rural-residential land uses. The Proponent has recently undertaken revegetation works along the ephemeral creek.

The site is zoned "Urban" under the Metropolitan Region Scheme (MRS) and "Urban Development" under the Shire of Serpentine-Jarrahdale (SSJ) Town Planning Scheme (TPS) No. 2.

1.4	**Size of the development footprint or work area (hectares)**	3.74 ha
1.5	**Street address of the site**	The two landholdings incorporating the site do not have assigned street addresses. The informal address of the site can be described as: Lots 9049 and 9063 Warrington Road Byford 6122 Western Australia

1.6 **Lot description**

The cadastral details of the two landholdings incorporating the site are shown in **Figure 2** and are as follows:

- Lot 9049 on Plan 401761 (Volume 2840 Folio 734)
- Lot 9063 on Plan 404513 (Volume 2879 Folio 591)

Both landholdings are held in freehold by the Proponent.

1.7 **Local Government Area and Council contact (if known)**

The Proposed Action is located within the Shire of Serpentine Jarrahdale.

Leonard Long (Acting Planning Manager)
Phone: (08) 9526 1111

1.8 **Time frame**

The site is appropriately zoned for urban development under the MRS and TPS No. 2. An approved and endorsed Local Structure Plan (LSP) incorporates the site and provides the statutory planning basis for the proposed urban development. A subdivision application will be lodged with the WAPC in late 2015 or early 2016.

Development works associated with the Proposed Action will commence following the attainment of subdivision approval and other required planning approvals. It is anticipated that construction works will be completed by mid-2016.

1.9	**Alternatives to proposed action**	**X**	No
			Yes, you must also complete section 2.2
1.10	**Alternative time frames etc**	**X**	No
			Yes, you must also complete Section 2.3. For each alternative, location, time frame, or activity identified, you must also complete details in Sections 1.2-1.9, 2.4-2.7 and 3.3 (where relevant).
1.11	**State assessment**		No
		X	Yes, you must also complete Section 2.5
1.12	**Component of larger action**	**X**	No
			Yes, you must also complete Section 2.7
1.13	**Related actions/proposals**	**X**	No
			Yes, provide details:
1.14	**Australian Government funding**	**X**	No
			Yes, provide details:
1.15	**Great Barrier Reef Marine Park**	**X**	No
			Yes, you must also complete Section 3.1 (h), 3.2 (e)

2 Detailed description of proposed action

2.1 Description of proposed action

The Proposed Action will involve development of the site for urban uses in accordance with the current "Urban" and "Urban Development" zoning under the MRS and TPS No. 2 respectively.

The proposed urban development of the site is outlined in the subdivision plan (**Attachment B**) prepared by Taylor Burrell Barnett Town Planning & Design (TBB), which will be submitted to the Western Australian Planning Commission (WAPC) for approval in late 2015 or early 2016. The design of the subdivision has been guided by the approved *The Glades Local Structure Plan* (**Attachment B**), which covers a total area of approximately 318 ha, with development commenced or completed over approximately 60% of the total LSP area to date. The extent of the LSP boundary is shown in **Figure 2**.

The proposed subdivision design aligns with the land uses set out for the site in the approved LSP and include:

- Residential lots in the form of two grouped housing sites.
- A reserve for POS and drainage.
- Accommodation of the ephemeral creek and constructed drain within reserves for POS and drainage, including the retention of existing vegetation in this area.

The proposed subdivision layout of the site and associated land uses is shown in **Figure 3**, in addition to the location of the two watercourses and the extent of revegetation works completed to date.

Extensive earthworks will be required to support the proposed urban development, which will involve the clearing of existing vegetation within areas of site proposed for residential use.

2.2 Alternatives to taking the proposed action

No alternatives have been considered by the Proponent with regard to the Proposed Action, as the proposed urban development is consistent with the strategic overarching land use planning framework.

The Western Australian Department of Planning (DoP) and WAPC are responsible for urban, rural and regional land use planning and the coordination of urban development within Western Australia. Statutory planning documents (such as Region Schemes) as well as regional and strategic guidance documents are prepared and updated to outline the location and nature of necessary urban growth, commercial/activity centres, transport systems and infrastructure throughout Western Australia. This planning framework considers environment, health, transport, infrastructure, economy and community within an integrated and holistic framework.

The Proposed Action is to be undertaken within an established broader land use planning context, in which the Government of Western Australia has considered the extent of urban growth required throughout Western Australia to accommodate the projected population growth, and in particular for the Perth Metropolitan Region. Land is zoned appropriately under the MRS to support population growth, with state government agencies, local government and utilities using the Region Scheme to make decisions regarding infrastructure needs, commercial centres and community facilities.

The southern Byford area incorporating the site was identified by the Government of Western Australia for urban land use as part of the "South-east sub-region" in *Directions 2031 and beyond – Metropolitan Planning Beyond the Horizon* (WAPC 2010) in addition to the *Draft South Metropolitan Peel Sub-regional Planning Framework* (WAPC 2015). These planning frameworks generally align with the historic regional *South East Corridor Structure Plan* (DoP 1996) and district-scale *Byford Structure Plan* (SSJ 2005). The preparation and design of the approved LSP and proposed subdivision plan incorporating the site were informed and guided by these planning documents and strategies. The proposed land use of the site, as set out in the approved LSP and the proposed subdivision plan align with the permitted uses of the "Urban" and "Urban Development" zones under the MRS and TPS No. 2 respectively.

2.3 Alternative locations, time frames or activities that form part of the referred action

While no alternative locations have been considered to taking the Proposed Action, the location of urban growth has been considered strategically by the Government of Western Australia, with the site identified as a suitable location. The timing of the Proposed Action is intended to accommodate a portion of the projected Perth population growth, and therefore the timing of its development and release is driven by prevailing market conditions which are now conducive to see the Proposed Action commence.

As discussed above, the Government of Western Australia through *Directions 2031 and beyond – Metropolitan Planning Beyond the Horizon* (WAPC 2010) and the *Draft South Metropolitan Peel Sub-regional Planning Framework* (WAPC 2015) have identified the southern Byford area as a suitable location to accommodate urban land uses. These documents outline the strategic framework for future growth within the Perth Metropolitan Region and Peel Region, and specifically considers how the projected long term population growth can be accommodated within these regions.

2.4 Context, planning framework and state/local government requirements

The Proposed Action has been informed and guided by strategic planning which has shaped the land uses within the wider region, including the zoning of the site. Major MRS Amendment 966/33 *South East Corridor (South of Armadale) Omnibus* was gazetted in December 1995 to establish the necessary region scheme framework to implement the *South East Corridor Structure Plan* (DoP 1996), and sets out the proposed intensification of land uses across a large corridor of land between Canning Vale in the north and Keysbrook in the south.

This MRS amendment involved the rezoning of a significant area of "Rural" zoned land to the "Urban" or "Urban Deferred" zones across the *South East Corridor Structure Plan* area. As a result of this amendment, the site and surrounding southern Byford area was zoned "Urban" under the MRS. Subsequent amendments to the SSJ TPS No. 2 have sought to reflect the region scheme zonings implemented as part of the *South East Corridor Structure Plan*, resulting in the "Urban Development" zoning across the site and wider Byford south area under the TPS No. 2.

The approved *Byford Structure Plan* (district-level) and *The Glades Local Structure Plan* have since been prepared and approved, in accordance with the overarching planning framework and regional planning strategies discussed above. These structure plans have informed the subdivision design proposed for the site, which will be submitted to the WAPC for approval in late 2015.

2.5 Environmental impact assessments under Commonwealth, state or territory legislation

Pursuant to the *Environmental Protection Act 1986* (EP Act), the EPA have considered the proposed urban land use of the site through their strategic environmental assessment of MRS Amendment 966/33 *South East Corridor (South of Armadale) Omnibus* (EPA 1995). This assessment was provided under Section 16 of the EP Act, which does not lead to the setting of legally binding environmental conditions, however was provided to guide stakeholders in dealing with environmental issues when preparing subsequent statutory planning proposals within the assessment area.

More recently, the environmental assessment of scheme amendments are considered by the EPA under Part IV of the EP Act, which can lead to the setting of environmental conditions. However, Part IV of the EP Act was not legislated until 1996, at which point MRS Amendment 966/33 had already been considered by the EPA.

As part of the Section 16 advice provided, the EPA concluded that the planning strategies proposed in MRS Amendment 966/33 were environmentally acceptable, subject to the realisation of the following environmental objectives as part of implementing the MRS amendment:

- Avoid and minimise environmental damage to wetlands of local and regional significance.
- Reserve land that has been identified in the System 6 Report as having conservation and recreation value.
- Prevent nutrient enrichment and degradation of the groundwater and the surface water systems from on-site effluent disposal.
- Protect remnant bushland communities identified in the System 6 review.
- Minimise the potential impact of noise, dust and odour from existing poultry farms and piggeries on proposed adjoining land uses.
- Ensure changes to land use within the catchment to the Peel Harvey Estuarine system are controlled so as to avoid and minimise environmental damage particularly in terms of nutrient export.
- Ensure suitable transport strategies have been adopted to ensure that air quality and greenhouse gas emissions in the South East Corridor meet health and environmental standards.

The proposed development of the site does not conflict with the above EPA objectives, primarily due to the degraded nature of the existing environmental values within the site as a result of historical land uses. Of most relevance to the Proposed Action is avoiding and minimising damage on the Peel Harvey Estuarine system as a result of nutrient export. This objective has been actively addressed throughout the statutory planning process for the site and greater south Byford area, specifically through:

- The preparation of a *Local Water Management Strategy* (JDA 2009) to support structure planning, which details strategies and responses in the structure plan design to maximise the retention of nutrients onsite to avoid any potential impacts downstream.
- The preparation of an *Urban Water Management Plan* (JDA 2011) to support subdivision within the site, which details the location and size of bio-retention areas and other drainage features, in order to achieve the nutrient management objectives set out in the LWMS.

In summary, the EPA have considered the potential impacts of the proposed urban land use within the site at a strategic level as part of a collective response to a significant rezoning proposal extending across the south-east metropolitan area. The EPA's recommendations based on the findings of the strategic environmental assessment did not identify any significant environmental issues applicable to the site which would prohibit the progression of the proposed urban development.

2.6 Public consultation (including with Indigenous stakeholders)

The MRS and TPS amendments incorporating the site, as discussed in **Section 2.4**, involved the advertising of the proposed intensification of land uses and an associated public comment submission period. Thus, wide public consultation relating to the proposed urban land use of the site and wider region has been undertaken.

