



360
environmental



Conservation and Urban
Development of Part Lots 11
and 74 Beenyup Road,
Banjup

Section 38 Referral Supporting Document

Prepared for:

Aigle Royal Developments

June 2020

● people ● planet ● professional

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Table of Contents

1	Introduction	1
1.1	Purpose and Scope	1
1.2	Proponent	1
1.3	Environmental Impact Assessment Process	1
1.4	Other Approvals and Regulation	2
2	The Proposal	3
2.1	Background	3
2.2	Proposal Description	3
2.3	Justification of Development	5
3	Existing Environment	7
3.1	Climate	7
3.2	Topography	7
3.3	Regional Geology and Soils	7
3.4	Hydrogeology	8
3.5	Hydrology	10
3.6	Flora and Vegetation	11
3.7	Fauna	20
3.8	Reserves and Conservation Areas	25
3.9	Environmentally Sensitive Areas	25
3.10	Heritage	25
3.11	Site History	26
4	Stakeholder Engagement	28
4.1	Key Stakeholders	28
4.2	Stakeholder Consultation	28
5	Key Environmental Factors and Impact Assessment	29
5.1	Key Environmental Factor – Flora and Vegetation	29
5.2	Key Environmental Factor – Terrestrial Fauna	34
5.3	Key Environmental Factor – Inland Waters	37
6	Other Environmental Factors or Matters	42
7	Environmental Principles of the EP Act	44
8	Matters of National Environmental Significance and Offset Strategy	46
9	Alternatives Considered	48
10	Limitations	50
11	References	51

List of Tables

Table 1: Proponent Details.....	1
Table 2: Other State and Local Government Approvals.....	2
Table 3: Proposal Description	4
Table 4: Preliminary Key Proposal Characteristics	4
Table 5: Broad Vegetation Types within the Development Envelope and its State and Regional Representation (Government of Western Australia 2017).....	11
Table 6: Vegetation Complex within the Development Envelope and its State and Regional Representation (Webb <i>et al.</i> 2016).....	12
Table 7: Vegetation Association Descriptions and their Extent in the Development Envelope and Conservation Area (Combined) (360 Environmental 2016; 2017)	13
Table 8: Vegetation Associations within the Development Envelope (360 Environmental 2016; 2017).....	15
Table 9: Vegetation Condition and Extent in the Development Envelope (360 Environmental 2016).....	16
Table 10: Banksia Woodlands TEC Floristic Community Type and Extent within the Development Envelope	16
Table 11: Conservation Significant Flora Potentially Occurring within 2 km of the Development Envelope	18
Table 12: Weed Species Identified within the Development Envelope and Conservation Area (360 Environmental 2016)	19
Table 13: Conservation Significant Fauna Species Likelihood Assessment.....	20
Table 14: Black Cockatoo Potential Breeding Trees Recorded within the Development Envelope and Conservation Area (360 Environmental 2017b).....	23
Table 17: Aboriginal Registered Sites within the Vicinity of the Development Envelope (DPLH 2018).....	26
Table 18: Contaminated Sites within 1 km Radius of the Development Envelope (DWER 2018).....	26
Table 19: Assessment of other Environmental Factors	42

List of Figures

Figure 1: Site Location	57
Figure 2: Proposed MRS Amendment Area	58
Figure 3: Topography, Groundwater Contours, PDWSA	59
Figure 4: Soil Subsystems.....	60
Figure 5: Acid Sulfate Soils Risk	61
Figure 6: Hydrology.....	62
Figure 7: Surveyed Vegetation Associations and Condition	63
Figure 8: Floristic Community Types.....	64
Figure 9: Banksia Woodlands TEC Extent	65
Figure 10: Black Cockatoo Habitat Extent.....	66
Figure 11: Conservation Areas and Heritage Sites.....	67
Figure 12: Bush Forever 492 Vegetation Associations (Eco Logical 2017)	68
Figure 13: Bush Forever 492 Vegetation Condition (Eco Logical 2017)	69
Figure 14: Contaminated Sites	70
Figure 15a: Historical Imagery (1953).....	71
Figure 15b: Historical Imagery (1965).....	72
Figure 15c: Historical Imagery (1974).....	73
Figure 15d: Historical Imagery (1985).....	74
Figure 15e: Historical Imagery (1995).....	75
Figure 15f: Historical Imagery (2006).....	76
Figure 15g: Historical Imagery (2016).....	77

List of Appendices

Appendix A	Level 2 Flora and Vegetation Survey
Appendix B	Threatened Flora Survey
Appendix C	Black Cockatoo and Banksia Woodlands TEC Assessment
Appendix D	District/Local Water Management Strategy
Appendix E	Naturemap & PMST Database Search Reports
Appendix F	Eco Logical (2017) Biological Report – Bush Forever 492

1 Introduction

1.1 Purpose and Scope

The purpose of this document is to support a referral pursuant to Section 38 of the *Environmental Protection Act 1986* (EP Act) associated with the creation of conservation reserve, rezoning, and subdivision of part Lots 11 and 74 Beenyup Road, Banjup ('Development Envelope') (Figure 1). Aigle Royal Group (Aigle Royal) ('the proponent') propose to create a significant conservation area, residential development including supporting roads, Public Open Space (POS) and wetland buffer ('the Proposal').

The Development Envelope is partially zoned as 'Urban Deferred' and 'Rural – Water Protection' under the Perth Metropolitan Region Scheme (MRS) (Figure 2).

1.2 Proponent

Table 1: Proponent Details

Proponent Details	
Name	Aigle Royal Group
ABN	24 749 154 661
Postal Address	Level 8, 225 St Georges Terrace Perth WA 6000
Proponent Contact	Kris Kennedy Aigle Royal Level 8, 225 St Georges Terrace Perth WA 6000
Consultant Contact	Tamara Smith 360 Environmental 10 Bermondsey Street West Leederville WA 6007

1.3 Environmental Impact Assessment Process

A number of site-specific environmental investigations have been completed for the Development Envelope and Conservation Area, which include:

- Level 2 (detailed) in-season Flora and Vegetation Survey (360 Environmental, 15 and 16 September 2016) (Appendix A)
- Targeted Flora Survey (360 Environmental, 11 October 2017) (Appendix B)
- Black Cockatoo Habitat Assessment and Banksia Woodlands Swan Coastal Plain (SCP) Threatened Ecological Community (TEC) Assessment (360 Environmental, February 2017) (Appendix C)

- District Water Management Strategy (Ochre West, June 2017) (Appendix D).

1.4 Other Approvals and Regulation

1.4.1 State and Local Government Approvals

The Development Envelope is partially zoned as 'Urban Deferred' and 'Rural – Water Protection' under the MRS. To support the proposed urban development, the Development Envelope will require lifting of Urban Deferral and rezoning through an amendment of the MRS, structure plan and subdivision approval (Table 2).

Table 2: Other State and Local Government Approvals

Proposal Activity	Legislation	Regulatory Body
MRS Amendment	<i>Planning and Development Act 2005</i>	Western Australian Planning Commission (WAPC)
Structure Plan	<i>Planning and Development Act 2005</i>	WAPC
Subdivision and Development	<i>Planning and Development Act 2005</i> <i>Planning and Development Regulations 2009 WA</i>	WAPC

1.4.2 Commonwealth Government Approvals

The Proposal (which includes the Development Envelope) has been referred to the Commonwealth Department of Agriculture Water and Environment (DAWE) pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Ref: 2017/7923).

The Proposal has received a 'Controlled Action' for assessment by preliminary documentation for listed threatened species and communities (sections 18 & 18A).

Preliminary documentation was submitted to DAWE on 7 January 2020, with public comment period between 26 February 2020 to 24 March 2020. No public submissions or comments were received on the referral and preliminary documentation.

Refer to Section 8.0 for further information.

2 The Proposal

2.1 Background

Aigle Royal propose urban development within the Development Envelope and to create a significant conservation area. The Development Envelope (10.25 ha) will round out existing subdivision to the north and west which form the suburb of Banjup. (Figure 1). This proposal will facilitate the creation of approximately 22.95 ha of additional conservation area that will enable extension of the adjoining Jandakot Regional Park.

The Development Envelope is currently zoned 'Urban Deferred' and 'Rural – Water Protection' and the Conservation Area zoned 'Rural – Water Protection' under the MRS. The proposal will require an amendment to the MRS to facilitate the creation of the conservation area (to Parks and Recreation reserve) and 'Urban' (Development Envelope) (Figure 2).

A range of environmental investigations have been completed for the Development Envelope and conservation area which include:

- Conservation Category Wetland (CCW) (UFI 12984)
- Priority 2 area of the Jandakot Underground Water Pollution Control Area
- Native vegetation floristic community type (FCT) 21a, 21c and 23a in Good or better condition that is representative of the Banksia Woodlands of the SCP TEC (Banksia Woodlands TEC)
- Black Cockatoo foraging habitat and potential breeding habitat
- Habitat connectivity to the adjacent Bush Forever Site 492 to the west of the Development Envelope.

The Development Envelope and proposed conservation area has specifically responded to enhance these significant values present within and adjacent to the Development Envelope. The proposal will create a 131 m wide ecological corridor between the Development Envelopes' retained environmental values and the adjacent Bush Forever Site 492 increasing the size of the Jandakot Regional Park by approximately 22.95 ha. The proposal also retains the CCW with a suitable buffer, 2.22 ha of Banksia Woodlands TEC, and 5.86 ha of Black Cockatoo habitat into the proposed conservation area.

2.2 Proposal Description

The description and key characteristics of the proposal are outlined in Tables 3 and 4 and shown in Figure 1.

Table 3: Proposal Description

Item	Description
Proposal Title	Part Lots 11 and 74 Beenyup Road, Banjup Conservation Reserve and Residential Development
Proponent Name	Aigle Royal Developments
Short Description	<p>The proposal is to clear native vegetation to enable Urban Residential Development of part Lots 11 and 74 Beenyup Road, Banjup, Western Australia. The proposal includes the following land uses within the Development Envelope:</p> <ul style="list-style-type: none"> • Urban development and associated infrastructure • POS • Wetland buffer <p>The proposal also facilitates the establishment of a conservation area adjacent to the Development Envelope</p>

Table 4: Preliminary Key Proposal Characteristics

Physical Elements	Proposed Location	Proposed Maximum Extent
Conservation Area (including Ecological Corridor)	Refer to Figure 1	22.95ha
Development Envelope	Refer to Figure 1	10.25 ha

The Urban development envelope will include the following:

- Residential dwellings
- Road reserves
- Public Open Space (POS)
- Utilities/infrastructure.

The urban development of the Development Envelope will facilitate the retention, rehabilitation, management and secure tenure of much of the high environmental values, including the CCW, and ecological corridor between the adjacent Bush Forever Site 492 to the CCW.

The proposed development of the Development Envelope (10.25 ha) will result in the clearing of up to 8.76 ha of remnant native vegetation between 'Excellent to Very Good' and 'Degraded' condition, including approximately 8.27 ha of the Banksia Woodlands TEC and 8.27 ha of Black Cockatoo habitat.