The Glades Local Structure Plan and supporting documentation were advertised and made available for public review as part of the statutory planning process. Comments from the public regarding the proposed LSP were submitted to the SSJ and were suitably addressed to allow for the adoption of the structure plan in April 2011. Thus, through the statutory planning process, opportunities have been provided for the public to provide comment on the proposed urban land use within the site and subsequently the Proposed Action.

2.7 A staged development or component of a larger project

Urban development of the southern Byford area has been progressed over a number of years through a staged subdivision approach, guided by the overarching LSP. Each stage of subdivision to date has been submitted to the WAPC for consideration and development has progressed following the attainment of each subdivision approval.

During the initial preparation of the LSP, the environmental values of the area were assessed and determined to be generally degraded as a result of historical agricultural and special rural land uses. Existing environmental values are further considered at each stage of subdivision during the urban design process. To date, all previous stages of subdivision within the LSP area have not resulted in any impacts upon Matters of National Environmental Significance (MNES) and therefore referral under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) has not been required.

It was determined that the implementation of the next stage of proposed subdivision (**Attachment B**) has the potential to impact upon MNES, specifically through indirect impacts on three Threatened species of black cockatoo associated with the loss of habitat. Based on this assessment, this stage of subdivision has been referred under the EPBC Act for consideration by the Department of Environment, as detailed in this report.

Given the degraded environmental values of the remaining undeveloped land within the LSP area, it is unlikely that future stages of subdivision will impact upon any MNES and it is therefore unlikely that any future referrals under the EPBC Act will be required. In specific regard to the three Threatened species of black cockatoo, no suitable habitat has been identified as occurring within remaining subdivision stages.

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3 Description of environment & likely impacts

3.1 Matters of national environmental significance

3.1 (a) World Heritage Properties

Description

No World Heritage Properties are located within or in the immediate vicinity of the site.

Nature and extent of likely impact

Not applicable.

3.1 (b) National Heritage Places

Description

No National Heritage Places are located within or in the immediate vicinity of the site.

Nature and extent of likely impact

Not applicable.

3.1 (c) Wetlands of International Importance (declared Ramsar wetlands)

Description

No RAMSAR wetlands are located within the site. The EPBC Act Protected Matters Search Tool identified "Forrestdale and Thomsons Lakes" approximately 8 km north-west of the site and the "Peel-Yalgorup System" approximately 42 km south-west of the site.

Nature and extent of likely impact

The site is not located in close proximity to any Ramsar wetlands and as such the Proposed Action will not incur any direct impacts upon Ramsar wetlands.

The site is located in the northern-most extent of the Peel-Harvey Catchment area, as defined by *Environmental Protection Peel Inlet – Harvey Estuary Policy* (EPA 1992), which delineates the upstream catchment of the Peel-Yalgroup System. Any impacts on the Peel-Yarlogup System as a result of implementing the Proposed Action would be indirect in nature and associated with surface runoff from the site. These impacts would not be significant, given the small size of the site and associated surface run-off volumes, the large distance between the site and the Ramsar wetland, the low risk of the proposed land use and the proposed management of the site's post-development hydrology.

Specifically, the management of the post-development hydrology of the site has been considered through the preparation of a *Local Water Management Strategy* (JDA 2009) and an *Urban Water Management Plan* (JDA 2011). The Proposed Action will not incur any significant direct or indirect impacts upon any Ramsar wetlands.

3.1 (d) Listed threatened species and ecological communities

Description

Threatened Flora

The EPBC Act Protected Matters Search Tool identified 15 EPBC Act listed Threatened Flora species as potentially occurring within or in proximity to the site, as outlined in **Table 1**. A spring flora and vegetation survey (Coffey Environments 2009b) was conducted across the greater LSP area by ATA Environmental (now Coffey Environments) in 2005 to support the preparation of the LSP, which did not identify any occurrences of EPBC Act listed Threatened Flora species. Remnant native vegetation within the site is largely limited to mature trees, with no native understorey or midstorey vegetation observed. As such it is extremely unlikely that any Threatened Flora species occur within the site and any instances would have been previously identified given the timing of the flora and vegetation survey during spring. The extent of the identified vegetation communities within the site are shown in **Figure 4**.

Table 1: *EPBC Act listed Threatened Flora species potentially occurring within or in proximity to the site.*

SPECIES NAME	EPBC ACT STATUS	PREFERRED HABITAT	LIKELIHOOD OF OCCURRENCE WITHIN SITE	LIKELIHOOD OF IMPACT FROM PROPSED ACTION	REASONING
Andersonia gracilis (Slender Anersonia)	Endangered	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	Unlikely	Unlikely	Suitable habitat does occur within the site, however species was not identified during spring flora survey.
Caladenia huegelii (King Spider-orchid)	Endangered	Grey or brown sand, clay loam.	Unlikely	Unlikely	Suitable habitat does occur within the site, however species was not identified during spring flora survey.
Centrolepis caespitosa	Endangered	White sand, clay. Salt flats, wet areas.	Unlikely	Unlikely	No suitable habitat occurs within the site. Species was not identified during spring flora survey.
Darwinia foetida (Muchea Bell)	Critically Endangered	Moist flats. Winter wet. Grey, brown or black sandy, peaty or clay soils.	Unlikely	Unlikely	Suitable habitat does occur within the site, however species was not identified during spring flora survey.
Diuris micrantha (Dwarf Bee-orchid)	Vulnerable	Brown loamy clay. Winter-wet swamps, in shallow water.	Unlikely	Unlikely	Suitable habitat does occur within the site, however species was not identified during spring flora survey.
Diuris purdiei (Purdie's Donkey-orchid)	Endangered	Grey-black sand, moist. Winter-wet swamps.	Unlikely	Unlikely	No suitable habitat occurs within the site. Species was not identified during spring flora survey.
Drakea elastic (Glossy-leaved Hammer-orchid)	Endangered	White, grey or black sand. Low-lying damp areas, or on the slopes adjacent to winter wet depressions, swamps and water courses.	Unlikely	Unlikely	Suitable habitat does occur within the site, however species was not identified during spring flora survey.
Drakaea micrantha (Dwarf Hammer-orchid)	Vulnerable	White-grey sand.	Unlikely	Unlikely	No suitable habitat occurs within the site. Species was not identified during spring flora survey.
Eucalyptus balanites (Cadda Mallee)	Endangered	Sandy soils with lateritic gravel.	Unlikely	Unlikely	No suitable habitat occurs within the site. Species was not identified during spring flora survey.
Grevillea curviloba subsp. Incurve (Narrow curved-leaf Grevillea)	Endangered	Sand, sandy loam. Winter-wet heath.	Unlikely	Unlikely	Suitable habitat does occur within the site, however species was not identified during spring flora survey.

SPECIES NAME	EPBC ACT STATUS	PREFERRED HABITAT	LIKELIHOOD OF OCCURRENCE WITHIN SITE	LIKELIHOOD OF IMPACT FROM PROPSED ACTION	REASONING
Lasiopetalum pterocarpum (Wing-fruited Lasiopetalum)	Endangered	Dark red-brown loam or clayey sand over granite. On sloping banks near creeklines.	Unlikely	Unlikely	No suitable habitat occurs within the site. Species was not identified during spring flora survey.
Synaphea sp. Fairbridge Farm (Selena's Synaphea)	Critically Endangered	Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	Unlikely	Unlikely	No suitable habitat does occur within the site, however species was not identified during spring flora survey.
Tetraria australiensis (Southern Tetraria)	Vulnerable	Sandy loam/clay. Slopes or flats. Sometimes swampy or winter damp.	Unlikely	Unlikely	Suitable habitat does occur within the site, however species was not identified during spring flora survey.
Thelymitra stellate (Star Sun-orchid)	Endangered	Sand, gravel, lateritic loam.	Unlikely	Unlikely	No suitable habitat occurs within the site. Species was not identified during spring flora survey.
Verticordia plumosa var. pleiobotrya (Narrow-petalled Feather flower)	Endangered	Sandy or clayey soils. Winter-wet depressions.	Unlikely	Unlikely	Suitable habitat does occur within the site, however species was not identified during spring flora survey.

Threatened Ecological Communities

The EPBC Act Protected Matters Search Tool identified three EPBC Act listed Threatened Ecological Communities as potentially occurring within or in proximity to the site, as outlined in **Table 2**. A spring flora and vegetation survey (Coffey Environments 2009b) conducted by ATA Environmental in 2005 across the greater LSP area did not identify any Threatened Ecological Communities within the site. Furthermore, remnant native vegetation within the site was described as representing a "Parkland Cleared" structure and is extremely unlikely to be representative of any Threatened Ecological Community, given the absence of native understorey and midstorey species.

Table 2: *EPBC Act listed Threatened Ecological Communities potentially occurring within or in proximity to the site.*

THREATENED ECOLOGICAL COMMUNITY	EPBC ACT STATUS	PREFERRED HABITAT	LIKELIHOOD OF OCCURRENCE WITHIN SITE	LIKELIHOOD OF IMPACT FROM PROPSED ACTION	REASONING
Claypans of the Swan Coastal Plain	Critically Endangered	Seasonal and ephemeral wetlands on clay substrates. Clay pan basins and clay flats.	Unlikely	Unlikely	Suitable habitat does occur within the site, however no intact remnant native vegetation communities representative of this Threatened Ecological Community were observed within site.
Corymbia calophylla – Kingia Australia woodlands on heavy soils of the Swan Coastal Plain	Endangered	Relatively wet sites with high rainfall. Heavy clay soils on eastern side of SCP. Seasonal wetlands, with high groundwater.	Unlikely	Unlikely	Suitable habitat does occur within the site, however no intact remnant native vegetation communities representative of this Threatened Ecological Community were observed within site.
Corymbia calophylla – Xanthorrhoea preissii woodlands and shrublands of the Swan Coastal Plain	Endangered	Drier sites (compared to the community described above) but still relatively moist and winter waterlogged. Heavy clay dominated soils.	Unlikely	Unlikely	Suitable habitat does occur within the site, however no intact remnant native vegetation communities representative of this Threatened Ecological Community were observed within site.

Threatened Fauna

The EPBC Act Protected Matters Search Tool identified eight EPBC Act listed Threatened Fauna species as having the potential to occur within or in proximity to the site, as outlined in **Table 3**. A number of fauna surveys and assessments have been undertaken across the site in order to identify fauna habitats and fauna species utilising the site, with particular regard to Threatened species. Positive identification of fauna species within an area is based on direct observations of individuals or the identification of potential or known habitat. The various fauna assessments and surveys undertaken within the site include:

- Desktop fauna assessment by ATA Environmental in September 2005 (Coffey Environments 2009b)
- Black cockatoo assessment by ATA Environmental in September 2005 (Coffey Environments 2009a)
- Site assessment by Aurora Environmental to verify habitat in December 2013 (Aurora Environmental 2014)
- Level 1 fauna assessment by G. Harewood in August 2015 (Harewood 2015) (**Attachment C**)
- Level 2 black cockatoo habitat assessment by G. Harewood in August 2015 (Harewood 2015) (**Attachment C**)

The level 1 fauna assessment and the level 2 black cockatoo habitat assessment conducted by Harewood in 2015 form the primary basis of this referral, as this provides the most robust and complete assessment of fauna values within the site. This is further discussed in **Section 8.2**.

Two EPBC Act listed black cockatoo species have been directly observed within the site (Harewood 2015). Specifically, three Forest Red-tailed black cockatoos were observed in addition to historic evidence of foraging (chewed marri fruits) and three Carnaby's black cockatoos were observed in addition to historic evidence of foraging (chewed marri fruits and pines cones). No direct observation of Baudin's black cockatoo nor any evidence to suggest historic presence was recorded within the site, however the species was inferred by Harewood to potentially use the site given its known occurrence in the wider local area and the identification of suitable potential habitat within the site. No other instances of Threatened Fauna were observed or are considered likely to occur within the site.

The 2005 black cockatoo assessment conducted by ATA Environmental did not identify any evidence of black cockatoo use within the LSP area, however did observe four Forest Red-tailed black cockatoos flying overhead (Coffey Environments 2009a). Aurora Environmental recorded a number of black cockatoo observations within the site in February 2014, including chewed marri nuts attributed to Forest Red-tailed black cockatoos and direct sightings of four Forest Red-tailed black cockatoos, three of which were foraging in a marri tree (Aurora Environmental 2014).

Table 3: *EPBC Act listed Threatened Fauna species potentially occurring within or in proximity to the site.*

SPECIES NAME	COMMON NAME	EPBC ACT STATUS	LIKELIHOOD OF OCCURRENCE WITHIN SITE	LIKELIHOOD OF IMPACT FROM PROPSED ACTION	REASONING
BIRDS					
Calyptorhynchus latirostris	Carnaby's black cockatoo	Endangered	Known to occur	See 'Nature and extent of likely impact' below	See 'Nature and extent of likely impact' below
Calyptorhynchus banksii naso	Forest Red-tailed black cockatoo	Vulnerable	Known to occur	See 'Nature and extent of likely impact' below	See 'Nature and extent of likely impact' below
Calyptorhynchus baudinii	Baudin's black cockatoo	Vulnerable	Possible	See 'Nature and extent of likely impact' below	See 'Nature and extent of likely impact' below
Leipoa ocellata	Malleefowl	Vulnerable	Unlikely	Unlikely	No observations recorded and no suitable habitat occurs within the site. Believed to be locally extinct.
Rostratula australis	Australian Painted Snipe	Endangered	Unlikely	Unlikely	No observations recorded and no suitable habitat occurs within the site. May be an occasional visitor to wetlands in the area.
MAMMALS					
Dasyurus geoffroii	Chuditch	Vulnerable	Unlikely	Unlikely	No observations recorded and no suitable habitat occurs within the site.
Pseudocheirus occidentalis	Western Ringtail Possum	Vulnerable	Unlikely	Unlikely	No observations recorded and no suitable habitat occurs within the site. Believed to be locally extinct.
Setonix brachyurus	Quokka	Vulnerable	Unlikely	Unlikely	No observations recorded and no suitable habitat occurs within the site. Believed to be locally extinct.

Nature and extent of likely impact

Threatened Flora

The spring flora and vegetation survey (Coffey Environments 2009b) conducted across the LSP area did not identify any instances of Threatened Flora species as listed by the EPBC Act within the site. Therefore there are no likely impacts on Threatened Flora as a result of the Proposed Action being implemented.

Threatened Ecological Communities

The spring flora and vegetation survey (Coffey Environments 2009b) conducted across the LSP area did not identify any Threatened Ecological Communities as listed by the EPBC Act within the site. Therefore there are no likely impacts on Threatened Ecological Communities as a result of the Proposed Action being implemented.

Threatened Fauna

The three Threatened species of black cockatoo (Carnaby's black cockatoo (CBC), Forest Red-tailed black cockatoo (FRTBC) and Baudin's black cockatoo (BBC)) are the focus of further discussion below in terms of the extent of suitable habitat, likely extent of use of the site, and therefore the nature and extent of the likely impacts of the Proposed Action on these species.

This section includes the following information in order to provide a comprehensive analysis of the potential impacts of the Proposed Action on the three Threatened species of black cockatoo:

- **General black cockatoo ecology:** information regarding the known distributions and general habitat preferences of each black cockatoo species.
- **Regional habitat context and considerations:** availability, quality, conservation value and known use of regional habitat for each species in proximity to the site.
- **Site-specific foraging habitat:** outlines potential black cockatoo foraging habitat identified within the site.
- **Site-specific roosting habitat:** outlines potential black cockatoo roosting habitat identified within the site.
- **Site-specific breeding habitat:** outlines potential black cockatoo breeding habitat identified within the site.
- **Summary of potential impacts on black cockatoo species:** summarises the above sub-sections to outline the potential impacts of the Proposed Action on the three Threatened species of black cockatoo.

General black cockatoo ecology

Each of the three black cockatoo species have different habitat preferences, which generally relate to each species' known geographical distribution. The year to year distribution of the black cockatoo species throughout their known range can vary, as the roosting sites and foraging areas often vary depending on a range of factors, such as seasonal water and food availability and climatic variations. The general ecology and associated habitat preferences for the three Threatened species of black cockatoo species of black cockatoos is summarised below in **Table 4**.

Table 4: *General ecology and habitat preferences for the three Threatened species of black cockatoo*

GENERAL DISTRIBUTION	FORAGING HABITAT	ROOSTING HABITAT	BREEDING HABITAT
CARNABY'S BLACK COCKATOO			
The most widely distributed of the black cockatoo species. The species is generally found north to the lower Murchison, east to Merredin, south to Esperance and along the west coast of Western Australia (Johnstone *et al.* 2011). Tends to move west and south after breeding in the northern and eastern portions of its range, moving from areas of lower rainfall to higher rainfall. Is found in a variety of habitats which include the coastal *Banksia* spp. shrub and scrubland, eucalypt woodlands and forests, marri woodlands and pine plantations.	Generally feeds on the seeds and nuts of proteaceous species (e.g. *Banksia, Hakea* and *Grevillea*) and also *Corymbia* and *Eucalyptus* species (Johnstone *et al.* 2011). The seeds from seed pods of *Banksia* and the cones of pines trees provide the highest energetic yield (Cooper *et al.* 2002). Birds generally nest in areas close to known areas of foraging habitat in the form of remnant vegetation and/or pine plantations.	Within non-breeding areas, the species will roost in a number of tree types including wandoo, marri, karri and tuart as well as introduced *Eucalyptus* and pines.	Generally breeds from early July to mid-December, mainly in the wheatbelt. Breeding range is currently expanding westward and south, into the jarrah – marri forests of the Darling Range and the tuart forests of the Swan Coastal Plain (Harewood 2015). Known to nest in hollows of smooth-barked eucalypts especially salmon gum (*Eucalyptus salmonophloia*) and wandoo, but nests have also been found in york gum (*E. loxophleba*), flooded gum (*E. rudis*), jarrah, tuart and marri.

GENERAL DISTRIBUTION	FORAGING HABITAT	ROOSTING HABITAT	BREEDING HABITAT
FOREST RED-TAILED BLACK COCKATOO			
Occurs within the humid and sub-humid south-west, mainly within the hilly interior and is found in Gingin to the north, Williams in the east, Albany in the south and along the west coast. Generally inhabit eucalypt forests, however lately there has been a shift in foraging areas, with this species expanding from the Darling Range to include the Swan Coastal Plain and the Wheatbelt (Johnstone *et al.* 2011). Unlike other black cockatoo species it is not generally known to migrate but instead remains a year-round resident within breeding areas.	Fruits and seeds from marri and jarrah species contribute to 90% of the diet for the species. Also known to feed on blackbutt, karri, sheoak and snottygobble.	Roosts predominantly in jarrah, marri and blackbutt trees. Generally does not migrate but instead remains a year-round resident within its breeding areas.	Breeding occurs in all months of the years, with peaks in spring and autmn-winter. Known to nest in the large hollows of marri, jarrah and karri (Harewood 2015).
BAUDIN'S BLACK COCKATOO			
Generally found in the south-western humid and sub-humid zones, north to Gidgegannup and south to the Waychinicup National Park along the south coast. Most common in eucalypt forests, including the Darling Range, but also common on parts of the southern Swan Coastal Plain. Is also known to occur within the eastern portion of the Swan Coastal Plain, which includes Byford, Mundijong and Serpentine (Johnstone *et al*. 2011). Flocks move north between March and September and are concentrated in the northern parts of the Darling Range. Return to breeding areas in the south during August-September.	Marri is the primary food source with the birds using its seeds, flowers, nectar and buds (Johnstone *et al.* 2011). Species also known to forage on proteaceous trees and shrubs (including *Banksia* spp. and *Hakea* spp.), jarrah, sheoak (*Allocasuarina fraseriana*), *Xanthorrhoea preissii*, *Kingia australis* as well as fruit in orchards.	Migrates to the central and northern parts of the Darling Scarp (Collie north to Mundaring) in winter to its traditional roost sites. Is known to roost generally in or near riparian environments, or natural and artificial permanent water sources in trees of jarrah, marri, blackbutt, tuart and introduced eucalyptus including Blue gum (*E. globulus*) and Lemon-scented gum (*Corymbia citriodora*) (DSEWPaC 2012).	Breeds in spring (September – December) within the deep south-west of its range, north to the Whicher Range and Lowden, with isolated records of breeding within the Wungong catchment, Serpentine (hills area) and east to Kojonup and near Albany (Johnstone *et al.* 2011). They have been found to largely nest in large, mostly vertical hollows of karri, marri, wandoo and bullich (*E. megacarpa*).