2.3 Justification of Development

The proposal can be justified on town planning and environmental grounds and is summarised as follows:

Town Planning

Previously the WAPC had expressed interest in acquiring the land as a Bush Forever site (refer attached correspondence). Nevertheless, no agreement was able to be reached with Aigle Royal Group regarding acquisition of the land.

A large conservation area (regional reservation) is proposed in exchange for a much smaller area of urban land. The proposed conservation area is capable of being amalgamated with the adjoining Jandakot Regional Reserve to the west. This will substantially increase the area of regional reserve and provide a strategic ecological corridor between the wetland on the subject land and the greater Jandakot Reserve. The consolidated area will be in public ownership representing the creation of an important community asset. The City of Cockburn has agreed to manage this asset as is currently the case with the adjoining Jandakot Regional Reserve.

The small area of proposed urban (residential) development will round out adjoining urban areas to the west and north. The land is strategically located for urbanisation as it located within 1 kilometre of the following services and facilities:

- Aubin Grove Shopping Centre and Medical Centre
- Aubin Grove Primary School
- The recently completed Aubin Grove Train Station.

Given the context, the initiative is entirely consistent with the objectives of the WAPC's blueprint for the area being the South Metropolitan & Peel Sub-Regional Planning Framework. The primary objective of the Framework is to integrate (connect) new residential development opportunities with existing services and infrastructure. The plan is clearly consistent with the objectives of the Framework.

Environmental

The proposed conservation area encapsulates the most significant environmental attributes of the subject land. The key attributes include:

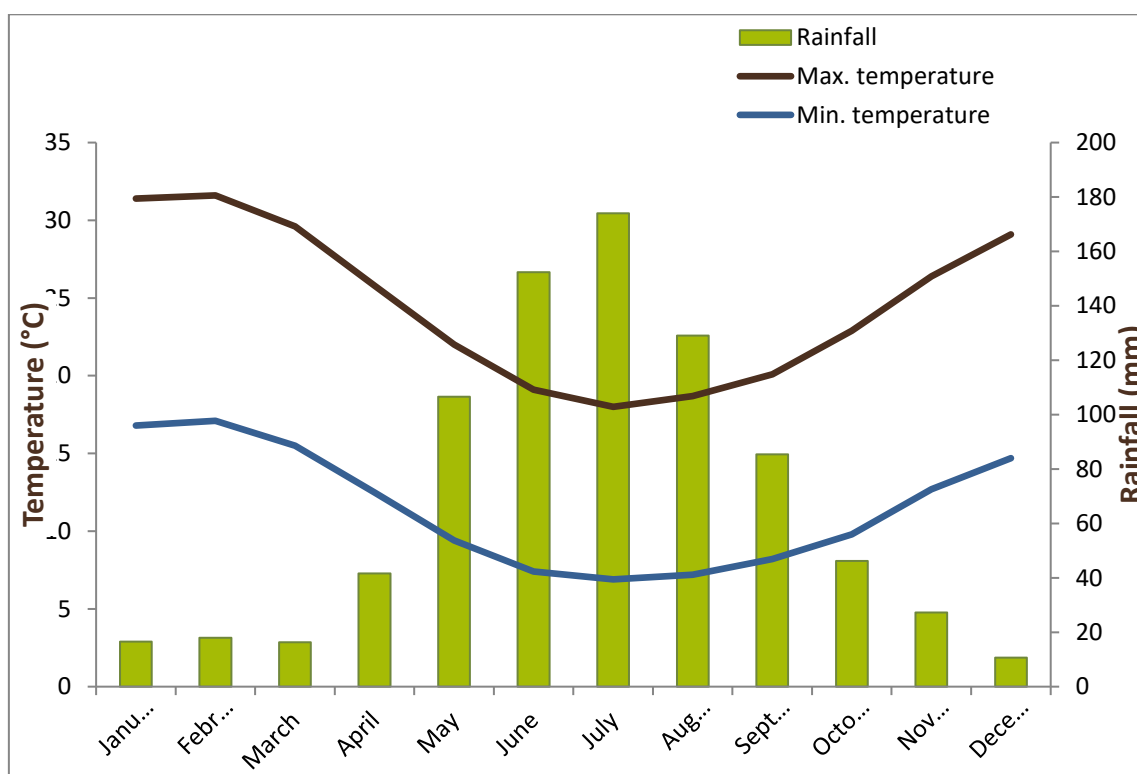
- 22.95 hectares of remnant vegetation
- Relinquishment of portion of land zoned 'Urban Deferred' to create a 1.32 ha ecological corridor to the adjoining Jandakot Reserve
- CCW
- Significant wetland buffers
- Habitat for Black Cockatoo.

As stated above, the conservation area is proposed to be reserved as Parks and Recreation under the MRS and ceded free of cost.

3 Existing Environment

3.1 Climate

The climate of the Development Envelope and local surrounds is described as warm Mediterranean with warm summers and cold winters. Weather data over 47 years was collected from Jandakot Aero Station (#009172) located approximately 7.06 km northwest of the Development Envelope (Graph 1). The annual mean maximum temperature is 24.6°C and the annual mean minimum temperature is 11.5°C. The annual mean rainfall for the area is 824.4 mm (BoM 2019).



Graph 1: Climate Statistics for Jandakot Aero Station 1972-2019 (BoM 2019)

3.2 Topography

The topography of the Development Envelope sits at an elevation of between 25 m Australian Height Datum (AHD) in the eastern portion of the site, to 34 m AHD in the south western section (DoW 2012) (Figure 3).

3.3 Regional Geology and Soils

Surface geology profile mapping at 1:250 000 indicates the geology of the Development Envelope and conservation area is typically defined as Bassendean sand: basal conglomerate overlain by dune quartz sand with heavy mineral concentrations, Aeolian coastal sediment (GSWA 2008).

The Development Envelope is within the Bassendean Land System (DAFWA 2012):

- **Bassendean System:** Sand dunes and sandplains with pale deep sand, semi-wet and wet soil. Banksia-paperbark woodlands and mixed heaths.

The Department of Agriculture and Food WA (DAFWA) Soil Subsystems mapping indicates that the Development Envelope and conservation area falls within the Bassendean System and within five soil subsystems. These subsystems are described below and displayed in Figure 4.

- **Bassendean B1 Phase** - Deep bleached grey sands sometimes with pale yellow B horizon or a weak iron-organic hardpan at depths generally greater than 2 m
- **Bassendean B2 Phase** - Deep bleached grey sands with a pale-yellow B horizon or a weak iron-organic hardpan 1-2 m
- **Bassendean B3 Phase** - Moderately deep, bleached sands with an iron-organic pan, or clay subsoil. Surfaces are dark grey sand or sandy loam
- **Bassendean B4 Phase** - Deep grey siliceous sands or bleached sands, underlain at depths generally greater than 1.5 m by clay or less frequently a strong iron-organic hardpan
- **Bassendean wet, swamp Phase** - Wet soils (Pale deep sands and peaty sands) (DAFWA 2014).

A Particle Size Distribution (PSD) investigation was conducted by Bioscience in 2017 from different bores across the Development Envelope and conservation area and confirmed the samples are in medium sand fraction range. Generally medium sand fraction soils have a permeability value of 10^{-4} to 10^{-2} m/s and are therefore suitable for at-source retention of surface water runoff through soak wells, open drains and infiltration basins (Ochre West 2017).

3.3.1 Acid Sulfate Soils

The Development Envelope is classified as having 'Moderate to Low' risk of Acid Sulfate Soils (ASS) occurring within 3 m of the natural soil surface. Adjacent to the Development Envelope within the conservation area there is a 'High to Moderate' risk beyond 3 m of natural soil surface (Figure 5) (DER 2014).

3.4 Hydrogeology

3.4.1 Groundwater

Pre-development groundwater monitoring was undertaken by Bioscience between September 2011 and September 2014. Results from the groundwater monitoring program found that the Average Annual Maximum Groundwater Level (AAMGL) ranges from 25.2 m AHD in the southern central portion of the Development Envelope to 25.85 m AHD in

the north-western portion of the Development Envelope and 25.4 m AHD in the north-eastern portion of the Development Envelope (Figure 3) (Ochre West 2017).

Based on topographical and AAMGL groundwater contours, the depth to groundwater within the Development Envelope ranges from approximately from 7.75 metres below ground level (mbgl) in the south-western section, to 1.2 mbgl in the north-western part of the Development Envelope and 1.6 mbgl in the north-eastern part of the site (DoW 2017).

3.4.1.1 Public Drinking Water Source Area

The Development Envelope is located in the Jandakot Underground Water Pollution Control Area (UWPCA) and is therefore subject to the provisions of the *Statement of Planning Policy No. 2.3- Jandakot Groundwater Protection Policy* and DoW Water Quality Protection Note No. 25. The western portion of the Development Envelope zoned 'Urban Deferred' is classified as a Priority 3 area and the remainder of the Development Envelope is classified as a Priority 2 area under the Jandakot UWPCA (Figure 3) (DWER 2019).

WQPN 25 sets out the groundwater catchment priority system (DoW 2016):

Priority 1 (P1) areas are defined and managed to ensure there is no degradation of the quality of the drinking water source with the objective of risk avoidance. P1 areas occur within priority drinking water source areas (PDWSAs) where the existing land uses have low risks to PDWSAs.

Priority 2 (P2) areas are defined and managed to maintain or improve the quality of the drinking water source with the objective of risk minimisation. P2 areas occur within PDWSAs where the land is zoned rural and the risks need to be minimised.

Priority 3 (P3) areas are defined and managed to maintain the quality of the drinking water source for as long as possible with the objective of risk management. P3 areas occur within PDWSAs where the land is zoned for urban and commercial or light industrial uses.

WQPN 25 sets out 'protection zones' that are defined in the immediate vicinity of drinking water extraction points, as these areas are the most vulnerable to contamination (DoW 2016). Protection zones can be located within P1, P2 or P3 areas. There are two types of protection zones: wellhead protection zones (WPZs) defined for groundwater sources; and reservoir protection zones (RPZs) defined for surface water sources (DoW 2016).

No WPZs or RPZs exist in the vicinity of the Development Envelope that requires a 'buffer' from urban development (DWER 2019).

3.4.1.2 Reclassification of Priority Areas

The 'State Planning Policy 2.3 Jandakot Groundwater Protection Policy' states that proposals to rezone land may be supported where they meet the following criteria:

A portion of the Development Envelope is within a Priority 2 Public Drinking Water Source Area (PDWSA). SPP2.3 aims to protect the Jandakot Groundwater Protection area ("the

policy area”) from development and land uses that may have a detrimental impact on the water resource.

a) In order to protect the quality of the public drinking water source, there is a presumption against new urban or industrial land uses in the Water Catchment reservation and the Rural-Water Protection zone of the Metropolitan Region Scheme.

b) Amendments to the Metropolitan Region Scheme will only be supported where the land has been identified for development in the manner proposed through a strategic planning document approved or prepared by the Western Australian Planning Commission, such as a sub-regional planning framework or sub-regional structure plan.

c) Planning for more intense land uses through strategic planning instruments (such as a subregional planning framework or sub-regional structure plan) and subsequent Metropolitan Region Scheme amendments should incorporate the following:

- the subject land is to meet the following criteria: – large landholdings that were already substantially cleared at the time this policy was published; and – directly adjacent to already developed ‘Urban’ zoned land
- the risk to drinking water supplies associated with the proposed development
- proven efficacy of available risk mitigation measures
- the net long-term public benefit attributable to the proposed rezoning
- the need for additional urban land, taking into account the current stock of undeveloped urban zoned land in the sub-region
- potential alternative locations for proposed land use in the sub-region that would have less or no impact on Public Drinking Water Source Protection Areas
- any strategic environmental assessment, whether underway or completed
- access to infrastructure that is already constructed or scheduled for construction.