Regional habitat context and considerations

In order to understand the likelihood and if so magnitude of any potential impacts of the Proposed Action on each the listed black cockatoo species, it is important to put the site in a wider regional context based on generally available black cockatoo ecology and habitat information. Ecology, distribution and mapping of known foraging, roosting and breeding sites for the three black cockatoo species is available through a number of sources, including:

- Department of Planning (2011), *Metropolitan Region Scheme (MRS) - potential habitat for the Carnaby's Black Cockatoo which may require further assessment*.
- Glossop *et al.* (2011), Carnaby's Black Cockatoo mapping (including digital GIS dataset).
- Johnstone *et al.* (2011), *Black Cockatoos on the Swan Coastal Plain*. A research report on three black cockatoo species for the Department of Planning.
- Finn *et al.* (2014), *The 2014 Great Cocky Count*, a community-based survey of roosting site for the CBC species.

Based on a review of available information, there are no previous records of black cockatoo roosting within or near the site, with the closest confirmed CBC roosting area located within the Darling Range, specifically in Karrakup (4 km east) and Bedfordale (5.5 km north east) (DoP 2011). There are no confirmed roost sites for the FRTBC or BBC mapped in the general region, although this is likely due to a lack of available data for these species compared to the CBC, although both are not known to frequent and roost in the area as commonly as the CBC.

Roosting is far more common within the eucalypt forests of the Darling Range to the east of the site, where there are extensive areas of suitable roosting trees in close proximity to available foraging habitat. Overall, the greater Byford region (incorporating the site) is not considered to be of significance in regard to regional black cockatoo roosting habitat, which is supported by an absence of any previously recorded observations of black cockatoo roosting in the locality.

Similarly, no confirmed breeding sites have been recorded within or near the site, with the closest confirmed CBC breeding area located within the Darling Range, specifically in Bedfordale (5.5 km north east) (DoP 2011). More broadly speaking CBC are known to breed in a number of locations on the Swan Coastal Plain, primarily in Tuart trees, but this is not as common compared to areas further inland. FRTBC likewise is known to occasionally breed on the Swan Coastal Plain, but possibly much less so than CBC. Based on a review of currently available information, there are no known records of BBC breeding on the Swan Coastal Plain (Johnstone *et al.* 2011).

Breeding is far more common within the eucalypt forests of the Darling Range to the east of the site, where there are extensive areas of suitable breeding habitat in close proximity to available foraging habitat. Overall, the greater Byford region (incorporating the site) is not considered to be of significance in regard to regional black cockatoo breeding habitat, which is supported by an absence of any previously recorded observations of black cockatoo breeding in the locality.

Glossop *et al.* (2011) undertook a spatial analysis to determine potential CBC foraging habitat across the Swan Coastal Plain and jarrah forest regions as part of a joint project between the (then) Department of Environment and Conservation (DEC) and the DoP. The dataset produced as a result of this project was then published in mapping produced by the DoP (2011), which shows the spatial extent of potential CBC foraging habitat across the Swan Coastal Plain and jarrah forest regions. This dataset was partially ground-truthed by Eco-Logical Australia in 2013, which found the dataset to be a reliable tool for identifying potential foraging habitat. It should be noted that similar regional-scale foraging habitat datasets are not available for the FRTBC and BBC species.

Mapping prepared by Glossop *et al.* (2011) indicates approximately 1.8 ha of potential CBC foraging habitat occurs within the site. This should be used as an indication that the site is likely to contain some foraging habitat, as opposed to being used a tool to determine quantitative values of foraging habitat area, given the regional scale of the dataset. Site-specific investigations are more appropriate to determine the area of black cockatoo foraging habitat within the site, providing a more accurate indication of foraging habitat value.

In order to gain an understanding of the current extent of potential CBC foraging habitat in the site's local and regional surrounds, the Glossop *et al.* (2011) dataset was utilised and modified to account for any clearing of potential CBC foraging habitat since 2011. Emerge Associates updated the Glossop *et al.* (2011) dataset with the *2014 Native Vegetation Extent* dataset produced by the Department of Agriculture and Food Western Australia (DAFWA) to provide an accurate representation of existing remnant vegetation (which was also identified as CBC foraging habitat).

The updated regional distribution of potential CBC foraging habitat is shown in **Figure 5**, which illustrates the high availability of potential CBC foraging habitat within the local and regional surrounds of the site, and that the potential CBC foraging habitat mapped within the site (1.8 ha) is considered to be only a small portion of this. A high proportion of potential CBC foraging habitat situated in close proximity to the site is afforded a high level of conservation protection, either through land use zoning and/or being within identified Bush Forever Sites.

The MRS prescribes areas reserved for "Parks and Recreation" or "State Forest" which prevents other land uses (such as urban, commercial or industrial) from occurring within these areas. Bush Forever Sites identified for retention and protection in the Government of Western Australia's *Bush Forever Policy* (2000), which is a strategic plan for conserving regionally significant bushland on the Swan Coastal Plain, offer additional protection via the implementation of *State Planning Policy 2.8 Bushland Policy for the Perth Metropolitan Region* which requires an impact assessment process to be followed for proposals or decision making that may impact on Bush Forever areas.

Table 5 outlines the amount of potential CBC foraging habitat protected within either "Parks and Recreation" (including "Public Restricted") and "State Forest" MRS reserves and/or Bush Forever Sites within varying distances from the site. This demonstrates the high proportion of potential CBC foraging habitat afforded some level of conservation protection in close proximity to the site. These areas are expected to remain in the long-term and will continue to provide foraging habitat into the future.

Table 5: *Area of potential CBC foraging habitat in proximity to the site (based on Glossop et al. (2011) updated with 2014 Native Vegetation Extent (DAFWA 2014))*

	WITHIN SITE	**WITHIN 1 KM OF SITE**	**WITHIN 5 KM OF SITE**	**WITHIN 10 KM OF SITE**
Total area of potential CBC foraging habitat (as defined by DEC 2011, updated with 2014 Native Vegetation Extent)	1.8 ha	48.65 ha	1617.81 ha	8399.46 ha
Percentage of area made up by potential CBC foraging habitat within the Proposal Area (1.8 ha)	100%	3.70%	0.11%	0.02%
Area of potentital CBC foraging habitat located within Bush Forever Sites and/or applicable MRS zones and reserves	0 ha (0%)	46.18 ha (95%)	1255.52 ha (78%)	6869.12 ha (82%)
Area of potential CBC foraging habitat **not** located within Bush Forever Sites and/or applicable MRS zones and reserves	1.8 ha (100%)	2.47 ha (5%)	362.29 ha (22%)	1530.34 ha (18%)

Locally, the largest contiguous areas of CBC foraging habitat in close proximity to the site is remnant bushland associated with Brickwood Reserve and Cardup Nature Reserve, as shown in **Figure 1**, both of which contain large areas of potential foraging habitat. Both reserves are identified as Bush Forever Sites and support a range of other conservation values, discussed further in **Section 3.3 (j).** The potential CBC foraging habitat within these reserves is considered to be of greater value to the CBC and black cockatoos generally, compared to that identified within the site. These reserves are relatively intact with the full native understorey and midstorey structure which provides greater habitat value for black cockatoos, in addition to covering a more extensive area.

As indicated previously, regional foraging habitat mapping for both the FRTBC and BBC is not readily available. Notwithstanding, both species are known to occupy the region generally, particularly along the Darling Range, and are likely to utilise this vegetation for foraging purposes. Vegetation within Brickwood Reserve and Cardup Nature Reserve are also likely to provide foraging habitat values for both species which, if utilised at all, would be expected to be preferred to foraging habitat within the site for the same reasons outlined above.

Site specific black cockatoo foraging habitat considerations

Foraging evidence left by black cockatoos in the form of chewed marri fruits was commonly observed during the 2015 targeted black cockatoo survey. This foraging activity was attributed to the FRTBC and CBC, based on the marks left on the fruit debris. Evidence of CBC foraging on pines cones was also observed, however this was limited to one or two cones at a single location. In total, 14 occurrences of foraging evidence were observed within the site, 13 of which were chewed marri fruits (eight by FRTBC and five by CBC). No evidence of BBC foraging activity was observed within the site.

The primary foraging value for black cockatoos within the site is associated with marri trees, either in groves or as individual specimens. Approximately five pine trees were identified within the site, however they do not appear to be producing a viable number of pine cones to provide meaningful CBC foraging habitat (Harewood 2015).

The quality and relative value of foraging habitat can vary depending on a range of factors, including (amongst other considerations) tree health, level of disturbance, vegetation community structure and proximity to water. In regard to the site, the distribution and grouping of marri trees is the primary consideration in regard to the quality of foraging habitat. The central grove of vegetation generally described as "marri woodland" (see **Section 3.3 (a)** and **Figure 4**) provides quality black cockatoo foraging habitat, given the marri trees are grouped closely together, providing higher densities of fruits for black cockatoos to feed upon in a small, localised area. This grove of foraging habitat covers an area of approximately 1.36 ha, however it should be noted that a small number of other trees species (exotic and non-endemic) which do not represent black cockatoo foraging habitat are included within this area.

In addition, scattered marri trees dispersed across the remainder of the site generally described as "parkland cleared" (see **Section 3.3 (a)** and **Figure 3**) provide lower quality foraging habitat, as the density of fruits is lower and the distribution of trees is sparse. As a result, black cockatoo are considered likely to preferentially forage in the marri woodland area of the site over the scattered marri trees. Harewood (2015) estimates that the total area of this lower quality foraging habitat is no more than 0.2 ha.

Overall, the site contains up to approximately 1.56 ha of black cockatoo foraging habitat, comprised of 1.36 ha of quality foraging habitat and up to 0.2 ha of lower quality habitat.

Site specific black cockatoo breeding habitat considerations

Potential breeding habitat is defined as trees of suitable species known to support black cockatoo breeding which either have a suitable nest hollow or have a diameter at breast height (DBH) of at least 50 cm, which may potentially lead to developing a nest hollow (DSEWPaC 2012). Only native, endemic species which met the above criteria were recorded as potential black cockatoo breeding habitat by Harewood (2015). The targeted black cockatoo survey conducted across the site identified 36 potential black cockatoo breeding habitat trees, as described in **Table 6** and shown in **Figure 5**.

Table 6: *Summary of potential black cockatoo breeding habitat trees (DBH >50 cm) within the site (Harewood 2015)*

SPECIES	TREES (DBH >50 CM) WITH NO HOLLOWS	TREES (DBH >50 CM) WITH SMALL HOLLOWS (<12 CM)	TREES (DBH >50 CM) WITH LARGE HOLLOWS (>12 CM)	TOTAL
Marri	28	4	0	**32**
Jarrah	1	0	0	**1**
Flooded Gum	1	0	0	**1**
Dead marri	1	1	0	**2**
TOTAL	**31**	**5**	**0**	**36**

Of the 36 potential breeding habitat trees identified, the vast majority (32) were marri, with the remainder comprised of jarrah, flooded gum and dead marri. Five of the 36 trees were found to contain hollows, however all of the observed hollows were assessed as being unsuitable for use by black cockatoos for nesting purposes due to small size, orientation and/or height above ground level (Harewood 2015). There was no evidence to suggest that the observed hollows within the site had previously or were currently being used by black cockatoos for nesting purposes.

Of the 36 potential black cockatoo breeding habitat trees identified within the site, 27 are contained within the 1.36 ha area of marri woodland. The remaining nine potential black cockatoo breeding habitat trees are scattered across the site. It is expected that six potential black cockatoo breeding habitat trees located adjacent to the ephemeral creek will be retained within the reserve for POS and drainage.

Based on the findings of the targeted black cockatoo survey, the site is not considered to support any existing breeding activity and is therefore unlikely to represent a locally or regionally significant breeding area. It is more likely that any black cockatoo breeding in the area would occur within the Darling Range, which is situated in proximity to the site and supports extensive areas of known black cockatoo breeding, foraging and roosting habitat.

Site specific black cockatoo roosting habitat considerations

Black cockatoos aggregate in groups at night to roost, generally within groves of large, tall trees. No existing roosting trees nor any evidence of roosting activity was positively identified within the site (Harewood 2015). Groups of large trees within the site could be considered to potentially support black cockatoo roosting, however there are no previous roosting records in or near the site, with the nearest known roosting site located to the east within the Darling Range.

Overall vegetation within the site is considered to provide marginal potential roosting habitat, which is considered unlikely to be utilised by black cockatoos given the historical distribution of known roosting sites. This conclusion is supported by a lack of visual evidence to suggest any trees within the site were used by black cockatoos for roosting purposes, such as branch clippings, droppings or moulted feathers.

Summary of the potential impacts of the Proposed Action on black cockatoo species

Given the majority of the site is proposed to be cleared to facilitate urban development, the information provided above indicates that the impacts of the Proposed Action on the three Threatened species of black cockatoo include:

- Clearing of up to 1.56 ha of black cockatoo foraging habitat, comprised of 1.36 ha of quality foraging habitat and up to 0.2 ha of lower quality foraging habitat. This habitat has been used by CBC and FRTBC species.
- Clearing of 1.36 ha of potential black cockatoo breeding habitat which contains 27 potential black cockatoo breeding habitat trees, in addition to three potential black cockatoo breeding habitat trees scattered across the "Parkland Cleared" areas of the site. Only five of the 36 potential black cockatoo breeding habitat trees identified within the site contain hollows and none of these hollows are of suitable size to support black cockatoo nesting. There is no known breeding activity within or in close proximity of the site.

3.1 (e) Listed migratory species

Description

The EPBC Act Protected Matters Search Tool identified five EPBC Act listed migratory species as having the potential to occur within or in proximity to the site, as outlined in **Table 7**. Three listed migratory species were considered to possibly utilise habitat within the site on occasion, however no direct or indirect observations of their presence within the site was recorded (Harewood 2015). No other migratory species listed under the EPBC Act are considered likely to occur within the site.

Table 7: *EPBC Act listed migratory species potentially occurring within or in proximity to the site.*

SPECIES NAME	COMMON NAME	EPBC ACT STATUS	LIKELIHOOD OF OCCURRENCE WITHIN SITE	LIKELIHOOD OF IMPACT FROM PROPSED ACTION	RESASONING
MARINE BIRDS					
Apus pacificus	Fork-tailed Swift	Migratory	Unlikely	Unlikely	Not recorded on the site, entirely aerial and largely independent of terrestrial habitats.
TERRESTRIAL SPECIES					
Merops ornatus	Rainbow Bee-eater	Migratory	Possible	See 'Nature and extent of likely impact' below	See 'Nature and extent of likely impact' below
WETLAND SPECIES					
Ardea alba	Great Egret	Migratory	Possible	See 'Nature and extent of likely impact' below	See 'Nature and extent of likely impact' below
Ardea ibis	Cattle Egret	Migratory	Possible	See 'Nature and extent of likely impact' below	See 'Nature and extent of likely impact' below
Pandion haliaetus	Osprey	Migratory	Unlikely	Unlikely	No observations recorded and no suitable habitat occurs within the site.

Nature and extent of likely impact

Rainbow Bee-eater (Merops ornatus)

The Rainbow Bee-eater was not observed within the site, however suitable potential habitat was recorded (Harewood 2015). This species is distributed across much of the Australian mainland and breeds throughout most of its range. It occurs mainly in open forests, woodlands, shrublands and in cleared or semi-cleared habitats, including areas of human habitation (Morcombe 2004). The species is a common seasonal visitor to the south west and a small number of individuals may possibly forage and roost onsite at times.

The Proposed Action is not expected to result in a significant impact on this species, and would be associated with the loss or modification of a very small area of natural habitat (Harewood 2015). The species can be expected to continue to utilise the general area despite any development. Habitat loss is not considered to be one of the key threatening processes for this species (Morcombe 2004) and as such any impact from development within the site would not be expected to be significant.

Great Egret (Ardea alba)

This species of egret commonly inhabits wetlands, flooded pasture, dams, estuarine mudflats, mangroves and reefs (Morcombe 2004). The species may very occasionally utilise the seasonal creek line present within the site, however this would provide marginal habitat at best. Breeding would not occur within the site (Harewood 2015). Given the marginal nature and small area of potential habitat within the site, in addition to the high availability of suitable habitat in close proximity to the site, the Proposed Action is not expected to result in a significant impact on this species.

Cattle Egret (Ardea ibis)

This species of egret is most often seen in association with cattle and commonly inhabits pastures with tall grasses, shallow open wetlands and mudflats (Morcombe 2004). The species may very occasionally utilise the ephemeral creek line present within the site, however this would provide marginal habitat at best. Breeding would not occur within the site (Harewood 2015). Given the marginal nature and small area of potential habitat within the site, in addition to the high availability of suitable habitat in close proximity to the site, the Proposed Action is not expected to result in a significant impact on this species.

3.1 (f) Commonwealth marine area

Description

The Proposed Action is not within a Commonwealth marine area.

Nature and extent of likely impact

Not applicable.

3.1 (g) Commonwealth land

Description

The Proposed Action is will be undertaken within freehold landholdings and will not impact upon on Commonwealth land.

Nature and extent of likely impact

Not applicable.

3.1 (h) The Great Barrier Reef Marine Park

Description

The Proposed Action is not within the Great Barrier Reef Marine Park.

Nature and extent of likely impact

Not applicable.

3.1 (i) A water resource, in relation to coal seam gas development and large coal mining development

Description

The Proposed Action is not related to coal seam gas development or large coal mining development.

Nature and extent of likely impact

Not applicable.

3.2 Nuclear actions, actions taken by the Commonwealth (or Commonwealth agency), actions taken in a Commonwealth marine area, actions taken on Commonwealth land, or actions taken in the Great Barrier Reef Marine Park

3.2 (a)	**Is the proposed action a nuclear action?**	**X**	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment		

3.2 (b)	**Is the proposed action to be taken by the Commonwealth or a Commonwealth agency?**	**X**	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment		

3.2 (c)	**Is the proposed action to be taken in a Commonwealth marine area?**	**X**	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(f))		

3.2 (d)	**Is the proposed action to be taken on Commonwealth land?**	**X**	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(g))		

3.2 (e)	**Is the proposed action to be taken in the Great Barrier Reef Marine Park?**	**X**	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(h))		

3.3 Other important features of the environment

3.3 (a) Flora and fauna

Flora

A spring flora and vegetation survey incorporating the site was conducted across the greater LSP area by ATA Environmental (now Coffey Environments) on 7 September 2005. The survey report was updated in June 2009 by Coffey Environments to support the lodgement of the LSP. A total of 100 plant species were recorded in the greater study area, of which 60 were native and 40 were introduced or non-endemic planted species. The spring flora and vegetation survey did not identify any flora species of state or federal conservation significance within the site or the greater LSP area. The results of the spring flora and vegetation survey are further discussed in **Section 3.3 (c)** below.

Fauna

ATA Environmental conducted a desktop fauna assessment in 2005 to identify any species of state or federal conservation significance which potentially occur or were known to occur within the LSP area. The results of this desktop fauna assessment were reported in the *Environmental Appraisal* document (Coffey Environments 2009b) to support the LSP. A subsequent black cockatoo assessment was undertaken in February 2005 by ATA Environmental across the majority of the LSP area and a number of adjacent areas of bushland. In regard to the site, the black cockatoo targeted survey incorporated only Lot 9049. The survey aimed to identify trees which contained hollows large enough for black cockatoo nesting however none were located within Lot 9049.

In August 2015, an additional fauna assessment was undertaken by Greg Harewood (a qualified zoologist) across Lots 9049, 9063 and 9073. This assessment involved both a level 1 fauna survey and an additional level 2 targeted black cockatoo survey. This assessment was undertaken in addition to the previous fauna survey in order to ensure a complete and robust analysis of fauna species occurring within the site was completed.

Harewood (2015) identified that remnant vegetation onsite is almost totally represented by marri trees either as scattered individuals or in small groves. A significant number of non-endemic eucalypt species, in addition to exotic trees (palms and pines), were also observed across the survey area. Native midstorey and understorey was found to be absent across the site except for areas along the ephemeral creek, which have been subject to revegetation works.

Based on site specific observations, three general vegetation communities were identified as occurring within the site, as outlined in **Table 8** and shown in **Figure 3**.

Table 8: *Vegetation communities identified within the site (Harewood 2015)*

VEGETATION COMMUNITY	DESCRIPTION	APPROXIMATE AREA
Parkland cleared	Introduced grassland with scattered endemic and planted non-endemic and exotic trees. Also incorporates a highly degraded constructed drain dominated by *Typha*.	1.82 ha
Marri woodland	Marri woodland over introduced grasses with some scattered non-endemic and exotic trees.	1.36 ha
Open woodland over revegetated open shrubland	Open woodland over revegetated open shrubland along the ephemeral creek (area of current revegetation within existing POS).	0.56 ha

Apart from two Threatened species of black cockatoo (CBC and FRTBC), no other species of state and/or federal conservation significance were identified as occurring within the site during the survey. However, one species of state conservation significance, *Falco peregrinus* (Peregrine Falcon) (Schedule 4 of the *Wildlife Conservation Act 1950*), was considered to potentially utilise the site as part of a larger home range, however no potential nest sites were observed (Harewood 2015).