A D/LWMS has been prepared by Ochre West that addresses the future water management requirements of future development as well the reclassification of the Priority 2 area (Ochre West 2017).

3.5 Hydrology

3.5.1 Surface Water

A large portion of the conservation area is subject to inundation, which follows the general area of the CCW (UFI 12984) and surrounds (Figure 6). The conservation area is wholly within the proposed Parks and Recreation reserve (DoW 2018).

There are no visible existing drains or flow paths within the Development Envelope. Regional topography suggests surface runoff in the side will flow towards the wetland within the central and eastern portions of the Development Envelope (Ochre West 2017).

3.5.2 Wetlands

Wetlands of the Swan Coastal Plain have been described and mapped by Hill *et al.* (1996) and assigned a management category reflecting their condition. DBCA's geomorphic wetlands dataset identifies CCW (UFI:12984) mapped adjacent to the Development Envelope (Figure 6) (DBCA 2018). There are no mapped geomorphic wetlands within the Development Envelope.

The adjacent wetlands are not listed as Ramsar sites. The entire site and the wider surrounding environment are mapped as the Gibbs Road Swamp System under the Directory of Nationally Important Wetlands (DoE 2008).

3.6 Flora and Vegetation

3.6.1 Bioregion

The Development Envelope and conservation area is located within the Swan Coastal Plain bioregion of the Interim Biogeographic Regionalisation of Australia (IBRA) of the Southwest botanical district. The Swan Coastal Plain 2 (SWA02) sub-region is an area composed of colluvial and Aeolian sands, alluvial river flats, coastal limestone. Heath and Tuart woodlands on limestone, *Banksia* and Jarrah-*Banksia* woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvial and includes a complex series of seasonal wetlands (Mitchell *et al.* 2002).

3.6.2 Broad Vegetation Associations

Mapping of the vegetation of the Perth region of WA was completed on a broad scale by Beard (1981). These vegetation units were re-assessed by Shepherd *et al.* (2001) to account for clearing in the intensive land use zone, dividing some larger vegetation units into smaller units.

There is one Beard / Shepherd vegetation unit in the Development Envelope. The Shepherd *et al.* (2001) vegetation type (along with the corresponding Beard [1981] type in brackets), is described below, and its representation within the Development Envelope, subregion, region and state is shown in Table 5.

- **1001** (e2Mb cbLi) – **Bassendean**; Medium very sparse woodland; *E. marginata* with low woodland, *Banksia* sp. and *Casuarina* sp.

Table 5: Broad Vegetation Types within the Development Envelope and its State and Regional Representation (Government of Western Australia 2017).

	Pre-European Area (ha)	Current Extent (ha)	Remaining (%)	Current Extent in DPaW Reserves (%)
IBRA Region Swan Coastal Plain	1,501,221.93	578,997.37	38.57	38.47
Statewide and IBRA Region				
1001	57,410.23	12,704.45	22.13	13.82

	Pre-European Area (ha)	Current Extent (ha)	Remaining (%)	Current Extent in DPaW Reserves (%)
Local Government Authority – City of Cockburn				
1001	7,328.39	2,038.06	27.81	14.66

Vegetation complexes of the Swan Coastal Plain have been mapped by Heddle et al. (1980). The Development Envelope and conservation area contains one vegetation complex which relates to the underlying soil profile, its representation is provided in Table 6:

- **'Bassendean Complex - Central and South'**: vegetation ranging from woodland of *Eucalyptus marginata* - *Allocasuarina fraseriana* - *Banksia* spp. to low woodland of *Melaleuca* spp. and sedgeland on the moister sites. This area includes the transition of *Eucalyptus marginata* to *Eucalyptus todtiana* in the vicinity of Perth.

Table 6: Vegetation Complex within the Development Envelope and its State and Regional Representation (Webb et al. 2016)

	Pre-European Area (ha)	Current Extent (ha)	Remaining (%)	Current Extent Secure Tenure Reserves (%)
Vegetation Complex (Heddle et al. 1980) in the State and Swan Coastal Plain Bioregion				
Bassendean Complex– Central and South	87,477	22,522.87	25.8	2.25

The Environmental Protection Authority (EPA)'s *Guidance Statement 33: Environmental Guidance for Planning and Development* has set a threshold for retention of 10% of the pre-existing extent of native vegetation within constrained areas on the Swan Coastal Plain (EPA 2008). The Development Envelope is considered to be a constrained area as it is with the Perth metropolitan area and adjoins established urban areas, which means there is a reasonable expectation that development will be able to proceed. All the current vegetation extents are greater than the above-mentioned 10% threshold.

3.6.3 Site Surveys

360 Environmental undertook a Level 2 Flora and Vegetation Survey of the Development Envelope and conservation area on the 15 and 16 September 2015 (360 Environmental 2016). The complete Flora and Vegetation report can be found in Appendix A. The flora survey was undertaken within the recommended season and flowering period for the south west botanical province.

A Targeted Flora survey was undertaken on 11 October 2017 by a Senior Botanist to identify the presence of any conservation significant flora species identified as Likely to occur within the 2015 survey and perennial orchids that are difficult to detect (*Caladenia huegelii* and *Drakaea micrantha*) (Appendix B). As a consequence of this second site visit, the vegetation condition within the Development Envelope was re-assessed and the

condition rescored from the original survey in 2015 (Appendix B) (360 Environmental 2017b).

Further to the above assessment, in September 2016 the Commonwealth listed 'Banksia Woodlands of the Swan Coastal Plain' as Endangered ecological community under the EPBC Act was released. Subsequently, 360 Environmental was commissioned to review the findings of the flora and vegetation survey and determine whether Banksia Woodlands of the Swan Coastal Plain is present within the Development Envelope and conservation area (Appendix C) (360 Environmental 2017a).

3.6.4 Surveyed Vegetation Associations

Thirteen natural vegetation associations were recorded in the Development Envelope and conservation area (combined). The descriptions are provided in Table 7 and represented in Figure 7. The extents of each vegetation association within the Development Envelope are provided in Table 8.

Table 7: Vegetation Association Descriptions and their Extent in the Development Envelope and Conservation Area (Combined) (360 Environmental 2016; 2017)

Vegetation Association Code	Description
BaBm(a)	Low Woodland of <i>Banksia attenuata</i> , <i>Banksia menziesii</i> , <i>Allocasuarina fraseriana</i> , <i>Eucalyptus marginata</i> over <i>Kunzea glabrescens</i> , <i>Acacia pulchella</i> , <i>Hibbertia hypericoides</i> , <i>Xanthorrhoea preissii</i> , <i>Bossiaea eriocarpa</i> and <i>Conostylis aculeata</i> .
BaBm(b)	Low Woodland of <i>Banksia attenuata</i> , <i>Banksia menziesii</i> , <i>Allocasuarina fraseriana</i> over <i>Kunzea glabrescens</i> , <i>Dasypogon bromeliifolius</i> , <i>Hibbertia subvaginata</i> , <i>Calytrix fraseri</i> and <i>Bossiaea eriocarpa</i> .
AfEmBi	Open Woodland of <i>Allocasuarina fraseriana</i> , <i>Eucalyptus marginata</i> and <i>Banksia ilicifolia</i> over <i>Xanthorrhoea preissii</i> , <i>Dasypogon bromeliifolius</i> , <i>Bossiaea eriocarpa</i> , <i>Gompholobium tomentosum</i> and <i>Phlebocarya ciliata</i> .
BiKg	Woodland of <i>Banksia ilicifolia</i> and <i>Banksia attenuata</i> over <i>Kunzea glabrescens</i> , <i>Xanthorrhoea preissii</i> , <i>Dasypogon bromeliifolius</i> and <i>Desmocladius flexuosus</i> .
ErMp	Woodland of <i>Eucalyptus rudis</i> and <i>Melaleuca preissiana</i> over <i>Kunzea glabrescens</i> , <i>Xanthorrhoea preissii</i> , <i>Adenanthos cygnorum</i> and <i>Hypocalymma angustifolium</i> .
KgHa	Low Open Woodland of <i>Melaleuca preissiana</i> and <i>Melaleuca raphiophylla</i> over <i>Kunzea glabrescens</i> , <i>Hypocalymma angustifolium</i> , <i>Astartea scoparia</i> , <i>Melaleuca teretifolia</i> , <i>Meeboldina scariosa</i> and <i>Lepidosperma longitudinale</i> .
MpKg	Low Open Woodland of <i>Melaleuca preissiana</i> over <i>Kunzea glabrescens</i> , <i>Hakea varia</i> , <i>Acacia pulchella</i> var. <i>glaberrima</i> , <i>Calothamnus lateralis</i> var. <i>lateralis</i> and <i>Meeboldina coangustata</i> .

Vegetation Association Code	Description
MrBa	Low Closed Forest of <i>Melaleuca raphiophylla</i> over <i>Baumea articulata</i> .
MtMr	Closed Tall Scrub of <i>Melaleuca teretifolia</i> , <i>Melaleuca raphiophylla</i> , <i>Meeboldina coangustata</i> and <i>Juncus capitatus</i> .
MrMI	Low Woodland of <i>Melaleuca raphiophylla</i> over <i>Melaleuca lateritia</i> , <i>Astartea scoparia</i> , <i>Meeboldina coangustata</i> , <i>Lepidosperma longitudinale</i> and <i>Juncus pallidus</i> .
Ec	Ecotone of <i>Banksia ilicifolia</i> and <i>Banksia menziesii</i> over <i>Kunzea glabrescens</i> , <i>Dasypogon bromeliifolius</i> and <i>Phlebocarya ciliata</i> .
Ha	Closed Heath of <i>Hypocalymma angustifolium</i> , <i>Kunzea glabrescens</i> , <i>Dielsia stenostachya</i> , <i>Dasypogon bromeliifolius</i> and <i>Boronia crenulata</i> var. <i>crenulata</i> .
Mr	Monoculture of young <i>Melaleuca raphiophylla</i> over water.

Table 8: Vegetation Associations within the Development Envelope (360 Environmental 2016; 2017)

Vegetation Association Code	Description	Area (ha)
MrML	<i>Low Woodland of Melaleuca raphiophylla over Melaleuca lateritia, Astartea scoparia, Meeboldina coangustata, Lepidosperma longitudinale and Juncus pallidus</i>	0.52
G/O	Gardens/ Orchards	0.59
ErMp	Woodland of <i>Eucalyptus rudis</i> and <i>Melaleuca preissiana</i> over <i>Kunzea glabrescens, Xanthorrhoea preissii, Adenanthos cygnorum</i> and <i>Hypocalymma angustifolium</i> .	0.11
Ec	Ecotone of <i>Banksia ilicifolia</i> and <i>Banksia menziesii</i> over <i>Kunzea glabrescens, Dasypogon bromeliifolius</i> and <i>Phlebocarya ciliata</i> .	0.74
AfEmBi	Open Woodland of <i>Allocasuarina fraseriana, Eucalyptus marginata</i> and <i>Banksia ilicifolia</i> over <i>Xanthorrhoea preissii, Dasypogon bromeliifolius, Bossiaea eriocarpa, Gompholobium tomentosum</i> and <i>Phlebocarya ciliata</i> .	1.46
BiKg	Woodland of <i>Banksia ilicifolia</i> and <i>Banksia attenuata</i> over <i>Kunzea glabrescens, Xanthorrhoea preissii, Dasypogon bromeliifolius</i> and <i>Desmocladius flexuosus</i>	1.11
MrBa	Low Closed Forest of <i>Melaleuca raphiophylla</i> over <i>Baumea articulata</i> .	0.002
BaBm (a)	Low Woodland of <i>Banksia attenuata, Banksia menziesii, Allocasuarina fraseriana, Eucalyptus marginata</i> over <i>Kunzea glabrescens, Acacia pulchella, Hibbertia hypericoides, Xanthorrhoea preissii, Bossiaea eriocarpa</i> and <i>Conostylis aculeata</i> .	0.45
BaBm (b)	Low Woodland of <i>Banksia attenuata, Banksia menziesii, Allocasuarina fraseriana</i> over <i>Kunzea glabrescens, Dasypogon bromeliifolius, Hibbertia subvaginata, Calytrix fraseri</i> and <i>Bossiaea eriocarpa</i> .	4.37
Cleared		0.89
TOTAL		10.2 ha

3.6.5 Vegetation Condition

Vegetation condition within the Development Envelope ranged from 'Completely Degraded' to 'Excellent- Very Good' based on the Keighery (1994) scale (360 Environmental 2016) (Figure 7). Historical vegetation clearing, weeds, housing, and the

presence of tracks in the Development Envelope were the most frequently observed impacts on native vegetation.

The CCW (within the proposed conservation area) has remained relatively intact and the majority was considered to be in 'Very Good' to 'Excellent condition' with a couple of areas of vegetation in 'Good' condition along with the tracks and a couple of small pockets considered to be in 'Degraded' to 'Completely Degraded' condition. The extent of vegetation condition within the Development Envelope is presented in Table 9.

Table 9: Vegetation Condition and Extent in the Development Envelope (360 Environmental 2016)

Condition	Extent (Ha)
Excellent – Very Good	1.26
Very Good	0.38
Very Good - Good	2.59
Good	3.86
Degraded	0.82
Completely Degraded	1.47
TOTAL	10.2 ha

3.6.6 Threatened and Priority Ecological Communities

The results from the Level 2 Flora and Vegetation Survey (360 Environmental, 2015) was used for the subsequent desktop assessment in 2017 to identify if any TECs occur within the Development Envelope (Appendix C) (360 Environmental 2017).

The statistical analysis undertaken as part of the desktop assessment identified vegetation associations; BaBm(a), AfEmBi, BiKg, BaBm(b) as having the most affiliation to FCTs; SCP 23a, SCP 21a, SCP 21c (Table 10; Figure 8).

Table 10: Banksia Woodlands TEC Floristic Community Type and Extent within the Development Envelope

Floristic Community Type (FCT)	Description	Extent (ha)
SCP 21a	Central <i>Banksia attenuata</i> - <i>Eucalyptus marginata</i> woodlands.	1.48
SCP 21c	Low lying <i>Banksia attenuata</i> woodlands or shrublands	5.57
SCP23a	Central <i>Banksia attenuata</i> - <i>Banksia menziesii</i> woodlands	0.48

Floristic Community Type (FCT)	Description	Extent (ha)
Ec	<p>Ecotone of <i>Banksia ilicifolia</i> and <i>Banksia menziesii</i> over <i>Kunzea glabrescens</i>, <i>Dasypogon bromeliifolius</i> and <i>Phlebooarya oliata</i>.</p> <p>Ecotone between the BaBm vegetation association and wetland. Due to the mix of both dryland and wetland species, an FCT for this area could not be determined</p>	0.74
TOTAL		8.27 ha

These FCTs are listed as sub-communities of the Banksia Woodland TEC (DEE 2016). The FCT has to meet key diagnostic characteristics be considered a TEC. In regards, to the presence of the Banksia Woodland TEC, the Approved Conservation Advice for the thresholds state that (DEE 2016b):

- Vegetation in Excellent condition should have a minimum patch size of 0.5 ha
- Vegetation in Very Good condition should be a minimum of 1 ha
- Vegetation in Good condition should be a minimum of 2 ha
- Vegetation patches considered Degraded or worse are excluded and not protected under the EPBC Act.

Vegetation mapped as 'Good', 'Good – Very Good', 'Excellent – Very Good' and 'Excellent' are considered to represent the Banksia Woodlands TEC and equates to a total area of 8.27 ha within the Development Envelope and 2.22 ha within the conservation area (360 Environmental 2018) (Figure 7).

3.6.7 Threatened and Priority Flora

A 2 km radial DBCA NatureMap and DEE (now known as DAWE) Protected Matters Search Tool (PMST) was undertaken. The NatureMap and PMST databases identified 23 conservation significant flora species as potentially occurring in the vicinity of the Development Envelope. Of these nine are classed as Threatened, one as Priority 1, six as Priority 3 and seven as Priority 4 (360 Environmental 2016).

The likelihood of occurrence of conservation significant flora species was determined by comparing the plant species requirements to the vegetation descriptions obtained from a Level 2 Flora and Vegetation Survey of the Development Envelope and conservation area. The likelihood assessment determined that of the 23 Conservation significant species (listed under the EPBC Act and the *Biodiversity Conservation Act 2016*) flora as potentially occurring in the vicinity of the survey area. Of this, there are 10 considered likely or possible to occur within the vicinity of the Development Envelope (Table 11) (360 Environmental 2016).

Most of these flora species are perennial (tuberous) short-lived herbs (orchids) that need various conditions to flower and exhibit different flowering patterns. Regardless of these attributes, the survey was undertaken during the optimum time for the flowering of these species and targeted searches were undertaken in their preferred habitats and none were found during the surveys undertaken in 2015 and 2017 (360 Environmental 2016; 2018).

Table 11: Conservation Significant Flora Potentially Occurring within 2 km of the Development Envelope

Taxa	Status under the EPBC Act	State Status	Likelihood
<i>Caladenia huegelii</i>	Threatened	Threatened	Likely
<i>Diuris purdiei</i>	Endangered	Threatened	Possible
<i>Drakaea elastica</i>	Endangered	Threatened	Possible
<i>Drakaea micrantha</i>	Vulnerable	Threatened	Possible
<i>Acacia lasiocarpa</i> var. <i>bracteolata</i> long peduncle variant	-	Priority 1	Possible
<i>Cyathochaeta teretifolia</i>	-	Priority 3	Possible
<i>Jacksonia gracillima</i>	-	Priority 3	Likely
<i>Stylidium longitubum</i>	-	Priority 4	Possible
<i>Stylidium paludicola</i>	-	Priority 3	Possible
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	-	Priority 4	Possible

360 Environmental conducted a Targeted Flora Survey for the King Spider-orchid (*Caladenia huegelii*), the Dwarf Hammer-orchid (*Drakaea micrantha*) and other conservation significant flora species identified as likely to occur within the Development Envelope. The targeted flora survey was undertaken on 11 October 2017 during the optimal flowering period for these species (September and October) (360 Environmental 2018).

The Development Envelope and conservation area was sufficiently surveyed by an experienced Principal Botanist. No Threatened species pursuant to the EPBC Act or BC Act or Priority listed species were recorded during the targeted survey (Appendix B).

3.6.8 Weeds

A total of 27 introduced species were recorded during the Level 2 Flora and Vegetation Survey undertaken in 2015 (Table 12).

Table 12: Weed Species Identified within the Development Envelope and Conservation Area (360 Environmental 2016)

Species	Common Name	WONS	Declared under BAM Act 2007*
* <i>Acacia iteaphylla</i>	Flinders Ranges Wattle	-	s11 permitted
* <i>Acacia longifolia</i>	Sydney Golden Wattle	-	s11 permitted
* <i>Arctotheca calendula</i>	Cape Weed	-	s11 permitted
* <i>Avena barbata</i>	Bearded Oat	-	s11 permitted
* <i>Asparagus asparagoides</i>	Bridal Creeper	Yes	s22(2) (C3)
* <i>Briza maxima</i>	Blowfly Grass	-	s11 permitted
* <i>Carpobrotus edulis</i>	Pigface	-	s11 permitted
* <i>Cotula coronopifolia</i>	Waterbuttons	-	s11 permitted
* <i>Crassula natans var. minus</i>	-	-	-
* <i>Cyperus tenellus</i>	Tiny Flat-Sedge	-	s11 permitted
* <i>Ehrharta calycina</i>	Perennial Veld Grass	-	s11 permitted
* <i>Ehrharta longiflora</i>	Annual Veld Grass	-	s11 permitted
* <i>Eragrostis curvula</i>	African Lovegrass	-	s11 permitted
* <i>Euphorbia terracina</i>	Geraldton Carnation Weed	-	s11 permitted
* <i>Fumaria capreolata</i>	Whiteflower Fumitory	-	s11 permitted
* <i>Galium murale</i>	Small Bedstraw	-	s11 permitted
* <i>Gladiolus caryophyllaceus</i>	Wild Gladiolus	-	s11 permitted
* <i>Hypochaeris glabra</i>	Smooth Cats ear	-	s11 permitted
* <i>Juncus capitatus</i>	-	-	s11 permitted
* <i>Lysimachia arvensis</i>	Pimpernel	-	s11 permitted
* <i>Pelargonium capitatum</i>	Rose Pelargonium	-	s11 permitted
* <i>Romulea rosea var. australis</i>	Guildford Grass	-	s11 permitted
* <i>Sonchus oleraceus</i>	Common Sowthistle	-	s11 permitted
* <i>Trifolium sp.</i>	Hop Clover	-	s11 permitted
* <i>Ursinia anthemoides</i>	Ursinia	-	s11 permitted
* <i>Vulpia bromoides</i>	Squirrels Tail Fescue	-	s11 permitted
* <i>Zantedeschia aethiopica</i>	Arum Lily	-	s22(2) (C3)

*The DAFWA maintains a list of Declared Plants for Western Australia under the *Biosecurity and Agriculture Management Act 2007* (BAM Act). If a plant is declared for the whole of the State or for particular Local Government Areas, all landholders are obliged to comply with the relevant species-specific control measures.