With respect to vertebrate fauna in general, no significant impacts are anticipated as a consequence of undertaking the Proposed Action given the limited extent and highly disturbed nature of available habitat within the site. The loss of some small areas of degraded habitat may occur, however the associated impacts (if any) would be minor, as most species are common and widespread, with most if not all likely to contain secure populations in nearby reserves. No overall change in their conservation status is anticipated, despite a possible localised reduction in habitat extent. There are substantial areas of similar habitat in nearby areas including some nature reserves/regional parks and most, if not all species which utilise the site will persist in these locations despite any future development.

3.3 (b) Hydrology, including water flows

Groundwater

The *Local Water Management Strategy* (LWMS) (JDA 2009) prepared for the site indicated that the superficial aquifer underlying the site and greater Byford locality consists of clayey sediments of Guildford Clay with a maximum thickness of 20 m. As a result, the aquifer exhibits poor hydraulic conductivity and the region is characterised by extensive surface flows through an integrated network of constructed drains, ephemeral creeks and other waterways.

Groundwater monitoring across the LSP area was undertaken between September 2005 and August 2006, the results of which were correlated with four nearby monitoring bores managed by the Department of Water. Groundwater levels across the site were inferred to range from approximately 44 m AHD in the east to 42 m AHD in the west (JDA 2011).

Surface Water

Two unnamed watercourses intersect the site as shown in **Figure 2**, both of which have a general westerly net-flow direction. The ephemeral creek located in the south-west of the site and the constructed drain located in the north of the site merge into a consolidated creek adjacent to the western boundary of Lot 9049 and enters the wider LSP area, before entering a network of natural watercourses and constructed open drains. This drainage network conveys surface run-off from the site, in addition to upstream areas within Brickwood Reserve, which is critical to the hydrographic system of the locality given the poor hydraulic conductivity of soils in the area. This drainage network connects with the Serpentine River 16 km to the south-west, which ultimately flows to the Peel-Harvey Estuary.

Urban development associated with the Proposed Action will adopt water sensitive urban design techniques to manage stormwater, ensuring there are no adverse impacts on hydrological features identified within the site. An *Urban Water Management Plan* has been prepared by JDA (2011) and approved by the SSJ, which supports the proposed subdivisional works and guides the stormwater management approach for the site. This includes the retention of both watercourses within the site, in order to ensure pre-development flows across the site are maintained in the post-development scenario. Bank stabilisation measures including revegetation works have been undertaken to date along the ephemeral creek, and will also be implanted along the constructed drain during subdivision.

Wetlands

The Armadale Palusplain Multiple Use Wetland (UFI 15797) is mapped as occurring across the site and the greater LSP area. This does not carry conservation significance and generally indicates the occurrence of groundwater close to the surface.

No wetlands of conservation significance occur within the site, however the Brickwood Reserve Conservation Category Wetland (UFI 15452) is located in close proximity, abutting the eastern side of Warrington Road. The proposed action will not impact upon this wetland, given it is hydrologically upstream of the site, however it is important that the pre-development surface flows of the site are maintained post-development to avoid any upstream impacts. This will be achieved by retaining the ephemeral creek and constructed drain to maintain pre-development flow volumes.

3.3 (c) Soil and Vegetation characteristics

Soil

The site is located in the eastern portion of the Swan Coastal Plain, near the base of the Darling escarpment. This physiographic region is named the Pinjarra plain, which is generally described as a valley-flat alluvial plain, which consists predominantly of clayey alluvium that has been transported by rivers and streams from the adjacent Darling Plateau (McPherson and Jones 2005).

Landform and soil mapping undertaken by Churchward and McArthur (1980) indicates that the site is within the Guildford soil association, which is characterised by flat plains with medium textured deposits and yellow duplex soils.

The *Perth Metropolitan Region 1: 50,000 Environmental Geology Series, Perth (Armadale Part Sheets 2033 I and 2133 IV)* (Gozzard 1983) shows the site is comprised of sandy clay, which is described as white, grey to brown, fine to coarse, sub-angular to rounded, clay of moderate plasticity with gravel and silt layers near the scarp, of alluvial origin.

Vegetation

Regional vegetation complex mapping for the Swan Coastal Plain undertaken by Heddle *et al.* (1980) indicates that the Guildford complex occurs across the site, which is described as a mixture of open forest to tall open forest of *Corymbia calophylla*, *Eucalyptus wandoo*, *Eucalyptus marginata* and woodland of *Eucalyptus wandoo* (with rare occurrences of *Eucalyptus lane-poolei*). Minor components of the complex include *Eucalyptus rudis* and *Melaleuca rhaphiophylla*.

The 2005 spring flora and vegetation survey undertaken by ATA Environmental to support the preparation of the LSP described vegetation within the site as a woodland of *Corymbia calophylla* (marri) with occasional **Melia azedarach* (cape lilac) and *Callistemon phoeniceus* (bottlebrush) over introduced grasses. ATA Environmental assessed the vegetation to be in 'Good' condition in accordance with the Keighery (1994) vegetation condition rating scale.

Based on the results of more recent field investigations and a review of recent aerial photography, it is more appropriate to categorise vegetation within the site into the following communities (as shown in **Figure 3**):

- Cleared/parkland cleared areas with scattered remnant endemic, and planted non-endemic eucalypt and exotic trees over introduced grasses in 'Completely Degraded' condition (1.82 ha).
- Marri woodland with some planted non-endemic eucalypt and exotic trees over introduced grasses in 'Completely Degraded' condition (1.36 ha).
- Open woodland over revegetated open shrubland in 'Degraded' condition abutting the ephemeral creek (0.56 ha).

The poor vegetation condition within the site is primarily due to the absence of native understorey or mid-storey species, as a result of historical clearing to support agricultural and special rural land uses. Only areas adjacent to the ephemeral waterway are considered to be in a relatively better condition ('Degraded') as a result of revegetation works completed to date. These general descriptions of vegetation communities within the site align with the fauna habitat types identified by Harewood (2015).

3.3 (d) Outstanding natural features

There are no outstanding natural features within the site.

3.3 (e) Remnant native vegetation

The site occurs within the broader Guildford regional vegetation complex (Heddle *et al.* 1980), which has historically been extensively cleared across the swan coastal plain for urban, agricultural and mining land uses. Approximately 5.3% of the original pre-European extent of the Guildford complex remains across the Swan Coastal Plain, however vegetation within the site is not considered representative of this complex, given the extent of historical clearing across the site which has resulting in a general 'Parkland Cleared' vegetation structure, with introduced grasses and scattered exotic and non-endemic plants species. Mature marri trees within the site represent the remaining remnants of pre-European settlement vegetation.

3.3 (f) Gradient (or depth range if action is to be taken in a marine area)

The topography of the site is generally flat, with the exception of two shallow creeks which intersect the site. Available contour information indicates elevation across the site ranges from approximately 44 m Australian Height Datum (ADH) in the east to 41 m AHD in the west.

3.3 (g) Current state of the environment

The site has historically been subject to agricultural and rural-residential land uses and as such extensive clearing of native understorey and midstorey vegetation has been undertaken. This has resulted in the highly disturbed condition of the site at present, with remnant vegetation limited to mature marri trees. The understorey of the site is dominated by weeds and introduced grasses.

Revegetation works along the ephemeral creek have been completed by the Proponent to date, resulting in the planting of native understorey and mid-storey species, which has also served to stabilise the creek bank. These works have contributed to establishing a more ecologically functional waterway and will be extended to include the constructed drain during subdivisional works.

3.3 (h) Commonwealth Heritage Places or other places recognised as having heritage values

No Commonwealth or other heritage places occur within the site.

3.3 (i) Indigenous heritage values

No Registered Aboriginal Heritage Sites or Other Heritage Places occur within the site.

3.3 (j) Other important or unique values of the environment

The agricultural and special rural land uses historically undertaken across the eastern portion of the Swan Coastal Plain, including the Byford locality, have led to extensive clearing of native vegetation, with limited amounts of bushland with natural community structure and native species richness remaining. As a result, contiguous areas of intact native vegetation remaining in the locality are less common and represent significant ecological value, particularly in regard to flora and fauna habitat. Vegetation within the site is not considered to represent such values, given the significant historical disturbance involving extensive understorey and midstorey clearing, which has diminished the natural community structure and native species richness within the site. Two native vegetation reserves in close proximity to the site do represent areas of locally and regionally significant bushland, which have been afforded various forms of environmental protection through the statutory planning process to ensure their ecological values are conserved in the long-term.

Brickwood Reserve (50 ha) and Cardup Nature Reserve (75 ha), the locations of which are shown in **Figure 1**, have been identified as having conservation value and as such are reserved for "Parks and Recreation" under the MRS and comprise Bush Forever Sites no. 321 and 352 respectively. Furthermore, both Reserves are listed as Conservation Category Wetlands by the Department of Parks and Wildlife. These statutory mechanisms ensure both Reserves are protected from direct and indirect impacts associated with land development, allowing for the long-term provision of ecological functions.

Vegetation within both Reserves is structured in prominent remnant communities, with a number of state and federal listed Threatened Ecological Communities identified as occurring within Brickwood Reserve, including *Corymbia calophylla – Kingia Australia woodlands on heavy soils of the Swan Coastal Plain*. In addition, occurrences of CBC and FRTBC have previously been recoded within the Brickwood Reserve (SSJ 2009), and both Reserves are mapped as containing potential Carnaby's black cockatoo foraging habitat (DEC 2011). The ecological values of both Reserves are of local and regional significance, given the quality of vegetation within both Reserves and the heavily degraded nature of adjacent areas and the broader region.

In addition to statutory planning protection, the ownership and management of remnant bushland areas contribute to their protection and long-term survival. For example, both Brickwood Reserve and Cardup Nature Reserve are held in Crown Land, with the management of each Reserve vested to the Shire of Serpentine Jarrahdale and the Department of Parks and Wildlife respectively. This allows for structured and thorough management of both Reserves, without the threat of potential future clearing and/or development associated with freehold land. As part of their management of Brickwood Reserve, SSJ prepared a managements plan for the Reserve in 2009, detailing the existing characteristics and future management practices of the Reserve.