During the Level 2 Flora and Vegetation survey in 2015, a total of 27 introduced species were recorded. Two species **Asparagus asparagoides* (Bridal Creeper) and **Zantedeschia aethiopica* (Arum Lily) are listed as Declared under the *Biosecurity and Agriculture Management Act 2007* (BAM Act). One species, **Asparagus asparagoides* (Bridal Creeper) is listed as a Weed of National Significance (WONS) (360 Environmental 2016).

3.7 Fauna

A DBCA NatureMap Fauna Search was undertaken with a 2 km and 5 km buffer of the Development Envelope and a DEE (now known as DAWE) PMST search was undertaken with a 1 km buffer of the Development Envelope and a likelihood assessment was undertaken (Appendix E) (Table 13).

Table 13: Conservation Significant Fauna Species Likelihood Assessment

Species	State Status	EPBC Act Status	Likelihood	Likelihood Justification*
<i>Apus pacificus</i> (Fork-tailed Swift)	-	Marine/ Migratory	Unlikely	This species is almost exclusively aerial.
<i>Ardea alba</i> (Great Egret)	-	Marine	Possible	May utilise wetland habitat on Development Envelope. Found within a 5 km NatureMap Search.
<i>Ardea ibis</i> (Cattle Egret)	-	Marine	Unlikely	Known to occupy wetland habitats. Not found within a 5 km NatureMap Search.
<i>Pandion cristatus</i> (Eastern Osprey)	-	Migratory	Unlikely	Mostly found in coastal areas.
<i>Merops ornatus</i> (Rainbow Bee-eater)	International Agreement	Marine	Likely	Found within a 2 km NatureMap Search. Occurs within a wide range of habitats including open forests and woodlands that exist within the Development Envelope. Often in close proximity to permanent water.
<i>Botaurus poiciloptilus</i> (Australasian Bittern)	Endangered	Endangered	Unlikely	Not found within a 5 km NatureMap Search.
<i>Calyptorhynchus banksii</i> subsp. <i>naso</i> (Forest Red-tailed Black Cockatoo)	Vulnerable	Vulnerable	Likely	Not found within 2 km NatureMap Search; however suitable habitat present (Eucalypt woodland) and in species known distribution.
<i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo)	Endangered	Endangered	Likely	Found within a 2 km NatureMap Search. Suitable habitat present

Species	State Status	EPBC Act Status	Likelihood	Likelihood Justification*
				(Banksia and Eucalypt woodland) and in species known distribution.
<i>Dasyurus geoffroii</i> (Chuditch)	Vulnerable	Vulnerable	Possible	Not found within 2 km NatureMap Search, however suitable habitat on-site (Eucalypt woodland).
<i>Leipoa ocellata</i> (Malleefowl)	Vulnerable	Vulnerable	Unlikely	Not found within 5 km NatureMap Search.
<i>Pseudocheirus occidentalis</i> (Western Ringtail Possum)	Critically Endangered	Vulnerable	Unlikely	Outside of known distribution.
<i>Rostratula australis</i> (Australian Painted Snipe)	Endangered	Endangered	Unlikely	Not found within 5 km NatureMap Search.
<i>Setonix brachyurus</i> (Quokka)	Vulnerable	Vulnerable	Unlikely	Not found within 5 km NatureMap Search. No suitable habitat on-site.
<i>Isoodon obesulus spp. fusciventer</i> (Southern Brown Bandicoot)	Priority 4	-	Likely	Found within a 2 km NatureMap Search. Suitable woodland habitat with sandy soils on the Development Envelope.
<i>Oxyura australis</i> (Blue-billed Duck)	Priority 4	-	Likely	Found within a 2 km NatureMap Search. Likely to occur in the wetlands on Development Envelope.

* Likelihood justification sourced from DEE (2018) Species Profile and Threats Database (SPRAT) and the Atlas of Living Australia for Priority species.

The likelihood assessment was undertaken and found that the Development Envelope is likely to offer suitable habitat for the (360 Environmental 2016):

- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksi naso*) – Vulnerable
- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) - Endangered.

It is considered that the conservation area may offer suitable habitat for the:

- Great Egret (*Ardea alba*) -Marine
- Chuditch (*Dasyurus geoffroii*) – Vulnerable.

The Great Egret's preferred habitat includes wetlands, swamps, marshes, damp or flooded grassland and is therefore likely to be associated with the CCW that contains 'Excellent' to 'Very Good' vegetation condition. The likelihood of the Chuditch occurring on site is possible as it contains suitable habitat of Eucalypt woodlands (360 Environmental 2016; 2017a).

3.7.1 Black Cockatoos

A search of the DEE's PMST and DBCA's NatureMap tool identified two Threatened fauna species as likely to occur within a 2 km radius of the Development Envelope; Forest Red-tailed Black Cockatoo (FRTBC) and Carnaby's Black Cockatoo (CBC).

A search of the Great Cocky Count data set prepared by Birdlife WA (2010) did not identify any recorded roosting sites within 1 km of the Development Envelope. The closest three recorded sites are 1.8 km north east (2018 confirmed roost-COCBANR003), 2 km south east (2018 unconfirmed roost-COCFORR002).

3.7.1.1 Black Cockatoo Habitat

A Black Cockatoo Habitat Assessment was undertaken by 360 Environment 2017 to record potential breeding trees, confirm the presence and size of tree hollows and foraging habitat. The initial assessment identified that the Development Envelope is mainly composed of Eucalypt Woodlands and Banksia Woodlands which are known habitats of three species of the Black Cockatoo (Figure 10). The Development Envelope is not currently utilised for breeding but has the potential for breeding in the future. The primary value of the area is a foraging resource for the Black Cockatoo (360 Environmental 2017).

Foraging Habitat

CBC feed on a variety of seeds, nuts and flowers from a range of native and exotic plants. Food plants include a number of Banksia species, Pine trees, Marri, Jarrah and *Allocasuarina* (Shah 2006; Johnstone & Storr 1998). The FRTBC feeds primarily on Marri and Jarrah Fruit which makes up 90% of the diet (Johnstone & Kirkby 1999; Cooper et al. 2002). Baudin's Black Cockatoo forages primarily in Eucalypt forest, where it feeds on Marri seeds, flowers, nectar and buds. They also feed on a wide range of seeds from other Eucalypt and Banksia species and Pines (Johnstone & Storr 1998).

The total area of Black Cockatoo foraging habitat within the Development Envelope is 8.27 ha and 5.86 ha within the conservation area. This foraging habitat consists of Jarrah, Flooded Gum, *Banksia attenuata*, *B. menziesii*, *B. ilicifolia*, *A. fraseriana* and *X. preissii*. Evidence of foraging was found within the Development Envelope and it is therefore considered that the site is used for foraging by the Black Cockatoos (360 Environmental 2017).

During the Black Cockatoo habitat assessments, no Black Cockatoos were observed flying over or heard in the Development Envelope (360 Environmental 2017a) (Figure 10).

Breeding Habitat

Black Cockatoos breed in large hollow-bearing trees, generally within woodlands or forests (Johnstone et al. 2013). The size of the tree can be a useful indication of the hollow-bearing potential of the tree. Trees of suitable DBH are potentially important for maintaining breeding in the long-term, through maintaining the integrity of the habitat and allowing trees to provide future nest hollows. Maintaining the long-term supply of trees of suitable size is particularly important in woodland stands that are known to support Black Cockatoo breeding (DSEWPac 2012). Hollow formation in trees is the result of a number of processes including fungal attack, termites and fire and the propensity for hollow formation varies between the Eucalypt species (Whitford 2002).

The Black Cockatoo habitat assessment and follow-up site visit identified that 11 Jarrah trees, eight Flooded Gum trees and one *Eucalyptus todtiana* tree that met the Trunk DBH criteria of >500 mm (DSEWPac 2012). The trees were placed in the following size class categories:

- A = 500 – 1000 mm DBH
- B = 1000 – 2000 mm DBH.

These trees are considered potentially significant for the Black Cockatoo to develop suitable breeding hollows (Table 14) (Figure 10). A total of six trees were identified as containing hollows.

Table 14: Black Cockatoo Potential Breeding Trees Recorded within the Development Envelope and Conservation Area (360 Environmental 2017b)

No.	Species	DBH*	Height (M)	Location	Comments
1	Jarrah	B	12	Development Envelope	No hollows, stag, lots of fallen branches, beehive present
2	Jarrah	A	12	Conservation area	Hollows, stag, red cap parrot on ends of branches
3	Jarrah	A	10	Conservation area	No hollows, stag

No.	Species	DBH*	Height (M)	Location	Comments
4	Jarrah	A	12	Conservation area	No hollows
5	Jarrah	A	12	Conservation area	Shallow hollow < 5 cm diameter, Stag
6	Jarrah	A	12	Conservation area	Shallow hollow, stag
7	Jarrah	A	12	Conservation area	Shallow hollow
8	Jarrah	A	14	Conservation area	No hollows, splits at 4m height
9	Jarrah	B	15	Development Envelope	No hollows
10	Flooded Gum	A	17	Conservation area	No hollows
11	Flooded Gum	A	17	Conservation area	No hollows
12	Flooded Gum	A	16	Conservation area	No hollows
13	Flooded Gum	A	16	Conservation area	No hollows
14	Flooded Gum	A	16	Conservation area	No hollows
15	Flooded Gum	A	16	Conservation area	No hollows
16	Flooded Gum	A	16	Conservation area	No hollows
17	Flooded Gum	A	17	Conservation area	No hollows, 5 branches
18	Jarrah	A	14	Development Envelope	Hollow with < 5 cm diameter, Beehive present
19	<i>Eucalyptus todtiana</i>	A	8	Development Envelope	No hollows
20	Jarrah	A	8	Conservation area	Burnt, 1 hollow with beehive

3.8 Reserves and Conservation Areas

The Development Envelope located adjacent to the Jandakot Regional Park and Bush Forever Site 492 adjoins the western and south-western boundary of Lot 74 (Figure 11).

Bush Forever Sites 263 and 344 are located approximately 650 m to the north and 1.17 km to the east of the Development Envelope, respectively, and are within the Jandakot Regional Park. There are extensive areas of Bush Forever Sites (392, 391) surrounding the Development Envelope associated with Forrestdale Lake Nature Reserve and Beelihar Regional Park (including Thompsons Lake Nature Reserve) (DoP 2014) (DPaW 2014) (Figure 11).

Perth Regional Ecological Linkage (ID: 52) runs through the northern portion of the Development Envelope (PBP 2008) (Figure 11).

3.8.1 Bush Forever Site 492 Characteristics

Bush Forever Site 492 (BF 492) that is located to the west and directly adjacent to the Development Envelope is included within the Jandakot Regional Park. Information of the vegetation and habitat within the BF 492 was sourced from the City of Cockburn who had commissioned Eco Logical to undertake a Natural Area Field Assessment and Banksia Woodlands TEC assessment as part of the 'Vegetation Condition, Floristic Community Mapping and Weed Mapping in the City of Cockburn' (2017) report (Figure 12 and 13).

BF 492 was further investigated to identify the vegetation condition, communities, weed cover and the representation of any TECs/PECs.

3.9 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are identified and protected under the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*. Under the Notice it is an offense to kill or destroy vegetation within an ESA. Mapping undertaken by Department of Water and Environmental Regulation (DWER) indicates that the Development Envelope and surrounding area is mapped as an ESA (Figure 11) (DER 2015a). The boundary of the ESA correlates to the Gibbs Road Swamp System and associated buffers according to the Directory of Important Wetlands (DoE 2008).

3.10 Heritage

3.10.1 Aboriginal Heritage

In Western Australia, the *Aboriginal Heritage Act 1972* protects places and objects customarily used by or traditional to the original inhabitants of Australia. A register of such places and objects is maintained under the Act, however all sites are protected under the Act whether they are registered or not. A search of the Department of Planning, Lands and Heritage's (DPLH) Aboriginal Heritage Inquiry System did not identify any 'Registered

Aboriginal Sites' or 'Other Heritage Places' within the site (DPLH 2019). The DPLH search identified registered sites within the vicinity of the Project area (Figure 11) (Table 17).

Table 17: Aboriginal Registered Sites within the Vicinity of the Development Envelope (DPLH 2018)

Site Name	Number	Type	Status	Distance (km)
Mather Reserve	3447	Mythological, Hunting Place	Registered	1.28
Thompsons Lake 01	15934	Former camp	Registered	1.36
Kraemer Reserve	21811	Mythological, camp, hunting place, meeting place, water source	Registered	2.32

3.10.2 European Heritage

A search of the Heritage Council of Western Australia database of culturally significant sites in Western Australia was undertaken for the Development Envelope. No State Heritage Places exist within or nearby the Development Envelope (SHO 2019).

3.11 Site History

3.11.1 Contaminated Sites

Under the *Contaminated Sites Act 2003*, contaminated sites must be reported to the DWER,

investigated and, if necessary, remediated. The DWER Contaminated Sites database identified a contaminated site across several Lots within Aubin Grove within 1 km of the Development Envelope. The contamination is described in Table 18 below and represented in Figure 14.

Table 18: Contaminated Sites within 1 km Radius of the Development Envelope (DWER 2018)

Site Number	Lot Number	Nature of Contamination	Status	Approximate Distance to Project Area
15634	Lot 8001 on Plan 53298 Aubin Grove containing 85 Parcels.	Microbiological indicators of possible pathogens (Thermo tolerant coliforms, Enterococci /Faecal Streptococci and <i>E.coli</i>) are present in groundwater across the Site.	Remediated for restricted use	800 m

3.11.2 Current Land Uses

There is a residential dwelling and gardens located within the centre of the Development Envelope. The remainder of the site is unused in private landownership.

3.11.3 Historical Land Uses

The Development Envelope has supported remnant vegetation with no visual signed and development up to 1995 (Figure 15 a to 15e). In 1995, there was an established residential dwelling and cleared tracks. In 2006, shed were noted near the residential dwelling (Figure 15f).

3.11.4 Surrounding Land Uses

Surrounding land uses include residential, rural residential and conservation areas.

Intensive animal production, rural residential, urban residential, conservation areas and irrigated perennial horticulture land uses exist to the south.

4 Stakeholder Engagement

4.1 Key Stakeholders

The following stakeholders have been identified as key stakeholders of the proposal:

- Commonwealth Department of Agriculture Water and Environment (DAWE)
- Environmental Protection Authority (EPA)
- Department of Water and Environmental Regulation (DWER)
- Department of Biodiversity, Conservation and Attractions (DBCA)
- Department of Planning, Lands and Heritage (DPLH)
- City of Cockburn.

4.2 Stakeholder Consultation

Since 2017, the proponent has been liaising with the DAWE regarding the proposal's referral under the EPBC Act. With the submission of the preliminary documentation in early 2020, the proponent has been in close consultation with DAWE and DBCA regarding the offset strategy and potential offset site located near Moore River Nature Reserve (National Park).

Extensive consultation has taken place with the City of Cockburn. The City agrees to take on the management of the proposed parks and recreation reserve. This represents a significant bonus as the City currently manages the adjoining Jandakot Reserve.

A meeting was held with the WAPC Chairman, David Caddy, to discuss the approach for the proposal to be referred to the EPA, either through Section 48 or Section 38 process. The WAPC Chairman advised a Section 38 process may be more suitable given the significant environmental features within the site.

A pre-referral meeting was held with EPA Services on 8 March 2019 at the DWER offices with the purpose to discuss the Section 38 referral associated with the proposal and identify next steps.

5 Key Environmental Factors and Impact Assessment

Based on the analysis of the proposal and site investigations, the proposal (Development Envelope) has the potential to impact on three environmental factors:

- Flora and Vegetation
- Fauna
- Inland Waters.

The potential impacts as well as mitigation and management measures for each factor are described in this section.

5.1 Key Environmental Factor – Flora and Vegetation

5.1.1 EPA Objective

To protect flora and vegetation so that biological diversity and ecological integrity is maintained (EPA 2016b)

5.1.2 EPA Policy and Guidance

- Statement of Environmental Principles, Factors and Objectives (EPA 2016a)
- Environmental Factor Guideline - Flora and Vegetation (EPA 2016b)
- Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016c).

5.1.3 Receiving Environment

- Eight Banksia dominated vegetation associations have been recorded within the Development Envelope
- The vegetation within the Development Envelope ranges from 'Completely Degraded' to 'Excellent-Very Good' condition (Figure 7). The vegetation condition percentage of the Development Envelope includes:
 - Excellent to Very Good: 12.13%
 - Very Good: 3.66%
 - Very Good to Good: 24.94%
 - Good: 37.17%
 - Degraded: 7.91%
 - Completely Degraded: 14.15%

- One State and Federal listed TEC is known to occur within the Development Envelope and within the adjacent Bush Forever Site 492: Banksia Woodlands of the Swan Coastal Plain ecological community. This TEC covers 8.27 ha within the Development Envelope and it is inferred the entire Bush Forever Site 492 is mostly Banksia Woodlands TEC (Figure 9)
- The Development Envelope contains FCT21a, 21c and 23a considered representative of the Banksia Woodlands TEC that covers an area of 8.27 ha
- No conservation significant flora species have been recorded within the Development Envelope.

5.1.4 Proposal Activities

- Creation of a formal conservation area (Parks and Recreation under the MRS)
- The proposed development of the Development Envelope (10.25 ha) will result in the clearing of up to 8.76 ha of remnant native vegetation between 'Excellent to Very Good' and 'Degraded' condition, including approximately 8.27 ha of the Banksia Woodlands TEC Development Envelope
- Incorporation of a wetland buffer within the Development Envelope to the adjacent CCW (UFI 12984) width of buffer to be confirmed by site specific buffer assessment at subsequent planning phases i.e. structure plan.

5.1.5 Potential Impacts

5.1.5.1 Direct Impacts

- Clearing of up to 8.76 ha of remnant vegetation of which includes 8.27 ha of Banksia Woodlands TEC (FCT21a, 21c and 23a)
- Clearing of vegetation ranging between Excellent to Very Good – Completely Degraded condition
- Clearing and fragmentation of environmental matters for urban developments within the Perth metropolitan area
- Ecological linkage fragmentation.

5.1.5.2 Indirect Impacts

- Formalisation of ecological linkage fragmentation between Bush Forever Site 492 and the retained Banksia Woodlands TEC and CCW
- Edge effects to the adjacent BF 492 from the proposed development – the potential edge effects from the proposed development are not likely to have a significant impact on the adjacent BF 492. The edge of the BF 492 abutting the

proposed development area may be subject to edge effects which may lead to a decline in the vegetation condition (Excellent-Very Good and Good condition) along the edge of BF 492 due to controlled access

- The impact of nearby development of BF 492 is not considered to have been significant and unlikely to impact the, majority of the Banksia Woodlands TEC. This is demonstrated by the condition mapping conducted by Eco Logical (2017) for the Jandakot Regional Park, which identifies the vegetation condition along the edges of a recent residential development in mostly 'Excellent' and 'Good' condition
- The vegetation within BF 492 has appeared to remain in a relatively high condition despite being surrounding by urban residential developments
- The presence of weeds within the adjacent BF 492 has the potential to increase as a result of the development within the Development Envelope. However, it is not likely there will be an introduction of weed species. Eco Logical's report has identified the majority of BF 492 contains <5% weed cover (Eco Logical 2017)
- Associated urban degradation and disturbances, including rubbish dumping, uncontrolled access and flower/seed harvesting
- Edge effects due to the proposed development caused by the interaction of native vegetation with surrounding urban land uses, leading to inhibition or promotion of certain species from establishing populations along edges and initiating a decline in vegetation condition
- Dust generation during construction smothering retained or nearby high value vegetation
- Dieback diseases
- Introduction and/or spread of invasive weed species
- Hydrological changes.

5.1.6 Mitigation and Management

5.1.6.1 Avoid

- The CCW will be avoided from direct impact
- The southern portion of the existing Urban Deferred zoning of Banksia Woodlands TEC in Excellent condition has been avoided (refer to Figure 7)
- Avoidance of riparian vegetation
- Hydrological changes to ensure the retained vegetation is not impacted, through hydrological assessment (D/LWMS).

5.1.6.2 Minimise

- Prior to ground disturbing works a Construction Environmental Management Plan (CEMP) will developed and implemented on site during construction and will include (but not limited to):
 - Clearing procedures i.e. Clearing in a slow and progressive manner across the site in a south east direction toward to conservation area. All clearing areas will be clearly designated
 - Black Cockatoo potential breeding tree hollow inspection
 - Phytophthora (Dieback) hygiene requirements and management
 - Weed control
 - Soil and dust management
 - Controlled access and fencing interface with conservation area
 - Contingency measures and responsibility
- Development and implementation of other management plans i.e. wetland buffer
- Subject to bushfire and drainage requirements, remnant vegetation may be retained within POS. However, a viability assessment against AS 4970-2009 Protection of trees on development sites will be undertaken to confirm the vigour of remnant trees to be retained.

5.1.6.3 Rehabilitate

Portions of the CCW within the proposed conservation area in Degraded condition will be revegetated.

5.1.6.4 Proposed Formal Conservation

The conservation area (22.95 ha) is proposed to be formally placed into conservation in perpetuity through an amendment to the MRS by placing the area into the Parks and Recreation Reserve (Figure 2). The extent of this reserve will include the CCW (UFI 12984), 5.86 ha of Black Cockatoo foraging habitat and 16 potential breeding trees. The Parks and Recreation reserve under the MRS allows the formal recognition and conservation of the important environmental values of the area. Under Part 9 Section 124 (2) of the *Planning and Development Act 2005*, once the MRS has been gazetted the City of Cockburn is required to amend the Town Planning Scheme No. 3 (TPS3) within 90 days to reflect the MRS Parks and Recreation reservation. The 22.95 ha will be ceded to the City and incorporated within the Jandakot Regional Park.

The Development Envelope has been designed to include a greater portion of the south-west corner of the site to be retained as an ecological corridor between the adjoining BF 492 and the CCW on site.

5.1.7 Assumptions and Key Knowledge Gaps

Approval and implementation of relevant management plans.

5.1.8 Assessment of Impacts

The residual impacts of the proposal include the reduction of Banksia Woodlands TEC on the Swan Coastal Plain by 8.27 ha.