In consideration of the above, areas of environmental significance with local and/or regional ecological value across the Byford region have been identified and afforded appropriate protections and conservation measures. The site has not been afforded any such protective measures and is therefore considered unlikely to contain any environmental values of local or regional significance. As such, the Proposed Action will not impact upon any identified locally or regionally significant environmental values.

The nearby location of two Reserves containing contiguous areas of remnant bushland in close proximity to the site will minimise any loss of environmental values within the site as a result of implementing the Proposed Action, particularly in regard to regional fauna habitat availability. The significant extent, quality and conservation management of locally and regionally significant vegetation provides high quality habitat for fauna species in proximity to the site.

3.3 (k) Tenure of the action area (eg freehold, leasehold)

The two lots incorporating the site are owned in freehold by LWP Byford Syndicate Pty Ltd.

3.3 (l) Existing land/marine uses of area

The site is not currently used for any specific purpose.

3.3 (m) Any proposed land/marine uses of area

The site is proposed for urban land use.

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4 Environmental outcomes

The implementation of the Proposed Action will result in the following environmental outcomes:

- The clearing of up to 1.56 ha of black cockatoo foraging habitat, which has been used by CBC and FRTBC species. This habitat is comprised of:
    - 1.36 ha of quality foraging habitat associated with an area of marri woodland.
    - Up to 0.2 ha of lower quality foraging habitat associated with scattered paddocks trees.

- The clearing of 1.36 ha of potential black cockatoo breeding habitat. There is no known breeding activity within or in close proximity to the site. This habitat is comprised of:
    - 1.36 of potential breeding habitat associated with an area of marri woodland, containing 27 potential black cockatoo breeding habitat trees, none of which contain hollows of a suitable size to allow for black cockatoo nesting.
    - An additional three potential black cockatoo breeding habitat trees scattered across the "Parkland Cleared" areas of the site, none of which contain hollows of a suitable size to allow for black cockatoo nesting.

- The retention of six potential black cockatoo breeding habitat trees within a reserve for POS and drainage, none of which contain hollows of a suitable size to allow for black cockatoo nesting.

- The revegetation of the ephemeral creek and constructed drains, which will incorporate known black cockatoo foraging species.

These environmental outcomes will be realised through the urban development of the site in accordance with the proposed subdivision plan (**Attachment B**).

5 Measures to avoid or reduce impacts

Measures to avoid or reduce environmental impacts potentially arising from the Proposed Action have been considered spatially in terms of the proposed subdivision layout (see **Attachment B**), as framed by *The Glades Local Structure Plan* design, which forms the statutory guide for the proposed development. The proponent has considered the significant environmental values within the site throughout the planning and design process and in particular has sought to avoid and mitigate environmental impacts associated with the proposed subdivision through the provision of a 1.43 ha reserve for POS and drainage, as shown in **Figure 2**. It is anticipated that this will allow for the following outcomes:

- The retention of six potential black cockatoo breeding habitat trees along the ephemeral creek and constructed drain.
- The retention of the ephemeral creek and associated foreshore area, which has previously been revegetated with native understorey and midstorey species.
- The retention of the constructed drain and associated foreshore area.

This process considered the impact on environmental values within the site in a holistic approach, and was not specific to MNES, in order to comply with the state statutory planning process and environmental approval requirements. This approach was undertaken due to the significant environmental and hydrological value associated with the watercourses and foreshore areas, as discussed in **Section 3.3 (b)**. The watercourses were prioritised for retention in consideration of the following factors:

- The watercourses provide important hydrological function within the site and are required to be retained to maintain the surface water flows across the site. They also provide logical linkages for terrestrial fauna through an otherwise urbanised area and are suitable for extensive revegetation works to boost this ecological function.
- Mature trees in the central portion of the site (which are proposed to be cleared as described in this referral) were considered overall to provide less environmental value than the watercourses given;
    - The extensive distribution of planted non-endemic eucalypt and exotic tree species throughout this area.
    - The absence of remnant native understorey and midstorey species, and the introduction of exotic grass species, resulting in a 'Parkland Cleared' community structure.
    - The 'Completely Degraded' condition of vegetation
- This design outcomes allows for some impacts of the Proposed Action to be avoided through the retention of six potential black cockatoo breeding habitat trees adjacent to the ephemeral creek and constructed drain.

The provision of the reserve for POS and drainage also provides opportunities to reduce any impacts on MNES through proposed revegetation works associated with the ephemeral creek and constructed drain, which will involve planting of native endemic understorey, midstorey and overstorey species. This will enhance the ecological value of these areas from their currently degraded form and will include the planting of species which support various types of black cockatoo habitat, including:

- *Corrymbia calophylla* (marri)
- *Eucalyptus rudis* (flooded gum)
- *Eucalyptus wandoo* (wandoo)
- *Grevillea bipinnatifida* (fuchsia grevillea)
- *Banksia nivea* (joneypot dryandra)

The Proponent has already completed part of the specified revegetation works to date, specifically along the ephemeral creek. The remainder of the outstanding revegetation works will be finalised and extended to the foreshore area of the constructed drain during the implementation of the Proposed Action.

6 Conclusion on the likelihood of significant impacts

6.1 Do you THINK your proposed action is a controlled action?

X	No, complete section 6.2
	Yes, complete section 6.3

6.2 Proposed action IS NOT a controlled action.

The impacts of the Proposed Action on black cockatoos will be indirect, associated with the loss of known foraging habitat and potential breeding habitat as a result of clearing. The habitat which will be cleared is not considered to be of local or regional significance given the availability of more intact and extensive areas of black cockatoo habitat in close proximity to the site; specifically within Brickwood Reserve, Cardup Nature Reserve and extensive forested areas of the Darling Range. Given this, in light of the quality and intactness of identified habitat within the site being marginal, and the significant extent and quality of both foraging and potential breeding habitat occurring within the wider locality and region, it is considered unlikely that the Proposed Action will have a significant impact on any of the three Threatened black cockatoo species.

The Department of Environment's *Significant Impact Guidelines 1.1* outline the criteria for what constitutes a significant impact on a Matter of National Environmental Significance. An action is likely to have a significant impact on a MNES if it triggers any of the nine criteria outlined in the guidelines. The potential impacts of the Proposed Action have been assessed against these criteria in relation to potential impacts on the three Threatened species of black cockatoo.

Table 9 below lists the significant impact criteria for 'Endangered' species (CBC) and 'Vulnerable' species (FRTBC and BBC) and provides comment on the Proposed Action in relation to each criteria. It is not anticipated that the Proposed Action will have a significant impact on any MNES, and as such is **not** considered to be a 'Controlled Action'.

Table 9: *Significant impact criteria for three Threatened species of black cockatoo in relation to the Proposed Action*

SIGNIFICANT IMPACT CRITERIA FOR 'ENDANGERED' SPECIES (CBC)	SIGNIFICANT IMPACT CRITERIA FOR 'VULNERABLE' SPECIES (FRTBC & BBC)	LIKELIHOOD OF SIGNIFICANT IMPACT	REASONSING
Lead to a long term decrease in the size of a population	Lead to a long-term decrease in the size of an important population of a species	Unlikely	In order to lead to a long term decrease in the size of a population (CBC) or an important population (BBC or FTBC) the Proposed Action would need to bring about a sustained reduction in birth rates and/or a sustained increased in mortality rates for any of the species. Given there are no records of black cockatoo breeding occurring in or near the site, the Proposed Action is unlikely to disrupt any existing breeding activity that would result in a sustained reduction in birth rates of any of the three black cockatoo species. In terms of mortality rates, the Proposed Action is very unlikely to increase mortality rates through direct bird deaths (vehicle strikes, hunting etc.) and unlikely to increase mortality rates indirectly through a reduction of foraging resources that would affect fledgling or adult bird health/survival, due to the significant amount of existing foraging habitat in proximity to the site (1618 ha within 5 km and 8,399 ha within 10 km). Therefore the proposed action in unlikely to lead to a long term decrease in the size of a CBC population or in an important population of BBC or FRTBC.
Reduce the area of occupancy of the species	Reduce the area of occupancy of an important population	Unlikely	Black cockatoos will continue to use the general area following the implementation of the Proposed Action, given the high availability of quality foraging habitat adjacent to and in proximity to the site (for example, 1618 ha of potential CBC foraging habitat within 5 km and 8,399 ha within 10 km of the site). It is considered extremely unlikely that the clearing of a relatively small area of black cockatoo foraging habitat and a small number of potential habitat trees within the site would lead to a reduction in the area of occupancy of the CBC as a species or an important population of FRTBC or BBC.

SIGNIFICANT IMPACT CRITERIA FOR 'ENDANGERED' SPECIES (CBC)	SIGNIFICANT IMPACT CRITERIA FOR 'VULNERABLE' SPECIES (FRTBC & BBC)	LIKELIHOOD OF SIGNIFICANT IMPACT	REASONSING
Fragment an existing population into two or more populations	Fragment an existing important population into two or more populations	Unlikely	Black cockatoos are highly mobile and known to routinely cover large distances that do not require continuous habitat coverage. The site covers an area of 3.74 ha and is situated close to a number of large areas of potential black cockatoo foraging habitat which are protected through Bush Forever, State Forest, suitable MRS zonings or local reserves. The implementation of the Proposed Action will not fragment an existing population of CBC or an existing important population of BBC or FRTBC into two or more populations.
Adversely affect habitat critical to the survival of the species	Adversely affect habitat critical to the survival of a species	Unlikely	Habitat critical to survival for the CBC can be summarised as (DPaW 2013): • The eucalypt woodlands that provide nest hollows used for breeding, together with nearby vegetation that provides feeding, roosting and watering habitat that supports successful breeding. • Woodland sites known to have supported breeding in the past and which could be used in the future, provided adequate nearby food and/or water resources are available or are re-established; • In the non-breeding season the vegetation that provides food resources as well as the sites for nearby watering and night roosting that enable the cockatoos to effectively utilise the available food resources. The habitat critical to survival of important populations of BBC and FRTBC comprises all marri (*Corymbia calophylla*), karri (*Eucalyptus diversicolour*) and jarrah (*Eucalyptus marginata*) forests, woodlands and remnants in the south-west of Western Australia receiving more than 600 mm of annual average rainfall (DEC 2008). Based on the above definitions, habitat within the site is not considered to be habitat critical to the survival of any of the three black cockatoo species. Whilst vegetation within the site does incorporate large marri trees, the condition of the vegetation is considered to be 'Completely Degraded' and does not represent an intact remnant vegetation community. The site contains a very small extent of potential future breeding habitat, none of which show any evidence of use, and there is no records of breeding or roosting occurring within the site. Therefore the Proposed Action is unlikely to adversely affect habitat critical to the survival of any of the three Threatened species of black cockatoo.
Disrupt the breeding cycle of a population	Disrupt the breeding cycle of an important population	Unlikely	There are no known occurrences of black cockatoo breeding within or near the site. There are known occurrences in the wider region, specifically within Befordable approximately 5.5 km north east of the site, amongst numerous other records along the Darling Range. It is considered unlikely that the site would be used for breeding purposes given the lack of suitably-sized black cockatoo nesting hollows and the condition of the available habitat, which was confirmed by Harewood in the 2015 fauna assessment. Vegetation to the east of the site along the Darling Range provides for significant areas of quality foraging habitat and fresh water sources (both of which are vital to support for black cockatoo breeding), and are therefore considered to be significantly more important areas of breeding habitat. Therefore the Proposed Action is unlikely to disrupt the breeding cycle of either a population of CBC or an important population of BBC or FRTBC.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely	Decline in this sense should be interpreted to mean a decline in the distribution and abundance of any of the three species of black cockatoo. The Proposed Action involves the clearing of up to approximately 1.56 ha of black cockatoo foraging habitat and up to 1.36 ha of potential breeding habitat, including 30 potential black cockatoo breeding habitat trees. Given this is a small area in contrast to extensive areas of black cockatoo habitat close to the site (1618 ha within 5 km and 8,399 ha within 10 km) the Proposed Action is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that any of the three species of black cockatoo is likely to decline.