5.2 Key Environmental Factor – Terrestrial Fauna

5.2.1 EPA Objective

To protect terrestrial fauna so that biological diversity and ecological integrity are maintained (EPA 2016d).

5.2.2 EPA Policy and Guidance

- Statement of Environmental Principles, Factors and Objectives (EPA 2016a)
- Environmental Factor Guideline – Terrestrial Fauna (EPA 2016d)
- Technical Guidance – Terrestrial Fauna Surveys (EPA 2016e)
- Technical Guidance – Sampling methods for terrestrial vertebrate fauna (EPA 2016f).

5.2.3 Receiving Environment

- No conservation significant fauna species were observed during the surveys
- The Development Envelope contains 8.27 ha of suitable Black Cockatoo foraging habitat and four potential breeding trees
 - Three *Eucalyptus marginata* (Jarrah) trees (of which one has an unsuitable hollow)
 - One *Eucalyptus todtiana* (no hollow)
- The Development Envelope is not currently used for Black Cockatoo breeding but is being used for foraging
- The likelihood of the Chuditch occurring within the Development Envelope is possible as it contains suitable habitat of Eucalypt woodlands
- Bush Forever 492 adjacent to the Development Envelope is likely to contain vegetation that is representative of Black Cockatoo habitat.

5.2.4 Potential Impacts

5.2.4.1 Direct Impacts

- Direct loss of 8.27 ha of Black Cockatoo foraging habitat and Four potential Black Cockatoo breeding trees
 - Three *Eucalyptus marginata* (Jarrah) trees (of which one has an unsuitable hollow)
 - One *Eucalyptus todtiana* (no hollow)

- Reduction in fauna habitat availability and increased habitat fragmentation within the Development Envelope and between the adjacent Bush Forever Site 492
- Potential animal deaths during the clearing process.

5.2.4.2 Indirect Impacts

- Habitat fragmentation and modification
- Increased abundance of introduced or feral species
- Inappropriate recreational use (unauthorised access)
- Animal deaths from clearing process and road strikes
- Edge effects from associated use of urban areas abutting retained significant vegetation and wetlands
- Loss or degradation of fauna habitat from dust emissions during construction
- Introduction of feral fauna species that can compete with and prey on native species associated with the adjacent wetland.

5.2.5 Mitigation and Management

5.2.5.1 Avoid

- The proposal avoids the severing the existing ecological corridor between the adjacent Bush Forever Site 492 and the conservation areas fauna habitat and CCW, this link will retain vegetation in mostly Excellent condition with a width of 131 m at the southern portion of the site to allow fauna movement to be maintained between bushland and the CCW
- The CCW and wetland fauna habitat will be avoided from direct clearing impacts and will be retained
- Prior to clearing activities Black Cockatoo breeding tree hollow inspection will be completed. While it is noted that the Jarrah tree contains a hollow which is currently not suitable for Black Cockatoo utilisation, should the hollow be utilised by Black Cockatoos the tree will not be cleared until the tree is no longer used.

5.2.5.2 Minimise

- Prior to ground disturbing works a CEMP will be developed and implemented on site during construction and will include (but not limited to):
 - Site induction program for all contractors through training on conservation significant fauna species
 - Clearing procedures i.e. Clearing in a slow and progressive manner across the site in a south east direction toward to conservation area. All clearing areas will be clearly designated

- Black Cockatoo potential breeding tree hollow inspection. Clearing outside of the breeding period for Black Cockatoos; where possible
 - Phytophthora (Dieback) hygiene requirements and management
 - Weed control
 - Soil and dust management i.e. Water carts will be used for dust suppression during earthworks and construction activities where required
 - Controlled access and fencing interface with conservation area
 - Contingency measures and responsibility
- A Fauna Management and Relocation Plan will be implemented (if applicable).
 - Subject to subdivision design, bushfire and drainage requirements, Black Cockatoo potential breeding trees may be retained within POS. and road reserves (where practical). However, a viability assessment against AS 4970-2009 Protection of trees on development sites will be undertaken to confirm the vigour of remnant trees to be retained. Consultation with the City of Cockburn will also be completed.
 - 5.86 ha of Black Cockatoo habitat and 14 potential breeding trees will be retained within the conservation area
 - 1.09 ha of Chuditch preferred habitat will be retained within the conservation areas
 - Prior to clearing works, pre-clearing fauna inspections will be conducted
 - Maintain the ecological corridor between the Development Envelopes' retained features and the adjacent Bush Forever Site 492
 - Provision of a suitable buffer distance from the CCW to reduce the potential for edge effects from the urban development and the retained wetland habitat
 - Access to the retained fauna habitats within the conservation area and adjacent Bush Forever Site 492 will be controlled via uniform (Conservation style) fencing
 - Hard edges, such as pathways and roads, will be implemented between the development and the CCW buffer and the retained fauna habitats to reduce edge effects.

5.2.5.3 Rehabilitate

- The buffer from the CCW will be revegetation in accordance with the relevant bushfire guidelines and the requirements of the City of Cockburn
- Portions of wetland fauna habitat (in Degraded condition) within the CCW will be revegetated (where required)
- Wetland planting within proposed drainage basins (in accordance with D/LWMS and Urban Water Management Plans).

5.2.6 Assumptions and Key Knowledge Gaps

- Fauna trapping and relocation prior to and during clearing works.

5.2.7 Assessment of Impacts

Residual impacts include the direct loss of 8.27 ha of Black Cockatoo foraging habitat. The proposed mitigation and management measures will retain habitat within the conservation area and the adjacent Bush Forever site 492 to reduce the potential direct impacts.

The proposal will allow for the retention of 5.86 ha Black Cockatoo foraging habitat within the conservation area. These retained habitats will be reserved as Parks and Recreation under the MRS and ceded to the Jandakot Regional Park for conservation in perpetuity. The proposed mitigation and management measures will ensure the risks associated with the proposal are reduced, and the EPA objective to maintain biological diversity and ecological integrity for Terrestrial Fauna can be met.

5.3 Key Environmental Factor – Inland Waters

5.3.1 EPA Objective

To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.

5.3.2 EPA Policy and Guidance

- Environmental Factor Guideline – Inland Waters (EPA 2016d).

5.3.3 Receiving Environment

- There are no mapped geomorphic wetlands within the Development Envelope. However, the generic 50m CCW buffer extends within the Development Envelope
- A CCW (UFI 12984) exists adjacent to the Development Envelope.
- A portion of the Development Envelope is potentially subject to inundation that generally follows the boundary of the CCW
- The Development Envelope and surrounding area are mapped as the Gibbs Road Swamp System wetland listed under the Directory of Nationally Important Wetlands
- The soil within the Development Envelope has high infiltration rates and is expected to have low surface run off
- The Development Envelope is partially within a Priority 2 PDWSA.

5.3.4 Potential Impacts

5.3.4.1 Direct Impacts

- The CCW is not expected to be directly impacted by the proposal.

5.3.4.2 Indirect Impacts

- Groundwater level changes from change in land use and clearing. Residential development has the potential to increase recharge of rainfall into groundwater through increased surface area of roofs, driveways, carparks and roads
- Increased runoff from hard urban surfaces into surrounding retained environment
- Alteration to the water regime of the Development Envelope can potentially influence the CCW through the following:
 - The removal of vegetation that can change the water balance through reduce interception and transpiration
 - Development of impervious urban surfaces that increases water interception but may increase groundwater recharge that is concentrated and directed to sumps and
 - Waterlogging originating from increases in the volume of surface water, rising groundwater and active groundwater recharge
- However, the above potential impacts will be addressed and managed via the D/LWMS and subsequent UWMP
- Habitat modification of the CCW from increased weed abundance from nearby urban residential developments that can smother native vegetation, inhibit light penetration, alter organic matter fluxes, interfere with water movement, alter evapotranspiration, alter water quality and increase fire risk
- Inappropriate recreational use to cause bank erosion, trampling of vegetation, pollution and disturbance of wildlife
- Edge effects
- The CCW is a potentially an important watering source for CBC
- Adjacent urbanisation (in an unmanaged environment) can have an impact on water quality entering the CCW.

5.3.5 Mitigation and Management

A Wetland and Buffer Management Plan will be completed at the appropriate planning phase for the integrated buffer and adjoining wetland. The buffer will be revegetated in accordance with the relevant bushfire guidelines and requirements of the City of Cockburn. This will include measures to retain and enhance wetland habitat within the CCW and provide a strategy for rehabilitation and revegetation of Degraded areas within the CCW and the associated buffer within the Development Envelope. The effectiveness of the wetland buffer as a management and mitigation measure is reliant upon the management plan and the works required prior to handover to the City. This includes maintenance and monitoring of the rehabilitation of the CCW and its buffer, including:

- Follow up maintenance immediately after planting
- Maintenance shall be undertaken no later than six months after planting and be continued for a minimum of two years following practical completion
- Monitoring will be undertaken every six months by suitably qualified/experience contractor for a period of two years post practical completion and will include:
 - Condition of plants
 - Survival rate of planted vegetation and individual species
 - Species diversity
 - Assessment of weed cover.
- Infill planting will be undertaken where mortalities of approximately 30 % are encountered
- Implementation of weed control measures as identified as being required.

Monitoring reports to be submitted to the City for review and completion criteria adopted.

5.3.5.1 Avoid

- The CCW has been avoided and is not included within the Development Envelope and will be retained.

5.3.5.2 Minimise

- A Wetland buffer of between 25 and 281 m (subject to site assessment in accordance with WAPC (2005) Guideline for the Determination of Wetland Buffer Requirements) will be implemented to provide a suitable buffering distance and protection to indirect impacts from the urban development to the retained CCW
- The Wetland Buffer will be revegetated in accordance with fire requirements and will include wetland (local provenance) species
- A District and Local Water Management Strategy (D/LWMS) has been prepared for the Development Envelope and includes measures to address impacts to inland waters:
 - At source retention of surface recharge where possible through soakwells, vegetated retention basins and swales
 - Retention of native trees within POS to reduce the demand for water during POS establishment
 - Management of irrigation in POS to reduce water use and loss
 - Bio retention areas will be provided onsite to ensure the low ARI rainfall events will be contained and maximise the useability of the POS areas

- Minimise irrigation and fertiliser via appropriate species selection
- Manage fertiliser application to minimise impacts of water quality
- Retain catchment runoff of up to the 1 in 100 Year ARI events within the development area
- Convey the 1 in 5 year ARI events within the pipe network
- Certain flows within individual lots with property soakwell sized for storage and infiltration of 1 in 20 year ARI rainfall events
- Maintain or improve nutrient concentrations in groundwater compared to pre-development
- Use of imported fill with a minimum PRI of 10 within POS and drainage areas
- Use of erosion control measures, such as surface treatments (mulch etc) to minimise soil erosion
- Vegetated bioretention areas to be sized at 2% of the connected impervious area (Ochre West 2017).

5.3.5.3 Rehabilitate

- Degraded portions of the CCW will be revegetated
- Bio-retention areas, swales and POS will be planted with native species, where required in accordance with UWMP specifications.

5.3.6 Assumptions and Key Knowledge Gaps

A Geotechnical Assessment will be required prior to the finalisation of the UWMP. The geotechnical investigation will confirm infiltration rates for proposed drainage basin locations and will include an investigation for ASS and contamination.

Assuming the geotechnical investigation will confirm expected infiltration rates for proposed drainage basin location and the investigation will not impact on the proposed stormwater management strategy (Ochre West 2017).

5.3.7 Assessment of Impacts

The pre-development hydrological regimes are expected to be maintained post development so that the environmental values of the Development Envelope, including groundwater and the CCW are protected and consistent with the EPA's objective for inland waters.

It is unlikely that there will be any significant changes to groundwater regimes and quality as a result of the proposed clearing and urban development of the Development Envelope. A D/LWMS has been prepared to support the next stages of planning including an MRS Amendment and Structure Planning. The D/LWMS has provided strategies to ensure the groundwater regimes will remain consistent with pre-development levels and water quality is maintained or improved.

6 Other Environmental Factors or Matters

No other environmental factors or matters were identified within the Development Envelope that were considered to be significant. Table 19 discusses the relevance or significance of the other environmental factors.

Table 19: Assessment of other Environmental Factors

Theme	Environmental Factor	Significance of Impact
Sea	Benthic Communities and Habitats	No benthic communities or habitats are located on or within the immediate vicinity of the Development Envelope.
	Coastal Processes	The Development Envelope is not located adjacent to or nearby coastal areas.
	Marine Environmental Quality	The Development Envelope is not located adjacent to or nearby marine areas.
	Marine Fauna	The Development Envelope is not located adjacent to or nearby marine areas.
Land	Landforms	There are no significant impacts to landform as a result of the proposed subdivision and development of the Development Envelope. The proposal will involve some earthworks (i.e. cut and fill) in accordance with engineering specifications, this will be confirmed in subsequent planning stages.
	Subterranean Fauna	There are no impacts to subterranean fauna as a result of the proposed subdivision and development of the Development Envelope.
	Terrestrial Environmental Quality	The impact of the proposal on the land and soil within in Development Envelope is not considered to be significant. The Development Envelope has no soil contamination and the clearing and construction of the site will occur in accordance with standard construction techniques and management practices as per the CEMP. The Development Envelope is within a 'Moderate to Low' risk of ASS occurring within 3 m of the natural soil surface.
Air	Air Quality	The proposal will result in minimal air quality (dust) emissions as a result of earthworks, however these will be appropriately managed through the implementation of a CEMP.
People	Social Surroundings	The proposal will not significantly impact on social surroundings of the Development Envelope. The Development Envelope is not currently used and is in private tenure that is surrounding by urban development and rural land uses. The Development Envelope has not been identified has having any current cultural, social significance.

Theme	Environmental Factor	Significance of Impact
		The generation of dust during construction activities is not likely to be significant or have a significant impact on neighbouring properties and will be managed through the implementation of a CEMP.
	Human Health	The proposed development will not have a significant impact on human health. The proposal will be for urban residential development and will be constructed in accordance with relevant standards, guidelines and best practice management for residential dwellings.

7 Environmental Principles of the EP Act

7.1.1 The Precautionary Principle

The proposed Development Envelope has been strategically designed to avoid significant damage of the environmental values adjacent to the Development Envelope and within the conservation area. The Proponent has designed the development to ensure high conservation values are retained within the conservation area and the linkage between the adjoining Bush Forever Site 492 and these retained features will be maintained and not severed by development. The Proponent has recognised that development of the existing 'Urban Deferred' zoning of the Development Envelope would not provide a good environmental outcome. As such, the design has been created to avoid significant impact to the values of the conservation area, allowing retention of high values and providing secure conservation tenure for these retained values.

Residual environmental impacts will be offset through the preservation and protection of 22.95 ha of land currently zoned 'Urban Deferred' and 'Rural- water protection' under the MRS to 'Parks and Recreation' (Figure 2). As part of the EPBC Act assessment process an offset strategy has also been developed for the implementation of the proposal.

7.1.2 The Principle of intergenerational equity

The Proposal allows for the conservation of a large portion of the conservation area to be secured in conservation in perpetuity, including the CCW and 5.86 ha of native vegetation that is representative of the Banksia Woodlands TEC and Black Cockatoo habitat. This immediately allows for the maintenance and enhancement of these significant environmental features for the future through long term management in a formal conservation reserve.

An offset strategy has been developed for the proposal which consists of a combination of ceding conservation area (adjacent to the Development Envelope) including the rehabilitation of degraded areas within the CCW (UFI12984) and through DBCA the acquisition of a potential offset site near Moore River Nature Reserve (National Park), which consists of Black Cockatoo foraging habitat, Banksia Woodland TEC and habitat for the Critically Endangered Western Swamp Tortoise.

7.1.3 The Principle of the conservation of biological diversity and ecological integrity

As part section 1.3, several ecological surveys have been recently completed to identify environmental attributes and condition within the Development Envelope. The proposal allows for the conservation in perpetuity of the retained significant environmental features of the conservation area including the entire CCW (Figure 6), 5.86 ha of Black Cockatoo habitat (Figure 10) and 2.22 ha of Banksia Woodlands TEC (Figure 9) within a conservation area (Figure 1) which connects to the Jandakot Regional Park. This will ensure the conservation values recognised for the conservation area not being developed are placed

into conservation for long term management to maintain biological diversity and ecological integrity. As the conservation area is currently in private tenure, development of the Development Envelope provides a mechanism for the securement of high conservation values to be formally protected.

7.1.4 The Principles relating to improved valuation, pricing and incentive mechanisms

The management of the environmental issues associated with the development of the Development Envelope will be considered in the pricing of the produced lots. The Proponent has allocated existing funds for the contribution to acquire a potential offset site as part of the offset strategy (EPBC Act process).

7.1.5 The Principles of waste minimisation

It is not expected that any significant waste or pollution will be generated from the proposed urban development of the Development Envelope. All clearing and construction wastes will be disposed of appropriately and in accordance with the CEMP. All site personnel will be inducted on the retained and nearby conservation areas and the importance of these to ensure dust, debris and waste materials are not introduced into high environmental features.

All reasonable and practicable measures will be taken to ensure the generation of waste during clearing and construction activities will be minimised, including surface water runoff control and environment construction management. A number of management plans will be completed to ensure this Principle is addressed.

8 Matters of National Environmental Significance and Offset Strategy

The *Matters of National Environmental Significance (MNES) Significant Impact Guidelines 1.1* outlined the following as MNES:

- World Heritage Properties
- National Heritage places
- Wetlands of international importance (Ramsar Wetlands)
- Nationally threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions
- Water resources in relation to coal seam gas development and large coal mining development (DoE 2013).

The Development Envelope contains the following MNES that are protected under the EPBC Act:

- Banksia Woodlands of the Swan Coastal Plain TEC (8.27 ha)
- Black Cockatoo foraging (8.27 ha) and potential four breeding trees (of which one tress contains an unsuitable hollow)
- The Development Envelope will involve the clearing of 8.27 ha of Banksia Woodlands TEC, 8.27 ha of Black Cockatoo foraging habitat and four potential breeding trees and deemed required for referral to the DEE
- The Proposal was referred to the DEE in 2017 and received a 'Controlled Action' for assessment by preliminary documentation (EPBC Ref: 2017/7923)
- Preliminary documentation was submitted to DAWE on 7 January 2020, with public comment period between 26 February 2020 to 24 March 2020. No public submissions or comments were received on the referral and preliminary documentation
- The DAWE's Offsets Calculator was used as a basis for assembling an Offsets Strategy to meet the Federal requirements for MNES. The results of the calculator determined that the provision of an offset of approximately 65 ha would meet the 106.50 % direct offset requirement for the CBC and 60 ha to meet 101.52% direct offset requirement of the Banksia Woodlands SCP TEC

- As part of the EPBC process, the Proponent and DBCA have been in close liaison regarding the offset strategy which includes the potential acquisition of a site that includes approximately 139 ha of Banksia Woodland (102 ha estimated to be in 'Excellent' condition), 9.2 ha of transitional seasonal wetlands, potential FCT 22,23a and 21c, and a known location for relocation of the Western Swamp Tortoise which is Critically Endangered under the EPBC Act.

9 Alternatives Considered

Alternatives to the Proposal were considered during the feasibility stage of the Project. The Development Envelopes' current zoning includes as a strip of 'Urban Deferred' along the length of the western Development Envelopes' boundary and the remainder of the Development Envelopes is 'Rural – Water Protection'. The Proponent investigated the potential of development within the existing 'Urban Deferred' zoned portion of the Development Envelopes.

Stakeholder engagement assisted in highlighting the potentially poor planning, development and environmental outcomes that could arise from the development of the strip of the existing 'Urban Deferred' land. The 'Urban Deferred' boundary is not consistent with the surrounding urban area and would pose a high bushfire risk from the adjoining Bush Forever Site 492 and the vegetation within the balance of the lot. In addition, the strip would sever the ecological corridor between Bush Forever Site 492 and the balance of the lot, thereby reducing the potential for fauna movement across the landscape within these high value patches of vegetation and habitat.

The Proponent has carefully considered the high value environmental features within the Development Envelope and the context of the wider area. The existing 'Urban Deferred' zoned strip of the conservation area contains very high value vegetation and habitat that is in Good, Good to Very Good, Very Good to Excellent and Excellent condition. The Proposal area defined in this document has been designed to avoid the clearance of vegetation in Excellent condition in the southwestern portion of the site and has included more degraded patches of vegetation in the northern portion of the site including Degraded condition. This approach avoids the clearing of Banksia Woodlands TEC and Black Cockatoo habitat in Excellent condition and the retention of this vegetation will ensure the ecological corridor between the Bush Forever Site 492 and the retained vegetation/CCW within the conservation area will be retained.

It is considered that development of the existing Urban Deferred zoning boundary would not provide a good planning or environmental outcome. As such, this Proposal is considered to adequately include measures to provide a net positive environmental outcome from the urban development of a portion of the site:

- Retention of vegetation in Excellent condition that is representative of the Banksia Woodlands TEC and Black Cockatoo habitat
- Maintain an ecological corridor between the adjacent Bush Forever Site 492 within the conservation area
- Full retention of the CCW and proposed buffer (to be confirmed through site specific assessment in accordance with WAPC (2005) Guideline for the Determination of Wetland Buffer Requirements)

- Handover the entire CCW and ecological corridor (conservation area) to the Jandakot Regional Park under a Parks and Recreation reservation for long term management and conservation in perpetuity
- Reduce bushfire risk.

10 Limitations

This report is produced strictly in accordance with the scope of services set out in the contract or otherwise agreed in accordance with the contract. 360 Environmental makes no representations or warranties in relation to the nature and quality of soil and water other than the visual observation and analytical data in this report.

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It is important to recognise that site conditions, including the extent and concentration of contaminants, can change with time. This is particularly relevant if this report, including the data, opinions, conclusions and recommendations it contains, are to be used a considerable time after it was prepared. In these circumstances, further investigation of the site may be necessary.

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11 References

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