SIGNIFICANT IMPACT CRITERIA FOR 'ENDANGERED' SPECIES (CBC)	SIGNIFICANT IMPACT CRITERIA FOR 'VULNERABLE' SPECIES (FRTBC & BBC)	LIKELIHOOD OF SIGNIFICANT IMPACT	REASONSING
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Unlikely	The key consideration here would be the introduction of species that are known to compete with black cockatoos for nesting hollows. These species include the native and introduced corellas (*Cacatua* species), galahs (*Cacatua roseicapilla*), Australian shelducks (*Tadorna tadornoides*), Australian wood ducks (*Chenonetta jubata*) and feral European honey bees (*Apis mellifera*). The Proposed Action is unlikely to either introduce or further establish any of these species within the site or in immediate surrounding areas that also support potential black cockatoo breeding habitat.
Introduce disease that may cause the species to decline	Introduce disease that may cause the species to decline	Unlikely	CBC is potentially susceptible to diseases such as beak and feather disease virus (BFDV), avian polyomavirus (APV) and chlamydophilosis. The Proposed Action is very unlikely to be responsible for the introduction of these diseases or increase the susceptibility of birds to these. *Phytophthora cinnamomi* (dieback), other soil-borne, foliar and canker pathogens, and insects can affect the health of black cockatoo habitat. The Proposed Action is very unlikely to be responsible for the introduction of these or increase the susceptibility of habitat to these given the extent of historic disturbance within the site. The Proposed Action is unlikely to introduce disease/s that may cause any of the three species of black cockatoo to decline.
Interfere with the recovery of the species	Interfere substantially with the recovery of the species	Unlikely	The recovery objective for Carnaby's black cockatoo is *"to stop further decline in the distribution and abundance of Carnaby's cockatoo by protecting the birds throughout their life stages and enhancing habitat critical for survival throughout their breeding and non-breeding range, ensuring that the reproductive capacity of the species remains stable or increases"* (DPaW 2013) Based on the minor loss of black cockatoo foraging and potential breeding habitat, and the high local and regional availability of quality black cockatoo habitat, the Proposed Action is not likely to interfere with the recovery of the CBC. The recovery objective for the BBC and FRTBC is *"to stop further decline in the breeding populations of Baudin's Cockatoo and the Forest Red-tailed Black Cockatoo and to ensure their persistence throughout their range in the south-west of Western Australia"* (DEC 2008). Based on the minor loss of black cockatoo foraging and potential breeding habitat, and the high local and regional availability of quality black cockatoo habitat, the Proposed Action is not likely to interfere with the recovery of the BBC or FRTBC.

6.3 Proposed action IS a controlled action

	Matters likely to be impacted
	World Heritage values (sections 12 and 15A)
	National Heritage places (sections 15B and 15C)
	Wetlands of international importance (sections 16 and 17B)
	Listed threatened species and communities (sections 18 and 18A)
	Listed migratory species (sections 20 and 20A)
	Protection of the environment from nuclear actions (sections 21 and 22A)
	Commonwealth marine environment (sections 23 and 24A)
	Great Barrier Reef Marine Park (sections 24B and 24C)
	A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E)
	Protection of the environment from actions involving Commonwealth land (sections 26 and 27A)
	Protection of the environment from Commonwealth actions (section 28)
	Commonwealth Heritage places overseas (sections 27B and 27C)

7 Environmental record of the responsible party

		Yes	No
7.1	**Does the party taking the action have a satisfactory record of responsible environmental management?** **Provide details** LWP Byford Syndicate Pty Ltd is the entity responsible for the development of the site and forms part of LWP Property Group Pty Ltd, who have extensive experience in the Western Australian urban development industry. In undertaking its projects, LWP Byford Syndicate Pty Ltd has a satisfactory record of responsible environmental management.	**X**	
7.2	**Has either (a) the party proposing to take the action, or (b) if a permit has been applied for in relation to the action, the person making the application - ever been subject to any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources?** **If yes, provide details**		**X**
7.3	**If the party taking the action is a corporation, will the action be taken in accordance with the corporation's environmental policy and planning framework?** **If yes, provide details of environmental policy and planning framework** LWP Byford Syndicate Pty Ltd do not have a specific internal environmental policy and planning framework, but works in accordance with State and Federal environmental and planning policies. LWP Byford Syndicate Pty Ltd engages a range of technical professionals (environmental, planning, engineering and design) to provide advice and support, and to guide the development of their projects.	**X**	
7.4	**Has the party taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?** **Provide name of proposal and EPBC reference number (if known)**		**X**

8 Information sources and attachments

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* Seddon, G., 2004, *Sense of Place: A Response to an Environment: The Swan Coastal Plain*, Western Australia, Melbourne.

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* Western Australian Planning Commission (WAPC) 2010, *Directions 2031 and Beyond: Metropolitan Planning Beyond the Horizon*, Department of Planning and Western Australian Planning Commission, Western Australia.

* Western Australian Planning Commission (WAPC) 2015, *Draft South Metropolitan Peel Sub-regional Planning Framework*, Department of Planning and Western Australian Planning Commission, Western Australia.

8.2 Reliability and date of information

ATA Environmental (now Coffey Environments) conducted a spring flora and vegetation survey in September 2005 across *The Glades Local Structure Plan* area, which incorporated the site. The survey methodology aligns with the requirements of EPA Guidance Statement No. 51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004). Whilst the survey was conducted some time ago, the general characteristics and land use of the site have not been altered to a degree which would undermine the findings of the survey. As such, the findings of the survey are considered to be representative of the current site conditions.

ATA Environmental also conducted a desktop fauna assessment and targeted black cockatoo assessment in September 2005 across *The Glades Local Structure Plan* area. Upon review of this survey, it was considered suitable to conduct an additional fauna assessment of the site which also incorporated a black cockatoo habitat assessment. This additional survey was conducted by Greg Harewood, a qualified zoologist, in August 2015 and provided a comprehensive and robust data source to determine the fauna values of the site, eliminating any uncertainty raised by data gaps in previous assessments. The additional survey allowed for detailed mapping of fauna habitat types and potential black cockatoo breeding habitat trees.

Overall, the environmental assessments and surveys conducted across the site and wider LSP to date are considered suitable to inform the preparation of this referral.

8.3 Attachments

		Attached	Title of attachment(s)
You must attach	figures, maps or aerial photographs showing the project locality (section 1)	**X**	**Figure 1** – Location Plan **Figure 2** – Site Plan **Attachment A –** Proposal Area Location (GIS files) **Attachment B (separate)** – Approved Local Structure Plan and Proposed Subdivision Plan
	GIS file delineating the boundary of the referral area (section 1)		
	figures, maps or aerial photographs showing the location of the project in respect to any matters of national environmental significance or important features of the environments (section 3)	**X**	**Figure 3** – Proposed Subdivision **Figure 4** – Vegetation Communities **Figure 5** – Potential Black Cockatoo Breeding Habitat Trees **Figure 6** – Regional Black Cockatoo Habitat Availability and Conservation Value
If relevant, attach	copies of any state or local government approvals and consent conditions (section 2.5)		
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 2.6)		
	copies of any flora and fauna investigations and surveys (section 3)	**X**	**Attachment C (separate)** – *Fauna Assessment Lots 9049, 9063 and 9079 Warrington Road, Byford South* (Harewood 2015)
	technical reports relevant to the assessment of impacts on protected matters that support the arguments and conclusions in the referral (section 3 and 4)		
	report(s) on any public consultations undertaken, including with Indigenous stakeholders (section 3)		

9 Contacts, signatures and declarations

Project title: Urban Development of Lots 9049 and 9063 - *The Glades*, Byford

9.1 Person proposing to take action

1. Name and Title	Danny Murphy (Managing Director)
2. Organisation	LWP Byford Syndicate Pty Ltd
3. EPBC Referral Number	N/A
4: ACN / ABN	117 550 553
5. Postal address	2 Doley Road, Byford WA 6122
6. Telephone	08 9525 0414
7. Email	Khowell@lwpproperty.com.au
8. Name of designated proponent (if not the same person at item 1 above and if applicable)	N/A
9. ACN/ABN of designated proponent (if not the same person named at item 1 above)	N/A
I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:	N/A
If you are small business entity you must provide the Date/Income Year that you became a small business entity:	N/A
I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations. 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:	N/A
Declaration	I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct. I understand that giving false or misleading information is a serious offence. I agree to be the proponent for this action. I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.
Signature	 Date 16/10/15

9.2 Person preparing the referral information (if different from 8.1)

Name	Jason Hick
Title	Director, Principle Environmental Consultant
Organisation	Emerge Environmental Services Pty Ltd (trading as Emerge Associates)
ACN / ABN (if applicable)	57 144 772 510
Postal address	Suite 4, 26 Railway Road, Subiaco, Western Australia, 6008
Telephone	08 9380 4988
Email	Jason.Hick@emergeassociates.com.au
Declaration	I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct. I understand that giving false or misleading information is a serious offence.
Signature	 Date 4/11/2015